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ABSTRACTS

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P001

Hernia Size & Operative Approach for Component Separation During Ventral Hernia Repair

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Introduction: Abdominal wall component separation includes techniques to facilitate durable repair of large (> 6–10 cm) or complex ventral hernias. Minimally invasive (MIS) approaches (e.g., laparoscopic or robotic) to component separation may lead to decreased morbidity. Despite increased utilization of component separation over time and the uptake of MIS approaches, it remains unclear how hernia size and operative approach influence a surgeon's choice to perform component separation at the time of hernia repair. Moreover, the lack of granular clinical data have prevented exploration into appropriate utilization of component separation by surgeons. Our study sought characterize hernia size and operative approach for patients undergoing abdominal wall component separation.
Methods: We performed a retrospective cohort study from January 1, 2020 to June 30, 2022 using data from the Michigan Surgical Quality Collaborative Hernia Registry (MSQC-HR), a state-wide, population-level registry that captures nuanced hernia and operation-specific details. We included patients undergoing anterior or posterior abdominal component separation (CPT code 15734) for ventral hernia. We specifically excluded patients only undergoing subcutaneous flaps or diastasis recti repairs. Descriptive statistics were used to evaluate the distribution of surgical approach (open vs. MIS) and hernia size (diameter or width in cm) for all patients in the sample. Mann–Whitney U tests were used to compare nonparametric variables.
Results: Of the 554 total component separations in our sample, 380 (69%) were performed open and 174 (31%) were done via MIS approach. Hernia size was available for 398 (72%) of patients. Median hernia size was not different between open and MIS cohorts (7.5 vs. 7.0 cm, p = 0.54). Notably, 168 (40%) of all component separations were performed for hernias < 6 cm in size, while 29 (7%) of component separations were for hernias measuring less than 2 cm. The rate of MIS repair was no different for smaller (< 6 cm) versus larger (6 + cm) hernias (35.0% vs. 34.4%, p = 0.91).
Conclusion: Rates of open and MIS component separation were similar for smaller versus larger hernias. A large proportion (over 40%) of component separations are being performed on hernias < 6 cm in size, raising the possibility of overutilization of this technique. Further exploration will explore long-term clinical outcomes for these patients.

P002

Inguino-scrotal Hernia of the Urinary Bladder

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Introduction: Inguino-scrotal hernia of the bladder is a rare condition that may present as scrotal swelling. It is easier to plan for the repair and avoid inadvertent injury to the bladder if preoperative diagnosis is made. In addition, unanticipated intraoperative discovery can pose a challenge to the surgeon
Case Presentation: We report a case of an 81-year-old male who presented to emergency department with incarcerated right inguinal hernia with small bowel contents. During his surgery, he was found to have the urinary bladder adhered to the hernia sac. The hernia sac and the urinary bladder were reduced without any complications. The patient underwent a Lichtenstein tension-free hernia repair.
Conclusion: Inguino scrotal hernia containing bowel contents is not uncommon; however, the presence of the urinary bladder is rare. It should be anticipated intraoperatively, particularly in patients with long-standing hernias. Management is surgical and Lichtenstein repair is a viable option with low rates of recurrence.

P003

Continuous intraabdominal pressure monitoring during laparoscopic inguinal herniorrhaphy: a prospective clinical trial

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Introduction: Elevated intraabdominal pressure (IAP) likely plays a significant role in the development of inguinal hernia (IH) recurrence. To avoid subjecting a new repair to increased IAP, surgeons frequently recommend avoidance of heavy lifting in the perioperative period yet ignore the potential impact of increased intraoperative IAP. To date, the extent and magnitude of intraoperative IAP peaks have been inadequately characterized. This is partly due to the labor-intensive nature and poor reproducibility of standard IAP data collection. Using innovative technology capable of continuous IAP monitoring, we aimed to characterize intraoperative IAP more precisely.
Methods and Procedures: We performed an IRB approved, prospective clinical trial observing patients undergoing elective laparoscopic IH repair. Intraoperative IAP was monitored using the Accuryn Monitoring System (AMS), which utilizes a novel bladder catheter system to dynamically measure IAP and urine output continuously in real time. Data were analyzed using JASP statistical software and subjected to a descriptive analysis. Data are presented as frequency (proportion) and median [range].
Results: Twenty-two patients were enrolled in the study (86% male, median BMI 23.8 kg/m^2, median age 57.5 years). The indications for surgery consisted of 15 (68%) bilateral IH and 7 (32%) unilateral IH, including 5 (23%) recurrent. All patients underwent laparoscopic repair (21 TEP, 1 TAPP) with a surgical duration of 73.0 [50.0–93.0] minutes and insufflation duration of 50.5 [17.0–71.0] minutes. Baseline IAP was 7.30 [1.95–11.6] mmHg. The peak IAP during extubation was 28.4 [3.14–52.6] mmHg (mean: 28.127 $\pm$ 13.3 mmHg), which was an increase from baseline IAP by 21.1 mmHg.
Conclusion: Using the AMS, we captured extensive, highly granular, IAP levels. This data was readily available in real time throughout the procedure and during extubation. Notably, the mean peri-extubation peak IAP exceeded that of even extreme strenuous activity as reported in the literature. By providing real-time IAP feedback, this system may help surgeons and anesthesiologists better manage intraoperative and peri-extubation IAP.

P004

"Sandwich" Approach to Complex Flank Hernia Repair: A Case Series of 8 patients

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Objective: Flank hernias are rare and challenging to repair given their unique anatomic locations. There are limited prospective studies describing repair techniques. Obtaining overlap of mesh during repair is difficult due to the lack of strong fascial layers laterally. Open repair of flank and lumbar hernias can have complication rates of up to 40% and recurrence rates of 0–15.9%. Laparoscopic repair improves complications and recurrence (0–37% and 0–2.9%, respectively) with variable outcomes.
Our case series describes a novel technique of open onlay combined with a robotic underlay mesh. The study provides a technical description of a two-layered mesh resulting in a "sandwich" and assess surgical outcomes for a new surgical approach for flank hernias.
Methods: Our study is a retrospective chart review for repair of complex flank hernias with open onlay and robotic underlay by a single surgeon from November 2017 to September 2022. IRB approval was obtained through Spectrum Health.
Results: The cohort contained eight patients that included six males (75%) and two females (25%) with a mean age at repair of 64 years old (R: 42–88) and mean BMI was 29.7 (R: 23.4–36.1, SD: 4.2). Seven hernias (87.5%) were the result of prior surgeries, three AAA repairs, three nephrectomies, and one spinal surgery. One hernia (12.5%) was the result of a motor vehicle collision. Five (62.5%) were reducible. Mean hernia defect width was 8.6 cm (R: 4–15, SD: 3.93). Mean hernia defect length was 5.9 cm (R: 3–10, SD: 2.1). Mean operative time was 248 min (R: 169–428, SD 87.0). Mean length of stay was 1.75 days (R: 0–5, SD: 1.83). Five (62.5%) patients were able to be discharged without narcotics. One (12.5%) patient developed a hematoma and one (12.5%) a seroma; both managed conservatively and without clinical sequela. One patient required readmission in the 30-day post-operative period for pain control. There have been zero hernia recurrences confirmed by CT scan at a mean follow-up of 20.75 months (R: 1–56, SD: 19.2).
Conclusion: This study outlines a novel approach to complex flank hernia repair with an open onlay and robotic underlay mesh placement for a "sandwich" technique. With minimal postoperative complications and no recurrences, the sandwich technique might be the better approach to a more durable flank hernia repair. Further prospective trials need to be performed to elucidate a gold standard technique.

P005

Initial experience with enhanced recovery after surgery (ERAS) and early discharge protocols after robotic extended totally extraperitoneal (eTEP) hernia surgery

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Introduction: This study evaluates safety, feasibility, and early outcomes of ERAS protocols and same-day discharges for robotic eTEP hernia repairs. With the advent of robotic eTEP surgery, large ventral hernias that previously required extensive open repair have now entered the domain of minimally invasive surgery. The growth of robotic surgery coincides with pressure to preserve patient outcomes while reducing surgical cost and hospital length of stay. We present our initial experience applying ERAS and same-day discharge protocols after robotic eTEP surgery for large ventral hernias.
Methods: A retrospective chart review was performed for all robotic eTEP hernia surgeries at our institution between November 2019 and December 2021. Analysis included patient demographics, hernia characteristics, intraoperative data, post-operative admissions, and complications at 30 post-operative days. ERAS protocol included judicious use of urinary catheters with removal at end of case, bilateral transversus abdominus plane (TAP) blocks, post-operative abdominal wall binder, and opioid-sparing perioperative analgesia. Patients were discharged same day from post-anesthesia care unit (PACU) if they lacked comorbidities requiring observation post-anesthesia and demonstrated stable vital signs, adequate pain control, ability to void, and ability to ambulate. Hospital length of stay (LOS)

was considered 0 for same-day PACU discharges or hospitalizations < 24 h.
Results: 59 patients were included in this initial cohort. Average age was 54 years, 41% were females, 66% had public insurance (Medicaid, Medicare, or both), and average BMI was 32. Average hernia defect size was 39 cm^2, with average mesh size of 460 cm^2; 11 (19%) patients required transversus abdominis release (TAR). 39 (68%) patients were discharged same day from PACU; 14 (24%) patients were discharged on post-operative day 1 but were admitted for greater than 24 h. The average hospital LOS was 0.46 days. Within 30 post-operative days, the aggregate (major and minor) complication rate was 8.5%. Observed minor complications (3) included one superficial surgical site infection, one port site wound dehiscence, and one hematoma. Major complications (1) consisted of one posterior sheath breakdown and bowel obstruction requiring reoperation.
Conclusion: Our initial experience with ERAS protocols and same-day discharges after robotic eTEP repair demonstrates this approach is safe and feasible with acceptable short-term patient outcomes. Compared to traditional open surgery for large ventral hernias, robotic eTEP may enable significant reductions in hospital LOS as adoption increases. As follow-up continues for this initial cohort, we aim to demonstrate longer-term hernia repair efficacy while further reducing post-operative LOS.

P006

Novel Single-Port Robotic Platform for Bilateral Inguinal Hernia Repair

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Purpose: Every year ~ 20 million inguinal hernia repairs are completed worldwide. The increased demand for less invasive techniques driven by better clinical and aesthetic outcomes has expanded interest in a single-port approach. The main technical issues with current single-port surgeries are the loss of instrument triangulation and the collision of instruments. A robotics platform with a novel approach to articulation and reach may obviate these issues.
Materials and Methods: A robotics platform has been developed that allows all instrument articulation to occur inside the abdomen by 2 flexible instrument arms inserted through a single incision that can be made transabdominally for male patients and transvaginally for female patients. The biomimetic instruments are designed to replicate the motions and capabilities of a surgeon's arms, with shoulder, elbow, and wrist joints. Both inguinal canals can be reached from a single-entry point, either transabdominally or in the preperitoneal space. This study measured the manipulability of this new robotic platform throughout its entire reachable workspace in the abdomen through either a transvaginal, umbilical, or pfannenstiel single-port insertion site by first generating a set of 200,000 configurations of the robotic arms and secondly calculating the manipulability index according to robotics literature.
Results: The results show that, due to the shoulder, elbow and wrist joints of the arms that perform all of their articulation after entry, the reachable workspace encompasses the entirety of the average male and female abdomen. Because the wrist joints have unlimited rotation and the shoulder and elbow joints allow the arms to function as they cross over each other, the manipulability index remains high (high usability) with all three single-port insertion sites within the abdominal cavity and particularly the deep inguinal ring, external oblique fascia, ilioinguinal nerve, spermatic cord and the pubic tubercle, allowing traction, countertraction, fine dissection, and triangulation in a large as well as a constrained workspace.
Conclusion: The design of this new robotic technology has the potential to realize the clinical benefits of a single-port approach while providing unprecedented triangulation and manipulability for either unilateral or bilateral inguinal hernia repair via a transabdominal or extraperitoneal approach. In addition, while traditional multiport robotics remains expensive and time consuming related to setup2, this new novel single-port robotic technology has the ability to drive costs to be more in line with traditional laparoscopic approaches.

P007

Laparoscopic versus Robotic Inguinal Hernia Repair: A Decade's Experience

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Objective: To compare outcomes and costs between laparoscopic and robotic inguinal hernia repairs (LIHR, RIHR)
Methods: Elective LIHR or RIHR from 2012 to 2022 were reviewed. Patients' demographics, operative details, postoperative outcomes, and financial burden (hospital, post-discharge, total costs) were compared using univariate statistical tests. Multiple linear regression analysis was performed to determine associations between preoperative variables and increased costs.
Results: 588 LIHR and 644 RIHR were included. Patient demographics did not differ except for the American Society of Anesthesiologists (ASA). Bilateral hernias rate was comparable ($p = 0.132$; RIHR: 34.2% vs. LIHR:28.9%). Rate of complex hernia (inguinal hernias previously repaired with posterior approach, history of open prostatectomy, incarcerated hernias, scrotal hernias) was higher in RIHR ($p < 0.001$; 29% vs. LIHR: 12%). Median operating time was ~ 20 min longer in RIHR ($p < 0.001$). Intraoperative complications rates were comparable ($p = 0.99$). Rates of peritoneal breach during preperitoneal dissection and of conversion were higher in LIHR than in RIHR. Length of hospital stay did not differ ($p = 0.097$). Clavien–Dindo Grade IIIB complication rate and mean Comprehensive Complication Index were higher in LIHR than RIHR (3.4% vs. 1.4% and 2.6 vs. 1.7, respectively, $p = 0.024$). Sixteen (3%) patients experienced a hernia recurrence in LIHR versus 4 (0.7%) in RIHR ($p = 0.003$). Mean hospital cost was significantly \$896 ($p < 0.001$) higher in RIHR. Mean post-discharge cost was \$155 ($p = 0.03$) lower in RIHR. Mean (95%-Confidence Interval) total cost was significantly higher ($p < 0.001$) in RIHR [5869(5607–6130) vs. 5128(4875–5381)]. The robotic approach, higher ASA scores, prior posterior IHR, previous prostatectomy, and bilateral inguinal hernia were independently associated with each cost component (table).
Conclusion: RIHR provided lower recurrence and complication rates in more complex hernias at a higher total cost. Hernia complexity, ASA class, choice of approach, and bilaterality may contribute to the higher financial burden of IHR.

	Hospital cost estimate	p-value	Post-discharge cost estimate	p-value	Total cost estimate	p-value
Robotic(vs. open)	600.2	0.0001	− 154.09	0.024	445.57	0.0126
ASA-2(vs.ASA-1)	170.40	0.47	108.61	0.2984	274.77	0.31
ASA-3	635.18	0.014	213.36	0.060	845.1	0.004
ASA-4	6485.61	< 0.0001	4668.38	< 0.0001	11,165.94	< 0.0001
Previous posterior Repair	1222.103	0.001			1319.25	0.0026
Previous prostatectomy	1263.51	0.01			1327.57	0.0183
Incarcerated hernia	2135.52	< 0.0001			2085.80	< 0.0001
Bilateral hernias	1045.36	< 0.0001			1080.80	< 0.0001

P009

A Single-Center Retrospective Review of Laparoscopic Totally Extraperitoneal (L-TEP) vs Robotic Transabdominal Preperitoneal (R-TAPP) Repair of Inguinal Hernia Repair

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Introduction: Laparoscopic inguinal hernia repair has been shown to have advantages over open repair, including improved quality of life, shorter hospital length of stay, reduced postoperative pain, and morbidity. One method for laparoscopic repair is the totally extraperitoneal repair (L-TEP), which has the advantage of not entering the peritoneal cavity but, however, has greater technical difficulty. With advancements and increased experience in robotic surgery, robotic transabdominal preperitoneal repair (R-TAPP) has become a commonly used approach for robotic inguinal hernia repair. Robotic surgery has demonstrated superiority over laparoscopy in many surgical settings; however, there is limited evidence comparing L-TEP and R-TAPP. Several studies have demonstrated equivocal early and late postoperative complications, although R-TAPP may have decreased peri-operative pain. With equivocal findings in early and late postoperative complications, the use of one method over the other is still debated.
Methods: We performed a retrospective review of all patients who underwent L-TEP and R-TAPP at Baylor University Medical Center between December 2011 and January 2022. The type of hernia repair represented a practice change over the course of the study with increased robotic use in recent years. Patient demographics, comorbidities, type of hernia repair, postoperative complications (hernia recurrence, pain, surgical site occurrence or infection) hospital length of stay, and postoperative complication requiring procedure (e.g., repair of hernia recurrence, drainage of abscess or seroma, hematoma evacuation) were collected. All the statistical analyses were conducted with R version 4.0.3 statistical software. All statistical tests were two-sided with a statistical significance level set at p values < 0.05.
Results: A total of 298 patients were analyzed. 245 patients underwent R-TAPP and 53 patients underwent L-TEP between December 2011 and January 2022. 303 patients underwent bilateral repair and 46 patients underwent concomitant ventral hernia repair. There were no significant differences in patient characteristics and comorbidities between the two groups. Significant differences were observed in complications for recurrence where L-TEP group had higher rates than R-TAPP group. Complications for pain were also higher in the L-TEP group as compared to R-TAPP group and approached borderline significance (p = 0.06).
Conclusion: Although there has been a transition from L-TEP to R-TAPP over recent years, there remains limited evidence supporting this change in practice. Our single-center retrospective review demonstrates that R-TAPP has significantly decreased postoperative pain and hernia recurrence.

P010

The Incidence and Approaches to Inguinal Hernia Repair in Patients with Ascites

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Introduction: Inguinal hernia repairs among patients with ascites are rare events. The limited available data from case series or single-center studies suggest a high risk of associated morbidity associated with this operation, but outcomes more broadly are unexplored at a population level. Within this context, we conducted a population-based study among patients with ascites undergoing inguinal hernia repair to characterize surgical approach and outcomes.
Methods: A retrospective analysis of adult patients with ascites undergoing inguinal hernia repair between January 1, 2020 and May 3, 2022. We used data from the Michigan Surgical Quality Collaborative (MSQC) which is a state-wide, payer-funded quality improvement program in Michigan aimed at improving patient care among patients undergoing surgery. Ascites was documented as the presence of fluid accumulation in the peritoneal cavity based upon physical examination, abdominal ultrasound, or abdominal CT/MRI within 30 days prior to or during the principal operation; ascites documented as minimal, trace, or small amount was excluded. The primary outcome in this study was surgical approach (minimally invasive vs open). Secondary outcomes included surgical priority (elective vs emergent/urgent) and 30-day adverse clinical outcomes (emergency department visit, readmission, re-operation, and surgical complications).
Results: Among 35,207 patients undergoing inguinal hernia repair in MSQC, there were 88 patients with documented ascites. Among these patients, the mean age (SD) was 64 ($\pm$ 12.13) years and 93% (N = 82) were male. The majority (n = 68, 77.3%) of patients underwent open surgical repair vs minimally invasive. Elective surgery was most common (71.6%, n = 63), while 28% underwent emergent/urgent repair (n = 25). Overall 30% (n = 27) of patients experienced at least one adverse outcome. Comparing minimally invasive to open approaches, minimally invasive approaches were associated with a lower rate of 30-day adverse clinical outcomes (16.7% vs 35.3%).
Conclusion: Inguinal hernia repairs in patients with ascites are extremely uncommon but highly morbid. Using this large series of patients we uncovered that there is not a uniform surgical approach and the overall risk of complications in this population was nearly 30 times the average for an inguinal hernia repair. Additionally, we found a relatively high proportion of patients undergoing minimally invasive repair which may represent a potentially dangerous practice. However, when patient selection is appropriate it appears minimally invasive approaches are safe and may decrease perioperative adverse outcomes. Future studies should examine the impact of minimally

invasive techniques on inguinal hernia recurrence and adverse outcomes within this population.

P011

First 100 Robotic ETEP's: initial experience and learning curve at a single institution

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Objective: The objective was to analyze the first 100 robot-assisted eTEP (extended totally extraperitoneal) hernia repairs at Mission Hospital. We sought to determine significant differences in operating room time and length of stay based on whether or not the surgeon was fellowship trained in the procedure and/or if a TAR (transversus abdominis release) was included.
Study Design: Retrospective case series
Setting: The setting was Mission Memorial Hospital within a group of general surgeons. All 3 surgeons included are fellowship trained in minimally invasive surgery. One learned the robot-assisted eTEP hernia repair technique during fellowship and two learned in practice.
Population Studied: The first 100 patients who underwent a robot-assisted eTEP at Mission Hospital were studied. There were 100 total subjects, of which 5 also underwent an additional procedure. These concomitant procedures were not included in the analysis to determine significant differences in outcomes, but were included in the total series.
Intervention/Instrument: The first 100 eTEPs completed at this hospital were analyzed. The main goal of data analysis was to compare outcomes in cases of fellowship-trained surgeons versus those trained in practice.
Outcome Measures: The primary outcome was operating at room time. The secondary outcome was hospital length of stay.
Results: Seventy seven percent of patients underwent eTEP alone, 11% underwent unilateral TAR with eTEP, and 12% underwent bilateral TAR with eTEP. Five cases underwent concomitant operations, including two robotic cholecystectomies, one inguinal hernia repair, and two parastomal hernia repairs (keyhole and Sugarbaker techniques). The overall average OR time was 3.3 h (2.3 for fellowship-trained versus 3.7 for not). Average hospital length of stay was 0 days with 71.6% of patients discharging on POD0. The wound complication rate was 3.8% and included one SSI, one hematoma, and two symptomatic seromas requiring drainage. There was one recurrence within one year, one conversion to an open procedure, and four readmissions (3.8%). Other complications included COPD exacerbation, pneumonia, and UTI. There was no significant difference between patient demographics, including BMI, ASA, age, estimated blood loss, or performance of TAR.
Conclusion: Mean OR time was significantly shorter for the fellowship-trained surgeon. This continued to be statistically significant when adjusted for BMI and whether or not a TAR was completed. Hospital stay was not significantly different between the two groups.
Limitations: The number of surgeons performing the procedure and the number of cases will continue to increase with time and could be analyzed at that time.

P012

Association of Mesh Fixation Method on Postoperative Pain in Abdominal Wall Hernia Repairs

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Introduction: The association of mesh fixation and pain following abdominal wall hernia repairs remains highly controversial. With such wide variety in surgical approach, a goal of mitigating postoperative pain is often used to justify intraoperative decisions. However, despite hernia repairs being extremely common, there is little evidence to indicate how various surgical techniques and intraoperative factors contribute to postoperative pain and opioid use. Therefore, the aim of this study was to evaluate the association of mesh fixation method with prolonged opioid use and return to normal daily function.
Methods: We used data from the Michigan Surgical Quality Collaborative—Core Optimization Hernia Registry, a payer-funded quality improvement program that captures nuanced perioperative and intraoperative elements from 70 hospitals across the state of Michigan. We performed a retrospective review of patients who underwent elective abdominal wall hernia repair from 2020 to 2022. The primary independent variable was mesh fixation method. The primary outcomes were opioid prescription at discharge and return to normal function and continued opioid use within 90 days of surgery. Descriptive statistics and univariate analyses were used to identify associations between mesh fixation method and the outcome variables of interest.
Results: Among the 6300 total elective abdominal hernia repairs in our cohort, the majority had suture for mesh fixation (82.2%), followed by tacks (10.3%) and adhesive (7.4%). There were no differences in mesh fixation method by patient sex, age, or comorbidities. Open hernia repairs were associated with higher use of suture (63%, adhesive: 25%, tacks: 13%), and laparoscopic repair used tacks most frequently (78%, suture: 5%, adhesive: 42%) (p-value < 0.001). There were significant differences in opioid prescriptions at discharge by mesh fixation type (95% adhesive, 90% with tacks, 82% suture, $p < 0.001$). Among patients who completed the follow-up survey within 90 days ($n = 447$), there were significant differences in the proportion of patients still taking their opioids (4.6% adhesive, 0% tacks, 3% suture, $p = 0.015$), but no differences in return to normal daily activities (65% adhesive, 54% tacks, 58% suture, $p = 0.763$).
Conclusion: Overall, there is wide variation in mesh fixation method by surgical approach. In the acute postoperative period, most patients received an opioid prescription. However, at 90-day follow-up, those with adhesive fixation were most likely to continue an opioid prescription. Further research is needed to elucidate how mesh characteristics and other intraoperative modifiable factors contribute to postoperative pain and recovery in hernia patients, as these may be areas of intervention to improve outcomes.

P013

Laparoscopic management for complicated urachal remnants in our hospital

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Introduction: The traditional surgical approach for removing an urachal remnant is via a large transverse or midline infraumbilical incision. In recent years, laparoscopic surgery (LS) has been performed by many surgeons and urologists to treat urachal remnants. In February 2020, we started LS for urachal remnants in our hospital. This study aimed to review our experience in LS for urachal remnants and report the efficacy and outcomes of this procedure.
Methods: Five cases of LS for urachal remnants performed from February 2020 to December 2021 were retrospectively reviewed.
Surgery: At our hospital, we performed a 3-port multiport method on the right side of the abdomen. Saline was injected into the bladder, the top of the bladder was confirmed, and the urachal remnant was removed together with the left and right medial umbilical folds. The bladder was not opened, and the umbilicus was preserved. No peritoneal suture was performed.
Results: Mean age was 29 years (23–35 years) and included 4 men. All patients underwent incisional drainage and administration of antibiotics before surgery. Average waiting time for surgery was 4.2 months (3–5 months). The average operation time was 99.8 min (91–117 min), and the amount of bleeding was small in all cases. The average postoperative hospital stay was 1.8 days (1–3 days), and no postoperative complications were observed. Postoperative pathological examination revealed an epithelium in one case and no malignant findings in any case.
Summary: Five cases of LS for urachal remnants performed at our hospital were reported. It was safely introduced without serious postoperative complications.

P014

Novel endo-laparoscopic surgical techniques to minimise morbidity (pain, seroma formation) and recurrence in large groin hernias.

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Introduction and Background: One of the most commonly performed surgeries in the world, groin hernia repair, has evolved dramatically from the days of primary suture repairs and the subsequent revolutionary "tension-free" anterior approach. In recent times, the endo-laparoscopic approach to the repair of groin hernias as proposed within the international guidelines has been extensively adopted worldwide owing to faster recovery times and lower risk of chronic pain.
However, the endo-laparoscopic approach to large groin hernias, with its inherent risks of seroma formation and recurrence, is still an evolving paradigm. In this talk, we propose our centre's tailored MIS approach for adult large groin (reducible and non-reducible inguinal, inguino-scrotal and femoral) hernia surgery using our published novel techniques: TEP/TAPP + (for large direct hernias) and mTEP (for large indirect hernias) in combination with NATURE (intraoperative analgesic control).
Methods: Stemming from the concept of combining TAP and TEP, in conjunction with modification of the novel eTEP procedure and use of local anaesthetic infiltration, are our following three novel techniques in use:
TEP/TAPP +: direct hernia defect closure with incorporation of transversalis fasciam TEP: division of arcuate line and posterior sheath beyond ASIS to incorporate larger mesh
NATURE (Nerves And Transversalis-fascia Using RopivacainE): infiltration of local anaesthesia at specific anatomical locations during endo-laparoscopic hernia surgery
Results: TEP/TAPP +: Compared to the group that did not undergo direct defect closure, the group that had closure of the direct defects demonstrated a statistically significant reduction in recurrence (4.4% versus 0.9%, $p = 0.036$) and seroma formation (12.6% versus 6.4%, $p = 0.045$). mTEP: 14 large inguinoscrotal hernia and 4 large femoral hernia were repaired using the modified-TEP technique in 15 patients. These patients reported minimal pain after surgery. There were no reported seroma, complications or recurrences up to 9-month follow-up period.
NATURE: The intervention group reported lower pain levels immediately after surgery (1.4 ± 1.7 versus 2.4 ± 1.9, $p < 0.01$) and at 4-h post-surgery (0.9 ± 1.1 versus 1.4 ± 1.2, $p = 0.02$). They also had lower levels of post-operative complications (4% versus 21.3%, $p = 0.03$).
Conclusion: Our tailored approach utilizing our novel endo-laparoscopic techniques (TEP +, mTEP, NATURE) minimizes morbidity (pain, seroma formation) and recurrence associated with repair of large groin hernias (inguinal, inguino-scrotal and femoral).

P015

Recurrent incisional hernia repair with biologic mesh complicated by delayed urinary leak

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Introduction: Biologic mesh has been used in clean-contaminated and contaminated fields and while wound infection rates may be high, infection is usually superficial and graft removal is unusual. Biologic mesh has been reported to have higher recurrence rates and poor incorporation into native tissue in comparison to synthetic mesh. Currently, there is no consensus on mesh preservation treatment in cases of mesh infection after hernia repair.
Methods: We present a 72-year-old male with prior radical cystectomy and neobladder creation complicated at the time by neobladder-cutaneous fistula and wound infection requiring revisional surgery and incisional hernia repair with mesh. He developed a large recurrent incisional hernia and underwent open hernia repair with bilateral anterior component separation, extensive lysis of adhesions, removal of prior mesh, and placement of a biologic mesh (Strattice^{TM} RTM) in an underlay and onlay fashion. Intraoperatively, the defect measured 20 cm long by 14 cm wide. Postoperatively, he was treated for neobladder infection and CT cystogram found no extravasation from the neobladder. He presented to the emergency department 6 weeks after surgery with spontaneous partial midline wound dehiscence, with exposure of the onlay mesh and drainage of clear fluid, which was confirmed to be urine by fluid creatinine level. Repeat CT scan demonstrated a filling defect at the anterior wall of the neobladder with contrast leaking into a contained collection interposed between the anterior abdominal wall and the underlay mesh, extending superiorly between the small bowel loops and dehiscence of the midline abdominal wound. The patient was treated with a course of antibiotics and indwelling Foley catheter and bilateral nephrostomy tubes for urine diversion.
Results: Three months later, repeat CT cystogram demonstrated resolution of the leak and the nephrostomy tubes and Foley catheter

were removed. The patient has continued daily wound care with significant reduction in size of the midline wound and increasing granulation tissue around the onlay mesh. He has not required further admissions to hospital and there has been no hernia recurrence so far.
Conclusion: In the appropriate setting, contaminated biologic mesh after surgery may be treated with medical management with adequate wound closure, avoiding the need for surgery and mesh explantation.

P016

Robotic Retromuscular Hernia Repair Optimizes Short-Term Outcomes in Higher-Risk Patients

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Background: Smoking, obesity, diabetes mellitus, and COPD are known risk factors for surgical site occurrences (SSO) following open ventral hernia repair. However, little evidence exists on whether these factors also significantly impact SSO after robotic hernia repair which has been shown to be associated with fewer wound complications. Our aim was to examine whether smoking, obesity, diabetes mellitus, and COPD increase postoperative SSO after robotic retromuscular hernia repair.
Methods: A retrospective review of a prospectively maintained database was conducted for extended totally extraperitoneal (eTEP) and transversus abdominis (TAR) ventral hernia repairs performed at three hospitals within our system from October 2019 to July 2022. Patient demographics, preoperative evaluation, operative details, 30-day follow-up, and patient-reported outcomes were recorded in the Abdominal Core Health Quality Collaborative (ACHQC) database. Patients were grouped according to exposure; smokers vs non-smokers, obesity (BMI > 40 vs < 40), and presence or absence of diabetes mellitus or COPD. The main outcome measure was SSO at one-month follow-up. Logistic regression models were used to determine the association between smoking, obesity, diabetes mellitus, and COPD with postoperative SSO.
Results: A total of 81 adult patients were included; mean age 55 ± 13 years and 41% were women. ASA scores were as follows: 1 (0%), 2 (30%), 3 (64%), and 4 (4%). The prevalence of risk factors was smoking, 17%; obesity, 16%; diabetes mellitus, 28%; and COPD, 6%. The overall SSO rate at 30-day follow-up was 12.2%. SSO rates for obese vs non-obese patients were 15.4% vs 11.5%, respectively ($p = 0.7$), and for smokers vs non-smokers were 11.1% vs 13.3% ($p = 0.5$). Logistic regression models showed that obesity (OR 0.75, 95% CI 0.13,4.31; $p = 0.7$), diabetes (OR 2.04,95% CI 0.36,11.7; $p = 0.4$), smoking (OR 2.55, 95% CI 0.27,23.9; $p = 0.4$), and COPD (OR 0.32, 95% CI 0.03,3.93; $p = 0.4$) were not predictive of postoperative SSO.
Conclusion: In our study, smoking, obesity, diabetes mellitus, and COPD did not predict 30-day follow-up wound complications after robotic retromuscular hernia repair. Given these findings, patients who are unable to optimize these risk factors may still be offered robotic retromuscular repair without increasing risk of postoperative SSO.

P018

Comparative analysis of abdominoplasty versus minimally invasive techniques in the surgical treatment of diastasis rectus abdominis in postpartum women: a systematic review

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Introduction: This systematic review aims to describe the surgical options available for treatment of diastasis recti in postpartum women, as well as compare current data on the effectiveness of these treatment options. Historically, diastasis recti has been repaired through open procedures, such as abdominoplasty. More recently, studies have explored other methods for the treatment of diastasis recti, including various minimally invasive surgical options.
Methods: This study is a systematic review. Twelve studies ranging from 2015 to 2022 were included in this analysis. Studies were identified using PubMed, EMBASE, and Cochrane Library. In each database, the following search terms were used to identify relevant studies: ("Diastasis recti" or "diastasis rectus abdominis") and ("abdominoplasty" or "open approach" or "minimally invasive" or "eTEP" or "laparoscopic" or "endoscopic"). Data from the studies that met the inclusion criteria were analyzed descriptively. Statistical comparison of surgical outcomes between studies was performed using Fisher's Exact Test in SPSS.
Results: The minimally invasive approaches identified for the repair of diastasis recti were categorized as laparoscopic pre-aponeurotic approaches, robotic approaches, and enhanced view/extended totally extraperitoneal (eTEP) approaches. These techniques were compared to two open approaches: abdominoplasty and mini-abdominoplasty. Analysis of surgical outcomes found no significant difference in the rate of seromas, surgical site infections/complications, or hematomas between abdominoplasty and minimally invasive surgical techniques ($p > 0.05$). Among the minimally invasive techniques, no significant difference in readmission rates were reported ($p > 0.05$). Additionally, no significant difference in diastasis recti recurrence rates were seen following minimally invasive or abdominoplasty repairs, except for the increased recurrence rates seen with the r-TARRD robotic technique ($p < 0.05$).
Conclusion: Although current data on minimally invasive approaches are limited, our comparison of abdominoplasty to minimally invasive techniques reveals that both open and minimally invasive approaches are viable options for diastasis recti repair in postpartum women. When deciding on the optimal approach for the repair of diastasis recti, it is important to tailor the surgical method to the patient's desired treatment outcome. If the patient indicates a desire for the removal of excess abdominal subcutaneous tissue, abdominoplasty may be a better surgical approach. Alternatively, if the patient puts a greater emphasis on shorter recovery time and smaller surgical incisions/scars, minimally invasive approaches may be a better surgical option. Our analysis suggests that patients with diastasis recti now have the option to choose from multiple effective surgical approaches for their diastasis recti repair.

P019

Randomised controlled study comparing tacker fixation and non-fixation of anatomical-shaped three-dimensional mesh in laparoscopic total extraperitoneal (TEP) inguinal hernia repair

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Background: While flat meshes have been used in totally extraperitoneal (TEP) repair for more than two decades, anatomically shaped three-dimensional meshes have advantage of being congruent to shape of myopectineal orifice and offer advantage of easy placement in preperitoneal space without any need of fixation. However, safety and efficacy of placement of these anatomical meshes without fixation have not been well-evaluated. The present study was designed to compare TEP using anatomical mesh with fixation using tacks and that without using fixation in terms of intra-operative parameters, post-operative pain and short-term complications.
Materials and Methods: Thirty adult patients meeting all inclusion criteria were randomised into two groups—GroupA—'Fixation' and Group B—"Nonfixation". Various intra-operative parameters were noted, including final diagnosis, operating time, mesh deployment time, size of mesh and complications like peritoneal tear and vascular/nerve/vas deferens injury. Post-operative pain was noted using VAS pain scoring system at 24 h, 72 h, 1 wk, 1 month and 3 months. Analgesics requirement (inj. Diclofenac 75 mg tds for 1 day and tab diclofenac 50 mg SOS), duration of hospital stay, time to return to work, complications and recurrence at 3 months were noted.
Results: Both tacker fixation group and non-tacker fixation group were comparable in terms of age, side and size of hernia. Mean operative time was 74.4 and 70.4 min (p 0.617), respectively, in tacker and non-tacker groups. There was no statistically significant difference between mesh deployment times in the two groups (180 versus 163 s p 0.171). There were no significant complications in either groups. There was no difference in the two groups in the VAS score at all time points except at 1 week (p.080 to 0.317). However, the analgesic requirement was significantly less in the non-fixation group (0.018). There was no statistically significant difference in duration of hospital stay (p 0.9) and return to work (p 0.669) between the two groups.
Conclusion: No difference in intra-operative parameters was found between laparoscopic totally extraperitoneal repair with tacker fixation and non-fixation using anatomical-shaped three-dimensional mesh. No difference was found in the immediate post-operative and short-term complications or recurrence rate between tacker fixation and non-fixation. Non-fixation of anatomically shaped three-dimensional mesh is as good as fixation in all respects with the added advantage of reduced post-operative pain, reduced analgesic usage and reduced cost (no cost of tacker).

P020

Outcomes of Multiple Approaches to Biosynthetic Mesh Incisional Hernia Repair after Kidney Transplant

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Background: Post-operative incisional hernias are a common occurrence in the transplant population. Hernia following kidney transplantation further complicates repair due to the location of the operative incision. The goal of this study was to compare recurrence rates between various operative approaches after biosynthetic mesh incisional hernia repair in patients after kidney transplant.
Methods: Using a prospectively maintained database, a retrospective review was performed for patients undergoing elective incisional hernia repair following kidney transplantation from January 2017 to June 2022. All patients were on a steroid-based immunosuppressive regimen at the time of hernia repair. A Gibson incision was performed at the index surgery for kidney transplantation. Hernia repairs were approached either open or robotic assisted via an intraperitoneal onlay mesh (IPOM) technique or a robotic transabdominal preperitoneal (RTAPP) mesh technique. Biosynthetic mesh was used in all cases. Patients who were actively smoking and hernia surgery in the setting of perforations were excluded.
Results: A total of 96 patients were included; 21 underwent an open approach, 18 had an IPOM, and 57 had an RTAPP. Average follow-up was 24 months (range 6–48 months). There were no significant differences in age, sex, BMI, co-morbidities (diabetes, smoking history), or hernia defect size ($p > 0.05$). The average time to incisional hernia repair following kidney transplant was 5 ± 2 months. The open approach took significantly longer than the other approaches (156 min vs. 131 min RTAPP, 109 min IPOM; $p < 0.001$). There were no significant differences in surgical site occurrences (infection, seroma, hematoma, wound dehiscence) or postoperative morbidity ($p > 0.05$). Recurrence rates were highest in the IPOM cohort at 12 months (6.7% vs. 0% open, 1.9% RTAPP) and at 24 months (13.8% vs. 5.95 open, 1.9% RTAPP).
Conclusion: Biosynthetic mesh incisional hernia repair following kidney transplantation has the lowest intermediate term recurrence rate with an RTAPP technique. Intraperitoneal onlay mesh is the least durable repair when compared to both the open approach and RTAPP. Longer follow-up is necessary to determine durability of repair by operative technique in the kidney transplant population.

P021

Establishment of a Minimally Invasive Abdominal Wall Reconstruction Program at a Community Hospital

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Study Objective: To illustrate how a minimally invasive abdominal wall reconstruction program was successfully established at a community style hospital.
Methods and Procedures: Twenty-four patients underwent abdominal wall reconstruction (AWR) between January 2017 and June 2022 by a single surgeon at our institution. Lifestyle information (smoking, diabetes, and obesity status) and procedure-related metrics (pre-operative botox use, hernia characteristics, and mesh type) were obtained. The ellipsoid formula (V = 4/3ABC) was used to calculate volume of the hernia sac (VIH) and abdominal cavity (VAC) (Fig. 1). Measurements at initial visit and time of surgery were compared and analyzed using a two-tailed T Test ($p < 0.05$ signified significance).
Results: Pre-operative counseling results are shown in Table 1. Procedure-related metrics are shown in Table 2.
Conclusion: Extensive counseling for modifiable risk factors such as weight loss, smoking cessation, and diabetes control was emphasized in our patient population. This significantly reduced the CeDAR risk scores in all categories. Chemical component separation with botox has become standard in our program. All patients underwent successful primary closure, even with loss of domain. This study

demonstrates the steps we have taken to optimize patients with complex ventral hernias and the benefits of a standardized protocol for minimally invasive abdominal wall reconstruction at our community hospital.

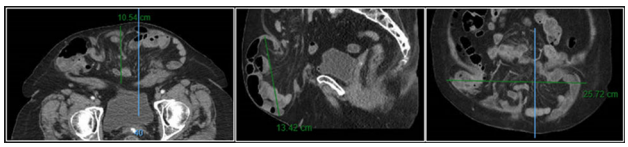
Table 1 Lifestyle Information

	First visit	Pre-op	%change	Significance
Active smokers	5	1	− 80.00%	
HbA1C	6.98	6.24	− 10.57%	$p < 0.05$
Excess body weight (kgs)	29.8	28.5	− 4.41%	$p = 0.23$
BMI (kg/m^2)	32.16	31.75	− 1.30%	$p = 0.27$
CeDAR SCORES:				
Risk of complications	35.29%	31.5%	− 10.74%	$p < 0.05$
In-Hospital charges	$7221.46	$6435.50	− 10.88%	$p < 0.05$
Follow-up charges	$17,193.58	$15,322.42	− 10.88%	$p < 0.05$

Table 2 Procedure metrics (averages)

Length of counseling	233 days
% Received Botox	11/24
% Stayed MIS	14/24
Defect Size	71.89 cm^2
VIH	483 cc
VAC	5766 cc
VIH/VAC	0.088

Fig. 1 Hernia sac measurements for calculating VIH (Left to right: axial, sagittal, coronal)



P022

Ventral hernia repair and intra-abdominal cancer

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Introduction: Many cancer survivors live with complex abdominal wall hernias. These have been shown to significantly impact their quality of life as they have major physical, social, and emotional repercussions. From a surgeon perspective, these can be challenging to manage due to potential for postoperative complications, such as wound complications caused by chemotherapy and/or radiation, hospital-acquired infections, and DVT/PE. Even though these risks are legitimate concerns, there are limited data evaluating the outcomes of ventral hernia repair in patients with a history of IAC. This study aimed to analyze outcomes in patients with history of cancer undergoing Ventral Hernia Repair (VHR). We hypothesized patients with a history of Intra-Abdominal Cancer (IAC) that would have increased length of stay, 30-day post-op outcomes, and a higher rate of hernia reoccurrence.
Methods: A retrospective review of our institution's database from January 2014 to February 2022 was used to identify patients undergoing ventral hernia repair with a history of IAC. These patients were compared to a control group of patients who underwent ventral hernia repair without a history IAC. Demographics, operative factors, and perioperative outcomes were collected for both groups. Risk-adjusted analysis was then used to measure the effect of IAC on length of stay, 30-day outcomes, and hernia reoccurrence.
Results: 428 hernia repair patients were identified (IAC: 76, No IAC: 352). When comparing baseline characteristics, patients with history of IAC had higher rates of hypertension (64.5% vs 46.2% $p < 0.01$), diabetes (32.9% vs 17.5% $p < 0.01$), and increased age (68.1 vs 55.7, $p < 0.01$). In regards to operative approach, the IAC group had a higher incidence of robotic hernia repairs (22.4% vs 8.6%, $p < 0.01$). When comparing surgical outcomes, there was no statistically significant difference in length of stay, hernia reoccurrence, 30-day SSI/SSO, and DVT/PE between the IAC and no IAC groups. A risk-adjusted analysis was also performed, showing patients with IAC had no significant increase in risk for longer length of stay, hernia reoccurrence, or 30-day SSI/SSO. In a matched cohort comparing the groups, there were no differences in hernia recurrence, LOS, SSI, SSO, and DVT/PE.
Conclusion: Patients with a history of IAC cancer do not have a significant increase risk for postoperative complications after VHR and can undergo VHR with good outcomes without significant risk for postoperative complications.

P024

Operative time and lengths of hospital stay for inguinal hernia repair among open, laparoscopic, and robotic-assisted approaches: a single-center experience

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Introduction: Although open inguinal hernia repair (IHR) has traditionally been the standard of care, laparoscopic and robotic-assisted laparoscopic approaches have become more commonplace. There is currently no consensus on the best surgical approach.
Methods: This is a retrospective review of elective IHR in adult patients performed by six general surgeons from January 1, 2019 to December 31, 2021. Patients undergoing simultaneous procedures were excluded. One-way analysis of variance (ANOVA) was used to compare the mean operative times (OT) and lengths of stay (LOS) for each approach.
Results: 184 patients with mean age of 58.8 (standard deviation SD ± 16.8), mean BMI of 26.9 (SD ± 4.3), and mean ASA of 2.15 (SD ± 0.68) were included. 89.7% were male, 20% (n = 37) of hernias were recurrent, and 43% (n = 80) patients had a history of abdominal surgery. There were zero intraoperative complications and a 4.3% postoperative recurrence rate (n = 8). 46.7% (n = 86) and 53.2% (n = 98) of patients underwent unilateral and bilateral repair,

respectively. In the unilateral IHR group, OT and LOS for each approach were not significantly different from each other ($p = 0.64$ and $p = 0.83$, respectively). In the bilateral IHR group, LOS were not significantly different either ($p = 0.08$). In the bilateral IHR group, the mean OT for open, laparoscopic, and robotic approaches were significantly different from each other at 94, 100.3, and 152.3 min, respectively ($p < 0.05$).

Conclusion: When compared to open or laparoscopic approaches, operative time in robotic approaches is the longest at our institution for bilateral IHR but not unilateral IHR. There was no significant difference in operative times for unilateral IHR performed by open, laparoscopic, or robotic techniques, which could be attributed to the more achievable learning curve with newer minimally invasive techniques. The operative time was significantly greater in the bilateral IHR robotic group, which may be due to the complexity of cases being selected for this technique. We believe that surgeons should be able to offer open, laparoscopic, and robotic techniques for IHR in order to choose the appropriate technique for each patient.

P025

Quantitative Sensory Testing for quantifying and correlating pain threshold in preoperative and post-operative period in patients undergoing laparoscopic inguinal hernia repair

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Background: The main aim of the study was to quantify the preoperative pain threshold in patients with groin hernia using quantitative sensory testing (QST) with thermal stimulus and to correlate it with post-operative pain outcomes following laparoscopic groin hernia surgery.

Materials and Methods: This prospective study was conducted from January 2020 to June 2021. Preoperative pain threshold was assessed using quantitative sensory testing (QST) using both hot and cold stimulus and also on visual analogue scale. Postoperatively, pain was assessed using VAS at 24 h, 1 week, 6 weeks, and 3 months. A repeat pain threshold measurement was done at the end of 3-month post-operative using QST.

Results: 20 patients with complicated groin hernia were included in the study and 20 normal individuals were taken as controls. Both the groups were comparable in terms of demographic profile. Pain threshold in preoperative period was significantly lower in patients with groin hernia on affected side as compared to controls ($p < 0.001$). On comparing, VAS with QST in the post-operative period, pain threshold on QST with hot and cold stimulus increases with decreasing pain score on VAS. Pain threshold increases on the hernia side as compared to the preoperative period which was also statistically significant ($p < 0.05$). This implies that patients having low thermal threshold in preoperative period have more pain in the post-operative period. However, there was a significant decrease in the pain threshold following surgery.

Both TAPP and TEP were comparable in terms of pain threshold and complications, like seroma. Patients developing seroma experienced more pain on VAS at 1-week post-surgery; however, the QST at 3 months was similar. Pain threshold did not have any statistically significant correlation between age, operative procedure, and type of hernia.

Conclusion: Patients having more pain in preoperative period have low thermal pain threshold. The pain threshold increases significantly in the post-operative period suggesting that hernia repair improves the pain threshold of the patient.

P027

Association of Mesh Fixation with Reoperation and Readmission Risk

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Introduction: Mesh fixation in laparoscopic inguinal hernia repair is used to reduce the risk of mesh displacement and subsequent recurrence, but, has also been associated with complications related to local trauma, such as nerve damage and chronic pain. The objective of our study was to investigate surgical outcomes related to mesh fixation. We hypothesize that fixation of mesh would not be associated with readmission or reoperation after laparoscopic inguinal hernia repair.

Methods and Procedures: A retrospective cohort study was performed at a single academic institution. All patients undergoing elective laparoscopic inguinal hernia repair (transabdominal preperitoneal and total extraperitoneal approaches) from 2013 to 2021 were included. The primary outcome was a composite variable of readmission and reoperation relating to the inguinal hernia repair within 6 months of surgery. Patient demographic characteristics were compared between groups with bivariate analysis using Pearson's chi-squared test. A logistic regression analysis of readmission/reoperation as the outcome was performed adjusting for fixation, surgery type, unilateral versus bilateral hernias, and recurrent hernia.

Results: Baseline demographics and co-morbidities of the study participants were comparable between groups (Fig. 1). Of 1674 inguinal repairs, 481 (29%) did not have any mesh fixation and 43 (2.57%) patients were either readmitted or re-operated on within 6 months for a complication related to their inguinal hernia operation. Of the readmissions/reoperations, 32 (2.68%) of those patients had hernia repairs performed with mesh fixation, while 11 (2.29%) had hernia repairs without. Logistic regression analysis did not demonstrate a significant increase in reoperation/readmission for patients with mesh fixation (OR 1.18, 95% CI 0.59–2.36) (Fig. 2).

Fig. 1 Patient demographic information

Variable	Fixation (n=1193)	No Fixation (n=481)	P-value
Age, mean (SD)	55.16 (14.73)	55.21 (14.95)	0.950
BMI, mean (SD)	26.94 (4.25)	26.90 (3.91)	0.862
Sex, male (%)	1097 (93.76)	432 (92.70)	0.435
Race, White (%)	1108 (93.27)	450 (93.07)	0.325
Surgery type, TAPP (%)	525 (44.01)	276 (57.38)	<0.0001
Laterality, bilateral (%)	435 (36.65)	180 (37.05)	0.744
Recurrent, no (%)	1073 (9.24)	434 (91.56)	0.835

Fig. 2 Multivariable logistic regression

		Reoperation/readmission within 6 months	Odds Ratio (95% CI), p-value
Mesh Fixation	Yes	32 (2.68%)	1.18 (0.59, 2.36), 0.644
	No	11 (2.29%)	
Surgery type	TAPP	29 (3.62%)	2.31 (1.21, 4.40), 0.011
	TEP	14 (1.60%)	
Laterality	Bilateral	19 (3.62%)	1.42 (0.79, 2.64), 0.261
	Unilateral	23 (1.60%)	
Recurrent	Yes	5 (3.50%)	1.40 (0.54, 3.62), 0.486
	No	38 (2.52%)	

Conclusion: These data suggest that mesh fixation during laparoscopic inguinal hernia repair is not associated with reoperation/readmission within 6 months. Without a clear benefit to mesh fixation, it may be an unnecessary step that increases both costs and risk of chronic pain. Further studies are needed to evaluate longer-term recurrence rates in this cohort.

P029

Saphena Varix: An Uncommon Condition Easily Mistaken for Reducible Hernia in the Evaluation of Groin Masses

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The high frequency of surgical referrals for hernia evaluation demands prudent review of differential diagnoses that mimic inguinal or femoral hernias. We report a case of a 41-year-old female referred by her gynecologist for evaluation of a groin swelling felt to be a lymph node. Symptoms appeared 2 months prior to presentation including constipation and radicular pain down the ipsilateral leg, but no obstructive symptoms. On examination, the patient had a soft, readily reducible bulge in the medial thigh below the inguinal ligament which reliably recurred upon standing with coexisting ipsilateral varicose veins in the calf. No recent imaging was available for review. The patient was taken to the operating room for planned combined laparoscopic-assisted vaginal hysterectomy and possible hernia repair. A small femoral hernia was identified and repaired via TAPP technique. At 2-week follow-up, the patient's symptoms and bulge had not abated. Further evaluation by a vein specialist diagnosed a Saphena Varix, an abnormal dilation of the Great Saphenous Vein (GSV) near the Sapheno-Femoral junction. Given the similar clinical presentations, even the experienced clinician may be challenged when differentiating a Saphena Varix from a reducible hernia. Venous insufficiency, presenting with concomitant venous varicosity, is often idiopathic and can result in the development of Saphena Varices via reflux into the GSV at its origin. Clinical suspicion for Saphena Varices should therefore be increased in the presence of varicose veins. We offer recommendations for efficient differentiation of these conditions in the outpatient clinical setting to prevent a missed diagnosis or unnecessary surgical risk.

P030

A novel approach for foramen of Winslow hernia repair

Alejandro F Sanz, MD[1]; Luke Brawer[2]; Natalie Telscher[3]; [1]OSF St Anthony's Health Center; [2]Georgia Tech; [3]Clemson University

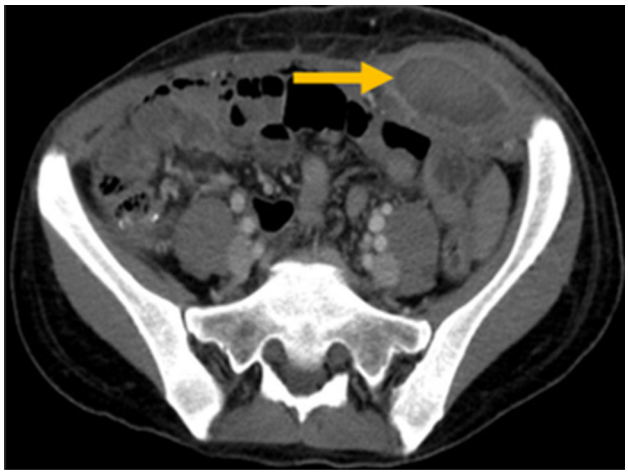
Introduction: Foramen of Winslow hernias are exceedingly rare. Prompt diagnosis and surgical management are important. Many different repairs have been described in the literature. Here, we present a novel laparoscopic approach to these difficult cases.
Methods and procedures: An 81-year-old Caucasian female was admitted to the emergency room with a complaint of 24-h epigastric pain, associated with nausea. She had history of a laparoscopic reduction of the foramen of Winslow internal hernia in our institution. CT scan of her abdomen showed a lesser sac internal hernia with an incarcerated colon and underwent a laparoscopic repair with a flap of falciform ligament and laparoscopic cecopexy. The surgery was successful.
Results: Foramen of Winslow hernias, a rare type of internal hernia. Internal hernias have an incidence rate of less than one percent, with Foramen of Winslow hernias accounting for only 8% of all internal hernias. The case at hand involves an 81-year-old Caucasian women who described a prior history of hypertension and a past laparoscopic reduction of the Foramen of Winslow internal hernia in the past. She had complaints of 24-h epigastric pain associated with nausea. She underwent a CT scan of her abdomen which revealed a lesser sac internal hernia with an incarcerated colon and was taken to the operating room where her Foramen of Winslow internal hernia was repaired laparoscopically using a flap of falciform ligament. The hernia contents included the ascending colon and ileum and were viable. A laparoscopic cecopexy and a flap of falciform ligament were done. The surgery was successful.
Conclusion: Foramen of Winslow internal hernias are exceedingly rare, as they account for approximately 8% of all internal hernias, which themselves have a precedence of less than 1%. Despite limited occurrence of Foramen of Winslow hernias, these hernias have mortality rates as high as 49%. Once diagnosed, several methods for repairing Foramen of Winslow hernias have been described. As surgical equipment and technology continue to improve, many surgeons have been switching from laparotomies to a laparoscopic approach. When the cecum shows signs of excessive movement, a cecopexy is often performed laparoscopically to limit such movement. In addition to cecopexy, a flap of falciform ligament was created in order to obliterate the space into the Foramen of Winslow. This novel approach has not been described in the literature. We strongly believe that it should be included as an option to treat these difficult hernias in the future.

P035

Abdominal wall injury from laparoscopic trocar insertion

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Introduction: Trocar insertion is an essential part of laparoscopic surgery. Vascular injury and gastrointestinal perforation are the most common access-related complications. Veress needles and placement of primary trocar are most commonly implicated in vascular injuries. Herewith, we present a case of an abdominal wall hematoma resulting from a 5-mm port insertion and review the literature.
Case Report: A 43-yer-old female presented with lower abdominal pain for 2 days associated with nausea and fever. She was diagnosed with acute appendicitis and was taken for laparoscopic appendectomy. Access to the abdomen was achieved using a Veress needle at the left upper quadrant. A supraumbilical midline incision was made and a 10-mm optical trocar was inserted into the abdomen. Subsequently, two 5-mm bladed trocars were inserted in the left lower quadrant and suprapubic region. The rest of the procedure was carried out in a routine fashion. Notably, the trocars were removed under direct visualization and with no apparent bleeding from the port sites. A few hours later, a 10 × 15-cm swelling was found over the lateral abdominal wall port site associated with skin ecchymosis. The swelling was asymptomatic and the patient was discharged the next day. She presented to the emergency room 10 days later with pain associated with swelling and fever. CT imaging confirmed an abscess collection associated with the hematoma which was percutaneously drained. The patient was discharged 3 days later after removal of the drain
Discussion: The reported rate of vascular injury is about 1 to 6 per 1000 laparoscopic surgeries. Abdominal wall vessels, most commonly the inferior epigastric artery, or intraabdominal mesenteric or larger vessels may be injured. Bleeding is rarely observed during surgery as the insufflated abdomen creates a tamponade effect over the vessel. A hematoma, as seen in our case, develops in the recovery room or up to 2–3 days postoperatively. Bladed cutting trocars are more likely to cause vascular injury than smooth trocars. Abdominal wall hematomas may be managed conservatively unless causing hemodynamic instability. Mortality associated with intraabdominal injury is about 15%. Knowledge of the abdominal wall anatomy, transilluminating the abdominal wall before introducing trocars, and entering the abdomen at the correct angle decrease the possibility of vascular injury.





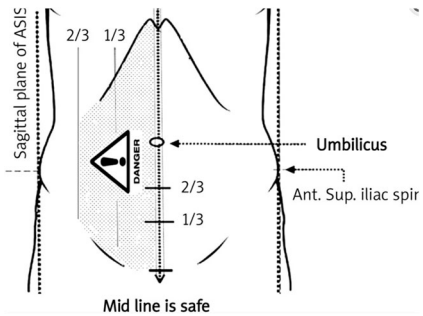


Figure Rule of 2/3rd. Medial 2/3rd of the abdominal wall is unsafe for trocar insertion except of avascular midline.

P036

Early experience of emergency laparoscopic repair of groin hernias within an emergency surgical unit (ESU)

Man Hon Tang; Isa Jusoff Albar Muhammed; Yuen Soon; Ng Teng Fong General Hospital

Background: The majority of emergency groin hernias are still repaired via the open approach, usually by a junior surgeon or resident in a teaching hospital. Laparoscopic repair still remains uncommon despite it being the standard approach for appendicectomies and cholecystectomies for typical emergency cases. The ESU presents a unique opportunity whereby a senior surgeon is involved with surgical emergencies early and is available to decide and operate on suitable cases for laparoscopic hernia repair. We reviewed our institution's outcomes for emergency laparoscopic repair of groin hernias. These cases typically are admitted via the emergency department and are managed by the ESU.
Methods: This is a retrospective analysis of patients admitted in the last 6 years (June 2016–June 2022) and had emergency laparoscopic repair of groin hernias during the same admission. Patients' demographic details, type of hernia, operative findings, time and type of hernia repair, post-operative course, and complications were extracted.
Results: A total of 35 patients with a mean age of 61 (range 23–94) years old underwent emergency laparoscopic repair of groin hernias. 4 cases were bilateral and 4 were recurrent groin hernias. All cases were reviewed within 12 h and performed by consultant surgeons with a mean operative time of 101.08 ± 46.89 min. 2 cases require bowel resection after hernia repair was performed laparoscopically and only 1 case was converted to open repair due to serosal tears during dissection. The remaining 20 and 14 cases were repaired via the transabdominal pre-peritoneal and total extra-peritoneal approach, respectively. There were 4 cases of obturator hernias that were repair successfully laparoscopically. The majority of patients (68.6%) tolerated diet by the next post-op date. The mean post-operative stay was 3.11 days. There were no mesh infection but 4 patients developed post-operative seroma that were treated conservatively. There were no recurrence at short-term follow-up.
Conclusion: Emergency laparoscopic repair of groin hernias is feasible with good outcomes. The benefits of laparoscopic repair includes the ability to assess bowel integrity even after hernia repair, to deal with recurrent, bilateral ,and even obturator hernias easily as well as faster post-operative recovery. An emergency surgical unit (ESU) allows for careful patient selection with experienced surgeons which are essential for success. Operative time is longer due to cases of bilateral hernias as well as the initial learning curve.

P038

Inguinal Hernia Prevention in Penile Prosthesis Implantation via Peno-scrotal Approach

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Introduction: The incidence of inguinal hernia following implantation of three-piece penile prostheses is under-reported. Migration of prosthesis reservoir is a known but rare complication, particularly in

patients with an undiagnosed inguinal hernia or those with known risk factors, such as obesity and chronic cough. Dissection of the space may also further weaken the posterior wall of the inguinal canal increasing the risk of future hernia development.
Material and Methods: Implantation of penile prosthesis is performed by urologists for management of refractory erectile dysfunction. A case series of three patients underwent the procedure and presented thereafter with direct inguinal hernias including the reservoir as part of the hernia sac. These were managed by intraoperative consultation with the general surgeon or through delayed consultation due to development of the hernia days to months following implantation.
Results: A peno-scrotal approach was used in the initial procedure where the reservoir is placed within the space of Retzius. All three patients presented with a weakness in the posterior wall compatible with a previously undiagnosed direct inguinal hernia through which the reservoir had migrated. Although laparoscopic repair is possible, dissection of the reservoir adjacent to the bladder for mesh placement may risk bladder injury and is therefore unadvisable. Repair was done using the standard open Lichtenstein technique with one important modification. Since the tubing from the reservoir descends from the space of Retzius through the posterior wall, past the mesh, and into the scrotum—a separate opening on the medial aspect of the mesh is performed in the same fashion as the slit created laterally to accommodate the spermatic cord. All patients were seen in the office for follow-up with no immediate complication.
Conclusion: All patients undergoing penile prosthesis implantation should be screened for inguinal hernia or generalized weakness either through dynamic abdominal wall ultrasound or referral to a general surgeon. Risk factors include chronic cough and high BMI. Once identified, a combined procedure can be performed by modifying the open Lichtenstein technique to accommodate the tubing traversing the inguinal canal and prevent future herniation through the weakened posterior wall.

P039

A case report of transverse colon Richter's hernia with a brief literature review

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A Richter's hernia can be defined as the protuberance of the bowel through an abdominal fascial defect, wherein only a part of the circumference of the bowel, usually the antimesenteric border, is entrapped and/or strangulated in the hernial orifice. Although the segment of the entrapped bowel is usually a portion of the ileum, any part of the intestinal tract from the stomach to the colon can be involved. This report discusses a case of a 65-year-old female with history of multiple cesarean sections, total abdominal hysterectomy and bilateral salpingo-oopherectomy, and open cholecystectomy, now presenting with a chief complaint of severe epigastric pain evolving for 24 h. Preoperative abdominal CT with contrast visualized a ventral abdominal hernia containing a portion of transverse colon without evidence of obstruction or angulation. Diagnostic laparoscopy confirmed an incarcerated Richter's ventral hernia with transverse colon which was repaired with intraperitoneal onlay mesh (IPOM). Richter's hernia is particularly common in frail, elderly women. With its non-specific clinical findings, it can be associated with a high rate of misdiagnosis and under-treatment. Abdominal CT are recommended along with timely surgical intervention to prevent mortality and worsening prognosis.

P040

Pantaloon Inguinal Hernia with Endometriosis

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Introduction: Pantaloon inguinal hernia (direct and indirect hernia) is a very rare variety in female patients but also uncommon to present with endometriosis mass in the inguinal canal.
The Case: A 41-year-old female patient complained of right inguinal pain and swelling 8 months ago. The pain was intermittent and sharp in intensity during the menstruation period. She had a past surgical history of partial hepatectomy and cesarean section 8 years ago. Inguinal examination showed a firm mass in the inguinal area with a positive cough impulse. An abdominal CT scan revealed an RT inguinal-herniated soft tissue structure seen protruded to subcutaneous tissue through the inguinal canal. She underwent an open inguinal hernia repair under general anesthesia. During surgery, we found a firm mass bulging through an external inguinal orifice to subcutaneous tissue surrounded by extensive adhesion. The inguinal canal opened and the finding was indirect inguinal hernia sac, omental content, attached firmly with the mass, and direct hernia. The mass was excised completely and Lichtenstein open "tension-free" mesh repair of inguinal hernias was done. The histopathology report demonstrated an endometriosis mass. Patient discharged in well-general condition to be followed up in the outpatient clinic.
Conclusion: Endometriosis with pantaloon hernia is a rare case presentation. Inguinal hernia with mass in a female patient and endometriosis is one of the important differential diagnoses.

P041

Effects of Mesh Weight on Lateral Abdominal Wall Hernia Repair: An Abdominal Core Health Quality Collaborative (ACHQC) Analysis

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Introduction: Lateral abdominal wall hernias (European Hernia Society classification L1–L4) are challenging to repair due to anatomic location and limited data to drive operative decisions. There are no guidelines for mesh selection in these patients; this currently is left to surgeon preference. Heavyweight mesh provides increased tensile strength but is associated with greater foreign body reaction and mesh sensation. We evaluated the effect of mesh weight on 30-day postoperative outcomes following lateral hernia repair.
Methods: Patients who underwent a lateral hernia repair with 30-day follow-up were identified in the Abdominal Core Health Quality Collaborative (ACHQC) database. The mesh used was categorized as heavy or non-heavyweight; heavyweight was defined as density > 75 g/m^2, and non-heavyweight was ≤ 75 g/m^2. Outcomes were compared between the two groups using multiple logistic regression with adjusted odds ratios (OR).
Results: The ACHQC identified 4130 lateral hernia repairs: 1357 with heavyweight mesh and 2773 with non-heavyweight mesh. Patients with a history of smoking, hypertension, and larger hernia dimensions were significantly more likely to have heavyweight mesh. Heavyweight mesh patients were less likely to develop a surgical site occurrence (SSO) (OR 0.79; 95% CI 0.64–0.96; $p = 0.02$) or be readmitted (OR 0.73; 95% CI 0.56–0.97; $p = 0.02$) compared to those with non-heavyweight mesh. The difference in SSO was attributed to

a higher rate of seroma in the non-heavyweight mesh group (5.99% vs. 3.91%; p = 0.005). Mesh weight was not significant in predicting the other outcomes of hernia recurrence, chronic pain, surgical site infection (SSI), surgical site occurrence requiring procedural intervention (SSOPI), and reoperation (Table).

Conclusion: Heavyweight mesh use in lateral abdominal wall hernia repair is associated with decreased rates of SSO and readmission. Mesh weight did not have a significant effect on other postoperative outcomes, including chronic pain and hernia recurrence. Future prospective and randomized controlled studies are necessary to confirm our findings.

Table Postoperative outcomes of heavyweight mesh patients compared to non-heavyweight (reference)

	Odds ratio (95% CI)	p-value
Chronic pain	1.24(0.48–3.23)	0.66
Recurrence	0.55(0.11–2.71)	0.46
SSI	0.90(0.66–1.22)	0.48
SSO	0.79(0.64–0.97)	0.02*
SSOPI	0.80(0.61–1.06)	0.11
Readmission	0.73(0.56–0.96)	0.02*
Reoperation	0.91(0.60–1.39)	0.67

*$p < 0.05$

P042

Laugier's Hernia Case Report

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A 63-year-old male with past surgical history including laparoscopic left inguinal repair with mesh and past medical history of Barrett's esophagus, Gilbert's syndrome, and gout presents to the emergency department with RLQ pain and nausea/vomiting. The patient is a construction worker and two weeks prior was lifting concrete blocks when he felt "something pop." On exam, he had an indurated mass in the right groin that was tender and non-reducible. CT of the abdomen and pelvis without contrast was performed. Findings were suggestive of a right femoral hernia causing a small bowel obstruction.

During the surgery, the peritoneum was entered superior to the hernia sac. A Hasan trocar and camera were inserted into the abdomen, and two 5-mm ports were placed in the lower left quadrant. Dissection was carried down in the extraperitoneal plane to the hernia defect. The defect was observed passing through the lacunar ligament (Laugier's hernia) and close to the pubic bone. The bowel was then reduced in a manner similar to a femoral hernia. The bowel was examined, and where it appeared hyperemic but with peristalsis and no necrosis present. A polypropylene mesh plug was inserted into the hernia defect and tacked to the nearby pubic bone. The peritoneal flap was sutured back to the anterior abdominal wall using a 3.0 Polysorb suture. The patient tolerated the surgery well and was discharged the following day.

Two days later, the patient returned to the emergency room with abdominal pain and nonbilious emesis with food intake. The patient had leukocytosis at 12.6. CT of the abdomen and pelvis without contrast was taken and revealed repair of hernia without recurrence and some minor fluid-filled small bowel suggestive of an ileus. Within two days, the patient was discharged with stable vital signs and tolerance to advances in the diet.

P043

Developing a patient-reported outcome measure to assess recovery after abdominal surgery: item analysis using Rasch measurement theory

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Introduction: In keeping with the principles of patient-centered care, patients' voices must be included in the measurement of recovery after abdominal surgery using patient-reported outcome measures (PROMs). However, the PROMs currently used to measure recovery after abdominal surgery were not developed according to optimal scientific standards and have limited evidence supporting their measurement properties. To address this research gap, we initiated a research program to develop a conceptually relevant and psychometrically sound PROM to measure recovery after abdominal surgery; the Recovery After Abdominal Surgery (RAAS) score. Preliminary qualitative work led to the development of a conceptual framework of recovery and the creation of relevant measurement items. The aim of the present study is to further refine the item pool using Rasch analysis and assess the measurement properties of the RAAS score.

Methods and Procedures: In this prospective cohort study, 100 adult patients undergoing abdominal surgery were recruited to complete the preliminary RAAS 59-item pool (via an online questionnaire) preoperatively and at postoperative days (PODs) 1, 7, 30, and 90. Item responses will be assessed using Rasch analysis (via RUMM2030 software), a statistical method that uses various diagnostic information (i.e., error estimates and fit statistics) to select the best items and create an accurate scoring algorithm for the final questionnaire. In the subsequent stage of our program, the calibrated RAAS questionnaire will be administered to a new cohort of 200 abdominal surgery patients for further assessment of measurement properties (i.e., construct validity, reliability, and responsiveness) according to COSMIN (Consensus-based Standards for the selection of health Measurement Instruments). The next phases of this research program include the development of computer adaptive testing for RAAS (to reduce response burden) and user-friendly electronic platforms (mobile app and web portal) for data collection.

Results: Between October 2021 and September 2022, 192 patients undergoing abdominal surgery at three university-affiliated hospitals were screened for eligibility, 151 met inclusion criteria, and 100 consented to participation (mean age 57 ± 14.7, 49% female, 59% laparoscopic surgery, 66% major/ major extended procedure). Response rates were 97% preoperatively, 93% on POD1, 91% POD7, 91% POD30, and 87% POD90. Rasch analysis of responses to the RAAS 59-item pool is currently underway.

Conclusion: As surgery enters the era of patient-centered care, PROMs have become an essential part of measuring postoperative recovery. The RAAS score will help incorporate patients' perspectives and experiences into research and quality improvement initiatives in abdominal surgery.

P044

Impact of obesity on 30-day and 1-year outcomes after eTEP ventral hernia repair

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Background: Obesity with BMI > 35 kg/m^2 has been described as an independent risk factor for increased morbidity after ventral hernia repair (VHR), especially after an open approach. Robotic enhanced view totally extraperitoneal (eTEP) hernia repair is a novel approach that is pushing the boundaries of hernia surgery. We aim to evaluate the safety and efficacy in adapting this new technique during the perioperative time frame in high-risk patients (BMI > 35 kg/m^2).
Methods: A retrospective analysis of patients undergoing incisional hernia repair using the robotic eTEP technique was performed over a two-year period. Patient demographics and comorbidities, perioperative variables, 30-day, and 1 year outcomes were stratified according to BMI < 35 kg/m^2 (acceptable risk) and BMI ≥ 35 kg/m^2 (high risk). Statistical analysis for both cohorts was performed employing student's t test for nominal variables and chi-squared analysis for categorical variables.
Results: 97 eTEP procedures were performed from April 2018 to 2020. 60 patients were in the acceptable risk cohort (mean 28.8 kg/m^2) and 37 patients were high risk (mean 41.0 kg/m^2). There was no difference in age (55.0 acceptable vs. 53.9 high, p = 0.67), gender distribution (41.7% male acceptable vs. 32.4% male high, p = 0.36), diabetic status (15% acceptable vs. 29.7% high, p = 0.08), or smoking status (16.7% acceptable vs. 10.8% high, p = 0.43) between the two cohorts. Operative times (average 143 min acceptable vs. Average 174 min high, p = 0.28) and conversion rates (1.7% acceptable vs. 5.4% high, p = 0.30) were also not statistically significant. Hospital length of stay was equivocal (average 1.4 days acceptable vs. 1.3 days high, p = 0.83). There were no differences in 30-day outcomes, including surgical site infection, seroma, hematoma, ileus, small bowel obstruction, any complication, emergency room visits, hospital readmissions, or reoperation. Average hernia size was significantly larger in the higher-risk group (average 8.8 cm^2 acceptable vs. 15.9 cm^2 high, p < 0.005). There was a higher rate of recurrence in the high-risk group. Number of recurrent ventral hernias at one year postoperatively was equivocal (8.3% acceptable vs. 8.1% days high, p = 0.97).
Conclusion: The robotic eTEP approach is safe in high-risk patients with elevated BMI (≥ 35 kg/m^2) and recurrence rates of ventral hernia were similar at one year postoperatively. The relationship between obesity and post-operative complications needs to be re-examined for the eTEP approach as the threshold for safe and durable outcomes exceeds the previous BMI ≥ 35 kg/m^2 threshold.

P045

Robotic Ventral Hernia Repair in the Community Setting: 4-Year Follow-Up

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Background: Ventral hernia repair is one of the most common surgeries performed by general surgeons. Recently, minimally invasive techniques involving robotic ventral hernia repairs have become increasingly more popular among surgeons and patients. Though there are a significant number of studies demonstrating equivalent or improved outcomes in the short term, there are a limited number of studies looking at the long-term recurrence rates with robotic ventral hernia repairs. In this study, we aim to look at the recurrence rates of robotic ventral hernia repairs from 2014 to 2018, with a minimum of a 4-year follow-up.
Methods: We performed a retrospective study of patients who underwent a robotic ventral hernia repair in the UPMC Central Pennsylvania system between 2014 and 2018. Patient demographics, co-morbid conditions, and post-operative complications were tracked. Utilizing electronic medical record and office documentation, hernia recurrences were identified.
Results: 121 patients had robotic ventral hernia repairs during this time period. Mean age was 59.5 years, mean BMI was 34.6, 49 (40.5%) were male, and 61 (59.5%) were female. The most common type of mesh used was Ventrio ST (34, 38%) and the most common type of procedure performed was IPOM (103, 95%). 41 (34%) of patients had a hernia recurrence within our follow-up period. COPD (5, p = 0.0436) and post-operative seroma (9, p = 0.022) were the only factors found to be significantly associated with recurrence.
Discussion: The hernia recurrence rate with a minimum of a 4-year follow-up was 34%. Looking at the data more closely shows a substantial learning curve. The recurrence rate over the first three years is 51%. The recurrence rate for the remainder of the repairs was 20%. This is suggesting that the surgeons' technique and results improved with time. The patient factors associated with recurrence that demonstrated statistical significance were COPD and post-operative seroma. Further follow-up is necessary to demonstrate the longevity and durability of a robotic ventral hernia repair.

P046

Is robotic repair a possible solution to improving wound complications in morbidly obese hernia patients?

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Introduction: Large, complex ventral hernias are frequently repaired via transversus abdominis release (TAR). Although first described as an open procedure, robotic TAR has become more prevalent with advances in minimally invasive surgical techniques. Obesity, particularly a BMI ≥ 40, is one of the strongest predictors of wound morbidity following open TAR. In this study, we aimed to determine if the robotic approach minimized wound morbidity in those with a BMI ≥ 40.
Methods: A retrospective chart review of all patients with a BMI ≥ 40 who underwent an open or robotic TAR at a tertiary academic medical center from January 2018 to December 2021 was completed. Demographics, medical history, operative details, and post-operative outcomes were collected and analyzed.
Results: In total, 42 patients with a BMI ≥ 40 underwent a TAR. Twenty-seven (64%) patients had open repair and 15 (36%) had robotic repair. BMI at time of surgery was similar between open and robotic groups (41.6 vs 42.1, p = 0.55). There was no significant difference in operative time between open and robotic approaches (297.2 vs 305.4 min, p = 0.71), although those patients who underwent an open repair had a larger hernia defect size (395 cm^2 vs 141 cm^2, p = 0.003). Those who underwent a robotic TAR had a significantly shorter hospital length of stay (1.8 vs 5.0 days, p = 0.0005), lower rate of surgical site occurrences (13.3% vs 48.1%, p = 0.02), and lower rate of surgical site infections (0.0% vs 25.9%, p = 0.03).
Conclusion: Although a BMI of 40 has been traditionally used as relative contraindication to elective repair of ventral hernias, primarily due to concern for wound morbidity, this may not be indicated if a robotic approach can be utilized. Patients with BMI ≥ 40 repaired robotically had faster recovery times and significantly fewer wound complications compared to their open counterparts. While not all

patients are candidates for both repairs, if feasible, a robotic TAR offers a safe alternative to open repair with less wound morbidity. Further work on long-term outcomes, including recurrence rates, in these patients is needed.

P047

Change in intra-abdominal pressure following endoscopic component separation with laparoscopic mesh reconstruction for large midline incisional hernias

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Introduction: The repair of midline incisional hernia is a very challenging surgery associated with a number of complications one of the dangerous being intra-abdominal hypertension/abdominal compartment syndrome. The outcome has significantly improved with endoscopic component separation technique (ECST) and intra-peritoneal onlay mesh repair (IPOM +) surgery. We aimed to evaluate the change in Intra–abdominal Pressure (IAP) after ECST with IPOM plus for large (6 cm) midline incisional hernia.
Objective: To assess the change in IAP immediately and 24 h after ECST with IPOM plus in patients with large ventral midline incisional hernia.
Methods: The change in IAP was measured by intra-vesical pressure (IVP) measurement in the peri-operative period at 4 different point of times and by monitoring change in peak airway pressure intraoperatively.
Results: Through prospective observational study carried out in 30 patients who were diagnosed with large midline incisional hernias, IVP measured had a pre-op Mean ± SD 9.43 ± 0.988 which increased to post-op IVP Mean ± SD 9.93 ± 1.02, with p value of 0.122 found to have a statistically insignificant increase. Intraoperatively another method used to measure IAP was Paw (peak airway pressure) measured just after induction and before the start of surgery had a Mean ± SD of 19.6 ± 1.22 vs immediately after surgery and before giving reversal had a Mean ± SD 19.53 ± 1.10 with p value of 0.753 whi,ch suggests a statistically insignificant result.
Conclusion: We observed insignificant change in the IVP and Paw, validating ECST with IPOM plus, a reliable method for tension-free closure of large midline incisional hernia.

P048

Su2ura Approximation Device—Case Study

Gil Ohana, MD[1]; Yoni Epstein, CEO[2]; [1]Barzilai Medical Center; [2]Anchora Medical

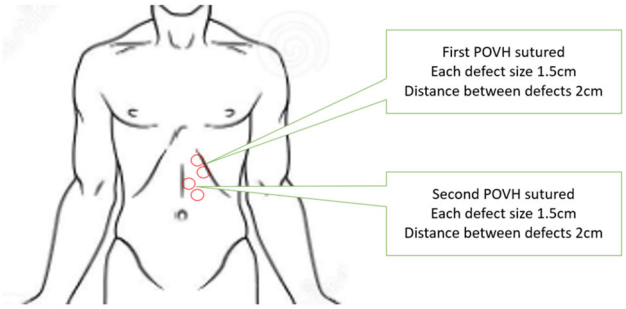
Introduction: This report describes a case presenting with 4 hernia defects, two of which located close to the ribs, which were sutured with the Su2ura® Approximation Device (AD), a newly developed instrument.
The patient is a 61-yo-male (BMI: 29.1), with a history of laparoscopic bilateral repair of inguinal and umbilical hernia repair and 3 laparoscopic gastric band procedures (placement, removal, and replacement of the band), referred due to swelling in the surgical scars area (left upper abdominal wall).

Incisional hernia or post-operative ventral hernia (POVH) develop at the site of a previous surgery. Up to one-third of patients who had abdominal surgery develops incisional hernia at the scar site. This type of hernia can occur anytime from months to years after abdominal surgery.

Suturing of the defect during a laparoscopic procedure is challenging and requires skills earned over many repetitive procedures before making such surgery short and effective.

The Su2ura® AD was used in this first in-human trial to simplify the closing of the POVH. The safety and efficacy of this device during this procedure were assessed.
Methods and Procedures: Two subcostal incisional hernias (size 1.5 cm each) were located 2 cm apart on the left abdomen. Two additional defects were observed left of the Linea Alba

Fig. 1 Defects locations



All defects contained omentum and preperitoneal fat. Multiple adhesions were observed around the defects and the gastric tube. Using diathermia, the peritoneum was incised and adhesions and preperitoneal fat were removed to expose the fascia surrounding the defects (Fig. 2).

All four defects were independently sutured and approximated using the Su2ura® AD, with 4 anchors for each defect (Fig. 3).

Following approximation, meshes were used to cover the defects of the abdominal wall, fixated using tackers. Tackers could not be used to fixate the meshes over the ribs area, so surgical glue was used instead.
Results: Suturing and approximation were effective using the Su2ura Approximation Device, as shown below in Fig. 3.
After 6-week follow-up, the patient does not show any device-related adverse events, nor any hernia recurrence, clinical bulge, or seroma.

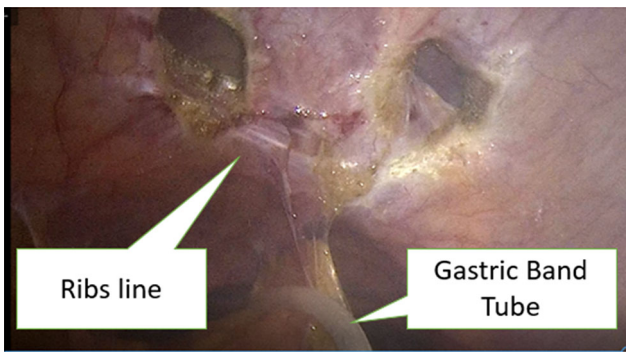


Fig. 2 Defects before suturing

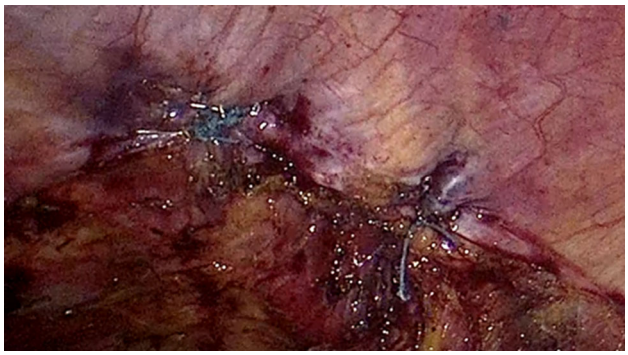


Fig. 3 Defects after suturing

Conclusion: Suturing defects located on the ribs area is particularly challenging, given the anatomical limitations. The Su2ura® AD, a new automated suturing device, facilitated the approximation of these defects in this particular anatomical area quickly and effectively.

P049

Single-center experience with robotic-assisted transversus abdominus release (r-TAR) and extended view totally extraperitoneal (eTEP) repairs

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Introduction: While robotic-assisted transversus abdominus release (r-TAR) and extended view totally extraperitoneal (eTEP) repairs are becoming more prevalent for the management of ventral hernias, they are still new and evolving techniques without defined standard outcomes. Thus, our study aims to characterize early postoperative outcomes following r-TAR and eTEP at a single-academic institute.
Methods: A retrospective analysis was performed of all patients undergoing r-TAR and eTEP repairs for primary ventral and incisional hernias. Patients with flank, parastomal, and hybrid (robotic dissection with open mesh placement/closure) were excluded. Preoperative characteristics and outcomes, including length of stay (LOS), postoperative pain, and complications were documented.
Results: Between 2018 and 2022, 15 patients underwent r-TAR and 41 patients underwent eTEP. Average age for all patients was 59.5 years, and 54% of patients were women. Average duration of symptoms prior to surgery was 48.6 months. Of all patients, 24 (42.9%) had mild pain preoperatively, 7 (12.5%) had moderate pain, and 6 (10.7%) had severe pain. No patients had obstructive symptoms, but 7 (12.5%) patients had preoperative nausea. Among eTEP patients, 14 (34.1%) underwent unilateral TAR and 9 (22.0%) underwent bilateral TAR; 23 patients (43.9%) did not require any TAR. Four (26.6%) r-TARs required conversion to open; no eTEPs required conversion. Average operative time was 317 min for r-TAR and 258 min for eTEP. Average LOS was 2.4 days for r-TAR and 1.1 days for eTEP. Eight (19.5%) eTEP patients discharged the day of surgery. Average length of follow-up was 14.9 days for r-TAR and 16.8 days for eTEP. Sixty-eight percent of both r-TAR and eTEP patients had complete resolution of pain by 2-week postop visit. Three (7.3%) of eTEP patients were readmitted within 30 days (for pulmonary embolism, hematoma, small bowel obstruction), but there were no readmissions among r-TAR patients. There were no deaths or reoperations in either group. No patients had early hernia recurrence.
Conclusion: R-TAR and eTEP are safe and effective procedures for the repair of primary ventral and incisional hernias with promising early outcomes. In our practice, r-TAR is typically reserved for more complex abdominal wall repairs, and this is reflected in greater operative time, conversion rates, and length of stay compared to eTEP. Nonetheless, both operations were associated with high rates of symptom resolution and low complication rates in the short term. Future studies are required to standardize patient selection and technical approach to further optimize outcomes.

P050

Is Biosynthetic Mesh the Right Choice? A Propensity-Matched Analysis of Ventral Hernia Repair in Contaminated (CDC-III) Surgeries

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Introduction: Recently, there has been increasing evidence supporting permanent mesh in contaminated wounds. While biologic mesh continues to be utilized in cases of gross contamination, the indications to opt for slowly absorbable "biosynthetic" prostheses comes to question.
Methods: The Abdominal Core Health Quality Collaborative (ACHQC) database was queried for elective ventral hernia repairs from January 2013 to 2022. We compared outcomes among different types of mesh in contaminated cases using propensity score matching (PSM) adjusting for gender, diabetes, BMI, smoking status, and operative time.
Results: 760 patients where included in the analysis. Slowly absorbable synthetic mesh (AS) was utilized in only 7% of the cases, while permanent mesh (P) in 77% and biologic mesh (B) in 16%. After PSM 255 patients remained for comparison, with no significant differences noted in demographics/hernia characteristics between groups. Furthermore, there was no difference in readmission (14%P, 12%AS, 13%B, p = 0.9), reoperation (2%P, 8%AS, 4%B, p = 0.14), surgical site infection (17%P, 20%AS, 12%B, p = 0.54), surgical site occurrence (16%P, 8%AS, 10%B, p = 0.27), or surgical site occurrence requiring intervention (13%P, 18%AS, 14%B p = 0.72)a t 30 days. At one year, there was no difference in recurrence among groups (26%P, 20%AS, 24%B p = 0.9).
Conclusion: Based on our findings, AS has comparable outcomes to other types of mesh, particularly when an optimal retro-rectus repair is performed. AS represent an option to avoid permanent foreign body reaction and the liability from late complications of permanent mesh, as well as to address patient wishes to avoid a permanent foreign body and increase treatment satisfaction.

1. PSM of Ventral Hernias in Contaminated Fields

	P(n = 153)	AS(n = 51)	B(n = 51)	p
Gender(F)	80(52%)	28(55%)	25(49%)	0.84
DM	29(19%)	12(24%)	12(24%)	0.68
BMI	32(29–37)	32(29–36)	32(29–35)	0.87
Smoking	10(7%)	4(8%)	3(6%)	0.92
Recurrent	54(35%)	23(45%)	26(51%)	0.11
Operative time > 2 h	149(97%)	49(96%)	49(96%)	0.84
Outcomes				
Readmission	21(14%)	6(12%)	6(12%)	0.9
Reoperation	3(2%)	4(8%)	2(4%)	0.14
SSI	26(17%)	10(20%)	6(12%)	0.54
SS	24(16%)	4(8%)	5(10%)	0.27
SSOPI	20(13%)	9(18%)	7(14%)	0.72
Recurrence @1-year(n = 88)	115(26%)	2(20%)	5(24%)	0.9

P051

A New Standard: Robotic Trans-Abdominal Preperitoneal Inguinal Hernia Repair with Primary Defect Closure

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Background: Inguinal hernia (IH) repairs are among the most commonly procedures performed worldwide, accounting for 75% of all abdominal wall hernias. In the USA, around 800,000 IH are repaired annually via open or laparoscopic techniques typically without closing the primary defect. However, advances in robotics are making new standards possible. In this case report, we present a robotic Trans-Abdominal PrePeritoneal (rTAPP) IH repair with primary defect closure performed using the da Vinci Xi.
Case Presentation: A 68-year-old male was admitted due to two-year history of symptomatic bilateral IH. The defects were painful but easily reducible and without sign of strangulation or obstruction. Surgical robot access was achieved using the Hassan technique. Both a left direct and smaller, right indirect IH were visualized. Dissection above the left groin was performed using monopolar scissors via the right port. Fenestrated bipolar forceps via the left port were used to dissect the hernia sac, exposing a significant defect (3 × 3 cm) in the transversalis fascia of the posterior wall of the inguinal canal. Due to its size the decision was made to close the primary defect. This was done using a robotic large needle driver and V Lock 3.0 continuous sutures. An additional single suture was placed lateral to the inferior epigastric vessels to achieve complete defect closure. After confirming there were no signs of tissue tension or bleeding, the mesh was placed and the peritoneum was closed with continuous Vi Lock 3.0 sutures.
Discussion: Despite being routine, highly prevalent procedures, IH repairs are still associated with high rates of complications including recurrence and postoperative pain when performed via laparoscopic or open surgery. Additionally, primary defect closure is not routinely indicated, largely due to space limitations preventing laparoscopic instruments from gaining safe access. This is a risk factor for future recurrence. As more literature is published on robotic IH repair, rTAPP offers a promising future in routine surgical practice, revolutionizing outcomes. Most studies demonstrate that robotic ease of use and ergonomics overcome the disadvantages and physical limitations associated with conventional methods. Specifically, high-resolution 3D images offer superior visualization while wristing with tremor filtration enables more precise maneuverability over laparoscopic instruments. rTAPP is also associated with shorter hospital stays and fewer postoperative complications including recurrence, pain, and surgical site infection.
Conclusion: Primary IH defect closure may enter routine clinical practice thanks to robotics, revolutionizing outcomes compared to conventional methods.

P052

Safety and feasibility of transabdominal preperitoneal inguinal hernia repair in very elderly patients

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Background/Objective: Opportunities to treat very elderly inguinal hernia patients are increasing in Japan. The transabdominal preperitoneal (TAPP) approach for laparoscopic inguinal hernia repair is minimally invasive, but its safety in elderly patients is unknown. The objective of this study is to evaluate the safety and feasibility of TAPP repair in very elderly patients.
Methods: This is a retrospective observational study involving 180 inguinal hernia patients who underwent TAPP procedure in our hospital, from January 2020 to July 2022. They were classified into two groups based on age: the elderly group (? 80 years old) and the control group (< 80 years old). We compared background characteristics and short-term surgical outcomes.
Results: There were 44 patients in the elderly group and 136 patients in the control group. There were more patients with heart disease and hypertension in the elderly group. Although the frequency of the American Society of Anesthesiologists' score of 3 was higher in the elderly group than in the control group (9/44 vs 4/136, P < 0.001), there was no significant difference in the postoperative hospital stay (2 days vs 2 days, median, P = 0.854). Major postoperative complication rates were comparable between the two groups (Clavien–Dindo class? III, 2/44 vs 1/136, P = 0.09). There was no inguinal hernia recurrence in both groups at median follow-up of 5.5 months and 4 months, respectively.
Conclusion: Advanced age is not a risk for worse outcomes and thus patients with inguinal hernia should not be contraindicated for the TAPP repair through age alone.

P053

Variation in Approach for Midsize (4–6 cm) Ventral Hernias Across a Statewide Quality Improvement Collaborative

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Introduction: Few, if any, guidelines specifically address operative management of midsize (4–6 cm) ventral hernias. How surgeons approach these hernias with regard to patient selection, mesh selection and location, and choice of minimally invasive versus open technique has not been explored. Understanding practice pattern variation is the first step toward quality improvement. Within this context we sought to characterize variation in surgical approach among patients undergoing repair of midsize (4–6 cm) hernias within the only population-level registry in the USA.
Methods: Retrospective cohort study of patients undergoing ventral hernia repair in the Michigan Surgical Quality Collaborative Hernia Registry (MSQC-CORE). This is a population-level registry which captures clinically nuanced hernia and operative-specific details such as hernia location, hernia size, and mesh characteristics. We included patients with a documented hernia width of 4–6 cm who underwent operative repair between January 1, 2020 and June 30, 2022. We evaluated differences between patients who underwent MIS (i.e., laparoscopic or robotic) compared to open surgery using descriptive statistics. A multivariable logistic regression model was used to identify factors associated with undergoing a minimally invasive approach.
Results: Among 771 patients, the mean hernia width was 4.7 cm (0.8) and 44% had a MIS approach (13.4% laparoscopic, 30.6% robotic). Mean hernia width was similar for hernias approached robotically compared to laparoscopic or open (4.7 cm vs 4.8 cm vs 4.8 cm, $p = 0.34$). BMI was highest in the open cohort compared to laparoscopic or robotic (34.8 vs 33.5 vs 33.5, $p = 0 < 0.01$). Open surgery was more common for patients undergoing elective repair compared to laparoscopic or robotic (53.2% vs 13.5% vs 33.4%, $p < 0.01$). Mesh was used least frequently in the open approach compared to laparoscopic or robotic (89.4% vs 97.1% vs 99.6%, $p < 0.01$), while myofascial release was more common in the open approach compared to laparoscopic or robotic (15.4% vs 1.1% vs 5.5%, $p < 0.01$). In the multivariable regression model, only higher BMI (aOR 0.97, 95% CI 0.95–0.99) and urgent/emergent surgery (aOR 0.43, 95% CI 0.24–0.79) were associated with lower use of MIS.
Conclusion: Among patients with midsize (4-6 cm) hernias, there was nearly equal distribution of patients who underwent open vs MIS approach. Few patient-level factors, including hernia width, were associated with approach which may indicate that surgeon preference factors largely into this decision. Future work should assess the association between approach and long-term outcomes (e.g., hernia recurrence, quality of life) for patients with midsize hernias.

P054

Ultrasound-guided endoscopic posterior neurectomy; the first report for anterior cutaneous nerve entrapment syndrome

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Background: Anterior cutaneous nerve entrapment syndrome (ACNES) is a rare etiology of acute abdominal pain. Although it is not life-threatening, it sometimes challenging because of its severe abdominal pain. Injection of local anesthesia with or without steroid is generally recommended, and surgery is an option after other non-operative therapy have been failed. While open anterior neurectomy has been reported as a standard, considering many of patients are adolescents or young adults, endoscopic approach is better from the point of view of cosmetic advantage. Herein, we present our new technique for ACNES. This is the first report of ultrasound guided endoscopic posterior neurectomy.
Case Report: A 27-year-old female was brought to our emergency department with sever upper abdominal pain. She was alert and vital signs were stable. She had been complained severe epigastric pain with tenderness. There were no peritoneal signs and carnet sign was positive. Image studies and laboratory tests were all negative. So, we suspect the etiology of her pain was ACNES. Local anesthesia was tried and just after injection the pain was relieved. Although the accurate diagnosis was made, the duration of pain control was limited only three hours which was same with the length of effectiveness of local anesthesia. She had been needed frequent injection and unfortunately her pain gotten worse each time. We also tried to use steroid and failed. Because she could not enough move and eat du to pain, she was not able to go home. After several discussions, we decided to try surgery. Although we did not have enough experience, we choose endoscopic posterior neurectomy which was done taking advantage of the experience of endoscopic surgery for varicose vein of lower extremities. Just after surgery her pain had been completely disappeared and she could discharge with limited area of numbness on her epigastric lesion.
Conclusion: According to previous reports, open and anterior neurectomy was done with its success rate of around 70%. However, considering of its operative scar, we wonder the number is feasible or not especially for young women. So, this time we choose endoscopic surgery for the reason of cosmetic advantage. We will present the detail and tips of this surgery with intraoperative movies.

P055

The human mirror: modified laparoscopic cholecystectomy technique for situs inversus totalis

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Introduction: Situs inversus totalis (SIT) is a rare congenital anomaly characterized by inversion of normal anatomy, creating a mirror image. In SIT, right-sided organs are on the left (i.e., liver, gallbladder) and left-sided organs on the right. SIT patients with biliary pathology requiring cholecystectomy pose a challenge due to reversal of anatomy and technique. The surgeon must remain versatile and maintain close attention to detail with precise hand-eye coordination. We propose a novel modified laparoscopic cholecystectomy (MLC) technique that is safe and feasible for treatment of biliary disease in SIT.
Technique: A 42-year-old male presented with left-sided abdominal pain and vomiting; CT demonstrated acute cholecystitis in the setting of SIT. The patient underwent MLC without immediate complications and was discharged postoperatively.
Traditional OR setup was maintained; surgeon on the patient's left and monitor above the patient's right shoulder. Following a RUQ Veress to establish pneumoperitoneum, a periumbilical optical entry port was placed. MLC was performed utilizing a 4-port configuration; 11-mm right mid-clavicular (P1), 11-mm periumbilical (P2), 5-mm left mid-clavicular (P3), and 11-mm left anterior axillary (P4). We utilized a 10-mm 45° laparoscope via P2. The main working ports were P3 and P4.

A grasper in P1 retracted the fundus. The left hand controlled a grasper in P3 to manipulate traction of the infundibulum. Using electrocautery and blunt dissection with the right hand in P4, a lateral-to-medial dissection of Calot's triangle was performed to obtain the critical view. The cystic artery coursed anteriorly to a dilated cystic duct. With a 10-mm clip applier in P4, the cystic duct and artery were each doubly clipped proximally, singly clipped distally, and then divided. The gallbladder was removed from the liver with

electrocautery, placed in a retrieval bag, and removed through P3. The fascia of all 11-mm ports were closed to prevent hernia formation.

Discussion: Port placement must be tailored to inverted anatomy to prevent crossing hands or instruments when operating with the dominant hand for right-handed surgeons. Operating from patient left enables a right-handed dissection and abates the need for complete mental reorientation. A 10-mm 45° laparoscope improves visualization. Multiple larger ports ease technical versatility. Performing a lateral-to-medial dissection protects important structures while defining the anatomy. Ultimately, meticulous dissection and surgeon adaptability are crucial to a safe operation.

Conclusion: Cholecystectomy in SIT patients is technically challenging, requiring significant surgeon adaptability, hand-eye coordination, and anatomic knowledge. MLC is safe and feasible for patients with SIT.

P056

Necrotising fasciitis: the contemporary patient, management principles, morbidity, and mortality

Vivian Phan, Miss; University Hospitals Birmingham

Introduction: We carried out a retrospective multi-center study into the current management of necrotising fasciitis (NF) and outcome to compare with the national data. NF is a life-threatening soft tissue infection, characterized by rapidly spreading infection and necrosis of the subcutaneous tissue and fascia. Core management includes a quick diagnosis, early surgical debridement, and broad-spectrum antibiotics. About 500 cases of NF occur per year in the UK, with an average mortality rate of 20.6%.

Methods: All patients diagnosed with NF (including Fournier's gangrene) at our three centres between 2017 and 2022 were identified. We used their medical records to collect demographic data, comorbidities, sites of infection, and whether this was a post-op complication. From biochemistry results, we retrospectively calculated the LRINEC score.

We then followed their clinical journey starting with time taken from presentation to the first surgical debridement. Intra-operative cultures, sensitivities, and antibiotic choices were noted. Postoperatively, data on VAC use, ICU admission, number of subsequent operations, and other interventions were gathered. Finally, we evaluated the length of hospital stay, complications, and mortality rate.

Results: Covering a large urban area, we admitted 144 patients with NF over 5 years, of which 17% were post-op infections. The male:female ratio was 3:2. Other risk factors included BMI > 30, cardio-respiratory diseases, and immunosuppression. Median age was 56. Commonest sites of infection were lower limbs (28%) and abdominal wall (28%). Unexpectedly, most of our patients (63%) were not diabetic. Mean LRINEC score was 8.

60% of cases were debrided within 48 h of diagnosis. Causative organisms were mainly Escherichia coli, Streptococcus, and polymicrobial. We had 44% adherence to guideline for antibiotics (IV Meropenem and Clindamycin). 7% of patients were not fit enough for surgical intervention.

The average patient had 4 debridements. Most stayed in ICU post-op (57%) and benefited from VAC therapy (65%). Median length of stay was 28 days. Mortality was 15% inclusive of operative and non-operative patients.

Conclusion: We report an average 28.8 cases of NF per year, proportional with the geographical area we cover in the UK. Our mortality rate is 15%, which is better than the previously reported national average of 20.6%. We find that the at-risk patient is male, in mid-50's, with obesity and cardio-respiratory conditions—this is increasingly the typical patient in the developing world. Therefore, NF may become more prevalent and surgeons should be aware of its risk factors, clinical presentation, and management principles.

P057

Surgical emergency or benign finding: Presentation of pneumatosis cystoides intestinalis

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Pneumatosis cystoides intestinalis is a rare radiological finding characterized by cysts or 'bubbles' within the walls of hollow organs. These findings can be localized to a small area or can be diffuse, occasionally burst causing benign findings of free air. The diagnosis is associated with connective tissue disorders but also found in patients with COPD, IBD, bacterial infections, or obstructions. It can be challenging to decide if patients presenting with these findings are in need of urgent surgical intervention or only require conservative management.

Here, we present a case of an 80-year-old male who initially presented to the emergency room with complaints of nausea, vomiting, and abdominal pain. A CT scan was performed which showed concerns of dilated loops of small bowel, areas of pneumotosis intestinalis, and free air. He underwent urgent laparotomy and was found to have a bowel obstruction and pneumotosis, but no compromised bowel. He returned two months later, again with a similar presentation and concern for bowel injury or obstruction. He once again underwent surgical intervention and the findings were similar to his prior operation. The patient was able to be discharged following recovery from his procedures without any other issues.

The finding of free air on imaging is one familiar to every surgeon. It elicits concern for compromised bowel leading to perforation and sepsis. It is difficult to discern this rare finding from an actual surgical emergency, but for patients who are stable and have risk factors, such as scleroderma, it may be a consideration to delay surgical intervention and monitor their symptoms.

P058

Perforated Duodenal Diverticulum and Enterolith Formation Leading to Small Bowel Obstruction

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Duodenal diverticula (DD) are relatively common and are seen in over 20% of the healthy population. The vast majority are asymptomatic and discovered incidentally on imaging. However, 1–5% of cases become symptomatic due to gastroduodenal, biliary, or pancreatic obstruction or due to hemorrhage or perforation, with the latter having a mortality rate of up to 30%. In very rare cases, DD can lead to enterolith formation with subsequent perforation and abscess formation, as well as small bowel obstruction in that region or distally. We present a case of a middle-aged female with inflammation and ulceration of a duodenal diverticulum along with enterolith formation that impacted distally in the jejunum leading to a small bowel obstruction.

A 43-year-old healthy female presented with one day of sharp epigastric abdominal pain accompanied by non-bilious emesis with subjective fevers. Computed tomography showed a $2.5 \times 4.3 \times 2.5$-cm duodenal outpouching with internal fecalization/necrosis and significant surrounding inflammation, representing an inflamed

duodenal diverticulum or a contained perforated duodenal ulcer. Upper endoscopy revealed a 30-mm nonbleeding diverticulum in the third portion of the duodenum with a 10-mm orifice and evidence of diffuse ulceration and friability with purulent appearing extravasating fluid. Endosonographic findings revealed a 4-cm heterogeneous collection cephalad to the diverticulum which was not amenable for endoscopic drainage. The patient was managed conservatively with antibiotics. Two-days post-endoscopy, she developed abdominal pain again with bilious emesis. CT showed interval improvement of the duodenal diverticulum but now with small bowel obstruction with a transition point in the right lower quadrant and development of extensive pancolitis. The patient underwent a diagnostic laparoscopy. The small bowel was run and the transition point was noted in the mid-jejunum, where a firm enterolith was identified. There was evidence of ischemic discoloration of the jejunal segment involved and, given concern for breakdown of the suture line, it was partially resected. The patient's post-operative course was uncomplicated and she was discharged on post-operative day 7, concluding her 21-day hospitalization.

Inflammation with enterolith formation leading to small bowel obstruction is an exceedingly rare complication of duodenal diverticula with only a handful of cases reported in the literature. Though the traditional treatment method has been surgical, there have been cases of conservative management leading to favorable outcomes. Our case highlights a very interesting complication of duodenal diverticula and aims to educate clinicians on prompt recognition and management of this uncommon phenomenon.

P059

Vasopressors: A Novel Tool for the Provocation and Diagnosis of Dieulafoy Lesions

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A Dieulafoy lesion is an uncommon but potentially life-threatening cause of an acute gastrointestinal (GI) bleed. The lack of an associated mucosal ulcer can make locating and treating an actively bleeding Dieulafoy lesion difficult. Historically, a heparin bolus has been reported to assist detection by provoking an active upper GI bleed. This case report examines the use of vasopressors for provocation of a Dieulafoy lesion in a patient with persistent upper GI bleeding despite multiple endoscopies, angioembolizations, and abdominal exploration.

A 58-year-old male with history of alcohol abuse, gout, and previous upper GI bleeds presented from a nursing facility for hemorrhagic shock due to repeat GI bleed. The patient was adequately resuscitated and underwent multiple upper and lower endoscopies with gastroenterology, nuclear medicine scans, capsule endoscopy, angioembolizations with interventional radiology, and abdominal exploration with general surgery. Despite each test and intervention, the patient would become acutely anemic requiring ICU care and resuscitation with blood products. The decision was made for a planned provoked hemorrhage under upper endoscopy visualization. The patient underwent an esophagogastroduodenoscopy and a norepinephrine drip was begun, titrating by 2 mcg/min. The mean arterial pressure was gradually elevated to > 100 with the systolic blood pressure remaining between 140 and 160 mmHg. A max systolic blood pressure of 173 was recorded via arterial line. With the increased arterial blood pressure, a bleeding lesion was revealed along the lesser curvature of the stomach close to the gastroesophageal junction. This lesion was subsequently clipped by gastroenterology. After this intervention, the patient's hemoglobin stabilized and did not require further blood transfusions. The patient has since followed up in clinic and reports no further episodes of GI bleeding.

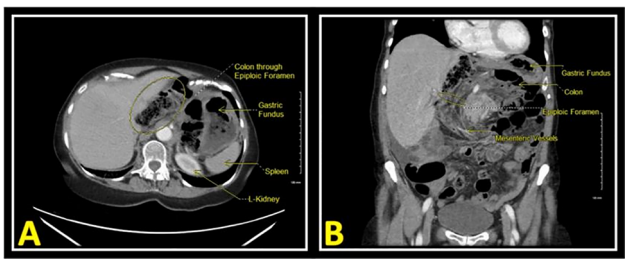
The purpose of this case report is to bring attention to the use of vasopressors in a controlled, monitored, gradual titration as a possible adjunct method for the provocation in GI bleeds of unknown etiology.

P060

Presentation of a Congenital Internal Hernia Through The Foramen of Winslow

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Introduction: Internal hernias are a relatively uncommon occurrence, with herniation through the Foramen of Winslow constituting only up to 0.1% of all abdominal hernias. Several anatomic factors, such as redundant mesentery, large foramen, or lack of lateral parietal peritoneal attachments contribute to their occurrence, and possibly, recurrence of this type of hernia.
Presentation of Case: In this case, a 66-year-old female who presented to the ED with abdominal pain and nausea, concerning for possible cholecystitis. Gallbladder work-up was negative and subsequent CT imaging showed signs of an internal hernia through the Foramen of Winslow. She was taken to the OR for a diagnostic laparoscopy. The diagnosis was confirmed the ascending and proximal transverse colon within the lesser sac. The hernia was reduced laparoscopically and a right hemicolectomy was performed due to ischemic changes and to decrease risk of recurrence.
Conclusion: A clear standard of care regarding treatment and prevention of recurrence has yet to be established. Further documentation of these cases and their outcomes following surgery could contribute to more rapid identification, fewer missed diagnoses, and better outcomes for patients.



P061

The role of laparoscopy in the traditional Hartmann's procedure

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Introduction: Hartmann's procedure (HP) was first described to treat obstructive tumor of the sigmoid colon. It is often also performed in the setting of complicated diverticulitis. The aim of this study is to determine the change in our surgical approach during the last decade while treating an acute abdominal condition that requires HP.
Methods: Our prospectively maintained database at the Bnai-Zion medical center was searched and analyzed for two time periods: between January 2009 and December 2011 (TP1) and between January 2019 and December 2021(TP2) for all HP (ICD-9-CM 45.75.09) and colostomy closure (ICD-9-CM 46.52).

Result: At TP1 27 HP were performed, 16 due to diverticulitis and 11 due to colonic obstruction. 3/27 (11.1%) were operated laparoscopically with 2 conversions to open surgery. At TP2 26 HP were performed, 12 due to diverticulitis and 14 due to obstruction. 10/26 (38.4%) were operated laparoscopically with only 3 conversions to open surgery. Length of stay (LOS) was 21 ± 30 days for the open HP patients and 11 ± 7 days for the laparoscopic HP patients. Colostomy closure was performed for 8/27 patients in TP1—1 of whom was operated laparoscopically, and for 11/26 patients in TP2—8 of whom laparoscopically with 2 conversions to open surgery.
Conclusion: In the last decade there is a paradigm shift toward the laparoscopic approach in performing HP. Laparoscopy seems to offer improved recovery and the potential for less post-operative complications.

P062

Benefits of early management of intestinal malrotation in adults: a case review

Leonardo Kozian, MD; Ryan Cohen, MD; Sakib Adnan, MD; Molly Casey, DO; Moshumi Godbole, MD; Pak Leung, MD, MS, MBA, FACS; Albert Einstein Medical Center

Introduction: Intestinal malrotation is an anatomic aberrancy caused by failure of midgut development during early embryogenesis, previously estimated to occur in 1 in 6000 live births, with 90% of cases identified within the 1st year of life. Epidemiological data in adults are less precise, although recent reports suggest a prevalence of 0.2–0.5% in the general population. In patients of all ages with acute cases of malrotation without volvulus, the long-established procedure of choice has been the Ladd procedure. However, compared to well-defined pediatric presentations, adults with malrotation typically present with chronic and non-specific symptoms thereby making diagnosis challenging. Literature regarding the management of this subset of patients remains controversial. Due to the high morbidity associated with delays in diagnosis, early, and empiric surgical intervention, i.e., Ladd procedure, is increasingly being favored as the management of choice.
Case Presentation: We present the case of a 36-year-old female presenting with chronic non-specific gastrointestinal symptoms due to her previously undiagnosed intestinal malrotation. Computer tomography scan was obtained and aberrancies in the patient's gastrointestinal anatomy were suggestive of a partial intestinal malrotation. Given these findings, the decision was made with proceeding with a diagnostic laparoscopy. Intraoperatively, the diagnosis was confirmed, and we were also able to identify the presence of extrinsic compression of the duodenum by the Ladd's bands which was not evident on imaging. The decision was made to proceed with robotic-assisted laparoscopic Ladd procedure. The patient tolerated the procedure well and had an uneventful hospital course. After being discharged home on postoperative day 3, outpatient follow-up was notable for expeditious recovery with resolution of her symptoms.
Discussion: Adults with intestinal malrotation often have non-specific and chronic gastrointestinal symptoms which results in diagnostic delays. In this subset of patients, early or empiric operative intervention may improve associated morbidity. Additionally, minimally invasive Ladd procedures are now rapidly gaining favor over the open approach due its superior immediate postoperative outcomes. Our case highlights the importance of maintaining a high index of suspicion for non-acute intestinal malrotation thereby allowing for a less morbid surgical approach to be taken by means of a robot-assisted laparoscopic Ladd's procedure.

P063

An Interesting Presentation of Bouveret Syndrome: Tumbling Phenomenon and Possible Genetic Component

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Background: Gallstone ileus is a rare complication of cholelithiasis in which a gallstone causes bowel obstruction. Repeated episodes of calculous cholecystitis can lead to the formation of a biliary-enteric fistula, allowing gallstone migration and impaction within the bowel. Gallstone ileus, in which a gallstone lodges in the stomach or duodenum, causing gastric outlet obstruction, is known as Bouveret syndrome.
Case Presentation: In this case, a 74-year-old woman with no prior history of gallbladder disease but positive first-degree family history presented to the emergency department with abdominal pain, nausea, and vomiting, concerning for small bowel obstruction. Computed tomography (CT) scan demonstrated a 2-cm rounded radiopaque structure within the duodenum with moderate stomach dilation. The presence of the gallstone within the duodenum was confirmed on endoscopy. Subsequent enterolithotomy for gallstone removal surprisingly showed gallstone impaction in the jejunum. Ultimately, the patient tolerated the surgery well and recovered without complications.
Conclusion: This case is important for three reasons. First, it illuminates the rarity of Bouveret syndrome and gallstone ileus. Second, it highlights the tumbling phenomenon and the varying ways gallstone ileus can present by investigating a presentation of Bouveret syndrome that evolved into gallstone impaction in the jejunum. Third, it draws attention to a possible relationship between family history and gallstone ileus.
Keywords: Gallstone ileus, Bouveret Syndrome, Intestinal obstruction, Bowel obstruction, Enterolithotomy

P064

Incidental Finding of Low-Grade Mucinous Appendiceal Neoplasm after Laparoscopic Appendectomy: A Case Report

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Introduction: Mucinous appendiceal neoplasms are a rare malignancy with diagnosis often obtained incidentally or intraoperatively as a result of surgical intervention for suspected acute appendicitis, accounting for 0.8–1.4% of appendectomy specimens. Approximately 50% of appendiceal tumors are neuroendocrine in nature and benign. Malignant appendiceal tumors can be classified based on histology, approximately 70% appearing as adenocarcinoma with the most common subtype mucinous (53%). Here, we describe a case of a 36-year old female who presented with symptoms of acute appendicitis and underwent laparoscopic appendectomy, with pathology report significant for low-grade appendiceal mucinous neoplasm (LAMN).
Case Presentation: A 36-year-old caucasian female presented to the emergency department with acute onset lower abdominal pain associated with nausea and chills. Past history was significant for hypertension and gastroesophageal reflux disease. She denied prior surgeries or colonoscopic evaluations. Her laboratory findings were significant for a leukocytosis of 12.2. She had a computed

tomography of her abdomen and pelvis which revealed appendiceal dilation up to 9 mm with periappendiceal fat stranding.
Patient was subsequently taken for a laparoscopic appendectomy. A diagnostic laparoscopy was performed noting the appendix which appeared dilated, non-perforated, and moderately inflamed. The appendix was subsequently stapled, removed, and the procedure completed shortly thereafter. The patient was discharged on postoperative day one in a stable condition. Pathology report obtained a week later demonstrated a low-grade mucinous appendiceal neoplasm confined to the tip, specifically with a 1.1 × 1.5-cm mucinous region with acellular mucinous deposits without evidence of perforation. The patient was subsequently counseled on this pathology finding and that it would not require immediate adjunctive intervention and therapies. She was recommended to undergo a colonoscopic evaluation which is still pending.
Discussion: Management of LAMNs is directed at prevention of rupture, seeding, and spread which can result is disseminated peritoneal adenomucinosis (pseudomyxoma peritonei). Low-grade appendiceal mucinous neoplasms (LAMNs) are confined to the muscularis propria, and due to the incidental nature in which many are found, patients may present at more advanced stages of disease which may require further therapies involving hyperthermic intraperitoneal chemotherapy (HIPEC) and cytoreductive surgery (CRS). In the absence of periappendiceal involvement or nodal or peritoneal metastasis, appendectomy alone is considered adequate treatment.
Conclusion: Low-grade mucinous neoplasms of the appendix are typically found incidentally. CT imaging and ultrasonography provide useful tools for diagnosis in more advanced stage disease. Those who present without evidence of metastasis confer good prognoses.

P065

Unique case of emphysematous gastritis in a patient with congenitally absent celiac trunk—a case report and review of the literature

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Introduction: Emphysematous gastritis (EG) is a highly morbid and lethal condition caused by infection of compromised gastric wall by gas-forming organisms. Radiologic evidence of gas within the gastric wall is a rare finding that poses a diagnostic dilemma as it may represent EG or the more benign gastric emphysema (GE). Aggressive identification and management of EG are critical to survival and may require gastric revascularization. We present a rare case of emphysematous gastritis in a patient with absent celiac artery.
Case Presentation: The patient is a 56-year-old male with congenitally absent celiac trunk and remote history of splenectomy and distal pancreatectomy. He presented with hematemesis, mild leukocytosis, tachycardia, and left upper quadrant abdominal pain without peritonitis. A computed tomography (CT) scan of the abdomen revealed air within the gastric wall and portal venous gas (PVG). Esophagogastroduodenoscopy (EGD) revealed mucosal erythema, sloughing and ulceration consistent with EG. The patient was managed nonoperatively with nasogastric tube decompression, nil per os (NPO), intravenous (IV) fluid hydration, IV antibiotics (Vancomycin and Zosyn), antifungal therapy (IV fluconazole), IV Protonix, and Carafate.
His clinical condition initially improved but subsequently worsened after hospital day (HD) 4. Repeat CT demonstrated resolution of PVG with significantly decreased intramural gastric air and EGD on HD 11 re-demonstrated mucosa erythema and ulceration with new areas of ischemia in the body of the stomach.

Given the congenitally absent celiac trunk and surgical history, the vascular surgery service was consulted. He underwent superior mesenteric artery (SMA) to left gastric artery bypass with vein conduit and feeding jejunostomy tube placement. Postoperatively, he tolerated a regular diet and his abdominal pain resolved.
Discussion: Ischemic gastropathy is a very rare cause of EG. To date, there are only four published case reports of EG associated with gastric ischemia. One patient improved with medical management alone, one required celiac axis and SMA stent placement, and the other two patients died from EG complications. Our patient is a unique case of EG with ischemic gastropathy who improved with medical management and open gastric revascularization.
Conclusion: The diagnosis of EG must be considered for all patients who present with abdominal pain, hematemesis, signs, and symptoms of sepsis, and compromised gastric perfusion. A multidisciplinary approach with aggressive medical management should be prioritized with gastric revascularization considered definitive for treatment.

P067

Clinical Validation Of A Rib Fractures Disposition Protocol Using The Trauma Quality Improvement Program (TQIP) Database

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Introduction: Patients with traumatic rib fractures are prone to respiratory decompensation. The triage to appropriate monitoring level could influence overall outcomes.
Methods: Adult patients in the TQIP (2018–2019) with a diagnosis of rib fracture(s) were included while excluding patients with severe extrathoracic injuries. Based on the triage algorithm proposed by a systematic review of the literature, patients were grouped into whether they needed ICU or inpatient floor management. Analysis of outcomes of under-triage vs appropriate triage was performed using univariable/multivariable analyses and sensitivity/specificity ROC analysis.
Results: In total, 132,391 patients were included. After evaluation in the emergency room, 32.8% were admitted to the ICU, 62.5% to an inpatient floor and 4.7% to observation. Of patients admitted to the floor 17.6% met ICU criteria. Patients admitted to the floor more often developed pulmonary complications when they met ICU criteria on admission vs when they did not (5.8% vs 1.9%, $p < 0.001$). After adjusting for age, injury severity score, and operative fracture management, the odds ratio for pulmonary complications was 2.54 (95% C.I. [2.28–2.83]) in ICU under-triage with a high discriminatory accuracy of the model (ROC-AUC = 0.703). Similarly overall complications and prolonged length of stay were significantly more likely in floor patients who met ICU criteria. These findings were not replicated in under-triage to observation.
Conclusion: Under-triage of traumatic rib fracture patients meeting ICU criteria was associated with worse in-hospital pulmonary and overall outcomes. Adherence to the standardized admission criteria we examined may improve clinical outcomes.

P068

Assessment of patient factors associated with frailty and outcomes in emergency general surgery

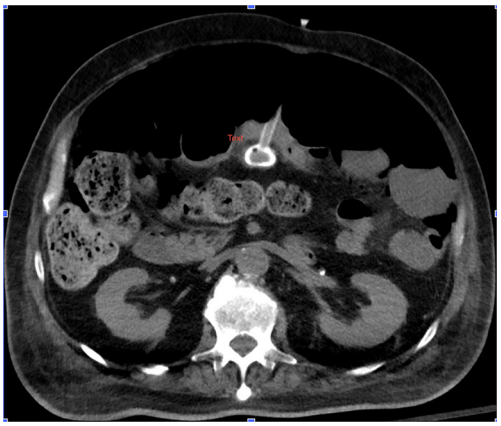
Jordan Williams, MD; Jessica Heard, MD; Robert Lim, MD, FACS, FASMBS; Gabriel Bolender, MD; Stephen Phillippee, MD; Mohamad Akel, BS; Gregory Merrell, BA; OUHSC Tulsa

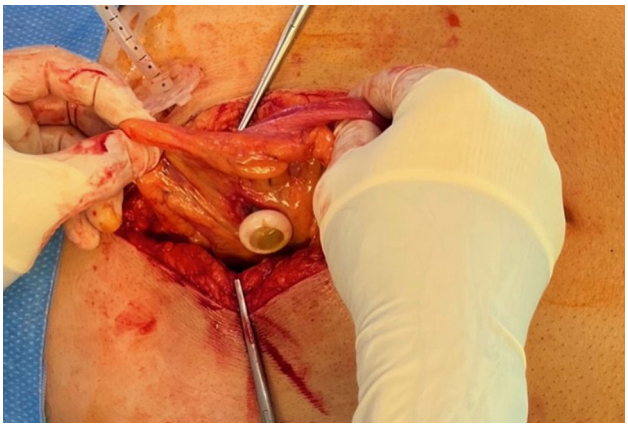
Introduction: Frailty is a misunderstood risk factor when making decisions in emergency general surgery (EGS) patients. Our aim was to determine how aspects of frailty affect both operative and non-operative patient outcomes.
Methods and Procedures: A database was assembled including type of management utilized, frailty scores, and complications sustained in EGS patients. 12 patient-specific factors were used to determine frailty. Patients who underwent operative management were compared against those managed nonoperatively. Differences between rate of in-hospital death, readmission within 30 days, subsequent operations, and subsequent procedures were retrospectively reviewed using components of frailty as exposures.
Results: There were 134 patients, 93 operative and 41 non-operative. There were 4 in hospital deaths, 10 re-admissions, 149 operations (97 initial, 52 subsequent), and 58 procedures (41 initial, 17 subsequent). For all frail patients managed with an operation, the RR for a second operation was 0.86 (95% CI 0.42–1.8). However, the RR for a subsequent operation was 1.5 (1.0–2.1) in those that did not mobilize independently, 2.2 (1.7–2.8) in those that could not perform activities of daily living (ADLs) independently, 1.9 (1.3–2.8) in patients with DM, and 1.7 (1.2–2.4) in patients with PAD or CHF. In frail patients managed nonoperatively, the RR for requiring a subsequent procedure was low at 0.035 (0.0090–0.14). However, in frail patients with an active cancer diagnosis, the OR was 36 (2.6–491) for a subsequent procedure and in patients with CHF, the OR was 11 (1.1–101).
The rate of in hospital death for operative and non-operative management was 3.6% and 2.7%, respectively, while the rate of re-admission was 9.5% and 2.7%, respectively. However, operative management had an OR for death of 9.3 (95% CI 1.1–74) in patients that did not mobilize independently, 10.8 (95% CI 1.6–73) in patients with a history of impaired sensorium and 11 (95% CI 1.3–89) in patients with a history of CHF. The OR for readmission rate for these patients was 4.0 (95% CI 1.2–13) in those that did not perform ADLs independently, and 5.3 (95% CI 1.3–22) for those with history of a CVA.
Conclusion: In frail EGS patients, operative management appears to have an increased risk of re-operation and risk of re-admission. Certain components of frailty are associated with significantly higher in-hospital death rates, re-admission rates, subsequent operations and procedures when managing EGS conditions. Assessing the different aspects of frailty should be used in the decision-making of EGS patients.

P069

PEG Tube placement into the Sigmoid colon

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Introduction: Percutaneous endoscopic gastrostomy (PEG) tube placement is a common procedure performed for enteral nutrition in patients that are unable to tolerate oral intake. Complications can occur in up to 23% of cases and include dislodgement, bleeding, pneumoperitoneum and injury to surrounding structures among others. Cases of PEG misplacement in the colon are uncommon and mostly affect the transverse colon. In this report, we describe a case of a PEG placed inadvertently into the sigmoid colon requiring emergent exploration.
Case Description: The patient is a 64-year-old male ventilator dependent that underwent a PEG tube placement at an outside institution and developed acute abdominal pain 3 days after his procedure. Upon transferring to our institution, a CT scan demonstrated PEG misplacement and pneumoperitoneum (Fig. 1). On emergent exploration, the PEG was found to be traversing through-and-through the sigmoid colon and had dislodged away from the greater curvature of the stomach. This required a sigmoid colectomy with side to side anastomosis, repair of the gastrostomy, and placement of a jejunostomy tube for enteral access. The patient recovered uneventfully.
Discussion: Colonic injuries after PEG tube placement are rare and account for less than 0.76% of all complications. Most of these affect the transverse colon of patients who typically have distended colons or lax mesentery. To prevent adjacent organ injury, it is essential to locate the insertion site on the abdominal wall using endoscopic transillumination and one-to-one finger indentation. To our knowledge, this is the first case of early sigmoid colon perforation after PEG tube placement that did not require an end colostomy.

P070

Jejunojejunal intussusception: an idiopathic and offbeat happening in a middle-aged, healthy, female patient ten days after laparoscopic cholecystectomy

Miguel Fernando Juárez Moyrón, MD; Luis Andrés Saenz Romero, MD; Nicolás Méndez Martínez, MD; Alfredo Barrera Zavala, MD; Francisco Javier Carballo Cruz, MD; Mariana González Valiente, MD; Secretary of Health of Mexico City

Introduction: Intussusception is an exceptional cause of abdominal emergency among adults. It consists in the imprisoning of a proximal portion of the bowel and its mesentery (intussusceptum) inside the following section of the gastrointestinal tract (intussuscipiens) and then, lymphatic, venous, and arterial circulation decreases; edema, obstruction, and ischemia will progress if the intussusception is not reduced and perforation and peritonitis might appear. Symptoms include abdominal pain, vomits, and bloody stools, followed by manifestations of peritoneal irritation. The majority of intussusceptions are found near the ileocolic junction; other configurations are jejunojejunal, jejunoileal, ileoileal, and colocolic invaginations. As the most common cause of abdominal emergency at the age of 6–36 months, 75% are idiopathic, linked to lymphoid tissue hypertrophy due viral infections. Tumors or polyps of the intussusceptum are known causes. 0.5–1% of adult bowel obstructions are associated to intussusception and up to 90% of them have an organic demonstrable lesion. Ultrasonography and computed tomographic (CT) scan are highly valuable for diagnosis.

Methods: A 45-year-old woman is presented to the emergency room with 24 h of abdominal cramping, biliar emesis, and hematochezia. Ten days before, she had an elective laparoscopic cholecystectomy due chronic cholecystitis, without complications. The heart rate was 115 beats per minute. Three laparoscopic ports with normal appearance, hypoactive bowel sounds, diffuse pain, and a palpable "sausage form" mass in the mesogastrium were found, without rebound tenderness. Laboratory revealed leukocytosis (25.5 109/L), serum lactate of 2.3 mg/dL and normal electrolytes, and liver enzymes. The CT scan showed a "target sign" and "pseudokidney sign." A midline laparotomy was performed. 3.6 feet passing the duodenojejunal flexure, an irreducible jejunojejunal intussusception was found; 2 feet of the proximal portion showed ischemia signs. The resection of intussusception with macroscopically normal margins (2.6 feet) and end-to-end enteric anastomosis were made.

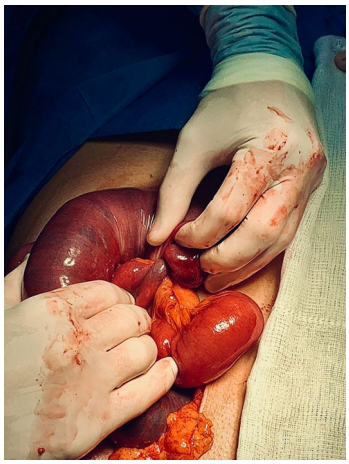
Results: Hematochezia ceased 48 h postoperatively; mild periincisional pain was reported during the stay. Prophylactic antibiotics were administered. Patient's discharge was four days after surgery: afebrile, orally fed, passing gas adequately, and having normal defecation. Pathology report described intussusceptum's transmural necrosis, mesenteric vessels thrombosis, and the absence of malignant cells.

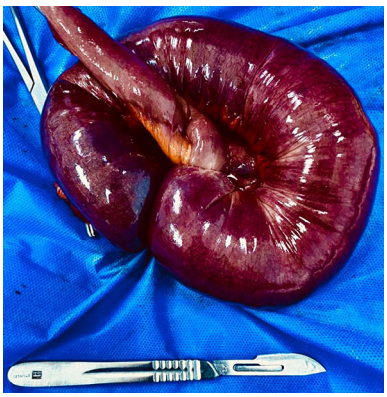
Conclusion: Intussusception is exceptional in adults. If it is demonstrated by CT scan for investigating causes of bowel obstruction involving systemic inflammatory response syndrome, operative management must be considered due the high rates of malignant etiologies, nevertheless, idiopathic intussusception also happens in adults.

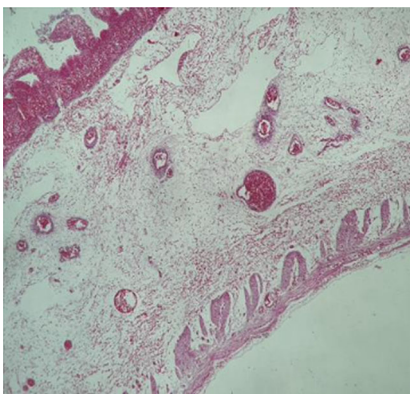


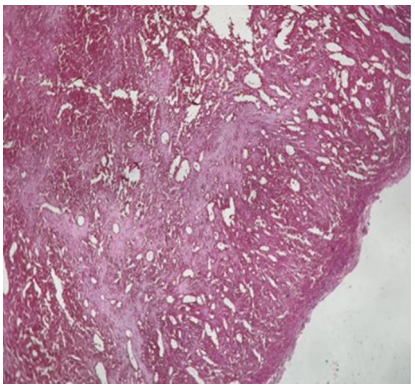












P071

Cecal Perforation Within A Foramen Of Winslow Hernia In A 29-Week Pregnant Patient: A Case Report

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Background: The borders of the foramen of Winslow are defined by the caudate lobe of the liver, the inferior vena cava (IVC), the duodenum, and the hepatoduodenal ligament. It serves as the only connection between the intra-abdominal cavity and the lesser sac and is a potential site of an internal hernia, although rare and infrequent with about 200 cases reported in the literature.
Methods: A 36-year-old woman who was 29-week pregnant presented as a transfer from an outside hospital (OSH) with acute onset epigastric abdominal pain. She had no prenatal care leading up to her transferring admission due to lack of insurance. The week prior to presentation, she had been hospitalized with nephrolithiasis, and the etiology of her presenting abdominal pain was attributed to constipation secondary to pain medications from her prior admission. Therefore she was transferred to a higher level of care for urologic interventions. At the time of presentation to our institution, the patient was tachycardic with peritonitis on physical examination. An upright chest X-ray was performed which demonstrated large volume pneumoperitoneum.
Results: The patient was consent for exploratory laparotomy in conjunction with the obstetrics service. A midline laparotomy was performed which was significant for an immediate rush of air and large volume purulent drainage, concerning for perforated viscus. Cephalad to the stomach and infrahepatic space, succus was noted to be draining focally from a perforation. The stomach and duodenum were examined and no perforation of these structures was noted. The lesser sac was explored without significant findings. The small bowel and large bowel were examined, and the terminal ileum, ileocecal valve, and cecum were reduced, from a foramen of Winslow hernia. An end ileostomy was created with mucus fistula after completion of

an ileocecectomy. The patient emergently delivered a healthy, although premature, baby following the procedure due to fetal decelerations noted in the immediate post-operative period.

Conclusion: Foramen of Winslow hernias are a rare presentation of an internal hernia. While infrequent, we describe an even more rare case of a foramen Winslow hernia in a 29-week pregnant patient presenting with acute onset epigastric abdominal pain found to have cecal perforation secondary to a foramen of Winslow hernia.

P072

Perforation of a colostomy secondary to a fecaloma after a stercoral perforation: a case report

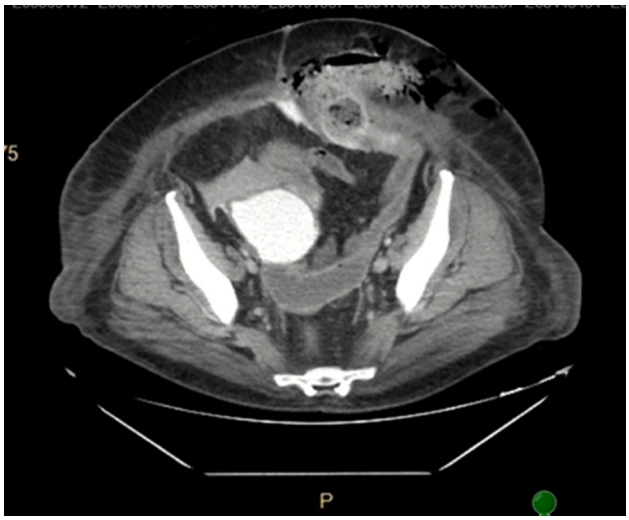
Sarah Martin, DO[1]; Odessa Pulido, DO[1]; Nancy Shen, DO[1]; Jason Lei, MD, FACS, FASCRS[2]; [1]PCOM; [2]Jefferson Northeast Hospital System

Introduction: Stercoral perforation is a rare complication of stercoral colitis with a high mortality rate. This occurs when stagnant fecal matter leads to colonic distention and fecaloma formation. This can subsequently cause pressure necrosis and bowel perforation. Prior cases have reported recurrent intraabdominal stercoral perforation proximal to end colostomies. Here, we present a unique case of a fascia-level, intra-abdominal stercoral perforation at an end colostomy after an index Hartmann's procedure for rectal stercoral perforation.

Presentation of Case: A 45-year-old woman presented with persistent left-sided abdominal pain for two weeks and an abdominal CT scan showing severe pan-colonic fecal impaction. During her hospital stay, she was noted to have worsening abdominal pain. A second CT scan demonstrated massive pneumoperitoneum. She was taken emergently for an exploratory laparotomy and Hartmann's procedure for rectal stercoral perforation. Postoperatively, she was recovering appropriately and then developed acutely worsening abdominal pain with signs of intra-abdominal sepsis. A CT scan was repeated, revealing an intra-abdominal perforation at the fascial level of the end colostomy due to another massive fecaloma. She was brought back to the operating room for a repeat laparotomy, Hartmann's revision, and a diverting ileostomy.

Discussion: Stercoral perforation remains a rare complication of chronic constipation. There are few reports of recurrent stercoral perforation of patients with a colostomy but no reports regarding fascial perforation of an ostomy by a second fecaloma. There is minimal data of management on recurrent stercoral perforation during the same hospital admission after an index Hartmann's procedure for rectal stercoral perforation.

Conclusion: We present a rare case of recurrent stercoral perforation after an index Hartmann's procedure for stercoral perforation. There have been no cases in the literature regarding a second perforation at the fascia of a colostomy due to a fecaloma. There is a rising incidence of chronic constipation and subsequent stercoral perforation. An increased awareness is needed regarding the possibility of secondary perforation in patients who have already undergone an operation intervention for perforated stercoral colitis.



P073

Laparoscopic management of Intussusception in an Adolescent

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Intussusception in adults is rare and represents 1% of small bowel obstruction with the most common cause being a tumor. A high index of suspicion is needed due to non-specific symptoms.

We report a case of Ileocolic intussusception in an adolescent.

An 18-yr-old female presented with severe right-sided abdominal pain. Initial US diagnosed a stone in gallbladder. Repeat visit to the ER and a CT was suspicious for intussusception (Figs. 1, 2). Small bowel series was negative. Patient had recurrent abdominal pain and taken for diagnostic laparoscopy. There was an ileocolic intussusception with TI up to the mid-ascending colon (Fig. 3). The intussusceptum could not be reduced with laparoscopic instruments. An extraction port made in the peri-umbilical area, and manual reduction was performed. When the bowel was exteriorized, there was at about 2 feet in the distal ileum an area of puckering, suggesting malignancy (Fig. 4). There was no sign of Meckel's diverticulum. Enterectomy was performed and a large lymph node in the drainage basin also removed. There was a mass that served as the lead point when specimen was opened. Pathology of the mass, the lead point, and the lymph node were suggestive of Lymphoproliferative disorder, DLBCL, Diffuse large B-cell lymphoma. The patient did well, discharged POD 2, from the surgery and is proceeding with oncology care.

Diagnostic laparoscopy and laparoscopic-assisted bowel resections enable quicker healing by reducing the size of the incision, future hernia, and quicker recovery. They may aid in diagnosis in confounding and complex cases. Resuscitation and expedient intervention can also avoid potential bowel necrosis from ischemia. We encourage the use of diagnostic laparoscopy in acute care surgery for optimal outcomes.

Fig. 1



Fig. 2



Fig. 3

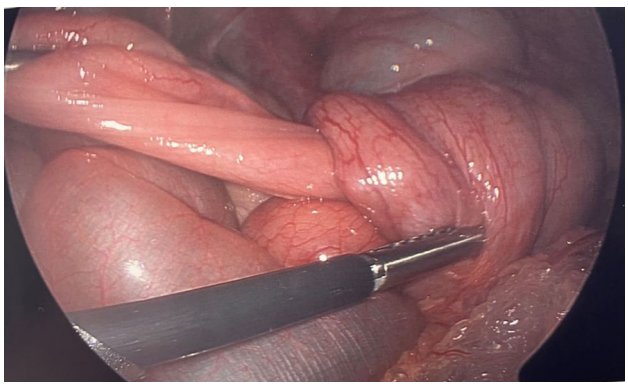


Fig. 4

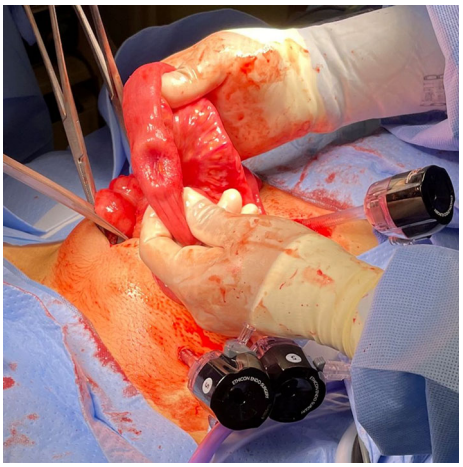
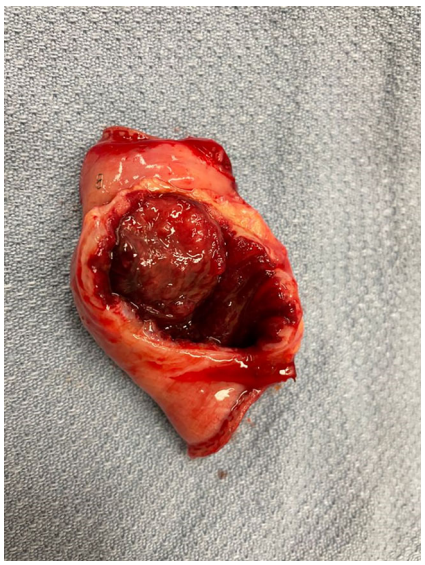


Fig. 5



P074

A Rare Case of Right Ventricular Pacemaker Lead Perforation into The Left Pleural Cavity: Two Weeks After Implantation

Azzan Arif, MD; Sameh Shoukry, MD; Alejandro Franco, MD; Trumbull Regional Medical Center

Introduction: Pacemaker placement is a common procedure in the US, with increasing incidence. Data from the NCDR ICD Registry shows 5.4% of patients experience complications requiring hospitalization or surgery within 90 days of implantation, with cardiac perforation in only 0.14% of cases. Complication rates for pacemakers are agreed to be comparable.
Presentation of Case: A 70-year-old female presented to the ED two weeks following implantation of a dual-chamber pacemaker. She complained of left chest pain, worsening overnight, similar to her previous MI. Imaging demonstrated a large left pleural effusion, with right mediastinal shift. Review of the images by cardiothoracic surgery was concerning for a pacemaker lead perforating into the left pleural space, with hemothorax. The patient was taken to the OR for

an emergent exploratory median sternotomy. The pericardium was opened and a moderate amount of bloody fluid was evacuated, heart exposed, and a pacemaker lead could be seen protruding 2 cm from the anterior wall of the left ventricle near the apex. The right ventricular lead was then withdrawn, replaced with a permanent screw-in lead, and the left ventricle was repaired.

Conclusion: This patient expired due to multi-organ failure, as a result of her initial hemorrhagic shock. Cardiac perforation by a pacemaker lead two weeks following initial implantation is extremely rare. Our aim with this case is to shed light on an unlikely complication, encourage more rapid identification and treatment, and to prevent long-term morbidity or mortality from this rare condition.

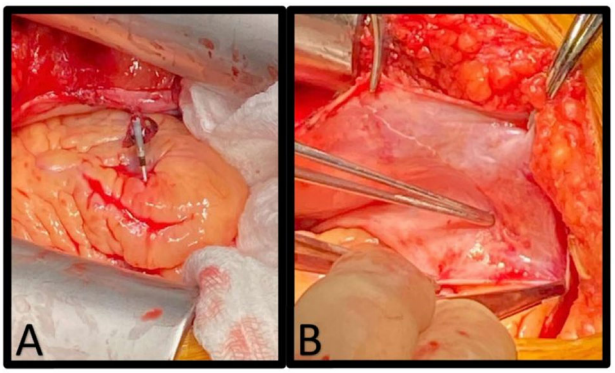


Figure 1: (A) demonstrating the pacemaker lead perforating out of the left ventricle, and (B) indicating the exact area of perforation through the myocardial wall.

Figure 1 A demonstrating the pacemaker lead perforating out of the left ventricle, and **B** indicating the exact area of perforation through the myocardial well

P075

Small Bowel Obstruction resulting from Meckel's Diverticulum Enterolith

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Enteroliths formed within Meckel's diverticuli is a rarely encountered underlying cause of small bowel obstruction. We present a 72-year-old female patient who developed mechanical small bowel obstruction from a Meckel's diverticulum enterolith. The management has not been clearly elucidated in the literature. Future studies may be able to review whether non-operative management would be an option or if surgery is mandatory. If surgery is mandated, minimally invasive surgery is likely an acceptable option that should be further explored.

P076

An unusual case of massive lower gastrointestinal bleeding Meckel's diverticulum

Ryan D Horsley, DO; Anna Bondonese; Beverly Hersh, MD; Alex Falvo, MD; Geisinger

Introduction: Massive LGIB is defined as bleeding distal to the ligament of Treitz accompanied by the passage of a large volume of red blood through the rectum, hemodynamic instability and shock, a decrease in hematocrit to 6 g/dL or less, transfusion of at least 2-U packed red blood cells, and bleeding that persists for 3 days or significant rebleeding in 1 week.

Meckel's diverticulum (MD) is the most common congenital malformation of the gastrointestinal tract caused by the failure of vitelline duct involution. Most cases are asymptomatic but approximately 2–4% of patients develop complications. These diverticula can contain heterotopic gastric mucosa which secrete acid and can lead to ulceration and subsequent bleeding. It should be considered in cases of gastrointestinal bleeding with no source identified on upper endoscopy or colonoscopy.

Case Report: A 33-year-old male presented with hematochezia was found to have acute blood loss anemia HGB from 12.7 to 7.5. He was transfused with 3-U PRBC, 2-U whole blood, 1-U plasma, and 1-U platelets transfusion overall during his admission. Upper endoscopy was notable for esophagitis with no bleeding ulcer, colonoscopy was notable for ileocolic AVM, and then patient underwent IR embolization of ileocolic artery; however, this did not stop the blood loss. Ultimately, he underwent laparoscopic small-bowel resection including a Meckel's diverticulum which achieved hemostasis. Since that time, he remained hemodynamically stable.

Discussion: The first step in treatment of a patient presenting with gastrointestinal bleeding is to evaluate if they require urgent intervention. Hemodynamically unstable patients require intravenous access, fluid resuscitation, and possibly a blood transfusion. Unstable patients or patients with active bleeding should be admitted for resuscitation and close observation. Upper endoscopy is modality first utilized, if no bleeding source is identified, colonoscopy should be considered. Interventional radiology can help localize and or treat with angiography and possible embolization. If all the above modalities fail to identify or treat the bleeding source, surgical management is necessary.

Conclusion: Utilization of minimally invasive surgery is feasible, prior to exploratory laparotomy, in the algorithm of a patient with massive LGIB. This case demonstrates the successful treatment of a bleeding Meckel's Diverticulum with a laparoscopic small bowel obstruction, in control of massive LGIB.

P077

Early Postoperative Small Bowel Obstruction Secondary to Internal Hernia After Sacrocolpopexy: A Rare Mechanism

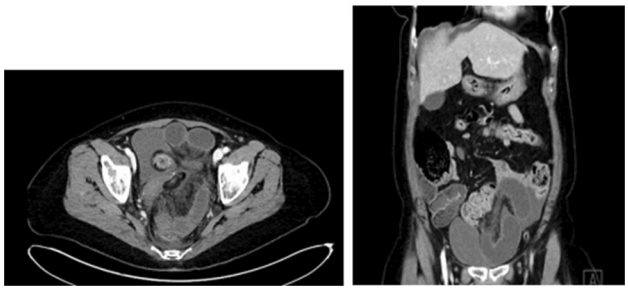
Tamar Sherman, DO; Erica Amianda, PA; Meiyi Shi, MD; Khashayar Shakiba, MD; Stephen Pereira, MD; Hackensack University Medical Center

Introduction: Early postoperative small bowel obstruction (EPSBO) occurs within 30 days of the index procedure in 0.7–3% of cases. Conservative nasogastric decompression success rate is 87%. The leading causes of EPSBO are adhesions or inflammation. Sacrocolpopexy (SC) treats vaginal prolapse and its overall incidence of small bowel obstruction (SBO) is 1% of cases, with mean time to SBO after SC of 1.9 years. EPSBO after SC rarely presents with bowel ischemia. However, findings suspicious for bowel ischemia should prompt urgent surgical intervention. This is the first reported case of sigmoid colon adherence to exposed mesh causing internal hernia after sacrocolpopexy.

Case Presentation: A 75-year-old female three weeks after an uncomplicated robotic-assisted hysterectomy and sacrocolpopexy with mesh presented with abdominal pain, nausea, and vomiting. She presented hemodynamically stable with a benign exam. Imaging revealed a closed loop obstruction with transition points in the lower pelvis and early ischemic changes. Labs were significant for a leukocytosis of 14,300. A nasogastric tube was placed and she underwent diagnostic laparoscopy. The anterior sigmoid colon was

adhered to exposed mesh with small bowel herniating through the newly formed orifice. The colon was dissected off the mesh and the exposed mesh was excised. 65 cm of ischemic small bowel was found and resected and an end-to-end small bowel anastomosis was created. Her postoperative course was uneventful and she was discharged on post-op day 4.

Discussion: This case describes a rarely reported instance of an EPSBO due to an internal hernia, after SC leading to bowel ischemia. EPSBO is typically managed successfully with conservative treatment. A review of 101 EPSBO patients demonstrated a 20% rate of surgical intervention after initial nasogastric tube placement. No patients had findings of bowel ischemia, proposing that EPSBO can be conservatively managed as bowel ischemia is an unlikely etiology for obstruction. Incidence of bowel obstruction after SC is quite rare and was reported to be managed surgically in only 0.6–8.6% of cases. Of the 3,231 patients in a multi-center case series that underwent SC, 1% (32 patients) presented with SBO. Thirteen were managed surgically and eight required bowel resection. It is imperative to consider bowel ischemia in the EPSBO patient, as internal hernias, although rare, can present in the early weeks after index procedure, despite a patient's clinical picture appearing benign.



P078

Transvaginal Removal of Large Low-Grade Appendiceal Mucinous Neoplasm

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Low-grade appendiceal mucinous neoplasm is a rare cancer that can be misdiagnosed as an ovarian lesion. We report the case of a 59-year-old female initially evaluated by gynecology and found to have a right adnexal mass after presenting for postmenopausal bleeding, cramping, and abdominal bloating. On physical exam, a mobile mass was palpable in the right cul-de-sac. Biochemical tests including CA-125, inhibin A/B and CA 19–9 were within normal limits. However, CEA was elevated at 12.3. Transvaginal ultrasound revealed a 10.9 × 4.7-cm solid complex mass and thickened endometrium. CT confirmed findings of right likely ovarian mass and did not demonstrate evidence of invasive disease. Given suspicion for ovarian malignancy, patient was offered and accepted robotic-assisted hysterectomy and bilateral salpingo-oopherectomy. Intraoperatively, the ovaries, uterus, and peritoneum were examined and found to be normal without masses or implants; however, a massively dilated appendix (10 cm) was visualized in the right cul-de-sac. At this point, general surgery was consulted for the intraoperative finding and patient's spouse was additionally consented for an appendectomy. Given the unknown pathology of the mass, the gynecology team proceeded to perform the hysterectomy and bilateral salpingo-oopherectomy in standard robotic fashion. Prior to closure of the vaginal cuff, we performed a robotic-assisted appendectomy, taking the mesoappendix with a bipolar device and the base of the appendix with a stapler. To prevent intraabdominal spillage, the mass was placed in a retrieval bag and delivered through the vaginal opening negating the need to extend one of our port incisions. Gynecology then closed the vaginal cuff. The mass was opened on the back table and mucin was encountered. Pathology revealed a stage Tis low-grade appendiceal mucinous neoplasm with no high-grade dysplasia, extra-appendiceal mucin, or lymphovascular invasion. Margins were negative for neoplasm. The patient did well postoperatively and was discharged home on post-operative day one. She has since followed up with general surgery and gynecology and will be seen in the surgical oncology for discussion of surveillance. She is unlikely to require further intervention given pathological grade and absence of extra-appendiceal mucin. The purpose of presenting this case is to highlight the diagnostic challenge posed by appendiceal mucinous neoplasms, the importance of maintaining a broad differential in evaluation of intraabdominal lesions without conclusive biochemical findings, and the utility of a transvaginal extraction for large specimen removal as part of a combined surgical case.

P079

Small Bowel Volvulus Around PEG Tube

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Percutaneous endoscopic gastrostomy (PEG) tube placement is a common procedure with possible but serious complications. Of reported PEG tube-associated volvulus complications, many are seen months to years after placement. We present a unique case of small bowel volvulus around a PEG tube manifesting on post-operative day two. A 77-year-old chronically bed-bound male with a history of chronic dysphagia was admitted for failure to thrive and associated metabolic encephalopathy. Due to ongoing severe protein calorie malnutrition, a 20-Fr PEG tube was placed without any initial complications. The patient initially tolerated tube feeds through his PEG tube but began developing abdominal pain on post-operative day two. Computed tomography of the abdomen revealed the PEG tube in a posterior position, tethered with swirling of adjacent vasculature. The patient developed worsening leukocytosis, tachycardia, and unresolved lactic acidosis. Upon exploratory laparotomy, the gastrostomy tube was found to traverse the small bowel mesentery inferior to the transverse colon and terminate inside the edge of the greater curvature of the stomach 5 cm from the pylorus, resulting in a small bowel volvulus. The PEG tube was removed and a new 22-Fr gastrostomy tube was placed. The patient recovered uneventfully and was discharged to a long-term rehabilitation facility. Awareness and early recognition of this potential complication of this commonly performed procedure are prudent and essential.

P080

Right iliac fossa pain: A rare case of triple pathology

Vivian Phan, Miss; Nabeela Malik, Miss; Khizar Kayyani; Dimitrios Stamatiou; University Hospitals Birmingham

Introduction: Right iliac fossa (RIF) pain is a common emergency surgical presentation. While appendicitis is often suspected, other conditions must be considered. Meckel's diverticulum, the most common congenital anomaly of the small intestine, may cause acute inflammation or gastrointestinal blood loss. A neuroendocrine tumour

(NET) is a rare malignancy. Triple presentation of acute appendicitis, Meckel's diverticulitis, and a NET is an extremely rare occurrence.
Case Study: A fit and well 34-year-old male patient presented with RIF pain and clinical features of acute appendicitis. He presented to the emergency department 4 months previously with lower abdominal cramps and watery stools with fresh blood preceded by a restaurant meal: he was discharged home with antibiotics for "gastroenteritis." He underwent laparoscopy for suspected appendicitis. Intraoperatively, purulent appendicitis as well as a separate interloop abscess associated with an inflamed Meckel's diverticulum was visualized. Laparoscopic appendicectomy and washout were performed, followed by mini-laparotomy and wedge resection of the Meckel's diverticulum. His post-operative recovery was uncomplicated. Histological examination revealed a perforated Meckel's diverticulum containing a completely resected, well-differentiated NET, with an MDT recommendation for no further management.
Conclusion: We reiterate the importance of remaining alert to the possibility of additional or alternative diagnoses in the management of patients with RIF pain, including the early presentation of intra-abdominal malignancies. The broad visual field enabled by the laparoscopic approach facilitates easier recognition of diagnoses other than appendicitis. In this case, co-incidental development of appendicitis facilitated early detection and cure of an uncommon GI malignancy.

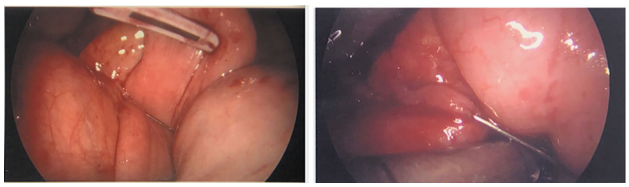
P082

Internal Hernia Secondary to Extruded Inferior Vena Cava Filter Limb Causing Small Bowel Volvulus

Michael Shockley, MD; Luis Serrano, MD; Fuad Shahin, MD; UCF/HCA GME Consortium Greater Orlando—HCA Florida Osceola Hospital

Introduction: Inferior vena cava (IVC) filters have become commonplace treatment modalities for prevention of pulmonary embolism. There are several known intra-peritoneal complications of these devices, including hemorrhage, bowel perforation, and scarring leading to small bowel obstruction. Our project describes the rare entity of small bowel volvulus due to creation of an internal hernia from an extruded IVC filter limb. Also, we propose a minimally invasive approach to managing this scenario with laparoscopic images of notable findings.
Case Presentation: The patient is a 31-year-old female with a history of a traumatic brain injury secondary to a motor vehicle accident status post-IVC filter placement, who presented to the hospital with abdominal pain and nausea/vomiting. Her computed tomography scan demonstrated the superior mesenteric artery positioned to the right of the superior mesenteric vein, associated with intestinal malrotation, and the majority of the small bowel located to the right of midline. She was diagnosed with acute small bowel volvulus and she was taken to the operating room for diagnostic laparoscopy. This revealed an internal hernia involving a metallic limb of her IVC filter protruding from retroperitoneum into the small bowel mesentery. To prevent loss of control of the extruded limb and damage to small bowel mesentery, a small, supraumbilical incision was made. The distal end of the IVC filter limb was dissected free from the mesentery. It was traced back to retroperitoneum and transected using a wire cutter. The obstruction and rotation of the small bowel were corrected. There was no further bowel injury or ischemia. She had an unremarkable postoperative course with tolerance of diet and return of bowel function within 48 h. She was discharged home and subsequently seen in clinic with no issues.
Discussion: This case is an example of a rare complication of IVC filter placement. They are associated with intra-peritoneal complications, such as duodenal perforation and adhesive small bowel obstruction. There have been limited case reports discussing small bowel volvulus secondary to IVC filters. In the literature, the surgical approach to this phenomenon has been via exploratory laparotomy. This case features an initial laparoscopic approach for localization followed by minimal open approach for control of the IVC filter limb and transection. As the laparoscopic images demonstrate, this can be reliably diagnosed and subsequently managed in a less invasive fashion leading to sustainable results, early return of bowel function, and reduced hospital stay.





P083

Diverticulitis of the appendix: a rarely identified pathology before surgery

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Background: Although acute appendicitis is one of the most common surgical pathologies, diverticular disease of the appendix (DDA) remains a rare and poorly understood entity. We present a systematic review and case report of DDA. A search strategy was employed on PUBMED, 265 articles were reviewed, and a total of 68 articles were summarized. DDA constitutes 0.004–2.1% of cases of presumed appendicitis, and the general incidence ranges from 0.0014 to 1.90%. 1 Found more often in males than females, DDA tends to occur in the third to fifth decades of life. 2–4 DDA is rarely identified on preoperative imaging, and the majority of reported cases are identified histopathologically.
Case Presentation: This is a 36-year-old female with acute appendicitis and diverticulitis of the tip of the appendix. At admission, the patient reported 2 weeks of intermittent epigastric and right-upper quadrant pain. Notably she did not have any right lower quadrant pain. Past medical and surgical history included active smoking, laparoscopic cholecystectomy, cesarean section, and tubal ligation. CT abdomen and pelvis with oral and IV contrast demonstrated distal thickening of the appendix and surrounding inflammation indicative

of acute appendicitis. The patient was brought to the OR for laparoscopic appendectomy and found to have an inflamed appendix. Unexpectedly, pathology results five days later showed acute appendicitis and diverticulitis of the tip of the appendix (Fig. 1). While the patient's abdominal pain had resolved by this time, her case brings up the question of how DDA should be managed.

Discussion: DDA represents a rare subtype of acute appendicitis and holds a greater risk of perforation5 and high association with malignancy. 1,6,7 The majority of cases are identified intraoperatively or postoperatively. If identified preoperatively or incidentally, resection should be considered even if asymptomatic. Failure of early identification, although paramount to improve patient outcomes, remains a current clinical weakness.

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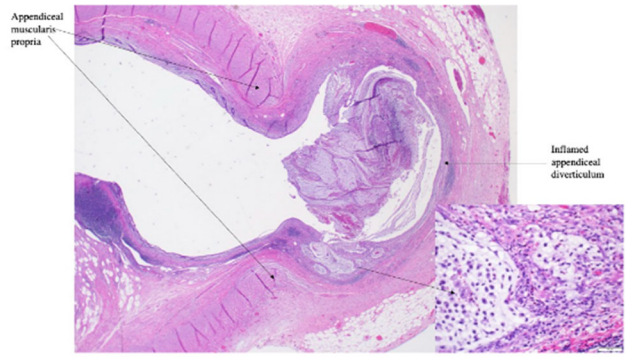


Figure 1: Pathology report of acute appendicitis showing diverticulitis

Figure 1 Pathology report of acute appendictis showing diverticulitis

P085

Massive Transfusion in Trauma: Does Payer Status Decrease Futile Transfusion?

Monique Arnold, MD; Madeleine Higgins, MD; Anthony Kopatsis; Matthew Conn, MSN, CCRNK, TCRN; Katherine Kopatsis; Yamira Bell, MD; George Agriantonis, MD; Jennifer Whittington, MD, PhD; Tony Kopatsis, MD; Mount Sinai

Introduction: Blood shortages are a national crisis creating dangerous scenarios for patients requiring massive transfusion protocol (MTP) in the trauma setting. Judicious use of blood product is critical to rescue salvageable patients while refraining from unnecessary MTP to save precious resources. We evaluate RBC transfusion volume and in-ED deaths relationship to payer status as markers of futility in trauma patients receiving MTP.

Methods: An urban Level I Trauma Center database was analyzed from 1/1/2017 to 06/30/2022. All patients presenting to the ED as trauma activations were included. RBC transfusion volume during initial resuscitation, as well as baseline patient and trauma event characteristics including region (zip code) and payer status. Patients who received massive blood transfusion (> = 5 units of RBC/24 h) were compared to those who did not. Multivariate analysis assessed relationships between MTP activations in the ED.

Results: Among the 11,098 patients, ED mortality rate was 1.2% (n = 132). Injury severity score (ISS) was higher in patients receiving MTP (14.7 vs.7.49, $p < 0.01$) and patients with penetrating trauma were more likely to receive MTP (32.8% vs. 10.1%, $p < 0.001$). Mean probability of survival was lower in the MTP group (0.73 vs. 0.97, $p < 0.01$). The median age of patients receiving MTP was younger (43.2 years vs. 51.3 years, $p < 0.01$). There was no difference in MTP status based on gender MTP given ($p = 0.15$), (female 33%, male 67%) vs. MTP not given (female 21.3%, male 78.7%), race ($p = 0.49$), ethnicity ($p = 0.50$), or region, urban vs. rural ($p = 0.06$). MTP was transfused was found to have been transfused more often in the died-in-ED group (7.6% vs. 0.5%, $p < 0.001$). Patients on Medicaid were more likely to have received MTP (only 37.7% of patients receiving MTP were on Medicaid compared to 62.3% non-Medicaid, $p < 0.05$); patients on Medicare were less likely to receive MTP (6.6% of patients receiving MTP on Medicare vs. 93.4% non-Medicare; $p < 0.05$). The discriminatory value for amount of PRBC transfused alone on whether a patient lived or died was high (AUROC 0.604 [95% CI 0.57 to 0.64]).

Conclusion: Patients with penetrating trauma and higher ISS are more likely to receive MTP, regardless of their probability of survival. Patients over the age of fifty years, Medicare recipients, and patients with blunt trauma are less likely to receive MTP. Assessing futility of MTP should be equitable and future transfusion guidelines should consider salvageability in cases with low probability of survival despite age and mechanism.

P086

Laparoscopic Management of an Intraoperatively Discovered Cholecystoduodenal Fistula After ERCP for Choledocholithiasis: A Case Report and Literature Review

Devin J Clegg, MD; Jacob H Creighton, MD, MPH; Alexander C Cavalea, MD; University of Tennessee Graduate School of Medicine

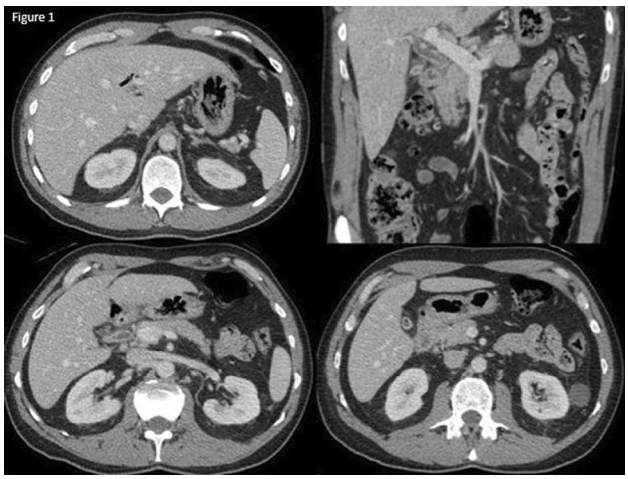
Biliary-enteric fistulas (BEFs) have an incidence of 0.15–5%, with cholecystoduodenal fistula (CCDF) accounting for the majority. Risk of development is higher with age > 60 years, larger gallstones, chronic biliary disease, and female sex. CCDF can cause perforation, infection, bleeding, or gallstone ileus. Historically, most BEFs were diagnosed intraoperatively, leading to conversion to open surgery. While imaging and endoscopic advancements have improved diagnosis, it remains challenging in absence of gallstone ileus, as most findings are not specific to distinguish CCDF from other biliary pathology. While literature supports safe and effective laparoscopic management for select BEFs, many are still converted to open surgery. We present a case of an intraoperatively discovered CCDF managed laparoscopically and review the current literature, as the recognition of this pathology is imperative for safe surgical management.

A 54-year-old male presented with new onset abdominal pain, vomiting, leukocytosis, transaminitis, hyperbilirubinemia, and

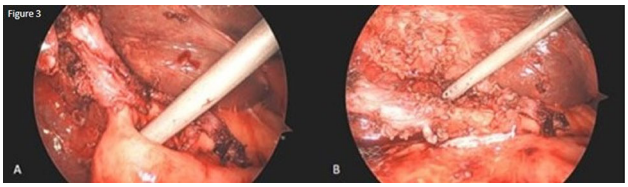
elevated alkaline phosphatase. CT imaging demonstrated a contracted gallbladder with CBD of 9 mm and pneumobilia concerning for choledocholithiasis with cholangitis (Fig. 1). After admission on antibiotics, EUS/ERCP yielded choledocholithiasis which was cleared with sphincterotomy. The following day he was taken for laparoscopic cholecystectomy with cholangiogram.

Intraoperatively, there were significant adhesions with a contracted intrahepatic gallbladder. As the infundibulum was dissected, a tubular structure leading from the lateral infundibulum to the duodenum was encountered. To better define anatomy, a dome-down dissection was performed mobilizing the gallbladder off the cystic plate until the infundibulocystic junction was encountered more medially. To confirm anatomy, a cholangiogram was performed through the gallbladder with brisk opacification of the duodenum without filling of the biliary tree (Fig. 2A). These findings were felt to suggest a CCDF. Further dissection isolated the fistula and exposed the cystic and CBD junction (Fig. 3A). The suspected fistula was occluded with a grasper and repeat cholangiogram was performed, demonstrating opacification of the biliary system with emptying into the duodenum (Fig. 2B). The fistula was divided with an endoscopic stapler (Fig. 3B) and cholecystectomy completed. The patient was discharged the following day, and at 4-week follow-up was recovered without complication.

While CCDFs are rare, recognition is paramount for surgeons in the acute and elective settings. There are a paucity of literature pertaining to safe laparoscopic management, especially when discovered intraoperatively despite imaging and endoscopy. This case highlights principles of safe cholecystectomy, adjuncts such as cholangiogram, and stapler technology for fistula division, allowing for reproducible techniques among surgeons.







P087

Obstruction of proximal jejunum due to anomalous congenital mesenteric band with herniated bowel

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Introduction: Small bowel obstruction (SBO) is the most common cause of surgical emergencies of the small bowel, predominantly due to postoperative adhesions. While far more common in children, congenital mesenteric bands are a rare, and unpredictable cause of SBO, especially in adults without history of abdominal surgery, trauma, or clinical hernia.
Case Presentation: We present a 56-year-old male with a history of hypothyroidism, with no previous history of abdominal surgery or pathology, that presented to the emergency department with a 1-day history of sharp abdominal pain and nausea. On exam, vital signs were normal, and the physical exam revealed a diffusely tender abdomen without rebound or guarding. Initial investigations included laboratory findings that were significant only for leukocytosis of 14,600/mm^3 with left shift and a comprehensive metabolic panel that revealed an elevated lactate level of 2.3 mmol/L. Computerized tomographic imaging of the abdomen showed dilated loops of small bowel in the mid-jejunum compatible with small bowel obstruction. At laparoscopy, multiple distended bowel loops were seen at the terminal jejunum, along with two non-contiguous segments of small bowel herniated through a congenital mesenteric band. The band was cut with scissors to decompress the bowel and release the dusky-appearing herniated segments. The dusky bowel was immersed in warm saline until the return of normal color before returning the bowel to its natural position. The patient had an uncomplicated postoperative recovery and returned home 4 days later.
Discussion: This report highlights the importance of considering a congenital mesenteric band as a cause for small bowel obstruction, especially in a person with no previous abdominal surgery or pathology, to reduce the risk of bowel strangulation while illuminating the numerous variations of congenital mesenteric bands.

P088

Association of Trimester on Management and Outcomes of Adhesive Small Bowel Obstruction During Pregnancy

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Introduction: There are increased risks of maternal and perinatal complications in pregnant patients with adhesive small bowel obstruction (ASBO) who fail non-operative management and undergo delayed surgery. However, the effect of pregnancy trimester on this population is unknown. The objective of this study is to report the association between management and outcomes of ASBO patients during each trimester.

Methods: The National Inpatient Sample was queried for pregnant women diagnosed with ASBO between October 2015 and December 2019. Patients were stratified by trimester of pregnancy and categorized into three management strategies: non-operative management (NOM), immediate surgery (within 1 hospital day of admission), or delayed surgery (> 1 hospital day). Multivariable regression analyzed the association between management strategies and maternal/perinatal complications in each trimester.
Results: A total of 1,005 pregnant women with ASBO were identified: 130 (13%) first trimester, 205 (20%) second trimester, and 670 (67%) third trimester. There was no significant difference in the rate of surgical intervention between trimesters (15 [12%] first trimester vs 70 [34%] second trimester vs 180 [27%] third trimester, p = 0.124). In the second trimester, there was no difference in perinatal complications between successful NOM and immediate surgery; however, delayed surgery was associated with increased odds of preterm delivery (OR: 16.59, 95% CI 1.26–218.5, p = 0.034). Third trimester patients had decreased odds of maternal complications when immediate surgery was performed (OR: 0.21, 95% CI 0.045–0.96, p = 0.044), as compared to successful NOM or delayed surgery, while there was no difference in perinatal complications between management strategies.
Conclusion: Our results suggest that the management of ASBO needs to be individualized based on trimester. When operative management is indicated, surgery should not be delayed, highlighting the need for prompt diagnosis and well-defined management strategies to improve outcomes.

P089

Not Just Testicles and Ovaries: A Case Report of Gallbladder Torsion

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Background: Gallbladder torsion is a rare pathological entity causing acalculous cholecystitis. More common in elderly women, it is an important diagnosis to include in the differential for right upper quadrant pain. We describe intra-operative diagnosis of gallbladder torsion as the etiology of gangrenous cholecystitis and bilious peritonitis.
Case: A 91-year-old woman with a history of appendectomy and right hemicolectomy presented with two days of right-sided abdominal pain. Physical examination revealed positive Murphy's sign as well as tenderness in the right lower quadrant. Laboratory studies revealed a leukocytosis of 22,000, bandemia of 19%, lactic acid of 2.1, total bilirubin of 1.1, normal aspartate transaminase, and alanine transaminase levels. Initial computed tomography demonstrated a distended and thick-walled gallbladder with intra- and extra-hepatic biliary ductal dilatation suggestive of acute cholecystitis without clear evidence of perforated or gangrenous cholecystitis. Ultrasound revealed a gallbladder wall thickness of 0.80 cm, common bile duct diameter of 1.2 cm, and no cholelithiasis. Magnetic retrograde cholangiopancreatography (MRCP), which was performed to evaluate for presence of a mass or stone causing ductal obstruction, again demonstrated a distended and thick-walled gallbladder with surrounding edema but did not reveal a mass or stone.
Intravenous antibiotics and crystalloid resuscitation were initiated. The patient was taken to the operating room for laparoscopic cholecystectomy. Intraoperatively, there was purulent bilious ascites, adhesions from the gallbladder to the omentum and hepatic flexure of the colon, and patchy necrosis of the gallbladder. The gallbladder appeared rotated 180° counterclockwise with the infundibulum positioned anterosuperior and the fundus posteriorly, so the gallbladder was rotated clockwise. There were minimal attachments from the gallbladder to the cystic plate and a pendulous cystic mesentery. The cholecystectomy was performed without complication. The pathology report revealed transmural necrosis and no malignancy. The patient was discharged postoperative day 7 to a skilled nursing facility.
Conclusion: The case described demonstrates the insidious presentation of acute acalculous cholecystitis from gallbladder torsion as well as the risk for gangrenous cholecystitis and gallbladder perforation. Despite improvement in imaging technology, it is often a diagnosis made intraoperatively. It should remain on the differential diagnosis for etiologies of acute acalculous cholecystitis, particularly in elderly women.

P090

Contained Intramesenteric Perforated Diverticulitis: a Literature Review and Case Report

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Background: Colonic diverticulitis is a common surgical pathology often requiring intervention. Contained intramesenteric abscess from perforated colonic diverticulitis, however, is rare and the risk of ruptured mesenteric abscess from colonic diverticulitis even rarer. We present a literature review and case report of a perforated mesenteric abscess secondary to sigmoid diverticulitis that resulted in an intra-abdominal disaster. A comprehensive literature search was employed on PUBMED resulting in 53 articles, with a total of 2 deemed applicable.
Case Presentation: This is a 66-year-old male with recurrent episodes of diverticulitis who presented with 2 weeks of diffuse and progressively worsening lower abdominal pain. An outpatient CT (Figs. 1, 2) revealed thickening of the sigmoid colon with contained perforation measuring 7 × 8 × 13 cm in the mesocolon. On admission, he was hemodynamically normal, with work-up remarkable for leukocytosis. Because the collection was contained and the patient was hemodynamically normal, the initial management proposed was nonoperative with IV antibiotics. IR did not have a safe window for intervention. Two days later, the patient clinically deteriorated and a decision was made to proceed to the OR for exploratory laparotomy. Upon entering the abdomen, dense adhesions were encountered and ultimately a window was created to unroof the large mesenteric abscess. However, the cavity was densely adherent to viscera, requiring appendectomy, partial sigmoid colectomy, and small bowel resection and end colostomy. Months later, an attempt at reversal was made, but failed due to rectal stump hematoma and local necrosis and leak with intact anastomosis, requiring creation of end ileostomy and mucous fistula in the following months. The patient ultimately underwent final, uncomplicated ileostomy reversal. One year later he has since been doing well.
Discussion: Intramesenteric abscess remains a poorly understood consequence of colonic diverticulitis. We argue that contained intramesenteric abscess from perforated colonic diverticulitis, due to the difficult mesocolic anatomic location, will likely fail nonoperative management. Additionally, spread of infection into the retroperitoneum, rather than the peritoneum, can be misleading clinically (e.g., no peritoneal signs). Therefore, we suggest a lower threshold to proceed surgically for this specific disease process.
Works Cited

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Fig. 1 Coronal CT abdomen and pelvis with abscess

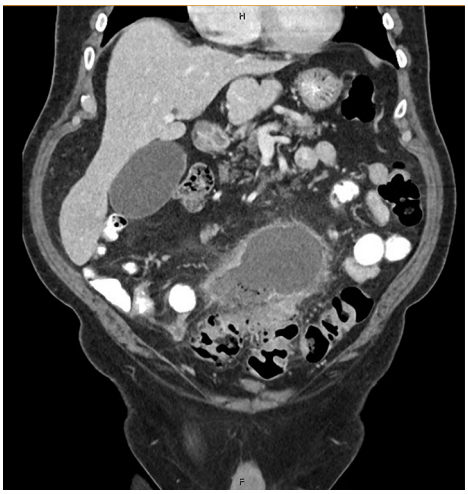
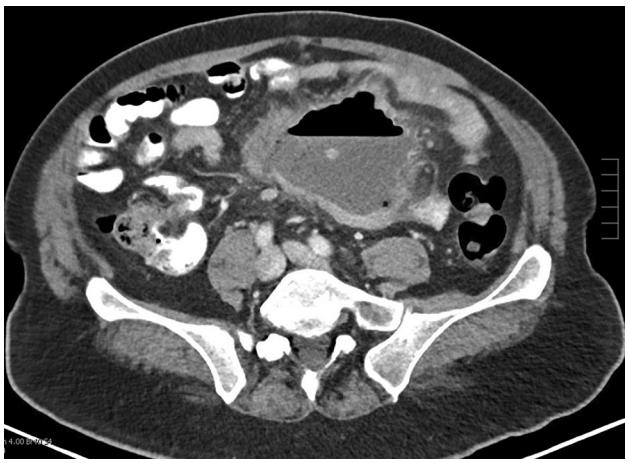


Fig. 2 Axial CT abdomen and pelvis with abscess



P091

Acute intussusception cause by suspected secukinumab-induced inflammatory bowel disease

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Introduction: Secukinumab (Cosentyx) is a monoclonal antibody that functions by inhibiting the proinflammatory cytokine IL-17. It is effective in treating several inflammatory conditions, such as plaque psoriasis, ankylosing spondylitis, and hidradenitis suppurativa. Despite its anti-inflammatory function, there are increasing numbers of case reports which describe patients developing inflammatory bowel disease (IBD) while taking this medication. We present a case of a young female with new onset right lower quadrant pain, ultimately diagnosed with IBD thought to be due to Cosentyx therapy.
Case Presentation: A 38-year-old female presented with several days of progressive right lower quadrant abdominal pain associated with multiple episodes of diarrhea. She had a history notable for hidradenitis suppurativa managed with adalimumab (Humira) but was transitioned to Cosentyx by her dermatologist two months prior. Work-up was significant for leukocytosis, terminal ileitis, and a 4.3-cm ileocolic intussusception. Given this clinical presentation, we theorized that the ileitis was secondary to the intussusception. The patient was subsequently started on antibiotics and taken to the operating room for diagnostic laparoscopy. Intraoperatively, the intussusception had spontaneously reduced and a short segment of inflamed terminal ileum was encountered. Postoperatively, the patient's pain significantly improved and she was discharged from the hospital the following day with a course of amoxicillin/clavulanate only to be readmitted three days later with continued fevers, leukocytosis, and diarrhea. She was transitioned to ciprofloxacin and metronidazole and discharged several days later following a negative infectious work-up and improvement in her symptoms. She followed up with gastroenterology and was diagnosed with Crohn's disease based on ileal biopsy. Her symptoms continually improved following discharge, and she was restarted on Humira several months later. Follow-up magnetic resonance enterography demonstrated improved inflammation suggesting Crohn's disease remission. At this time, it is more than 18 months after initial presentation, and the patient has had no further abdominal pain.
Discussion: Cosentyx was originally developed to help treat multiple inflammatory conditions, including IBD. Counterintuitively, it was found in phase II trials to be ineffective for treatment of IBD and even led to more adverse events when compared to placebo. In this patient with vague right lower quadrant pain, the differential is wide and includes infectious, inflammatory, vascular, congenital, traumatic, and autoimmune causes. Cosentyx-induced terminal ileitis should also be considered in the appropriate clinical setting.

P092

Revision of bariatric surgery for gastroesophageal reflux disease: characterizing patient and procedural factors and 30-day outcomes

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Introduction: Gastroesophageal reflux disease (GERD) is a well-established potential consequence of bariatric surgery. In severe cases, it can require revisional surgery to a second procedure. Our understanding of the population requiring revision, and their associated outcomes, is limited. In this study, we aim to characterize patients with GERD requiring revisional surgery to better understand their perioperative risks and identify strategies to improve their outcomes.
Methods: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) registry was used to identify a retrospective cohort of patients who required a conversion surgery for GERD in 2020. Categorical data are described by absolute values and percentages, while continuous data are described by means and standard deviations. Multivariable logistic regression modelling was used to assess correlations between baseline characteristics and 30-day serious complications and 30-day mortality.
Results: A total of 4412 patients required revisional surgery for the indication of GERD, encompassing 40.5% of all conversion procedures. The mean age of these patients was 47.4 ± 10.7 years and the majority of the patients were female (n = 4032, 91.4%). Most patients had a pre-existing history of GERD (n = 3711, 84.1%). The mean body mass index of the cohort was 38.0 ± 7.22 kg/m2 with 34.2%

(n = 1509) of patients having hypertension. In the majority of cases, patients had undergone sleeve gastrectomy as their original surgery (n = 3535, 80.1%), with a smaller proportion having undergone adjustable gastric banding (n = 680, 15.4%). The revisional surgery for most patients was a Roux-en-Y gastric bypass (RYGB) (n = 3722, 84.4%).
Serious complications related to the revision surgery occurred in 527 patients (11.9%) and 10 patients (0.23%) died within 30 days of surgery. Significant serious complications included anastomotic leak in 31 patients (0.70%) and gastrointestinal bleeding in 38 patients (0.86%). Multivariate analyses revealed post-operative anastomotic leak as a significant predictor of mortality, while operative length, pre-operative GERD, and RYGB were all significant predictors of serious post-operative complications.
Conclusion: GERD is a common indication for revisional surgery in patients who have undergone bariatric surgery, comprising over 40% of all revision cases. Pre-existing GERD and the primary surgery being the sleeve gastrectomy seem to be important risk factors. Further inquiry is needed to understand how we can best tailor operative approaches and pre-operative optimization to improve outcomes for revisional surgery patients.

P093

Trends in Revisional bariatric surgery at a single MBSAQIP accredited academic medical center

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Introduction: The prevalence of morbid obesity continues to increase in the USA. Bariatric surgery is currently the only safe and effective treatment for this condition. Revisional procedures are currently the third most common form of bariatric surgery after sleeve gastrectomy (SG) and gastric bypass (GB). Large databases such as MBSAQIP and other national registries report the incidence of revisional procedures, but do not provide granular data, such as index operation and reason for revision. The purpose of this study is to evaluate the trends in revisional surgery over and changes in outcomes over time during the study period at this institution.
Setting: U.S. Academic medical center.
Methods: Retrospective analysis was performed on an institutional data registry of patients who underwent revisional bariatric surgery between 2012 – 2022. Two full-time bariatric surgeons performed the procedures at this institution.
Results: Between 2012 and 2021, 317 patients required re-operations after bariatric surgery at this institution. In 2020, RYGB was the most common index bariatric procedure constituting 57% (n = 30) of revision cases, followed by SG, which accounted for 36% (n = 19).
Conclusion: Revisions after laparoscopic gastric band are decreasing in frequency. Revisions after SG and GB are increasing over time. Bariatric surgery is safe and overall has low complication rates. These trends must be observed and patients should be appropriately counseled regarding possible need for re-operation after SG. There was a decrease in revisional surgery volume in 2021 due to COVID pandemic and staffing shortages.

P094

Assessment of changes in bone mineral density using dual-energy x-ray absorptiometry scan after bariatric surgery

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Introduction: Morbid Obesity an emerging health problem is surgically treated around the world which can have a detrimental effect on bone and mineral metabolism. Dual-energy x-ray absorptiometry (DEXA) scan measures Bone Mineral density (BMD) at the spine and hip, calculates T & Z scores to evaluate individuals at risk of osteoporosis, and accesses the potential risk of fracture.
Aim & Objectives: Primary Objective: Evaluate BMD using dual-energy x-ray absorptiometry scan in patients undergoing bariatric surgery.
Secondary Objective: Correlate BMD by DEXA Scan with the levels of serum calcium and vitamin D before and after bariatric surgery.
Materials & Methods: Prospective observational study was conducted after obtaining IEC clearance. Sample size calculation was done by and a convenient sample of 60 patients were taken satisfying inclusion and exclusion criteria. DEXA scan was done pre-operative and 90-day post-operative after bariatric surgery along with blood parameters of serum calcium level and serum vitamin D. Results were analyzed using SPSS 17.0 version.
Results: In mean age of 46.4yrs, 16/60 underwent malabsorptive procedure, while primarily restrictive was done in 44/60. At POD90, BMI (P-Value < 0.001), Serum Calcium (P-Value < 0.001) and Vitamin D (P-Value < 0.001) levels were significantly less compared to pre-operative levels, while decreased trends seen in BMD (p-value 0.005), T-Score (p-value 0.032), and Z-Score (p-value 0.048) were not statistically significant. Post-operative positive Pearson Correlation-R was significantly seen only with T-score ($p < 0.001$), Z-score ($p < 0.001$), and serum calcium level ($p = 0.002$). No significant gender, age ,or type of surgery (Malabsorptive vs Restrictive) correlation were found.
Conclusion: Bariatric surgery decreases both BMI and BMD which is evident on DEXA scans (T-Score & Z-scores. BMD can be positively correlated with decreasing levels of Serum calcium and Vitamin D. Serum calcium and vitamin D supplementation did not alter post-operative decreased levels.

P095

Roux-en-Y gastric bypass vs. vertical sleeve gastrectomy in BMI < 50: long -erm surgical outcomes

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Introduction: Vertical Sleeve Gastrectomy (VSG) is becoming an increasingly popular surgical treatment for morbid obesity compared to Roux-en-Y Gastric Bypass (RYGB) which used to be the gold standard in North America. The aim of this study was to evaluate the 5-year outcome of VSG in comparison to RYGB in patients with

BMI < 50 who did not have RYGB due to operative difficulty or as part of two stage duodenal switch.

Methods: Data collected in Ontario Bariatric Registry between 2010 and 2021 were used to compare long-term outcomes of patients undergoing VSG or RYGB (currently the gold standard) with BMI less than 50. Intention to treat analysis was performed. Results include conversions.

Results: Of the 17 267 patients that underwent surgical treatment, 15 311 (88.7%) had RYGB (baseline BMI 44.0; age 44.4 years; 85.6% female) and 1956 (11.3%) had VSG (baseline BMI 43.8, age 49.0 years; 80.9% female). The follow-up data were available for 3344 RYGB at 3 years and 1220 at 5 years. For VSG, 313 patients had 3-year follow-up and 105 patients had 5-year follow-up.

		RYGB	VSG	p-value
%EWL, mean (SD)	5 year	65.4 (28.7)	48.4 (28.0)	**<0.0001**
Improvement in GERD	5 year	40.4%	2.5%	**<0.0001**
Improvement in Diabetes	5 year	35.9%	18.4%	**0.0003**
Improvement in OSA	5 year	42.8%	20.4%	**<0.0001**
Improvement in Musculoskeletal Pain	5 year	29.9%	10.7%	**<0.0001**
Conversion %	5 year	0.07%	2.2%	**<0.0001**

Conclusion: RYGB results in more favorable weight loss, better resolution of co-morbidities, and less surgical conversions at 5 years after surgery.

P096

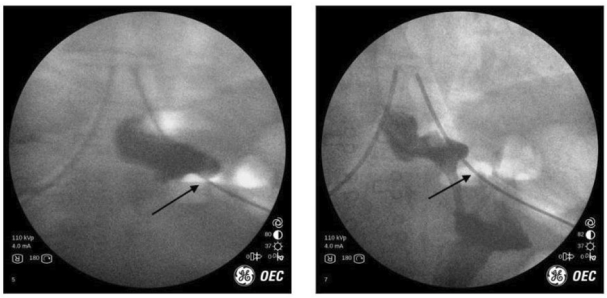
In-Office Fluoroscopy as an Adjunctive Tool in the Work-up of the Post-operative Bariatric Surgery Patient

Crystal S Zhang, MD, MPH[1]; Pial Hope, DO[2]; Samik Patel, MD[2]; Cristina Guerra, MD[2]; Mark Smith, MD[2]; Terive Duperier, MD[2]; [1]Ascension St. Vincent Hospital Indianapolis; [2]Bariatric Medical Institute of Texas

Not only is there a growing number of bariatric procedures being performed, but also several cohorts of patients are getting farther out from index operations. Moreover, while the rates of post-operative complications after bariatric surgery are relatively low, they do occur. There are permanent alterations made to a patient's anatomy which can give rise to a unique set of problems. The work-up of post-operative issues can pose a diagnostic dilemma.

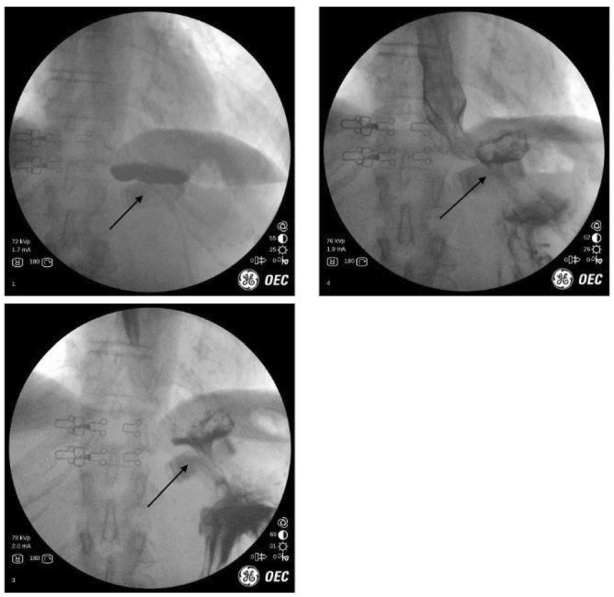
We compiled a list of several patients who underwent bariatric surgery and developed post-operative complications, which we diagnosed and characterized with the assistance of in-office fluoroscopy. In this case series, we have utilized fluoroscopy to identify and resolve issues with gastric bands (Figs. 1, 2) as well as to elucidate anatomic and physiologic problems with gastric sleeves, such as incisural narrowing (Fig. 3), acute angulations (Fig. 4), and gastroparesis (Fig. 5). Similarly, we have been promptly able to identify issues with bypasses, such as "candy cane" syndrome (Fig. 6) and strictures (Fig. 7) during the patient's office visit. The liberal use of fluoroscopy has made it possible for us to identify various etiologic nuances, which in turn has informed our strategies for intervention.

Figure 1. Slipped gastric band.



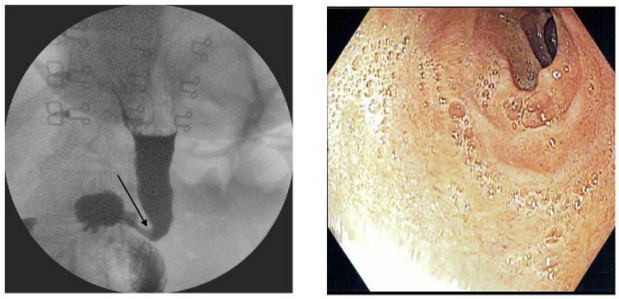
Left: slipped band causing complete obstruction. There is no progression of contrast past the region of the band (arrow pointing to lucent band).
Right: contrast flows easily past region of band after deflation of band (arrow pointing to lucent band).

Figure 2. Over-filled gastric band.



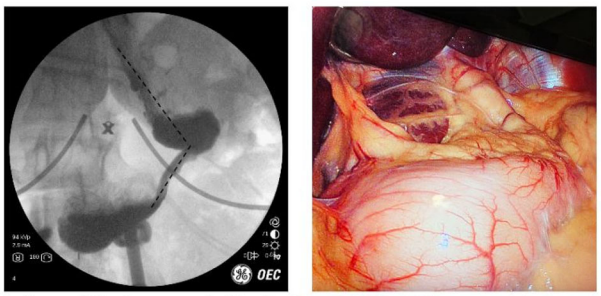
Top Left: no outflow of contrast through the band (arrow pointing to band).
Top Right: trace amount of contrast flowing through the band after a few minutes (arrow pointing to band).
Bottom Left: contrast emptying easily through the band after removing 2.5 mL (arrow pointing to band).

Figure 3. Sleeve narrowing.



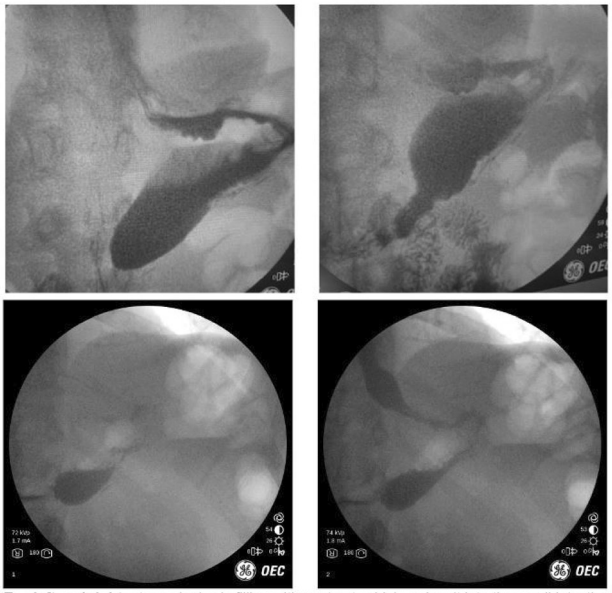
Left: severe narrowing at the incisura (arrow) causing symmetrical dilation of the proximal sleeve.
Right: endoscopic view with normal proximal sleeve lumen caliber that narrows to 1 cm at the incisura.

Figure 4. Acute angulation of the mid-sleeve due to adhesions.



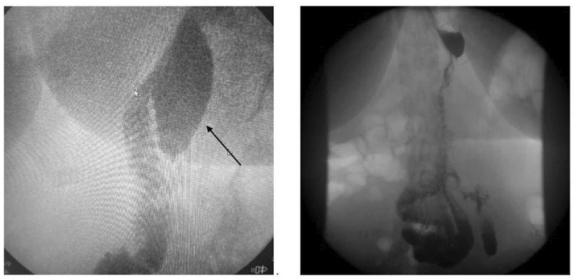
Left: we call this phenomenon the "Pac-Man" sign (dotted line). This was secondary to greater curvature adhesions causing acute angulation along the mid-sleeve, which led to a functional obstruction.
Right: deceptively, unremarkable-appearing intraoperative findings highlighting benefit of preoperative upper GI study.

Figure 5. Gastroparesis after gastric sleeve.



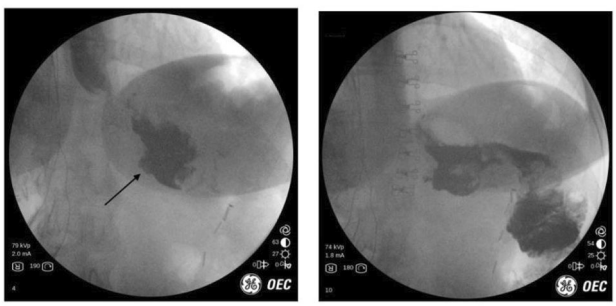
Top left and right: stomach slowly filling with contrast, which makes it into the small intestine, but only after several minutes.
Bottom left and right: after pyloromyotomy; normal transit of contrast through the sleeve into the duodenum.

Figure 6. "Candy cane" syndrome after Roux-en-Y gastric bypass.



Left: contrast filling blind afferent Roux limb at the gastrojejunostomy (arrow) and eventually, the alimentary limb.
Right: normal filling of the gastric pouch and flow of contrast down the alimentary limb after resection.

Figure 7. Stricture at gastrojejunostomy



Left: contrast filling the gastric pouch (arrow) but no contrast flowing distally.
Right: contrast filling the gastric pouch and flowing through the alimentary limb after revision.

Fluoroscopy has also proven to be a tool for patient education and

behavior modification. It has been more effective to demonstrate fluoroscopically to patients what happens when they drink too much or too quickly rather than just counsel them. Correlating their symptoms with real-time imaging provides a highly effective form of dynamic feedback.

In conclusion, we have found in-office fluoroscopy to be an invaluable adjunct not only for the diagnosis of a myriad of problems in the bariatric surgery patient but also as a patient education and behavior modification tool.

P097

Types and Management of Biliary Pathology During Cholecystectomy After Bariatric Surgery: A Single-Institution Review

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Background: The rapid weight loss and bile stasis associated with bariatric surgery portends an increased risk of gallstone formation that can lead to biliary issues. Choledocholithiasis is a particularly challenging problem in patients that have roux-en-y anatomy. This retrospective review aims to examine the rates of biliary disease and management techniques at our institution.
Methods: All patients who underwent bariatric surgery from 2012 to 2022 at our institution were abstracted. Patients that had their gallbladder removed after bariatric surgery were included. Demographic data including sex, age, body mass index prior bariatric surgery, type of bariatric surgery, time between bariatric surgery and cholecystectomy, and percent excess body weight loss at cholecystectomy were included. Specifics on the biliary procedures at time of cholecystectomy were tabulated including cholangiogram findings, need for endoscopic retrograde cholangiopancreatography (ERCP), or common bile duct exploration. Details about biliary procedures were compared between each surgery type.
Results: Of the 2357 total patients that previously underwent bariatric surgery at our institution, 195 (8.3%) subsequently underwent cholecystectomy after bariatric surgery, 93 had previously undergone roux-en-y gastric bypass (RYGB), 99 had undergone sleeve gastrectomy (SG), and 3 had undergone gastric band (GB). Mean time in months since weight loss surgery to cholecystectomy was 18.80 (RYGB group), 19.45 (SG group), and 14.19 (GB group) and was not significantly different ($p = 0.682$). There was a significant difference in mean percent excess body weight loss (eBWL) at the time of cholecystectomy; the RYGB had 51.71 percent, the SG group had 47.03 percent, and the GB group had 13 percent ($p = 0.007$). The type of biliary pathology at the time of cholecystectomy included 12 patients (6.15%) with choledocholithiasis, three of which were RYGB patients and nine of which were SG patients; the type of biliary pathology between groups approached significance ($p = 0.067$). Choledocholithiasis was managed with flushing in two of the RYGB patients and laparoscopic common bile duct exploration (CBDE) in the other RYGB patient. In the SG patients, choledocholithiasis was managed with flushing in two, ERCP in five, and CBDE in two of the nine total patients.
Conclusion: The rate of choledocholithiasis after bariatric surgery is incredibly low, and in some cases has been successfully managed with avoidance of CBDE or ERCP via flushing the duct.

P099

Outcomes of Patients who underwent Transoral Outlet Reduction for Inadequate Weight Loss After Roux-en-Y Gastric Bypass

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Introduction: In patients who experience weight regain or inadequate weight loss after undergoing Roux-en-Y Gastric Bypass (RYGB), Transoral Outlet Reduction (TORe) is a possible revisional endoscopic procedure to augment a patient's weight loss. This study aims to evaluate outcomes of TORe performed at our institution.
Methods and Procedures: This is a retrospective review of patients who underwent TORe for either inadequate weight loss or weight regain after RYGB. Patients with a BMI greater than 30.0 and an EGD showing the gastrojejunostomy outlet diameter measuring greater than 2 cm were offered TORe. TORe was performed using a combination of argon plasma coagulation and either one continuous or multiple interrupted purses string sutures, totaling 360°. The suture was tightened over an 8-mm inflated balloon to confirm post-TORe outlet size. To analyze efficiency of TORe, Absolute Weight Loss (AWL), and Percent of Excess Weight Loss (EWL) at 1, 2, 3, 6, 12, and 18 months were examined. Secondary outcomes examined adverse events associated with procedure. Continuous variables are expressed as median for follow-up timepoint.
Results: A total of 51 patients underwent TORe from 2020 to 2022. In total, the cohort had regained $46.6 \pm 21.2\%$ of their weight lost after their RYGB. The pre-TORe BMI was 37.9 ± 5.4 kg/m^2. The average pre-TORe gastrojejunostomy outlet diameter was 3.47 cm. 38 TORe were performed with one continuous suture and 13 were performed in an interrupted fashion. 45 of the patients who underwent TORe have followed up at least one post-operative visit. The median of AWL (kg) was 4.08, 7.71, 7.26, 3.63, 4.54, and 3.18 at 1, 2, 3, 6, 12, and 18 months, respectively. The median of percent EWL was 7.39, 15.68, 21.34, 8.49, 8.00, and 11.30% at 1, 2, 3, 6, 12, and 18 months, respectively. There was no difference between the Percent EWL between patients who received the 360 continuous stitch vs interrupted stitch pattern at 6-month post-TORe ($p < 0.204$). The pooled rate of adverse events was 13.3%. The most common adverse event (11%) being ED visit within 30-day post-TORe. These visits were due to PO intolerance or abdominal pain. There were no occurrences of perforation, UGIB, or repeat procedure required.
Conclusion: This study shows that TORe is a safe and effective procedure, regardless of suture technique, that can be performed as part of long-term treatment in patients experiencing weight regain after undergoing RYGB.

P100

Adding Gastropexy Is Safe and Improves Outcomes Following Sleeve Gastrectomy.

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Purpose: Patients after Sleeve Gastrectomy (SG) are susceptible to new onset GERD. Different intraoperative strategies have been used to reduce post-SG reflux, with one strategy being the addition of gastropexy. The goal of this study was to evaluate early and late outcomes after the addition of routine gastropexy to SG.
Method: We completed a retrospective analysis of 447 patients with SG before (SG-Pre, N = 223) and after the addition of gastropexy (SG-Post, N = 224). A single surgeon used the same technique between December 2018 and May 2021 except for the addition of

gastropexy as of May 2020. We evaluated operative time, postoperative complications and interventions, shorter- and longer-term GERD, upper GI-related symptoms, and weight loss. GERD was considered present depending on the use of anti-reflux medications. Statistical analysis was completed on an intention-to-treat and intervention-specific basis with IBM SPSS using Independent Sample T test for continuous variables and chi-squared analysis as well as Fisher Exact Test for categorical variables.

Results: Twenty-one of 223 SG-Pre-patients had a gastropexy with or without hiatal hernia repair. Of the SG-Post-group, 11 of 224 did not have gastropexy, for a total of 234 SG with gastropexy (SG-P) and 213 without gastropexy (SG-NP). There were no significant differences between groups with regards to pre-op GERD, length of stay, postoperative complications (leak, bleeding, DVT), ER visits, readmissions, early interventions, as well as shorter- or longer-term nausea, dysphagia, abdominal pain, or weight loss. Significant differences were identified in regards to the length of surgery, with SG-P taking 9 min longer ($P < 0.001$), and long-term vomiting, which was higher in the SG-NP 4.6% vs 0.5% in the SG-P ($P = 0.016$). At 3 months, there was more GERD in SG-NP ($P = 0.049$), and although GERD was higher at 6 and 12 months, these did not reach statistical significance. At $\geq$ 24 months there were more revisional procedures for SG-NP 4.4% vs none with SG-P, although this also was not significant.

Conclusion: Gastropexy increased operative time but did not increase the risk of postoperative complications. Gastropexy reduced long-term vomiting and reduced GERD at 3 months, with a trend toward reduced long-term GERD and reduced revisional surgery. A longer-term follow-up or a larger sample size may be needed to further evaluate whether gastropexy should be a recommended intervention to reduce long-term GERD and revisional procedures following SG.

P101

Characterizing the role of Asian racial status in post-operative complications and mortality in patients undergoing elective bariatric surgery: An MBSAQIP analysis of 594 837 patients

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Introduction: With the expansion of indications for bariatric surgery to include Asian patients with type 2 diabetes (DM2) and body mass index (BMI) $\geq$ 27.5 or BMI $\geq$ 32.5, it is important to characterize the North American Asian patient population undergoing bariatric surgery and assess their postoperative outcomes including serious complications and mortality.

Methods: This retrospective study was performed using the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) data registry which prospectively collects data from approximately 800 centers in the USA and Canada from 2015 to 2019. All patients undergoing primary Roux-en-Y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (LSG) who self-reported as Asian or White racial status were included. Statistical analysis was performed to assess trends in patient characteristics and 30-day postoperative outcomes. The primary outcomes were to characterize the Asian racial status population in North American and to identify if Asian racial status was associated with increased rates of serious complications or mortality at 30 days.

Results: A total of 594,837 patients met inclusion criteria, with 4,229 self-reporting Asian racial status. Patients of Asian racial status were more likely to be younger (41.8 vs 45.5 years, $p < 0.001$) and have a lower BMI (42.8 vs 44.7 kg/m^2 $p < 0.001$) than White patients. They were also more likely to have insulin dependent diabetes (10.9% vs 8.2%, $p < 0.001$), have received prior cardiac surgery (10.0% vs 1.2% $p < 0.001$), and suffer from renal insufficiency (1.0% vs 0.5%, $p < 0.001$). There were no significant differences between rates of RYGB (28.3% vs 28.9%, $p = 0.4$) and mean operative length (87.7 vs 87.5 min, $p = 0.7$) between groups. There were also no statistical differences in 30-day outcomes including leak rate (0.5% vs 0.5%, $p = 0.6$), bleeding (1.2% vs 1.0%, $p = 0.1$), overall serious complications (3.4% vs 3.5%, $p = 0.6$), or 30-day mortality (0.1% vs 0.1%, $p = 0.7$). Asian racial status was not a significant predictor of increased risk of serious complications (OR 1.0, CI 0.9–1.2, $p = 0.7$) or mortality (OR 1.1, CI 0.3–3.3, $p = 0.1$) after adjusting for comorbidities.

Conclusion: Despite the increased baseline metabolic burden of Asian racial status patients, these patients have no differences in 30-day outcomes in comparison to White patients. Racial status was not an individual predictor of increased perioperative morbidity or mortality in North American populations, suggesting these patients may safely undergo bariatric surgery independent of the increased metabolic burden.

P102

GERD vs Weight loss failure as indication for conversion of sleeve gastrectomy to RYGB: 30-day outcomes comparison using the 2020 MBSAQIP database

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Introduction: Sleeve gastrectomy (SG) is the most common bariatric procedure worldwide, but there is a moderate conversion rate mainly due to GERD or weight loss failure (defined as insufficient weight loss or weight regain over time, with the BMI maintained $\geq$ 40 or $\geq$ 35 with comorbidities). Using the 2020 MBSAQIP database, we evaluated the safety and 30-day outcomes of conversions from SG to gastric bypass (RYGB) conversion due to GERD versus weight loss failure as the leading indications.

Methods: The new variable, "conversion: final indication" in the 2020 MBSAQIP database was analyzed. Patients with GERD or weight loss failure as a final indication of SG to RYGB conversion were identified. Using the Propensity Score Matching analysis, the cohorts were matched for 23 preoperative characteristics. We then compared 30-day outcomes and bariatric-specific complications in both GERD and weight loss failure groups.

Results: In 2020, the most common indications for SG to RYGB were GERD and weight loss failure with 53% and 37%, respectively. There were 2,466 cases of GERD and 1,720 cases of weight loss failure. The matched cohorts (n = 1,112) for the two groups had similar pre-operative characteristics. Propensity-matched outcomes showed that patients who underwent SG to RYGB due to GERD had more readmissions (7.7% vs. 5.4%, $p = 0.030$) and emergency visits (13.8% vs. 10.4%, $p = 0.017$). Conversely, the two procedures demonstrated no significant differences in mortality (0.1% vs 0.1%, $p = 1.000$), interventions (2.7% vs 2.1%, $p = 0.401$), reoperations (2.9% vs 2.2%, $p = 0.350$), and bariatric-specific complications such as anastomotic leak (0.4% vs 0.5%, $p = 0.754$), postoperative bleeding (0.7% vs 0.3%, $p = 0.227$), intestinal obstruction (0.5% vs 0.1%, $p = 0.125$), internal hernia (0.4% vs 0.2%, $p = 0.453$), and anastomotic ulcer (0.5% vs 0.1%, $p = 0.125$). Length of stay (1.79 ± 1.64 days vs 1.69 ± 1.33 days, $p = 0.116$), and operative time (137.93 ± 65.73 min vs 139.12 ± 66.68 min, $p = 0.673$) were not significantly different.

Conclusion: GERD as a final indication is the leading etiology for SG to RYGB conversion and is related to more readmissions and

emergency visits with similar postoperative outcomes such as mortality, reoperations, and interventions compared with the conversion due to weight loss failure. The SG to RYGB conversion for both indications is a safe and feasible operation with acceptable 30-day outcomes.

P103

Gastric Bypass Reversal, The Patient's Journey: An Analysis of Pre-Reversal Interventions and Post-Reversal Outcomes

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Introduction: Bypass reversal is a rarely performed therapy for the treatment of severe persistent symptoms following Roux-en-Y gastric bypass (RYGB). It was our objective to evaluate the pre-operative course and postoperative outcomes of patients undergoing RYGB reversal.
Methods: A retrospective chart review from an IRB-approved database was performed for all patients who had revisional bariatric surgery at our hospital system between 2013 and 2021. A full-chart review (demographics, symptoms, radiographic, endoscopic, intraoperative findings, and outcomes postoperatively) was performed for patients who had undergone RYGB reversal.
Results: From January 1st, 2013 to January 1st, 2021, 425 bariatric revision procedures were performed. Of those, seven were RYGB reversals. The most common indications for reversal were nausea (71%), abdominal pain (57%), gastro-jejunal ulcer (57%), gastro-jejunal stricture (43%) and diarrhea (29%). The mean number of pre-reversal surgeries, endoscopic interventions, and total endoscopies were 2.6, 8.6, and 10.8, respectively.
At 1-year follow-up, 29% of patients had resolution of pre-operative symptoms, 43% had symptomatic improvement, and 29% had no improvement. The most common persistent symptoms at 1 year were abdominal pain (57%) and nausea (43%). At 2 years, these were again abdominal pain (60%) and nausea (60%).

Mean initial and pre-reversal BMIs were 40.5 and 24.1 kg/m2. All patients had weight regain with a mean BMI increase of 7.2 kg/m2 at 1 year and 8.5 kg/m2 at 2 years.
Conclusion: RYGB reversal may provide some symptomatic relief but rarely leads to full resolution of symptoms, such as abdominal pain and nausea. It is important to set patient expectations accordingly. From the nutritional standpoint, RYGB reversal appears to be effective for producing weight regain.

P105

Effect of bilateral truncal vagotomy at the time of primary Roux-en-Y gastric bypass on postoperative marginal ulcer rates

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Introduction: Our primary aim was to compare MU incidence in patients who underwent RYGB with (RYGBwBTV) and without (RYGB) bilateral truncal vagotomy (BTV). Secondary aims were to compare MU complication rates, GERD, PPI use, and percent body weight loss (%BWL).
Methodology: Retrospective review of patients at a tertiary academic medical center was completed. All patients who underwent primary RYGB, with or without BTV, from 2015 to 2020 were included. Patients without post-operative EGD were deemed negative for MU. Fisher's exact test was used to assess statistical significance of study aims.
Results: A total of 1940 patients underwent RYGB, while 55 patients underwent RYGBwBTV. Median follow-up was 32.8 months for RYGBwBTV and 38.0 months for RYGB. Patients who underwent RYGB were younger, had higher preoperative BMIs, and had no significant difference in MU incidence. RYGB had significantly greater %BWL with significantly less major complications. There were no significant differences in minor complications. In patients who underwent post-operative EGDs for GERD, there was no significant difference in esophagitis ($p = 0.213$) or PPI use up to 2 years ($p = 0.999$).
Conclusion: RYGBwBTV did not reduce the risk of MU or GJA complications. RYGBwBTV was associated with major complications compared to RYGB. Patients undergoing RYGB had significantly better %BWL in the first two years.

Table 1 RYGBwBTV and RYGB outcomes

Outcomes	RYGB (n = 1940)	RYGBwBTV (n = 55)	p
Demographics			
Age	44.5	47.7	0.034
Sex			0.201
Female	82.5%	89.1%	
Male	17.5%	10.9%	
BodyMassIndex(kg/m^2)	46.1	44.1	0.044
Outcomes			
Marginal Ulcer	1.80%	1.82%	0.999
Any Complication	4%	9.1%	0.075
Minor Complications	2.8%	3.6%	0.670
Major Complications	1.9%	9.1%	**0.005**
GastroJejunalAnastomotic Stenosis	1.7%	5.4%	0.080
GastroGastric Fistula	0.1%	0%	0.999
GastroJejunal Anastamosis Bleed	0.3%	0%	0.999
Percent Weight Loss			
1 Year	30.4%	25.2%	**< 0.001**
2 Years	30.6%	25.8%	**0.003**
3 Years	28.2%	27.5%	0.769

P106

GERD after Sleeve Gastrectomy: Persistent Obesity may not be at fault

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Background: Sleeve gastrectomy (SG) is the most routinely performed bariatric procedure in the world. When compared to Roux-en-Y gastric bypass (RNY), SG is found to be equally effective in improving weight loss, quality of life, and complications for up to 3 years. However, many studies have noted that gastroesophageal reflux disease (GERD) is a common complication of SG – occurring in up to 76% of patients after SG. The treatment of choice is often conversation to RNY. It remains unclear what factors put patients at increased risk of having symptomatic GERD that requires RNY conversion. The aim of this study is to evaluate if persistent obesity is a driver for GERD symptoms following sleeve gastrectomy.
Methods: A retrospective analysis of patients undergoing bariatric surgery from January 1, 2019 to March 3, 2022 was completed evaluating patients with history of sleeve gastrectomy with need for conversion to Roux-en-Y gastric bypass for the purpose of gastroesophageal reflux disease. Resolution of GERD was evaluated and determined to be complete (no utilization of medications, resolution of symptoms), partial resolution (symptomatic relief, reduction of medications), and no resolution (ongoing medication use or increase, no symptomatic relief). Comparison of BMI at 6 months following conversion to sleeve gastrectomy and GERD symptoms was evaluated.
Results: A total of 50 patients underwent conversion from sleeve to bypass for reflux over the four-year study period. Two patients were excluded secondary to loss to follow-up. 87.5% of patients at the time of their conversion were obese with a mean BMI of 37.3 kg/m^2 (SD: 6.48). At 6 months following conversion, 26.2% of obese patients were no longer obese ($p < 0.001$). The mean BMI loss was 5.25 kg/m^2 (SD: 3.54). 64.6% of patients (31/48) had complete or partial resolution of symptoms following conversion with a mean BMI loss of -4.65 kg/m^2 (SD: 3.21). Those with no resolution of symptoms had a mean BMI loss of -6.35 kg/m2 (SD: 3.94) ($p = 0.11$).
Conclusion: Patients undergoing conversion from sleeve gastrectomy to Roux-en-Y gastric bypass for reflux disease remained obese prior to their conversion. Unexpectedly, although not statistically significant, those with ongoing symptoms had more weight loss following conversion, compared to those with complete resolution or partial resolution of symptoms. This may reflect decreased oral intake secondary to significant reflux symptoms.

P107

Evaluating Weight Loss Associated With Bariatric Surgery After Liraglutide Use: A Matched Cohort Study

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Background: Liraglutide is a glucagon-like peptide-1 receptor agonist that causes an increase in insulin and a decrease in glucagon. It is one of the most common weight loss medications used to treat type 2 diabetes and obesity in the USA. In addition, bariatric surgery has been shown to be the most effective treatment for obesity.
Rationale: Studies have investigated the efficacy of liraglutide in patients with unsuccessful weight loss after bariatric surgery and found liraglutide as an effective adjunct treatment. However, the interaction of liraglutide prior to bariatric surgery is not well explored.
Objective: The primary objective of this study was to determine the impact of liraglutide prior to surgery on postoperative weight loss.
Methods: A retrospective analysis of data from the Ontario Bariatric Network was conducted on patients receiving a primary bariatric procedure in Ontario, Canada, between January 2010 and June 2020. Patients were categorized into two groups: (1) liraglutide naïve—patients that did not take liraglutide pre- or postoperatively and (2) liraglutide users—patients that took liraglutide preoperatively. Patients were 3:1 case–control matched on sex, age, BMI, surgery type, and diabetes status. Data from baseline and 1-year follow-up was compared between groups.
Results: There was a significant difference in weight loss ($p < 0.001$), change in BMI ($p < 0.001$), excess ($p < 0.001$) an,d total weight loss ($p < 0.001$) between liraglutide naïve patients and users.

Table 1 1-year follow-up weight and BMI measurements

Variable	Liraglutide naïve (1434)	Liraglutide users (470)	Total (1904)	p-value
Weight loss ± SD, kg	38.7 (14.5)	35.4 (14.2)	37.9 (14.5)	0.00
Excess weight loss ± SD, %	68.2 (24.8)	63.2 (23.4)	67.0 (24.6)	0.00
Total weight loss ± SD, %	30.0 (9.8)	27.4 (9.1)	29.4 (9.7)	0.00
BMI at 1 year ± SD, kg/m^2	32.5 (6.4)	33.4 (6.4)	32.7 (6.4)	0.01
Change in BMI ± SD, kg/m^2	14.0 (5.2)	12.6 (4.8)	13.7 (5.1)	0.00

Conclusion: Liraglutide naïve patients had more observed weight loss than liraglutide users at one year, but both groups had substantial and clinically relevant weight loss. Our results suggest that liraglutide naïve patients and users benefit significantly from bariatric surgery, with both groups having clinically significant BMI differences at 1-year follow-up.

P108

Refractory Gastroparesis Following Duodenal Switch Treated With Laparoscopic Subtotal Gastrectomy With Roux-en-Y Gastrojejunostomy Reconstruction: A Case Report

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Introduction: Gastroparesis is a known but rare complication following gastric surgery. Gastroparesis in a patient who has previously undergone duodenal switch (DS) is rarely seen. Medical management with prokinetic agents is first-line therapy. There is evidence of laparoscopic pyloromyotomy or pyloroplasty and per-oral endoscopic

myotomy (POEM) as viable treatment strategies. However, the evidence is lacking as to what approach is most effective if these patients do not improve with pyloromyotomy or pyloroplasty.

Case Description: This is a 66-year-old female with a complex surgical history who initially underwent laparoscopic DS with hiatal hernia (HH) repair in 2017. Her case was complicated by a duodenal stump leak requiring 3 subsequent operations. In 2018 and 2019, she underwent two redo laparoscopic HH repairs. She subsequently developed gastroparesis and underwent laparoscopic pyloroplasty in 2021. After that, she presented to our facility with lower chest/epigastric pain with eating and regurgitation of solids and liquids.

Work-up included an upper GI which demonstrated dilated and enlarged sleeve gastrectomy with poor emptying. Nuclear medicine gastric emptying study demonstrated severe gastroparesis with 86% of tracer retained at 240 min. Laboratory values indicated severe protein-calorie malnutrition. A laparoscopic jejunostomy tube (J-tube) was placed for preoperative nutritional optimization into her biliopancreatic limb.

4 months after J-tube placement, she presented to undergo laparoscopic subtotal gastrectomy with Roux-en-Y (RNY) reconstruction. There were significant intraabdominal adhesions. She did not have evidence of recurrent HH. The stomach specimen was enlarged and full of solid, retained, undigested food. The stomach was transected proximally to create a small pouch and distally at the duodenoileostomy (DI) anastomosis. The DI anastomosis was taken down and the ileum anastomosed to the newly created gastric pouch. The subtotal gastrectomy specimen was removed.

Postoperatively, she recovered well. Her J-tube feeds were continued and she was able to tolerate oral intake with no regurgitation. She was ultimately discharged home in improved condition on a full liquid diet plus tube feeds. She has had no issues or complaints regarding oral intake since undergoing subtotal gastrectomy with RNY reconstruction.

Discussion: Gastroparesis following duodenal switch is a rare but known complication. The literature regarding the best management of this complication is lacking. Options include medical management, dietary management, gastric pacemaker placement, pyloroplasty (surgically or endoscopically), gastric bypass, and subtotal gastrectomy. As demonstrated in our case, laparoscopic subtotal gastrectomy with RNY reconstruction is a viable option.

P109

A sleeve meter with pressure sensors for assisting sleeve gastrectomy

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The demand for surgical treatment for morbid obesity is increasing. Nearly 200,000 bariatric surgeries are being performed in the USA in 2020, of which sleeve gastrectomy has increased dramatically, making it the most performed surgery today.

In this study, a 'sleeve meter' is proposed so that even novices can easily perform gastrectomy. The main component of the device is a bougie equipped with pressure sensors to monitor the traction force which the surgeon applies to the stomach during surgery. Using this, the remaining stomach (sleeve) after surgery has a long shape with a constant diameter.

When performing gastrectomy, it is important to make the sleeve shape long with a constant diameter. To do this, the bougie is inserted through the patient's mouth to the stomach and then the larger curvature of the stomach is excised, while the surgeon is checking the shape of the stomach wall tissue surrounding the bougie. If he/she overtightens and staples the tissue, the sleeve becomes taut. This can result in a smaller diameter of the sleeve, narrowing or clogging the passage way. Conversely, if the surgeon does not retract the stomach sufficiently, the diameter of the sleeve is too large. The bulky sleeves then do not lead to the patients' weight loss. If the diameter is not uniform, there is a risk of perforation when the stomach moves for digestion.

To solve this problem, the device has a small, thin, flexible pressure sensor on the bougie surface. A sleeve meter, a sensory bougie, is applied with the similar way of conventional procedure. It collects and analyzes pressure signals to monitor and warn when procedures are not appropriate. Too high pressure on the sensor means excessive traction and leaves a narrow stomach passage after surgery. Too small pressure means loosened traction and will keep back a large volume of sleeve after surgery. This allows the surgeon to perform the procedure with proper traction and stapling, thus maintaining the proper sleeve shape during surgery.

Sleeve gastrectomy was performed with the device assisting on the silicone model stomach and the excised swine stomach. Repeated experiments were conducted in a group consisting of novices and experts. The shape and volume of the sleeves after surgery were evaluated. Using this device and method, even novices can perform the sleeve gastrectomy more easily and effectively. Furthermore, it is also expected to prevent various complications.

P110

Does a preoperative intensive medical weight loss program improve bariatric surgery outcomes?

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Introduction: The prevalence of obesity continues to increase in North America and throughout the world. Intensive medical programs (IMPs) provide nutritional, behavioural education, and multidisciplinary interventions aimed at managing obesity. We assessed whether preoperative participation in IMPs affected weight loss outcomes after bariatric surgery.

Methods: This was a retrospective study of patients who underwent sleeve gastrectomy (SG) or Roux-en-Y gastric bypass (RYGB) at our Bariatric Centre of Excellence between September 2009 and January 2021. The intervention group were patients who completed an IMP before bariatric surgery, while controls only had standard preoperative education before their surgery. IMPs consisted of medically supervised weight loss which included 6–12 weeks of liquid meal replacement and up to 24 months of education. Weight patterns and obesity-related comorbidities were evaluated preoperatively and 5 years postoperatively. Two-sample t tests and Chi-square were used to compare means, and ANCOVA analysis was used to account for any co-variants.

Results: Of 1562 patients included in the study, 1347 (86.3%) were controls and 215(13.7%) were in the intervention group. Table 1 shows that percent total body weight loss (%TBWL) was greater in the control group at 1 year, although this statistical difference is unlikely to be clinically relevant. There was no difference in long-term weight loss outcomes.

Table 1 Preoperative IMP does not improve bariatric surgery weight loss outcomes

	Control		Intervention		p-value
	N	Mean (SD)	N	Mean (SD)	
1-year weight loss (%TBWL)	1347	26.78 (9.93)	215	24.37 (9.98)	0.0168
5-year weight loss (%TBWL)	116	23.21 (11.97)	21	26.79 (16.17)	0.409

Conclusion: Participation in an IMP had no clinically relevant impact on short- or long-term weight loss outcomes with bariatric surgery. This may be useful when considering some surgical program's requirements for preoperative weight loss before surgery. Further prospective research might elucidate whether specific components of an IMP may impact surgical outcomes and include them in standard surgical pathways.

P111

The influence of pregnancy on long-term results of bariatric surgery

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Introduction: Bariatric surgery is commonly performed on obese women of reproductive age. Few studies have analyzed the impact of pregnancy on the results of bariatric surgery. The aim of our study is to evaluate the effect of pregnancy on long-term outcomes of bariatric surgery in a tertiary center.
Methods: A retrospective study was conducted with 62 women aged 20 to 40 years who had undergone primary laparoscopic sleeve gastrectomy (LSG) or primary laparoscopic Roux-en-Y gastric bypass (LRYGB) surgery between 2017 and 2018. A comparison of results at their 4-year follow-up appointment was performed between two groups, one with patients who became pregnant after their primary bariatric surgery and one with patients who did not get pregnant. We excluded patients who did not have a 4-year follow-up, had undergone revisions or conversions, and who were currently pregnant.
Results: 22 (35.5%) patients became pregnant after their primary bariatric surgery. Median age was 27 years (IQR 24–30) and median preoperative BMI was 44.6 kg/m^2 (IQR 40.7–48.2). In this group, 2 (9.1%) patients underwent LRYGB and 20 (90.9%) underwent LSG. The non-pregnant group was formed by 40 patients. Median age was 31.5 (IQR 27–39) and median preoperative BMI was 44.7 kg/m^2 (IQR 39.5–51.9). 9 (22.5%) patients underwent LRYGB. There was no difference in preoperative BMI between groups. The non-pregnant group had a higher median age when compared to the pregnant group ($p = 0.002$), and median postoperative BMI was higher in the pregnant group 36.7 kg/m^2 (IQR 32.6–43.4) when compared with the non-pregnant group 33.3 kg/m^2 (IQR 27.7–39.4) ($p = 0.048$).
Conclusions: Pregnancy after primary bariatric surgery correlated with higher BMI at the 4-year follow-up.

P113

Robotic Approach to Reduction of Retrograde Small Bowel Intussusception in Bariatric Patients

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Introduction: Small bowel intussusception (SBI) after Roux-en-Y gastric bypass is a rare complication occurring in 0.1–1.2% of cases. Although antegrade and retrograde intussusception can occur at both the gastro-jejunal or jejuno-jejunal anastomosis, the latter is more likely to be associated with small bowel obstruction. Surgical approaches can vary from reduction alone, reduction and enteropexy or resection, and reconstruction. Recurrence is estimated at 22% with resection and reconstruction associated with the lowest incidence. However, here are a paucity of literature on clear recommendations for management. We report a case series of patients with jejuno-jejunal SBI managed surgically using the robotic approach.
Methods: This is a retrospective case series of patients who presented to our institution with SBI causing obstruction after Roux-en-Y gastric bypass. Electronic medical records of patients diagnosed with SBI requiring surgery were reviewed and 6 patients were identified. Patient demographics were collected, as well as postoperative outcomes and complications.
Results: All patients included in our cohort were female with a median age of 39.5 years. The median BMI at the time of presentation was 25.5 kg/m^2 with a % estimated weight loss of 38 kg. The median time of presentation after Roux-en-Y gastric bypass was 6.5 years. On presentation, all patients were hemodynamically stable. Diagnosis of small bowel obstruction at an intussusception lead point was confirmed on Computed Tomography scan. All patients underwent robot-assisted diagnostic laparoscopic within 12 h of presentation which revealed retrograde intussusception immediately distal to jejuno-jejunal anastomosis. Five patients underwent reduction only; resection and reconstruction was performed in 1 patient due to inability to reduce retrograde intussusception. Out of 5 patients who underwent reduction only: 1 patient had immediate recurrence on post-operative day 2 and was taken back for resection and reconstruction. Return of bowel function occurred at a median of 2 days with a median length of stay of 4 days. On long-term follow-up, 2 patients had recurrent small bowel obstruction within 1 year without evidence of intussusception which were managed nonoperatively with successful return of bowel function within 2 days.
Conclusion: Small bowel intussusception after Roux-en-Y gastric bypass is a poorly understood entity with limited evidence on best approaches to management. Reduction only using the robotic approach has been shown to be effective in our cohort. Multi-center future studies are necessary to compare outcomes of different approaches and can help mitigate the rare presentation of retrograde intussusception in bariatric patients.

P114

To Stent or Not to Stent: Endoluminal Stent Outcomes in Bariatric Leaks

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Introduction: Bariatric surgery allows for rapid, often sustained weight loss, and effective treatment of the comorbidities associated with morbid obesity. However, staple line and anastomotic leaks remain one of the most severe complications, often resulting in significant morbidity and mortality. Although surgical intervention

remains the gold standard, endoluminal stenting has proven a less invasive alternative for the management of leaks. Stenting however is associated with a multitude of complications, such as stent migration, bleeding, perforation, and death. This study examines stenting in Bariatric surgery and its associated outcomes.

Methods: A database was constructed by identifying patients of multiple providers between gastroenterology and general surgery across multiple hospitals and facilities between February 2018 and February 2022. 20 Patients were identified to have undergone bariatric surgery with associated leaks. Patient characteristics, comorbidities, stent information, and outcomes were obtained from patient records and scanned documents. Salient patient data were extracted, including stent size and location, stent complications such as bleeding, perforation, migration and death, returns to endoscopy suite, and the need for percutaneous drainage vs Laparoscopic drainage.

Results: The mean age of the 20 selected patients was 43.4, of which the majority were female (13). Average BMI was 42 with a Charlson Comorbidity Index of 0.45 and average length of stay of 13.2 days. A total of 9 patients underwent a Sleeve Gastrectomy, 3 patients a bypass, and 8 Modified Duodenal Switch. Leaks occurred either at the sleeve staple line (n = 9) or across the G-J anastomosis (n = 3) requiring stenting with a total length ranging from 120 to 150 cm. Ten patients returned to the endoscopy suite with complications ranging from stent migration (n = 4), bleeding with Hgb less than 7 or requiring transfusion (n = 2), perforation (n = 2), or death (n = 1). Ten patients required percutaneous drainage and six laparoscopic drainage. Of the twenty patients ten were ultimately discharged on TPN.

Discussion: Endoluminal stenting is a safe and minimally invasive alternative to the surgical management of leaks post-bariatric surgery. Stenting however is not benign, and associated with several complications such as bleeding, perforation, migration, and death requiring repeat endoscopy or surgical vs percutaneous drainage. The cohort outlined in this study were representative of the success and pitfalls of stenting as a management tool for leaks associated with Bariatric Surgery.

P115

A 5-year characterization of trends and outcomes in elderly patients undergoing elective bariatric surgery

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Introduction: The North American population with severe obesity is aging and with that so will the number of elderly patients ($\geq$ 65 years) meeting indications for metabolic surgery. Trends in bariatric delivery in this population is poorly characterized and outcomes remain conflicting, limiting potential uptake and delivery.

Methods and Procedures: The MBSAQIP database was used to identify elderly patients ($\geq$ 65 years) undergoing elective bariatric surgery from 2015 to 2019. Objectives were to analyze their unique characteristics, surgical trends, and outcomes by comparing to a non-elderly cohort. Multivariable logistic regression identified independent predictors of serious complications and 30-day mortality.

Results: Data from 2015 to 2019 were analyzed evaluating a total of 751,607 patients and 5.3% (n = 39,854) were elderly ($\geq$ 65 years). The mean age of each group was 43.1 $\pm$ 10.88 years for the non-elderly cohort versus 68.3 $\pm$ 2.75 for the elderly cohort. Elderly patients were less likely to be female (70.7% elderly vs 80.1% non-elderly) and had lower mean BMI (43.17 $\pm$ 6.64 kg/m2 elderly vs 45.42 $\pm$ 7.87 kg/m2 non-elderly). They were more likely to have higher American Society of Anesthesiologists classification, lower functional status, more insulin dependent diabetes, hypertension and hyperlipidemia, among other cardiovascular, pulmonary, and endocrine comorbidities.

Over the five-year period the number of operations on elderly patients decreased, encompassing 5.34% of operations in 2019 vs 5.75% of operations in 2015 and more sleeve gastrectomy were performed among elderly patients (74.4% of operations in 2019 vs 70% in 2015).

There were no clinically significant differences between the most frequently performed bariatric surgery for those < 65 and the elderly cohort. Sleeve gastrectomy remained the most common surgery (73.7% non-elderly vs 72.3% elderly); however, operative time was longer overall among the elderly population. Functional status was the most predictive for both serious complications (OR 1.72; CI 1.53–1.94) and mortality (OR 2.92; CI 1.98–4.31). Surgery among elderly patients was associated with poorer 30-day postoperative outcomes across all categories and was independently associated with serious complications (OR 1.23; CI 1.17–1.30, $p < 0.001$; absolute risk 4.64%) and 30-day mortality (OR 2.49; CI 2.00–3.11, $p < 0.001$; absolute risk 0.27%), after adjusting for comorbidities.

Conclusion: Elderly patients make up approximately 5% of all elective MBSAQIP bariatric surgeries. After adjusting for comorbidities, functional status remains the most predictive factor for poor outcomes; however, elderly patients have increased 30-day odds of serious complications and 30-day mortality, suggesting a need to tailor our approach to these individuals that carry a unique operative risk.

P116

Black vs White racial disparities in 30-day outcomes following revisional bariatric surgery: an MBSAQIP database analysis

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Introduction: Previous studies demonstrated Black vs White disparities in postoperative outcomes following primary bariatric surgery, including higher complications, readmission, and mortality 1-5. Bariatric surgery is a common procedure with a subsequent rise in revisional surgery cases, accounting for 17% of American bariatric cases in 20,196. There are a lack of evidence examining racial disparities in revisional surgery outcomes. Thus, we compared the postoperative outcomes of Black vs White adults who underwent revisional bariatric surgery.

Methods and Procedures: We conducted an observational cohort study of adults who underwent revision Roux-en-Y gastric bypass, sleeve gastrectomy, duodenal switch, or one-anastomosis gastric bypass using the 2015–2020 MBSAQIP database. Propensity score was used to 1:1 match Black and White patients across covariates. McNemar's test was used to compare 11 postoperative outcomes modeled in the MBSAQIP semi-annual reports and mortality between matched cohorts.

Results: We identified 47,913 patients identified as Black (n = 10,838) or White (n = 37,075) who underwent revisional bariatric surgery and 21,014 patients were matched. Black and White patients had no difference in mortality (0.14% vs 0.15%), morbidity (3.56% vs 3.97%), all-occurrence morbidity (4.23% vs 4.06%), all-cause reoperation (2.87% vs 2.94%), related reoperation (0.42% vs 0.33%), related readmission (1.63% vs 1.57%), all-cause intervention

(2.77% vs 2.66%), related intervention (1.45% vs 1.32%), serious event (3.47% vs 3.73%), and bleeding (1.51% vs 1.47%). Interestingly, Black patients experienced higher postoperative all-cause readmission rates (7.41% vs 6.17%, $p < 0.001$), and lower surgical site infection rates (1.6% vs 2.08%, $p = 0.009$).

Conclusion(s): Postoperative outcomes were similar between Black and White adults who underwent revisional bariatric surgery. These results differed from previous findings of racial disparities in primary bariatric surgery. Further elucidating the patient-, procedure-, and system-level differences between primary and revisional bariatric surgery may provide insights into addressing the racial disparities demonstrated after primary bariatric procedures.

P117

Bariatric Surgery is Safe in Septuagenarians at a High-Volume MBSAQIP center

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Background: The geriatric population continues to grow as the Baby Boomer cohort approaches 65. Therefore, it is imperative to understand the surgical risks within this population. As the obesity rates in the USA and worldwide continue to rise, it is vital that the role of bariatric surgery in the over 70 age group be understood so that the risks, benefits, and alternatives can be presented to patients appropriately. This study examines outcomes data related to bariatric surgery performed at a Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) accredited Center in a patient population over 70 years of age.

Methods: We retrospectively reviewed data from patients 70 years and older who had undergone bariatric surgery between 2009 and 2018. The patient charts were examined to determine patient age, index procedure, and post-operative occurrences.

Results: We identified 125 patients, 70 years or older (72.82 mean, range 70–93) who underwent laparoscopic bariatric surgery. This included 23 gastric band placements, 11 Roux-en-Y gastric bypasses, 26 revisions, and 65 sleeve gastrectomies. The mean pre-op BMI was 40.59. We identified 1 major perioperative occurrence (Clavien–Dindo (CD) grade III or greater) (0.8%) and 8 minor occurrences (CD grade I or II) (6.4%) with no known 30-day mortality. The overall occurrence rate of 7.2% is not statistically different from the MBSAQIP occurrence rate of 5.11% during the same time period.

Conclusion: Bariatric surgery performed on patients 70 years of age and older is associated with low perioperative morbidity and mortality, statistically comparable to the general bariatric population. We conclude that bariatric surgery in this population is safe at a high-volume MBSAQIP center.

P118

Endoscopic gastric pouch revision versus medical management for treatment of weight recidivism after Roux-en-Y gastric bypass

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Introduction: Bariatric surgery is one of the most effective tools to combat the growing obesity epidemic, and Roux-en-y Gastric (RYGB) bypass is one of the most effective bariatric procedures. Despite its effectiveness, weight regain remains a significant concern. Treatment options for patients that experience weight recidivism include medical management and endoscopic revision with gastric pouch plication. The purpose of this study was to compare the effectiveness of medical management to endoscopic pouch revision for the treatment of weight recidivism after RYGB.

Methods: A retrospective review was conducted for all patients who underwent endoscopic revision and medical management for treatment of weight recidivism after RYGB between January 2019 and July 2022. Multivariable regression analysis was used to assess adjusted differences in weight loss and BMI between the two groups at 1 month, 3 months, and 6 months.

Results: Thirty-eight total patients (33 females, 5 males) with a mean age of 50.4 years were identified. There were 26 patients in the endoscopic revision group and 12 patients in the medical management group. There was no difference in age ($p = 0.11$) and sex ($p = 0.55$) between the two groups. A significantly higher proportion of patients in the medical management group had musculoskeletal disease ($p < 0.01$), diabetes ($p = 0.03$), dyslipidemia ($p = 0.03$), and depression ($p = 0.02$). Mean pre-intervention BMI was 42.3 kg/m^2 for the endoscopic revision group and 42.1 kg/m^2 for the medical management group ($p = 0.96$). Patients treated with endoscopic revision experienced higher mean percent weight loss than medical management patients at 1 month (5.1% vs 3.6%, $p = 0.26$), 3 months (6% vs 4.4%, $p = 0.65$), and 6 months (8.4% vs 8.2%, $p = 0.95$). Mean BMI was also lower for the endoscopic revision group at 1 month (40.5 kg/m^2 vs 41.2 kg/m^2, $p = 0.96$), 3 months (38.4 kg/m^2 vs 40.7 kg/m^2, $p = 0.85$), and 6 months (36.5 kg/m^2 vs 38.5 kg/m^2, $p = 0.62$).

Conclusion: Although not statistically significant, endoscopic revision of the gastric pouch results in higher mean percent weight loss and lower mean BMI than medical therapy for the first 6 months of treatment.

P119

Outcomes for revision of gastric bypass for abdominal pain: is bypass revision for pain a worthwhile endeavor?

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Introduction: Gastric bypass (GBP) has been proven to be a widely successful weight loss surgical option for patients with morbid obesity. Up to 15–30% of patients present to the emergency department with abdominal pain after GBP. This study aims to review the intraoperative management of pain thought to be a result of GBP to determine which interventions are most likely to result in pain improvement or resolution.

Methods: A retrospective chart review from an IRB-approved database was performed for all patients who had gastric bypass revision at our single hospital system between 1/1/12 and 7/29/21. A full-chart review (demographics, symptoms, radiographic, endoscopic, intraoperative findings, and outcomes postoperatively) was performed for patients who had undergone bypass revision for abdominal pain. The mean interval from initial bypass to revision was 2646, ranging from 17 to 6570) days. Follow-up after the operative intervention was between 4 and 1825 days. Patients with ventral hernias were excluded. Significant improvement was defined as the resolution of abdominal pain at the final follow-up visit.

Results: 57 patients (53 females/4 males, mean age 47.6 yrs) underwent revision of gastric bypass due to abdominal pain between

1/1/12 and 7/29/21. 1 patient was excluded due to no follow-up in our system. Additional symptoms included nausea (83.9%), emesis (73.2%), dysphagia/PO intolerance (1.8%), and GERD (25%). Intraoperative findings as follows: candy cane resection (52.6%), SBO (39.3%), internal hernia closure (23.2%), adhesive SBO 16.1%, GJ ulcer 14.3%, perforation (7%), hiatal hernia repair (21.4%), intussusception (1.8%), and gastrogastric fistula (3.6%). At the most recent follow-up, pain resolution or improvement was noted in 58.9%, 39.3% had persistent pain, and 1.8% had worse pain. Of those improved, 32.1% had isolated candycane identified, while 51.5% of those improved had candy cane with and without additional intraabdominal pathology. 9/33 (27.3%) of those improved had internal hernia identified and 7/9 (77.8%) had isolated reduction of hernia with the closure of the mesenteric defect.

Conclusion: In this study, 58.9% of patients had improvement in abdominal pain symptoms and were more likely to have findings of internal hernia. Other interventions resulted in poorer resolution of pain. Operating for pain after gastric bypass remains challenging and only attempted with a clear diagnosis.

P120

Hypertension improves after bariatric surgery despite the severity of preoperative hypertension

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Background: Bariatric surgery in the setting of severe obesity refractory to medical interventions is associated with improvement in multiple comorbidities, including hypertension. The link between obesity and hypertension has been well established and likewise the resulting improvement of hypertension after bariatric surgery. However, some patients with Class II obesity (BMI 35–39.9) are unable to use hypertension as a qualifying comorbidity unless they are on at least two to three medications. There are no previous retrospective studies that look at outcomes of hypertension after bariatric surgery stratified by the number of preoperative anti-hypertensive medications. This study investigates the correlation between hypertension severity and improvement of hypertension after bariatric surgery.

Methods: All adult patients with bariatric consultation at any time at the New York University Langone Health campuses during the period 2012 to 2021 were evaluated via electronic medical records. Patients with hypertension on anti-hypertensive medications preoperatively who underwent primary bariatric surgery were included. Patients with hypertension but not on medications, undergoing revision surgery, or incomplete data/follow-up were excluded. Patients were categorized into 3 groups: on one anti-hypertensive medication (Group 1), on two medications (Group 2), and on three or more medications (Group 3). A Chi-square test was performed on the difference in number of anti-hypertensive medications taken at 12-month post-bariatric surgery.

Results: Of the 267 patients with documented hypertension, 65 (24.34%) patients took at least 3 anti-hypertensive medications, 85 (31.84%) patients took 2 medications, and 117 (43.82%) patients took 1 medication. There was a significant difference in the improvement of hypertension in all three groups of patients ($p < 0.001$, Fig. 1). At one-year follow-up from bariatric surgery, the number of anti-hypertensive medications taken by all three groups of patients decreased significantly ($p < 0.001$, Fig. 2).

Conclusion: We found that 56.55% of patients experience resolution or improvement of their hypertension. 45.30% of patients who took 1 anti-hypertensive medication preoperatively experienced resolution of their hypertension at 1-year follow-up. Our findings suggest that all patients with Class II obesity (BMI 35–39.9) and hypertension will benefit from bariatric surgery regardless of the severity of their disease. Limitations to bariatric surgery on the basis of hypertension severity based on sheer number of anti-hypertensive medications a patient takes should be reconsidered.

Keywords: hypertension, sleeve gastrectomy, roux-en-y gastric bypass, weight loss surgery, bariatric surgery, preoperative medical management.

Figure 1. Improvement in Hypertension at 1 year Post-Op

# Pre-Op meds	N	Remission	Improvement	No Change	Worsen
3+	65	19 (29.23%)	32 (49.23%)	12 (18.46%)	2 (3.08%)
2	85	26 (30.59%)	21 (24.71%)	31 (36.47%)	7 (8.24%)
1	117	53 (45.30%)	N/A	50 (42.74%)	14 (11.97%)
Total	267	98 (36.70%)	53 (19.85%)	93 (34.83%)	23 (8.61%)
				X2	67.729
				P-Value	<0.001

Figure 2. Change in number of medications taken 1 year Post-Op

# Pre-Op meds	N	Mean	Std. Err	t stat	P-Value
3+	65	-1.723	0.160	-10.743	<0.001
2	85	-0.776	0.106	-7.297	<0.001
1	117	-0.324	0.065	-4.971	<0.001

P122

Stopping the block: efficacy of pre-operative bowel prep in decreasing post-operative constipation in bariatric surgery patients

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Background: Post-operative constipation after bariatric surgery is the most common post-operative complaint at our institution, resulting in decreased patient satisfaction and quality of life. Limited research has explored the rates of constipation pre- and postoperatively in this patient cohort. Moreover, to our knowledge, no literature exists examining the efficacy of a pre-operative bowel regimen in reducing post-operative constipation. This study aims to address this gap in the literature and explore the efficacy of a well-established bowel regimen, polyethylene glycol (PEG), in reducing constipation rates after surgery.

Methods: This was a retrospective, single-center study. Patients > 18 year old undergoing bariatric procedures (sleeve gastrectomy, Roux-en-Y gastric bypass, and LSG to RYGB conversion, vertical band gastroplasty to RYGB conversion) from May 1, 2021 to June 30, 2021 were selected as historical controls. The use of pre-operative PEG bowel prep for bariatric patients was introduced as an institutional quality improvement measure in August 2021. Allowing for a three-month adjustment period, patients undergoing bariatric procedures from November 1, 2021 to January 31, 2022 were followed. For all patients, demographics, pre-existing comorbidities, and pre-operative and post-operative constipation rates were collected. Constipation rates were assessed based on patient interviews and patient responses to GIQLI surveys. Student t tests were used for statistical analysis.

Results: In the control group who received no bowel regimen, there was a significant increase in patients who reported constipation after surgery, with 2/62 (3.22%) patients endorsing constipation preoperatively and 15/62 (24.19%) patients endorsing constipation at 3-week follow-up ($p < 0.001$). In the intervention group, 26/56 (46.43%) patients successfully completed the bowel regimen. 0/56 (0%) patients reported pre-operative constipation and 5/26 (19.23%)

patients reported constipation at 3-week follow-up. There were no significant differences between 3-week constipation rates in patients who received PEG vs. not (19.23% vs. 24.19%, p = 0.61).
Discussion: Regardless of bowel regimen usage, patients report significant rates of constipation post-bariatric surgery. Use of bowel regimen preoperatively trended toward a decrease in post-operative constipation at follow-up, but was not statistically significant. This is potentially attributable to small sample size. There was limited patient compliance with bowel regimen, with under half completing the preparation. Further work will aim toward increasing sample size and implementing additional interventions to increase compliance, allowing us to better delineate the utility of pre-operative bowel regimen in reducing post-operative constipation.

P123

Outcomes of concomitant cholecystectomy in bariatric surgery at an academic center

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Introduction: Obesity and gallstones have a close association. The timing for cholecystectomy in bariatric patients is still controversial.
Objective: To evaluate the outcomes between concomitant laparoscopic cholecystectomy and bariatric surgery (LC + BS) compared to bariatric surgery (BS) alone at an academic center.
Methods: Retrospective observational cohort study including all patients who consecutively underwent primary bariatric surgery (sleeve gastrectomy and roux-en-Y gastric bypass) from 2016 to 2022. Patients were allocated in two groups: LC + BS versus BS alone. Patients with other types of concomitant surgeries were excluded from the analysis. Demographic analysis and intraoperative variables were considered. 30-day follow-up is reported, including morbidity and mortality.
Results: A total of 2073 patients were included. All surgeries were performed laparoscopically. A total of 148 patients (7.1%) underwent LC + BS and 1925 patients (92.9%) underwent BS alone. In the LC + BS group, median age was 39.7 (20–69) years; 73% (n = 108) were women; 48.6% (n = 72) underwent Roux-en-Y Gastric Bypass; and 51.4%(n = 76) Sleeve Gastrectomy. In the BS alone group, median age was 37.7 (13–72) years; 71% (n = 1367) were women; 51.8% (n = 998) underwent Roux-en-Y Gastric Bypass; and 48.2%(n = 927) Sleeve Gastrectomy. The overall morbidity rate was 4.1% in the LC + BS group and 1.8% in the BS alone group; no statically significant differences were observed between groups (p = 0.122). No mortality was reported in both groups.
Conclusion: Laparoscopic cholecystectomy is safe when concomitant with bariatric surgery. Laparoscopic cholecystectomy should be considered at the time of bariatric surgery.

P125

Predictors of outpatient IV therapy following revisional bariatric surgery: an MBSAQIP analysis

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Introduction: Revisional bariatric surgery is being increasingly performed and is often associated with higher operative risks and morbidity. This study aimed to identify the rate and predictors of outpatient IV therapy after revisional bariatric surgery.
Methods and Procedures: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP®) data for 2015–2020 was queried. We included revisional sleeve gastrectomy (SG), Roux-en-Y gastric bypass (RYGB), adjustable gastric band (AGB), and biliopancreatic diversion with duodenal switch (BPD-DS) cases. Univariate analysis was performed using chi-squared tests for categorical data and independent sample t tests for continuous data. Multivariable logistic regression models were developed to determine predictive factors for outpatient IV therapy.
Results: Of 100,463 patients who underwent revisional bariatric surgery from 2015 to 2020, 37% received a RYGB, 35.6% a SG, 25.8% a BPD-DS, and 1.6% an AGB. On univariate analysis, female gender, decreased age, African American race, insulin-dependent diabetes, current smokers, as well as pre-operative gastroesophageal reflux disease (GERD), steroid use, history of PE, and vein thrombosis were associated with increased need for outpatient IV therapy. Additionally, operative factors of revisional RYGB and increased operative time were associated with outpatient IV therapy. On multivariable analysis, independent risk factors for postoperative dehydration treatment included female gender (adjusted odds ratio (AOR) 1.36, $p < 0.001$), African American race (AOR 1.23, $p < 0.001$), insulin-dependent diabetes (AOR 1.44, $p < 0.001$), pre-op steroid/immunosuppressant (AOR 1.37, $p < 0.001$), history of PE (AOR 1.29, $p < 0.001$), pre-op GERD (AOR 1.47, $p < 0.001$), as well as revisional RYGB (AOR 1.63, $p < 0.001$) and revisional BPD-SD (AOR 1.28, $p < 0.001$).
Conclusion: Among revisional bariatric patients, those who were younger, African American, those with associated co-morbidities (insulin-dependent diabetes, pre-op GERD/steroid use/hx of PE), as well as those who underwent revisional RYGB procedures were at increased risk for outpatient IV therapy. Pro-active measures and closer surveillance for those at elevated risk may prevent the need for outpatient IV therapy. In particular, the increased risk among historically marginalized communities requires urgent further study.

P126

Differences in Post-Surgical Outcomes and Complications Among Males and Females Undergoing Bariatric Surgery: A State-wide Analysis

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Introduction: Sex as a biologic variable remains largely understudied, even for the most commonly performed operations. Bariatric surgery is one of the most commonly performed operations in the USA and is the most effective treatment for obesity and obesity-associated comorbidities. However, there is scant data to describe potential differences in outcomes between male and female patients, particularly with regards to weight loss. Within this context, we examined weight loss and complications up to one year following sleeve gastrectomy or gastric bypass within a state-wide bariatric quality improvement collaborative.
Methods and Procedures: We performed a retrospective cohort study among patients who had bariatric surgery. Using a state-wide bariatric-specific data registry, all patients who underwent gastric bypass or sleeve gastrectomy between June 2006 and June 2022 were identified. The primary outcome was total body weight loss, percent total body weight loss, and body mass index at one year. The secondary outcome was the adjusted risk of 30-day complications. We used multivariable linear regression models to estimate weight loss

and BMI, and multivariable logistic regression models to estimate overall risk of complications.
Results: Among 107,504 patients, the majority (n = 85,135; 79.2%) were female and most patients (n = 49,731; 58%) underwent sleeve gastrectomy. Compared to female patients, male patients were older (47.6 yrs vs 44.8 yrs; $p < 0.0001$), had higher baseline weight (346.6 lbs vs 279.9 lbs; $p < 0.0001$), had higher preoperative BMI (49.9 kg/m2 vs 47.2 kg/m2; $p < 0.0001$), and higher prevalence of most comorbid conditions, including hypertension, hyperlipidemia, diabetes, and sleep apnea ($p < 0.0001$). Compared to females patients, male patients experienced greater total body weight loss (105.1 lbs vs 84.9 lbs; $p < 0.0001$) and higher excess body weight loss (60.0% vs 58.8%; $p < 0.0001$) but had higher BMI overall (34.0 kg/m2 vs 32.8 kg/m2; $p < 0.0001$) at one year of follow-up. Compared to females, males had higher rates of 30-day complications, including serious complications (2.5% vs 1.9%; $p < 0.0001$).
Conclusion: In this study we found that both males and females experienced excellent weight loss with a low risk of complications following bariatric surgery. However, male sex was associated with slightly greater weight loss and slightly higher incidence of complications. Providers should consider referring males earlier for bariatric surgery which may improve outcomes for this population.

P127

Redo hiatal hernia repair and revisional bariatric surgery: a staged approach with thoracic and bariatric surgery

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Introduction: Traditionally, hiatal hernias are repaired concurrently for patients undergoing bariatric surgery. In our study, however, this was not possible due to large complicated hiatal hernias. This case series examines the outcomes of staged procedures for two patients undergoing redo hiatal hernia repair (HHR) followed by revisional bariatric surgery during same hospitalization.
Methods and Procedures: Both patients had a previous sleeve gastrectomy and developed large to moderate type 3 hiatal hernias, creating significant symptomatology. Both patients had also undergone prior failed HHR. Pre-operative work-up included double contrast upper GI; CT of chest, abdomen and pelvis; gastric emptying study; and esophagogastroduodenoscopy. Both patients had significant reflux disease and selected for conversion from sleeve to Roux-en-Y gastric bypass (RYGB). Both patients were ASA class 3. HHR followed by RYGB was performed during the same admission. HHR was performed transabdominal by a thoracic surgeon on the Xi robot. All patients underwent primary crural repair, without reinforcing mesh with anterior and posterior sutures using 0 Surgidac and pledgets. Following HHR, both patients underwent laparoscopic RYGB with our bariatric surgeon. RYGB was done laparoscopically with a 150-cm antecolic roux limb. Gastrojejunostomy was created using 25-mm EEA stapler and jejunojejunostomy anastomosis was created using EndoGIA stapler.
Results: Both patients were females ages 55 and 68. Pre-operative BMI was 26.51 and 36.14. Preoperatively, one patient was found to have Barrett's esophagus prior to surgery and both patients with nearly 50% of stomach in the chest. Operative times were 390 min and 227 min for HHR. RYGB operative times 101 min and 164 min. Intraoperative complications included chest tubes placed for both patients during HHR. The times between HHR to RYGB were 2 and 4 days. Total hospitalization time from initial procedure to discharge were 6 and 8 days. All surgeries were completed laparoscopically. No other 30-day postoperative complications were encountered with significant improvement in their initial symptoms.
Conclusion: Our staged procedures were successful in treating large, complicated hernias with the ability to perform revisional bariatric surgery within the same hospital admission. Minimally invasive surgery was successful in treating hiatal hernia instead of patients undergoing open thoracotomy. We concluded that it was more appropriate (given the large hiatal hernia) to be performed by our thoracic surgeons due to high dissections in the chest and chances for intrathoracic complications. We hope to continue to collect more data at our institution and track long-term outcomes.

P128

Early Recovery after Bariatric Procedures in an Ambulatory Surgery Center: the role of aprepitant on postoperative nausea and vomiting (PONV)

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Introduction: Postoperative nausea and vomiting (PONV) are a common occurrence after bariatric surgery and Gastric Balloon Placement. This retrospective cohort study compares the incidence of PONV in aprepitant exposed vs non-exposed patients after bariatric surgery and gastric balloon placement.
Methods: The data were extracted from the Athena Collector v22.7 GA—Georgia Surgicare LLC from January to March 2022 using the International Classification of Diseases-10-Clinical Modification (ICD-10-CM) diagnosis codes. We used the Relative Risk Reduction test to analyze the outcomes of prevention of postoperative nausea after exposure to a 2-day course of aprepitant after patients underwent laparoscopic and endoscopic bariatric surgery and gastric balloon placement and the chi-square test for statistical analyses. A two-tailed p-value of < 0.05 was considered statistically significant.
Results: One-hundred eight eligible patients were included in the study: 93 patients received aprepitant (A group) and 15 did not (NA group). All of the patients were discharged home on the same day of surgery. Twenty-six patients from Group A and three from Group NA, experienced PONV (20% vs 44.08%). Seven patients from group NA and Thirty-seven from the A group experienced late PONV 24–48 h after discharge during the follow-up (46.67% vs 39.78%). The Relative risk reduction (RRR) in 24–48-h post-OP nausea (regardless of presence of emesis) and emesis (regardless of presence of nausea) is 0.22 and 0.15, respectively. Exposed patients reported significantly lower PONV scores at all in-clinical timepoints examined ($p < 0.0001$ for Rhodes Index) and significantly higher self-rated quality of recovery at 24 h (Quality of Recovery-15 instrument, $p < 0.05$).
Conclusion: Preoperative and postoperative administration of aprepitant showed to be effective against PONV after following the two-day course treatment. Further studies with a larger number of patients in both groups might be necessary to validate this result.

P130

A comparison of one- and two-stage laparoscopic single anastomosis gastric bypass following failed laparoscopic adjustable gastric banding

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Introduction: Laparoscopic gastric banding (LAGB) is a simple bariatric procedure that fell out of favor in the last few years. Laparoscopic single anastomosis gastric bypass (OAGB) is one of the options for the revision of a failed gastric band. It can be performed synchronously with band removal or during two separate procedures: band removal first and OAGB later on.
Aim: Our study aimed to compare single- and two-stage OAGB following a failed LAGB in terms of short- and mid-term outcomes, with an emphasis on post-operative aspects and complications.
Methods: A retrospective cohort study comparing revisional OAGB's safety and efficacy after failed LAGB removal over 3 years. Data were collected from the patients' medical files, as well as op reports and clinic visits. Patients' demographics, weight loss, postoperative complications, and length of stay were compared.
Results: 75 patients were enrolled in the study. Of these, 54 (72%) underwent a single-stage revisional LSAGB and 21 (28%) a two-stage procedure. There were 19 males (25.3%) and 56 females (74.7%) with a mean age of 41.9 years (± 9.8). Basic demographics were similar in these groups. 60 days Re-admission rate and re-operation rate in the index hospitalization were higher in the 2-stage procedure (1.9% vs. 19% in the single-phase procedure, $p = 0.002$). A similar trend was seen in the overall complication rate, which was higher in the 2-stage procedure (57.1% vs. 33.3% in the single-stage procedure, $p = 0.059$). Procedure length in minutes, as well as total hospitalization and post-op length, did not differ between the groups.
Conclusion: Laparoscopic single anastomosis gastric bypass as a revision for a failed gastric banding in one stage is safer than a two-stage procedure in terms of short- and mid-term complications. We believe that there is a benefit in performing elective surgery in a single-stage procedure due to the fact there are fewer adhesions and a less challenging procedure unless there are clinical indications for a 2-stage procedure, such as band erosion.

P132

Propensity Score-Matched Analysis of Laparoscopic Revisional and Conversional Sleeve Gastrectomy with Concurrent Paraesophageal Hernia Repair

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Introduction: The primary aim of this study was to evaluate the perioperative complications and outcomes associated with concurrent paraesophageal hernia repair (CPHR) when performing a conversional or revisional vertical sleeve gastrectomy (VSG). CPHR is often a necessary procedure in patients undergoing VSG due to the potential development of gastroesophageal reflux disease (GERD) or obstructive symptoms postoperatively if the paraesophageal hernia is not repaired.
Methods and Procedures: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement (MBSAQIP) participant use file was assessed for the years 2015–2020. The presence of CPHR was used to create two groups. Patients were excluded if undergoing a primary procedure. Patients who underwent a revisional or conversional VSG procedure without a CPHR served as controls. Propensity score matching was performed with E-analysis to provide an estimate of unknown confounding.
Results: There were 29,870 patients after all exclusion criteria were applied. Of these patients, 5,001 underwent the VSG procedure with CPHR. In the unmatched analysis, there was an increased frequency of patients being female (84.74% vs 82.68%;$p < 0.001$), having a history of GERD (36.93% vs 30.54%; $p < 0.001$), and being of older age (49.31 ± 11.05 vs 48.48 ± 10.86; $p < 0.001$). Additionally, patients undergoing VSG with CPHR had a decreased presence of sleep apnea (27.00% vs 30.50%;$p < 0.001$), and diabetes (15.00% vs 18.28%; $p < 0.001$). Propensity score matching yielded 5,001 patient pairs for analysis. In the matched cohort, patients with CPHR experienced increased operative time (114 min IQR [78,141] vs 102 min IQR [66,127];$p < 0.001$), increased risk of postoperative pneumonia (0.5% vs 0.22%; $p = 0.030$) and readmission (4.48% vs 3.50%; $p = 0.016$) within thirty days. However, patients undergoing a CPHR with revisional or conversional VSG did not experience increased risk of death, postoperative bleeding, postoperative leak, intervention within thirty days, or reoperation within thirty days.
Conclusion: Despite a small association with increased postoperative pneumonia, the rate of complications in patients undergoing laparoscopic revisional/conversional VSG and CPHR are low. CPHR is a safe option when combined with the laparoscopic revisional/conversional VSG procedure in the early postoperative period.

P133

Predictors of in-patient opioid consumption after laparoscopic bariatric surgery

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Introduction: The primary aim of this study was to assess the extent to which patient and procedural factors are associated with in-patient opioid consumption after laparoscopic bariatric surgery. The overprescription of opioids to surgical patients is a recognized contributor to the opioid epidemic. Despite the widespread use of laparoscopy and multimodal analgesia to attenuate postoperative pain, patients undergoing bariatric surgery remain at increased risk of persistent opioid use, with 4–14% continuing to use opioids beyond 3 months postoperatively. Increased opioid consumption during in-patient stay is a risk factor for persistent use post-discharge and often leads to adverse effects that delay discharge (i.e., nausea and vomiting, drowsiness). Thus, addressing factors associated with in-patient opioid consumption may improve quality of care after laparoscopic bariatric surgery.
Methods and Procedures: This prospective cohort study included patients undergoing laparoscopic bariatric surgery at two university-affiliated hospitals and one private clinic in Montreal, Canada, from September 2021 to April 2022. Perioperative care was according to enhanced recovery with opioid-sparing analgesia. Our primary outcome was morphine milligram equivalents (MME) consumed during acute in-patient recovery (postoperative day [POD] 0 and 1). Multivariate linear regression was used to identify pre- and intra-operative predictors of in-patient opioid consumption. Secondarily, we estimated the adjusted association of in-patient opioid consumption with length of stay (LOS) and 7-day post-discharge consumption.
Results: 351 patients were analyzed (mean age 44, mean BMI 45, 77% female, 71% sleeve gastrectomy). The median opioid consumption on POD 0–1 was 92.5 MMEs (IQR 55–142.5); median LOS was 2 days (IQR 1–2). In multivariate analysis, younger age (+ 1.4 [95%CI + 0.8 to + 1.9]), concomitant surgical procedures (i.e., hernia repair, cholecystectomy; + 15.6 [95% CI + 0.9 to + 30.2],

and higher preoperative pain expectation (+ 2.9 [95%CI + 0.4 to + 5.4]) were associated with increased in-patient opioid consumption. Use of transversus abdominus plane block (TAPB) was independently associated with decreased consumption (− 46.1 [95%CI − 58.3 to − 33.9]). In-patient opioid consumption was an independent predictor of increased LOS (+ 0.003 [95%CI + 0.002 to + 0.004]) and 7-day post-discharge consumption (+ 0.11 [95%CI + 0.06 to + 0.15]).

Conclusion: This study supports that TAPB may reduce in-patient consumption of opioids after laparoscopic bariatric surgery. Younger patients and those undergoing concomitant procedures were identified as potential targets for pain management optimization to decrease opioid use. Importantly, our results suggests that setting pain expectations before surgery has the potential to decrease postoperative requests for opioids.

P134

Short-term Outcomes of One-Stage versus Two-Stage Revisional Bariatric Surgery after Adjustable Gastric Band Removal

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Introduction: The need for revisional bariatric surgery after adjustable gastric banding (AGB) is increasingly reported with a rate of 30–60%. The timing of band removal and type of revisional procedure remain controversial. Our aim was to compare the safety and short-term outcomes of one-stage versus two-stage revisional surgery after AGB removal.

Methods: This is a retrospective review of all patients who underwent AGB removal with planned revisional bariatric surgery at a single-academic institution during 2013–2020. Baseline demographics, body mass index (BMI), early postoperative morbidity, and short-term outcomes were recorded. Descriptive statistics are displayed as count (percentage) or median (range).

Results: Sixty-one patients underwent AGB removal with a planned revisional surgery. While 44 patients (72%) underwent one-stage revisional surgery, 17 patients (28%) had their revisional bariatric surgery performed in two stages. Median time interval between band removal to planned revisional surgery in the two-stage group was 3 (1–24) months. Forty-four patients (72%) were female, and median BMI prior to band removal was 46 (30–72) kg/m2. Median time from AGB insertion to removal was 7 (2–17) years with the most common cause for band removal being weight regain or inadequate weight loss (70%). The most common revisional surgery performed was sleeve gastrectomy (SG) (89%). While 43 patients (98%) in the one-stage group underwent SG, only one patient (2%) underwent single anastomosis duodenal switch. On the other hand, 11 patients (65%) in the two-stage group underwent SG and 6 patients (35%) underwent a Roux-en-Y gastric bypass. Median follow-up time was 12 (5–18) months and 11 (7–17) months in the one-stage and two-stage groups, respectively (P = 0.17). Median percent total weight loss (%TWL) was 22% (6–40%) in the one-stage group and 22% (1–26%) in the two-stage group (P = 0.12). The overall rate of 30-day postoperative morbidity, including readmissions and reoperations, was 11% for the entire study cohort. The rate of major postoperative morbidity was 5% versus 12% in the one-stage and two-stage groups, respectively (P = 0.65). There was one patient from the entire study cohort who developed a leak after a two-stage SG, which was managed non-operatively.

Conclusion: Revisional bariatric surgery, particularly SG, after AGB removal can be safe in a one-stage setting. Both one-stage and two-stage approaches in revisional surgery after AGB removal are similarly effective in further weight loss at short-term follow-up. Larger studies with longer follow-up time are needed to confirm our findings.

P135

Outcomes following sleeve gastrectomy in the obese population. An observational Canadian single-center experience

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Since 2014, sleeve gastrectomy has been the most common bariatric surgery performed in North America. Since that same year, we have noticed a marked increase in the number of sleeve gastrectomy performed in the Medico-Surgical Clinic for the Treatment of Obesity (CMCTO) of the CIUSSS de l'Estrie of the Centre Hospitalier Universitaire de Sherbrooke (CHUS). The main purpose of this study is to evaluate patients' outcomes and weight loss following surgery at the CMCTO of the CHUS.

The medical records of all patients who underwent sleeve gastrectomy at the CMCTO of the CIUSSS de l'Estrie CHUS between January 2014 and December 2018 were retrospectively analysed to evaluate weight loss and complication rates over 36 months. The results were subsequently compared with data in the literature.

113 patients were included. Weight loss in CMCTO's patients exceeded that observed in the literature at 12 and 24 months postoperatively (PO) and was comparable at 36 months PO. At 12-month PO, %EWL was 63.92%, 59.39% at 24 months, and 56.27% at 36 months PO. The rates of acute renal failure ($p < 0.001$), cardiopulmonary complications ($p = 0.019$), and wound infections ($p < 0.001$) were higher than the literature data, while other complications were comparable. However, patients operated at the CMCTO were more obese than the literature average, with a mean preoperative BMI of 49.3 kg/m2, and had higher rates of preoperative SAHS ($p < 0.001$) and a trend toward higher dyslipidemia ($p = 0.069$).

Even though this is a smaller cohort, weight loss incurred at 12- and 24-month PO in our institution surpasses results found in the literature. These numbers make a case for early multidisciplinary longitudinal management and close follow-up like the one provided to our patients at the CMCTO. The next step will be to recruit patients in a long-term prospective cohort. This will allow us to evaluate if the results showcased in the pilot project are sustained in time and in a bigger cohort.

P136

Non-alcoholic fatty liver disease in bariatric patients: the value of NAFLD fibrosis score in determining who needs liver biopsy

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Background: Non-alcoholic fatty liver disease (NAFLD) and its spectrum of liver pathologies can affect the perioperative management of bariatric patients. Recently, in a position statement, the American Society for Metabolic and Bariatric Surgery (ASMBS)

proposed an algorithm based on NAFLD fibrosis score (NFS) for screening for liver fibrosis. In this study, we set out to validate this algorithm in a cohort of bariatric patients.

Methods: A retrospective, single-center study of 450 patients who underwent either laparoscopic Roux-en-Y gastric bypass (LRYGB) or laparoscopic sleeve gastrectomy (LSG) with liver wedge biopsy was performed. The patients' NFS were calculated for stage 0, 1–2, and 3–4 fibrosis. Univariate and multivariate analyses of the correlation between liver pathology and liver function test (LFT), age, body mass index (BMI), type 2 diabetes, platelet count, and albumin were performed.

Results: Overall 369 patients were included in the final analysis. A total of 178 and 191 with an average age of 43.8 years old (%73.6 female, $p < 0.05$) underwent LRYGB and LSG, respectively. All patients underwent liver wedge biopsy. The average BMI was 43.7. Patients' average aspartate aminotransferase (AST), Alanine transaminase (ALT), albumin, Hemoglobin A1c, and platelets were 32.3, 40.3, 4.25, 5.87, and 259, respectively. More than 50% of patients who had abnormal liver biopsy results had normal preoperative LFTs. The average NFS was + 2.22 [− 1.28, + 7.08]. A total of 26 patients had stage 1–2 fibrosis and 7 patients had stage 3–4 fibrosis. The NFS was statistically different across patients with no fibrosis, stage 1–2 fibrosis, and stage 3–4 fibrosis (+ 2.1, + 2.8, and + 3.7, $p = 0.003$). On multivariate analysis, only BMI and hemoglobin A1C showed a statistically significant correlation with presence of abnormal liver pathology (BMI, OR 1.22, $p = 0.019$; hemoglobin A1C, OR 2.07, $p = 0.007$).

Conclusion: To our knowledge, this is the first paper that applied the NFS scoring model to a large cohort of bariatric surgical patients. Our study found that preoperative liver function tests are a poor marker of abnormal liver pathology. Furthermore, our study determined that both BMI and presence of diabetes correlate strongly with abnormal liver biopsy pathology. Further large-scale studies might help further validate the NFS scoring system and facilitate selection of liver biopsy candidates.

P137

Characteristics and outcomes for patients undergoing revisional bariatric interventions due to persistent obesity: a retrospective cohort of 10,716 patients

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Introduction: Revisional bariatric interventions and pharmacologic management are options for patients who experience weight regain and recidivism of other metabolic parameters after initial bariatric procedures. However, there are conflicting data on safety outcomes of revisional procedures. We aim to characterize patient demographics, procedure type, and safety outcomes for those undergoing revisional compared to initial bariatric interventions to guide management of these patients.

Methods and Procedures: The 2020 Metabolic and Bariatric Accreditation and Quality Improvement Program (MBSAQIP) registry was analyzed, comparing primary elective to revisional bariatric procedures for inadequate weight loss. Bivariate analysis was performed to determine between group differences. Multivariable logistic regression determined factors associated with serious complications or mortality.

Results: We evaluated 158,865 patients, including 10,716 (6.7%) revisional procedures. Patients undergoing revisional procedures were more likely to be female (85.4% revisional vs. 81.0% initial; $p < 0.001$), had lower body mass index (43.6 ± 7.8 kg/m^2 revisional vs. 45.2 ± 7.8 kg/m^2 initial; $p < 0.001$), and less metabolic comorbidities, including non-insulin-dependent diabetes (4.0% revisional vs 6.8% initial; $p < 0.001$), insulin-dependent diabetes (12.0% revisional vs 16.9% initial; $p < 0.001$), and hypertension (42.8% revisional vs 44.8% initial; $p < 0.001$). The most common revisional procedures were Roux-en-Y gastric bypass (48.0%) and sleeve gastrectomy (32.5%). Revisional procedures had longer operative duration (127.0 ± 75.2 min revisional vs. 86.4 ± 51.4 min initial; $p < 0.001$) than primary procedures.

Patients undergoing revisional procedures were more likely to experience readmission to hospital (4.8% revisional vs. 2.9% initial; $p < 0.001$) and require further operative intervention (2.4% revisional vs. 1.0% initial; $p < 0.001$) within 30 days of the procedure. Revisional procedures were independently associated with increased serious complications (OR 1.48, CI 1.35–1.63, $p < 0.001$) but were not a significant predictor of 30-day mortality (OR 0.74, CI 0.36–1.50, $p = 0.400$).

Conclusion: In comparison to primary elective bariatric surgery, patients undergoing revisional procedures have less metabolic comorbidities. Revisional procedures have worse perioperative outcomes and are independently associated with serious complications. This data helps to contextualize outcomes for patients undergoing revisional bariatric procedures and to inform decision-making in patients.

P138

Emergency Department Visits During the Post-operative Period Affect Body Mass Index Reduction in Bariatric Surgery Patients

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Introduction: The purpose of this study is to investigate whether an emergency department (ED) visit or readmission after bariatric surgery affects BMI reduction in the 12-month postoperative period. Patients who choose to undergo bariatric surgery often have other comorbidities that can affect both the outcomes of their procedures and the post-operative period. Complications within this postoperative period may affect the rate of weight reduction. We hypothesize that patients who visit the ED due to bariatric complications or were readmitted to the hospital will have a slower rate of weight reduction than those who did not visit the ED.

Methods and Procedures: Data points were retrospectively collected from the charts of 440 patients from March 2012 to December 2019 who underwent a sleeve gastrectomy or gastric bypass surgery. Of the 440 patients, 87 patients had a visit to the ED, while 353 patients did not. Data collected included patient demographics, baseline BMI, overall BMI reduction, emergency department visits, and readmissions in the first year after surgery. Specifically, bariatric-related ED visits were defined as patients presenting with symptoms, including, but not limited to, abdominal pain, nausea, and/or vomiting. A readmission was defined as any admission to the hospital, whether from the ED or direct admission.

Results: Patients who had at least one ED visit in the first year after surgery due to bariatric complications had a slower rate of weight loss as measured by BMI change than those who never visited the ED ($p = 0.01$). Whether a patient was readmitted or not during the postoperative period had no impact on overall BMI reduction ($p = 0.615$).

Conclusion: Patients who visit the ED following bariatric surgery had a slower rate of BMI reduction following in the year following surgery. This finding could suggest, intuitively, that a more complicated postoperative period can hinder total weight reduction. However, the level of care the patient required, as measured by readmission, does not have an impact on the rate of weight reduction. One possible reason to explain the discrepancy between these findings could be that patients who are readmitted are under watchful monitoring of nursing staff and physicians and are more likely to have a controlled diet while in-patient.

P139

Primary Biliopancreatic Limb Gallstone Causing Gallstone Ileus After Roux-en-Y Gastric Bypass

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Background: A 69-year-old female with history of Roux-en-Y gastric bypass 16 years prior for morbid obesity presented to the emergency department with twelve hours of cramping abdominal pain that began while consuming a beer. The pain resolved after the patient took a shower, however she presented due to the initial severity of the pain. In the emergency department, the patient had a normal complete blood count with elevated aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase, and lipase, but normal bilirubin. A computed tomography scan of the abdomen and pelvis was performed demonstrating a large mass in the proximal ileum measuring 3.6 × 3.5 cm (Fig. 1), a distended gallbladder, and enlarged common bile duct. Patient was taken to the operating room for diagnostic laparoscopy with concern for small bowel mass vs intussusception vs internal hernia, at which time the common channel was noted to be edematous immediately distal to the jejunojejunostomy and a large mass was noted at the ileocecal valve. The mass was unable to be milked proximally or distally with laparoscopic instruments, therefore a midline laparotomy incision was made. The mass was then able to be manually milked proximally. A longitudinal enterotomy was made, the mass was removed (Fig. 2), and the enterotomy was closed transversely in two layers without narrowing. Final pathology identified the mass as a gallstone measuring 4 × 3.9 × 2.5 cm. The gallbladder was then inspected. It was noted to be distended with no fistulous tract to the surrounding small intestine or colon identified. An open cholecystectomy was performed. Postoperatively, patient did well with normalization of her hepatic function tests.

Discussion: Given the lack of cholecystoenteric fistula, distended gallbladder on presentation, and an enlarged common bile duct, this presentation likely represents stasis in the biliopancreatic limb. This resulted in the development of a primary biliopancreatic limb gallstone, likely in the duodenal sweep, causing a gallstone ileus. The patient's abdominal pain likely occurred as the gallstone traversed the jejunojenunostomy and became lodged in the distal small bowel. While an uncommon phenomenon, choleliths can develop in any area of bile salt stasis, including biliopancreatic limbs following roux-en-Y gastric bypass. Understanding the nature of this phenomenon may help surgeons identify patients at-risk and offer pre-emptive interventions.

Fig. 1 CT scan demonstrating gallstone in transit



Fig. 2 Gallstone with ruler for size comparison



P140

Randomized controlled trial comparing of preoperative oral carbohydrate loading vs conventional fasting for postoperative insulin resistance in bariatric surgery

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Introduction: Enhanced Recovery After Surgery (ERAS) protocol in bariatric surgery is well-accepted worldwide. Preoperative oral carbohydrate loading is one of the components of ERAS protocol which has scarce data in bariatric patients. Preoperative fasting increases insulin resistance and inflammatory stress responses which can be reduced by preoperative oral carbohydrate loading. Our study aimed to evaluate the effect of preoperative oral carbohydrate loading on insulin resistance and inflammatory outcomes compare with conventional fasting protocol.

Methods: The randomized controlled trial was conducted from October 2021 until February 2022 in King Chulalongkorn Memorial Hospital, Thailand. Morbidly obese patients underwent bariatric surgery were randomized to intervention group and control group. The intervention group received 2 doses of oral carbohydrate loading, the night before and 3 h prior to surgery. In control group, patients received 2 doses of water in the same fashion as intervention group. Primary outcome was insulin resistance, measured by homeostasis

model assessment-estimated insulin resistance (HOMA-IR) index. Secondary outcomes were interleukin-6 (IL-6) and C-reactive protein (CRP) level. We measured HOMA-IR index, IL-6, and CRP level at preoperative, postoperative day 1, 2, 3, and 14.
Results: 31 patients were enrolled in this analyses (16 patients in intervention group, 15 patients in control group). The mean preoperative HOMA-IR index was 7.7 in intervention group and 6.24 in control group ($p = 0.55$). The mean HOMA-IR index in postoperative day 1 was 22.83 in intervention group and 16.76 in control group ($p = 0.36$). In postoperative day 2, 8.38 in intervention group and 9.54 in control group ($p = 0.61$). In postoperative day 3, 4.32 in intervention group and 4.72 in control group ($p = 0.78$). In postoperative day 14, 1.67 in intervention group and 2.64 in control group ($p = 0.26$). There is no statistically detected difference in mean IL-6 and CRP level between the groups.
Conclusion: Preoperative oral carbohydrate loading has no difference in insulin resistance and inflammatory outcomes when compare with fasting group in bariatric surgery patients. Increasing in number of patients may alter the results. Further studies should be conduct for other clinical outcomes.

P141

Fracture of adjustable gastric band tubing: a rare late complication

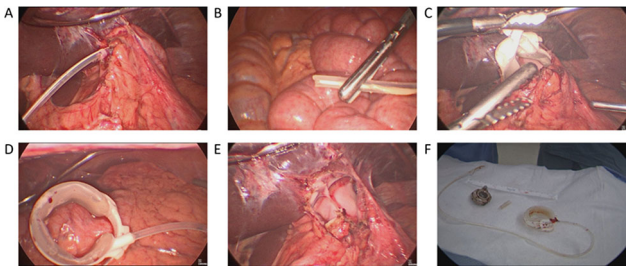
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Background: Laparoscopic adjustable gastric banding (LAGB) procedure has fallen out of favor in the past decade due to subpar weight-loss and complications. In 2019, LAGB constituted only 0.9% of all bariatric procedures performed in the USA, compared to 35% in 2011[1].
Case Report: A 59-year-old female presented 15 years after LAGB with 2 months of right lower quadrant abdominal pain. Her excess weight loss (EWL%) was 59% with a current body mass index (BMI) of 24.94. Computed tomography (CT) images showed disconnected tubing (Fig. 1). The patient was taken to the operating room for laparoscopic removal of the band. The band was adhered to the liver capsule (Fig. 2). The tubing was tangled around adhesions, and the fractured tip of the tubing was near the right iliac vessels (Fig. 2). Fracture and disconnection of adjustable gastric band tubing is a rare complication occurring at a rate between 5% and 9.4%[2–4]. The reasons are multifactorial including stiffening of the tubing material over time, tension caused by weight loss, or intraabdominal adhesions.
Conclusion: Although LAGB is rarely performed, contemporary bariatric surgeons should be familiar with the different band systems and their long-term complications.

Fig. 1 A, upright abdominal x-ray showing a free-floating adjustable gastric band tubing. B-C, CT scan imaging showing the tubing lodged near the iliac vessels



Fig. 2 A, adhesions tenting the adjustable gastric band tubing. B, fractured tubing tip. C-E, Removing the adjustable gastric band from the liver capsule and stomach. F, Explanted adjustable gastric band



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P142

Conversion of a failed endoscopic sleeve gastroplasty to Laparoscopic Sleeve Gastrectomy

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Background: Endoscopic sleeve gastroplasty (ESG) is a novel endobariatric procedure. While the rate of severe adverse events (i.e. pneumonia, readmission to ICU, sepsis, etc.) after ESG remain low (1%), patients tend to have more readmissions, re-operations, or re-interventions[1–4].
Case Report: A 37-year-old female with morbid obesity (weight of 323 lbs., BMI of 50.9) previously treated with ESG at an outside institution presented with abdominal pain, dysphagia, and emesis. Computed tomography imaging was unremarkable (Fig. 1). The ESG involved using Apollo Overstitch device, performing a total of 5 U-stitch permanent sutures. The patient failed to achieve and maintain adequate weight-loss, having lost only 35 lbs. after the procedure, which she regained within a year. Initial gastroscopy showed failed luminal stitches and unravelling of the gastroplasty (Fig. 2A). The laparoscopic view demonstrated trans-gastric suturing of the stomach to the abdominal wall from the ESG (Fig. 2B–G). She subsequently underwent a combined laparoscopic and endoscopic conversion to laparoscopic sleeve gastrectomy (Fig. 2H). She had an uneventful recovery from surgery and was discharged on post-operative day 2. She has lost 25 lbs. to date.

Conclusion: Despite recent promising results of ESG, it should be utilized as part of a structured program that includes adequate nutritional counseling, exercise, behavioral modification, and long-term outcomes monitoring in a multidisciplinary bariatric program.

Fig. 1 Computed tomography (CT) scan images showing anchoring sutures retained in the stomach

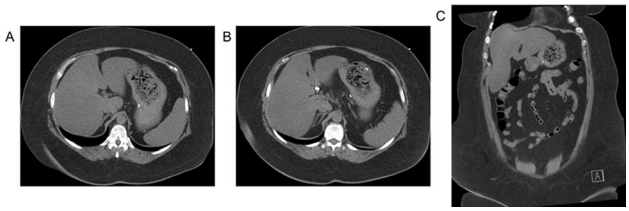
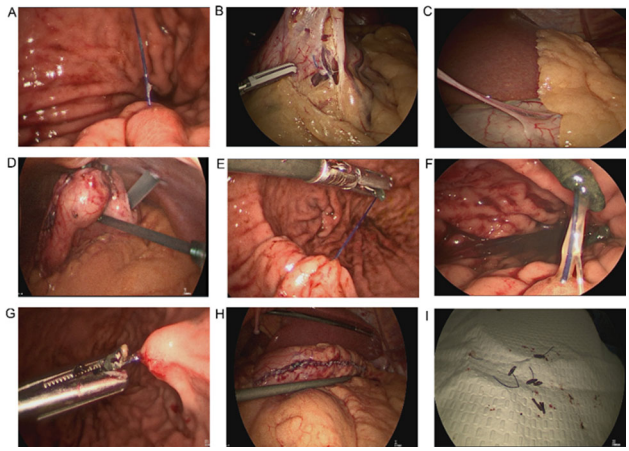


Fig. 2 A, Endoscopic view. B,C, Laparoscopic view of the lesser sac and peritoneal attachments showing failed gastric imbrication sutures. D, laparoscopic view of the access into the stomach lumen. E–G, Combined laparoscopic and endoscopic technique for removal of the retained gastroplasty stitches. H, laparoscopic sleeve gastrectomy with staple line suturing. I, Apollo Overstitch sutures and anchors



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P143

Does pre-operative weight loss make a difference: a retrospective single-institution analysis

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Background: Pre-operative weight loss is not routinely required by insurance or bariatric programs. Previous studies have shown a mix of results with several showing no relationship between pre-operative success and post-operative outcomes. Some newer studies have however shown that these two may be related.
Objective: Our goal was to determine if there was a relationship between pre-operative weight loss and post-operative weight loss as well as follow-up rate.
Methods: We performed a retrospective analysis of over 1400 patients who underwent bariatric surgery between 2012 and 2020. Analysis was completed using regression analysis and ANOVA to determine pre-op and post-op weight loss were associated. We also performed a subgroup analysis of those who followed up at one year using ANOVA to assess if pre-op weight loss was associated with follow-up rates.
Results: The average weight loss pre-operative was 8.4 kg, at 6 months was 26.9 kg and at 1 year was 33.4 kgWe found that weight loss pre-operative was associated with increased post-operative weight loss. Additionally, pre-operative weight loss was found to be associated with increased rate of follow-up.
Conclusion: Pre-operative weight loss is a useful tool to determine which patients are more likely to succeed postoperatively. This allows surgeons to assess which patients may need more post-operative help to ensure both long term follow-up and long-term results.

P144

Predictors of Early Postoperative Mechanical Ventilation in Laparoscopic Bariatric Surgery Patients

Laith Batarseh; Mueen Megdadi; Anna Axentiev; Catriona Swift; Ascension Saint Agnes

Introduction: Patients who are obese have elevated risk for postoperative complications. There is limited literature on the risk factors associated with early postoperative need for mechanical ventilation (MV) in patients undergoing laparoscopic bariatric surgery. This study evaluates the factors associated with increasing that risk.
Methods: All bariatric surgery cases reported to Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) for the years 2015 to 2020 were collected. Longitudinal sleeve gastrectomy (SG), Roux-en-Y gastric bypass (GB), and biliopancreatic diversion with duodenal switch (DS) cases that were performed through laparoscopic or robotic-assisted approach were selected (n = 966,840). Cases that required MV for $>$ 48 h in the first 30 days postoperatively (n = 756) were matched with cases that did not require MV (n = 4,674) using propensity score matching (PSM) with 0.2 propensity score tolerance. Binary logistic regression was used to determine if any of the 36 factors included in the study were associated with the need for MV in these patients. Predicted probability for each case during regression was captured for charting.

Results: 0.1% of total selected cases required MV for > 48 h in the first 30 days of postoperative period. Statistically significant factors for requiring MV > 48 h in the first 30 days postoperatively were as follows: DS as primary procedure (vs SG, odds ratio, OR: 1.92, confidence interval, CI: 1.23–2.99, p-value, p: 0.004), GB as primary procedure (vs SG, OR: 1.78, CI: 1.45–2.17, p: < 0.001), previous foregut surgery (OR: 1.32, CI: 1.03–1.69, p: 0.029), smoking status within one year of surgery (OR:1.32, CI: 1.01–1.72, p: 0.046), increasing age (OR: 1.03, CI: 1.02–1.03, p: < 0.001), body mass index (BMI) closest to surgery (OR: 1.02, CI: 1.01–1.03, p: < 0.001), preoperative hematocrit level (OR: 1.01, CI: 1.002–1.02, p: 0.012), operation length (OR: 1.001, CI: 1.001–1.002, p: 0.042), and occurrence of intraoperative or postoperative cardiac arrest (OR: 2.01, CI: 1.52–2.67, p: < 0.001).
Conclusion: Regardless of gender, older patients who smoke, had previous foregut surgery, higher BMI, undergoing laparoscopic gastric bypass, or biliopancreatic diversion with duodenal switch are at increased risk of requiring mechanical ventilation for > 48 h in the early postoperative period. Surgeons should consider these factors when planning for bariatric surgery.

P145

Intra-operative use of TAP (transversus abdominus plane) block shortens hospital stay in patients undergoing bariatric surgery

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Introduction: We evaluated if the addition of intra-operative TAP block to our bariatric ERAS (Enhanced recover after surgery) protocol would decrease post-operative narcotic and anti-emetic use and length of stay.
Methods and Procedures: A retrospective review of outcomes of patients undergoing bariatric procedures (Roux-en-Y gastric bypass and sleeve gastrectomy) performed prior to the implementation of TAP block January to March 2019 were compared to the outcomes of patients after the implementation of TAP block January to March 2020 with a single surgeon. The study was approved by the Institutional Review Board. The primary outcome of the study was total post-operative narcotic use on the floor in mg oral morphine equivalents. The secondary outcomes were anti-emetic use, time to oral intake, and length of stay.
Results: A total of 127 patients were included in the study, 55 (43.3%) underwent bariatric procedure in 2019 and 72 (56.7%) in 2020. Both groups were matched for demographics, BMI, ASA, and type of surgeries performed. There were significantly more patients with the comorbidity of hypertension in the 2020 group (n 48, 67%, p 0.004). Duration of surgery was similar in both groups, showing that the intra-operative addition of TAP block did not increase time of the operation. There was no statistically significant difference in the time patients spent in PACU, amount of narcotic, and anti-emetic used in PACU. On the floor there was no statistical difference in both groups in narcotic doses used and anti-emetic doses used. There were more patients in the 2020 group who used no narcotics; however, this was not statistically significant. There was also no statical significance in time to oral intake between both groups.
A statistically significant length of stay was noted between the 2 groups, with patients undergoing intra-operative TAP block showing shorter length of stay (53.9 h vs 47.9 h, p 0.02).
Conclusion: The addition of intra-operative TAP blocks to already existing bariatric ERAS protocols does not increase operative times and can have positive outcomes on post-operative patient care including reducing length of hospital stay.

P146

Evaluating the Comparative Risks of Weight Loss Surgery in Post-Menopausal Women

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Introduction: Bariatric Surgery is the most effective tool for weight loss and resolution of the metabolic syndrome. It decreases the risk for cardiovascular and liver disease mortality and cancer incidence1-4. The rate of obesity may be higher in post-menopausal women than currently estimated due to changes in body composition observed in the post-menopausal state5. To date, no study has attempted to evaluate the risks of weight loss surgery in post-menopausal women as compared to their pre-menopausal counterparts.
Methods: Using MBSAQIP 2019–2020 data, we performed a retrospective cohort study comparing 30-day outcomes of women of pre-menopausal age (Age 18–35) vs post-menopausal aged women (Age 55–65) undergoing sleeve gastrectomy (VSG) or roux-en-y gastric bypass (RYGB). Propensity Score Matching analysis for 26 pre-operative characteristics resulted in 12,178 patients per cohort.
Results: Post-menopausal aged patients who underwent VSG had increased unplanned ICU admission (0.6 vs 0.2, p < 0.001) and operative time (70.42 vs 63.84 min, p < 0.001), but fewer emergency room visits compared to the younger cohort. There was no statistically significant difference in 30-day mortality and bariatric-specific complications, such as leak, bleeding, or obstruction.

After RYGB, post-menopausal women had increased risk of pulmonary complications (0.2 vs 0.0, p 0.038), renal complications (0.2 vs 0.2, p 0.007), unplanned ICU admission (1.2 vs 0.6, p 0.002), reoperation (2.6 vs 2.0, p 0.029), post-operative LOS (1.82 days vs 1.63, p < 0.001), and operative time (127.57 min vs 117.28, p < 0.001) but fewer post-operative emergency visits and readmissions. There was a statistically significant increased rate of anastomotic leak in post-menopausal women compared to pre-menopausal aged women (0.4 vs 0.1, p < 0.001). There was no difference in the rate of other bariatric specific complications or all-cause 30-d mortality.
Conclusion: There was no statistically significant difference in VSG-specific complications between the pre- and post-menopausal age bariatric patients. However, post-menopausal aged women were found to have higher rates of anastomotic leak after RYGB. As there was no difference in overall mortality or cardiac complications, our findings suggest that bariatric surgery can be safe in appropriately selected post-menopausal women. The higher leak rate observed in post-menopausal women undergoing RYGBP deserves further investigation.

P147

Gender comparison of surgical outcomes in patients undergoing sleeve gastrectomy – an historical cohort study

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Introduction: The aim of our study was to examine the long-term gender associated with the outcome of LSG, including the impact on

QOL. Clinical trials in the field of bariatrics, and specifically in Lap Sleeve Gastrectomy (LSG), have frequently been gender imbalanced, with males representing only 20% of examinees. Long-term gender-oriented results, and specifically the quality of life (QOL) parameters, have not been addressed sufficiently.

Methods: A retrospective cohort study of patients who underwent LSG at Soroka University Medical Center, Israel, between 2017 and 2021. This cohort was selected from all patients fitting the inclusion criteria. Demographics, BMI, and hospitalization records were extracted from the national medical records system (Ofek). Quality of life (QOL) and weight parameters were supplemented via telephone questionnaires, using the Bariatric Analysis and Reporting Outcome System (BAROS).

Results: There were 217 patients who underwent LSG surgery between 2014 and 2017 at the Surgical Ward A, "Soroka" University Medical Center (SUMC). Of these, 86 were males (39.6%) and 131 were females (60.4%). The patient's mean age upon surgery was 40.1 ($\pm$ 12.9) with an average of 5.2-year post-surgery of follow-up ($\pm$ 0.8). Basic demographics did not show any significant differences between males and females, except for a higher percentage of females being born in Israel. Not surprisingly, males weighed more than females prior to surgery and after it, but pre-op BMI and excess weight percentage Excess weight loss, and BMI reduction did not differ between the groups. QOL measures defined by the BAROS questionnaire did not differ between males and females, including failure rate, and total BAROS score.

Discussion: LSG surgery results in similar outcomes for male than female patients as measured by the BAROS, as well as in objective measures, like complications rate and length of hospitalization, as well as a similar BMI reduction. These results reiterate that Gender-specific outcomes should be taken into consideration in optimizing patient selection and preoperative patient counseling.

P148

Endoscopic Trans-oral Outlet Reduction With Overstitch As An Elective Alternative To Surgical Revision Of Gastric Bypass

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Introduction: Morbid obesity is one of the largest public health problems of our generation, and bariatric surgery has been shown to be a safe and effective treatment. Roux-en-Y gastric bypass is the gold standard procedure, with the most common complications of weight regain and gastrojeunal anastomosis (GJA) widening. Endoscopic trans-oral outlet reduction (TORe) is a safe, technically feasible, and durable treatment for revision of GJA enlargement. The objective of this study is to demonstrate that TORe is an effective alternative to surgical correction of GJA widening, with fewer adverse events (AEs) than other surgical options.

Methods: We conducted a comprehensive review of several databases including PubMed and GoogleScholar to identify relevant articles related to TORe and related procedures. The primary outcomes were the efficacy and practicability of TORe as measured by weight loss, Sigstad score for dumping syndrome, ghrelin levels, outlet diameter, and technical feasibility. We then reviewed the charts of 65 patients who underwent TORe in NY and CT with the primary outcomes of total weight loss (TWL) at 1, 3, and 5 months as well as adverse events.

Results: Six prospective and retrospective studies and one systematic review were included, involving 1778 patients undergoing TORe. TORe was correlated with weight loss as early as 3 months and for as long as 7-year postprocedure. Endoscopic suturing was superior to sclerotherapy for weight loss, and there was no significant difference in weight loss between endoscopic and surgical correction of GJA widening. The technical success rate was 99.89–100% with no serious AEs and an overall AE rate of 6.5–11.4%. In our 65 patient sample, the average starting weight was 255.84 $\pm$ 52.73 lbs with TWL at 1-, 3-, and 5-month post-TORe of 16.06 $\pm$ 9.17, 25.34 $\pm$ 12.79, and 30.22 $\pm$ 12.91, respectively. There were no serious AEs reported, with the most common AE being the need for a second TORe procedure (4 patients, 6.06%).

Conclusion: TORe is not only a safe and technically practical option for GJA outlet reduction after gastric bypass, but it may offer weight loss without the risks associated with more invasive surgical revisions.

P149

Does euglycemic DKA contribute to risk of postoperative hemorrhage?

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Many patients undergoing bariatric surgery have obesity-related comorbidities, of which diabetes mellitus (DM) is common. SGLT2 inhibitors are second-line therapy, touting improved cardiovascular mortality and offering kidney protection. SGLT2 inhibitors have also been found to increase the risk of euglycemic diabetic ketoacidosis (eDKA).

We present a patient with life-long obesity and type 2 DM, managed on multiple oral antihyperglycemic medications and high doses of insulin who underwent laparoscopic sleeve gastrectomy complicated by eDKA which we believe resulted in coagulopathy and contributed to postoperative bleeding. Our patient was a 44-year-old male on metformin, insulin (120U QD), glipizide, and ertugliflozin. He halved his glargine for 2 days prior to the operation and stopped all oral DM medications on the day of surgery.

His sleeve gastrectomy was uncomplicated. Late on POD#0, he became tachycardic. Stat labs showed stable hemoglobin, anion gap 24, beta hydroxybutyrate > 5, bicarbonate 17, and glucose 159; he was in eDKA. He was admitted to the ICU, started on an insulin drip, resuscitated and his acidosis resolved. His tachycardia persisted, so CTAP was obtained demonstrating hemoperitoneum, for which he returned to the operating room for hematoma evacuation around the staple line. No active bleeding was seen.

Acidosis has been shown to impair platelet aggregation, increasing fibrinogen breakdown and impair the coagulation cascade. There is a well-documented association between DKA and gastrointestinal bleeding. We hypothesize that DKA may also contribute to postoperative hemorrhage; however, other such scenarios have yet to be documented.

Well documented in patients on SGLT2 inhibitors, eDKA is characterized by serum bicarbonate level < 18 mEq/L, pH < 7.3, anion gap > 12 mEq/L, elevated serum ketone level, and dehydration, blood glucose < 250 mg/dL. While most oral DM medication should be held on the day of surgery, SGLT2 inhibitors should be held 4 days prior to surgery, per FDA 2022 recommendations. In bariatric patients, it may be advantageous to hold the SGLT2 inhibitors four days prior to starting pre-operative liquid diet. EDKA typically occurs after a physical stressor such as surgery or fasting. Its presentation is similar to that of postoperative complications with symptoms of abdominal pain, tachycardia, and nausea, making accurate and timely diagnosis difficult. Bariatric surgeons need to be aware of eDKA and how to manage SGLT2 inhibitors preoperatively.

P150

Peri-operative Risk Factors for Incisional Hernia After Minimally Invasive Bariatric Surgery—An MBSAQIP analysis

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Introduction: Incidence of incisional hernia following minimal invasive surgery is far less compared to open surgery. There is an increase in the annual number of bariatric procedures being performed worldwide. We evaluated the incidence and risk factors for incisional hernia within 30 days after minimal invasive bariatric procedures.

Methods: We used the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database between 2015 and 2019 to identify adult patients who underwent laparoscopic or robotic sleeve gastrectomies (SG) and Roux en-Y-gastric bypasses (RYGB) for BMI 30 or higher. We excluded those converted to open and when there was a concurrent ventral/incisional/umbilical hernia repair. Outcome of interest was incisional hernia examined postoperatively and the peri-operative risk factors associated with it.

Results: Out of 744,781 patients, 612 (0.08%) had an incisional hernia on post-operative examination within 30 days. Incisional hernias were associated with patient factors, such as age, females, current smoker, COPD, previous surgery; operative factors, such as operative time; and post-operative factors such as pneumonia, deep surgical site infection (DSI), and wound disruption (Table). On multivariate analysis, increasing age (Odds Ratio 1.02, $p < 0.001$), current smokers (OR 1.37, $p = 0.02$), increasing operative time (OR 1.004, $p < 0.001$), pneumonia (OR 6.76, $p < 0.001$) an,d DSI (OR 6.28, $p < 0.001$) were independent risk factors for post-operative incisional hernia.

Conclusion: Incisional hernia after minimal invasive bariatric surgery is quite rare affecting only 0.08% of the patients. There was no difference between laparoscopic versus robotic or SG versus RYGB procedures; however, certain patient and perioperative factors were associated with a higher risk.

Table Univariate analysis baseline characteristics (significant only)

	No Incisional hernia, n = 744,169	Incisional Hernia, n = 612	p value
Age, mean (SD) years	44.9 (11.92)	48.18 (11.83)	< 0.001
Female (%)	80.1	76.8	0.039
Current smoker	60,521 (8.1%)	68 (11.1%)	0.007
COPD	11,849 (1.6%)	20 (3.3%)	0.001
Previous surgery	52,907 (7.1%)	63 (10.3%)	0.002
Operative time, mean (SD) mins	87.7 (49.7)	105 (62.4)	< 0.001
Deep Surgical Infection	469 (0.1%)	5 (0.8%)	< 0.001
Wound disruption	412 (0.1%)	2 (0.3%)	0.04
Pneumonia	1459 (0.2)	12 (1.96%)	< 0.001

P151

Incidence and management of portomesenteric vein thrombosis following bariatric surgery: a case series

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Introduction: This case series discusses the similarities and differences of bariatric surgeries complicated by portomesenteric venous thrombosis (PMVT) and provides management examples based on clinical presentation and disease severity. We provide insight into recognizing severe cases of PMVT and approaches to treatment to assist others in ensuring that adequate resources are available to appropriately manage this relatively rare and life-threatening complication.

Methods: This retrospective study includes seven cases at a single high-volume bariatric surgery center from 2017 to 2022. Patients were categorized based on age, procedure, risk factors, symptoms, time of diagnosis, duration of hospitalization, and treatments. All patients underwent extensive hematologic workup and were not found to have any underlying hypercoagulable disorders.

Results: All patients underwent a laparoscopic vertical sleeve gastrectomy. The average age was 48, average time from surgery to initial symptoms was 11 days, and from surgery to diagnosis 18 days. Duration of hospitalization varied from 2 to 13 days, with an average of 1 week. 100% endorsed abdominal pain, 57% nausea, 14% vomiting, and 14% back pain. 100% involved the superior mesenteric vein (SMV), 71% portal vein, 43% splenic vein, and 14% inferior mesenteric vein (IMV). Imaging demonstrated edema in 57% of patients, with two patients having significant small bowel thickening. The 5 patients without edema or bowel thickening underwent close monitoring in an ICU setting and systemic anticoagulation. These patients were transitioned to oral anticoagulation prior to discharge.

The 2 patients with bowel thickening underwent diagnostic laparoscopy, with one patient showing compromised bowel requiring resection. Interventional radiology was also recruited to perform a transjugular intrahepatic portosystemic shunt (TIPS) and SMV thrombectomy with an excellent outcome.

Conclusion: PMVT is a life-threatening complication after bariatric surgery. The incidence of PMVT at our institution is 0.53%, similar to other centers and nearly 200 times greater compared to the general population (2.7 in 100,000). Presenting symptoms varied from 2 to 32 days; thus, it is important to maintain a higher level of suspicion for patients presenting with abdominal pain following bariatric surgery and obtain appropriate imaging.

Edema on imaging increases concern and lowers the threshold for operative intervention. It is our recommendation to consider exploration of patients with any evidence of bowel ischemia, such as wall thickening. The use of advanced endovascular techniques may also be considered as possible primary treatments or adjuncts to surgery, however, any aforementioned concern of ischemia should always be promptly evaluated in the OR.

P152

Insurance disparities and increased comorbid conditions result in care fragmentation after weight loss surgery

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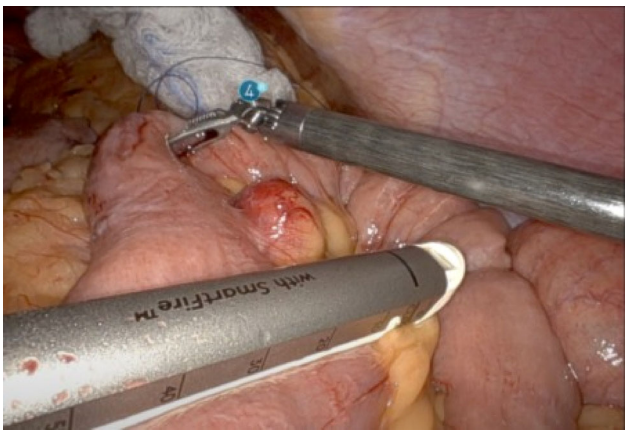
Introduction: Although inpatient readmission after weight loss surgery is rare, it is preferred that patients get readmitted to the institution where the index operation was performed to assure continuity of care. While individual risk factors such as ethnicity, baseline functional status, comorbidities, procedural characteristics, and postoperative complications help identify those at risk for early readmission, it remains unclear what factors are associated with fragmentation of care (readmission to a different hospital than where the original surgery occurred) in bariatric surgery patients. We hypothesized that private insurance is associated with better continuity of care in bariatric surgery patients.
Methods and Procedures: Using the 2017 National Readmissions Database, patients with concurrent codes for obesity and weight loss surgery during elective admission in the first nine months of the year and then subsequently readmitted within 90 days were identified. The outcome of interest was admission to the same hospital as the index admission. Factors assessed included gender, comorbidities, payer, hospital type, and patient zip code income quartile. Payers included private insurance, Medicare, Medicaid, and Other. Survey-weighted logistic regression was performed to identify factors associated with readmission to the same hospital.
Results: We included 71,702 patients who met our inclusion criteria, of whom 80.3% were female. Median age was 44 (IQR 35–53). More than half of patients had private insurance (59.3%), with 19.9% Medicaid, 14.1% Medicare, and 6.8% Other. Readmissions occurred in 5.1% (n = 3,640), of which 22.4% (n = 816) occurred at a different hospital. Survey-weighted logistic regression showed that patients with Medicare were significantly less likely to be readmitted to the same hospital (OR 0.71, 95% CI 0.56–0.90) as were patients with higher comorbidity burden ($\geq$ 2 comorbidities OR 0.74, 95% CI 0.57–0.97) and the index hospital not being a Metropolitan teaching hospital (OR 0.59, 95% CI 0.46–0.75). Female gender (OR 1.31, 95% CI 1.04–1.65) was associated with less care fragmentation and improved continuity of care. Zip code income quartile was not associated with care fragmentation.
Conclusion: Medicare payor status, higher comorbidity burden, and the index hospital not being a Metropolitan teaching hospital are associated with increased fragmentation of care in bariatric surgery patients. Meanwhile, female gender is associated with improved continuity of care for readmission. While fragmented care in patients with comorbidity burden may be partly attributable to medical acuity, disparities between hospital type and payor groups suggest systemic inequities. Further study is necessary to better understand and address the root causes of these disparities.

P153

Incidental GISTs encountered during bariatric surgery: a case series

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Introduction: With the commonality of bariatric procedures, it is not surprising that surgeons could incidentally encounter coexisting pathologies intraoperatively or postoperatively upon histologic examination of surgical specimens. For example, gastrointestinal stromal tumors (GISTs) have an increased incidence in the obese population and therefore could be incidentally encountered during bariatric surgery.
Presentation of Cases: In this case series, we report on three cases of GISTs encountered incidentally during bariatric surgeries (Roux-en-Y gastric bypass and sleeve gastrectomy) at our institution. Preoperatively, all three patients were asymptomatic and had normal work-up. Two of these cases involved intraoperative detection of tumors, while one case identified a GIST upon histopathologic examination of the resected stomach specimen.
Discussion and Conclusion: Because obesity is positively associated with gastrointestinal cancers, the bariatric surgeon should be knowledgeable of the medical and surgical management of GISTs in order to treat patients appropriately who have an incidental finding of GIST during or after surgery.



P154

Patients' perspectives on weight recurrence after bariatric surgery: a single-center survey

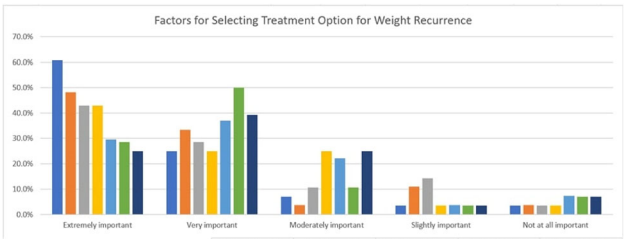
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Introduction: Weight recurrence (WR) affects nearly 20% of patients after bariatric surgery. This may have detrimental psychological effects on patients, ranging from frustration and anger to anxiety and depression. This study aimed to assess patient needs, goals, and preference regarding the available treatment options for WR following bariatric surgery.
Methods and Procedures: An 18-item, web-based survey was developed and distributed to adult patients seeking treatment for WR (> 10% increase from nadir weight) after a primary bariatric surgery (PBS) at a single MBSAQIP-accredited center between November 2021 and June 2022. Survey items included somatometric data, questions pertaining to the importance of specific factors for successful weight loss, decision-making regarding WR management options, and treatment expectations.
Results: 29 patients with > 10% increase from their nadir weight were included in the study. The average time from PBS was 124.5 $\pm$ 15 months and the mean weight increase at the time of the

survey was 39.8% ± 5. Patients had originally undergone roux-en-Y gastric bypass (62.1%), sleeve gastrectomy (31%), or lap band (6.9%). When assessing their satisfaction with PBS, 51.7% were somewhat/extremely satisfied and 34.5% somewhat/extremely dissatisfied, while 13.8% were ambivalent. Patients considered the expected weight loss as the most important factor when choosing a treatment option for WR (Fig. 1). Patient goals included "being able to resume activities I could not do before" (96.4% very/ extremely important), "feeling good about myself" (92.8% very/ extremely important), and "improved quality of life and life expectancy" (92.9% very/extremely important). Finally, RBS, lifestyle modification with peer support and use of weight loss medication were ranked as first treatment options for WR by 50%, 45.8%, and 13% of the respondents, respectively.

Conclusion: Despite experiencing WR, most patients were satisfied with the results of their PBS. Weight loss outcomes were the most important factor when choosing a WR treatment modality with RBS and lifestyle changes being preferred over weight loss medications. Given the scarcity of available comparative evidence of the available treatment options for WR, large prospective randomized trials are needed to better counsel this patient population.

Fig. 1 Importance of factors contributing to the selection of a WR treatment modality



	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Benefits (e.g.,expected weight loss from the treatment)	60.7%	25.0%	7.1%	3.6%	3.6%
Time/effort to complete preoperative requirements	48.2%	33.3%	3.7%	11.1%	3.7%
Additional out of pocket costs	42.9%	28.6%	10.7%	14.3%	3.6%
Risks and side effects	42.9%	25.0%	25.0%	3.6%	3.6%
Time/effort to adhere to treatment instructions/guidelines	29.6%	37.0%	22.2%	3.7%	7.4%
Fit with your lifestyle	28.6%	50.0%	10.7%	3.6%	7.1%
Prior treatment option experience	25.0%	39.3%	25.0%	3.6%	7.1%

P155

Small bowel obstructions following elective bariatric surgery: Evaluation of prevalence, clinical characteristics, and predictors

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Introduction: Small bowel obstruction (SBO) after bariatric surgery is an important yet poorly understood complication. Our primary objectives were to first characterize bariatric surgery patients who developed an SBO and second, to compare 30-day complication rates among bariatric surgery patients who developed an SBO with those who did not. We also sought to determine the influence of patient and procedure factors on the development of SBO among bariatric surgery patients.

Methods and Procedures: All data were extracted from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database using the 2020 operative year. All primary Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) procedures were included, while prior revisional surgeries and emergency surgeries were excluded. Multivariable logistic regression modeling was used to determine the influence of patient and operative factors on the development of SBO.

Results: A total of 142 111 patients were identified, of which 408 (0.3%) developed an SBO. Overall, SBO patients were older (45.7 ± 11.5 vs. 43.5 ± 11.9 years; $p = 0.0002$), of reduced BMI (43.6 ± 6.8 vs. 45.1 ± 7.7; $p = 0.0001$), and more likely to be of female sex (92.2% vs. 81.1%; $p < 0.0001$). SBO patients had more anastomotic leaks (6.1% vs. 0.2%; $p < 0.0001$), wound disruptions (0.7% vs 0.1%; $p < 0.0001$), deep surgical site infections (2.5% vs. 0.1%; $p < 0.0001$). At 30-days post-operation, complications including need for reoperation (59.8% vs. 1.0%; $p < 0.0001$), reintervention (12.8% vs. 0.9%; $p < 0.0001$), readmission (71.3% vs. 3.0%; $p < 0.0001$), and intensive care unit admission (9.8% vs. 0.6%; $p < 0.0001$) were all increased in SBO patients.

Regarding surgical characteristics, 85.3% of SBO patients underwent RYGB compared to 26.6% among non-SBO patients ($p < 0.0001$). Additionally, initial operative length was on average longer among SBO (68.8 min) patients when compared to non-SBO (49.7 min) patients (< 0.0001). RYGB as the index surgery was the largest independent predicator of development of SBO (OR 11.91; 95% CI 8.92–15.90; $p < 0.0001$). Longer operative length was also found to be predictive of development of SBO (OR 1.0; 95% CI 1.00–1.01; $p < 0.0001$).

Conclusion: SBO occurs in approximately 0.3% of all elective bariatric surgery patients and is associated with increased morbidity and mortality. Further elucidation of technical factors for RYGB specifically associated with development of SBO may reduce the burden of SBO morbidity among elective bariatric surgical patients.

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Randomized controlled study comparing intraoperative and postoperative parameters and weight loss after laparoscopic sleeve gastrectomy in morbidly obese patients using 36-Fr an 42-Fr bougie

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Background: Laparoscopic sleeve gastrectomy (LSG) has been increasingly offered to bariatric patients and has emerged as the definite standalone procedure for this ailment. Size of bougie used to fashion a sleeve during LSG has varied from surgeon to surgeon and there is no consensus on optimum bougie size for the procedure. Larger bougies creating a broader sleeve have been shown to have a definite lower complication rate, while smaller bougies are considered to create narrower sleeve with better weight loss at the cost of higher complications. There is a reason therefore, to scientifically assess the ideal orogastric bougie size to make LSG a safe procedure. This study was designed to compare the intra operative and postoperative parameters, weight loss, complications and resolution of co-morbidities after LSG using size 36 Fr and 42 Fr bougie for creation of sleeve.

Materials and Methods: A total of 20 patients (17 females and 3 males), age ranging from 18 to 65 years who fulfilled the inclusion and exclusion criteria were evaluated. Patients were randomly assigned into two groups for undergoing LSG with bougie size 36 Fr (group A) and 42 Fr (group B). Postoperatively, patients were evaluated every 2 weeks for a period of 3 months for weight loss, resolution of co-morbidities, and complications.

Result: A total of 20 patients underwent LSG during the study period. Patients were randomized into two groups. These groups were comparable with similar preoperative parameters. There were no intra-operative or post-operative complications. Absolute weight loss at 3 months was 25.2 kg and 27.04 kg in Group A and Group B, respectively ($p = 0.001$). Reduction in BMI was 10.021 and 10.79 in

Group A and Group B, respectively (p = 0.001). Mean BMI and %EWL in group A at 3 months were 37.9 kg/m^2 and 40.54% as compared to 38.5 kg/m^2 and 44.011% in group B, however the difference between the two groups did not achieve statistical significance. There was 100% resolution of hypertension and diabetes mellitus in all cases in both groups.

Conclusion: This study shows that LSG with either bogie sizes, results in significant weight loss and resolution of co-morbidities. Intra-operative and post-operative parameters and complications after LSG were comparable in both groups. When stratifying outcomes by bougie size, results suggest that using a bougie size of 36 Fr when compared with 42 Fr does not result in any difference in weight loss in the short term with equivalent resolution of co-morbidities.

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Weight Loss Outcomes Following Bariatric Surgery for Patients with and without Psychiatric Diagnoses

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The association between obesity and psychiatric diagnoses have been widely described. However, the impact of preoperative psychiatric status on postoperative outcome is unclear. Furthermore, psychiatric co-morbidity can act as a barrier to receipt of bariatric surgery, which is the most effective and sustainable form of treatment for obesity. This study aims to compare weight loss outcomes between patients with and without psychiatric diagnoses at 3 years following bariatric surgery.

We conducted a large retrospective cohort study using the Ontario Bariatric Registry, including patients with a BMI under 50, who underwent vertical sleeve gastrectomy (VSG), or Roux-en-Y gastric bypass (RYGB), since 2010. Percentage of excess weight loss (%EWL) was compared between patients with and without psychiatric diagnoses. Subgroup analyses were conducted on patients with a history of physical, mental, or sexual abuse, patients with eating disorders, and patients on preoperative antidepressant therapy with SNRI or SSRI, compared to those without these diagnoses.

Of 17,022 patients included, 15,152 underwent RYGB, of whom 7,909 (52.2%) had a psychiatric diagnosis and 1,870 underwent VSG, of whom 1,036 (55.4%) had a psychiatric diagnosis. For patients who underwent RYGB, 3-year %EWL was 72.7% for patients with a psychiatric diagnosis and 71.7% for patients without a psychiatric diagnosis (p = 0.250). For patients who underwent VSG, 3-year %EWL was 53.6% for those with a psychiatric diagnosis and 56.9% for those without a psychiatric diagnosis (p = 0.314). No statistically significant differences in weight loss outcomes were seen in subgroup analyses.

Psychiatric co-morbidity does not predict decreased weight loss outcomes at 3 years for patients who underwent bariatric surgery in Ontario, Canada. More specifically, a history of abuse, eating disorder, or preoperative antidepressant use did not result in a statistically significantly different weight loss outcome. No difference in weight loss outcomes was observed between patients with and without psychiatric diagnoses; therefore psychiatric diagnoses should not preclude access to bariatric surgery.

P158

Exploring the Role of Prophylactic Cholecystectomy in Select Patients Prior to Bariatric Surgery: A Retrospective Study

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Objective: Biliary disease is a well-described complication of bariatric surgery. It had previously been the practice of many centers to routinely perform prophylactic cholecystectomy during the patient's index bariatric operation. More recently, this practice pattern has changed, and routine concurrent cholecystectomy is rarely performed despite significant incidence of biliary disease after bariatric surgery. In this study, we aim to identify specific characteristics more frequently found in patients who develop biliary complications postoperatively and thus recognize certain patient populations that may benefit from prophylactic cholecystectomy.

Methods: Using the OR case log at a single, high-volume bariatric center we identified every initial bariatric operation that occurred between January 1, 2014 and December 31, 2015. Exclusion criteria included previous or concurrent cholecystectomy, death within 4 years of index operation, and age < 18 or > 89 years old. Charts were reviewed for characteristics of age, gender, preoperative BMI, type of bariatric operation (sleeve vs roux-en-y gastric bypass), presence of diabetes, hypertension, hyperlipidemia, GERD, and postoperative biliary complications.

Results: 681 charts were reviewed, and 150 patients were excluded (145 for previous cholecystectomy, 5 for death within 4 years of index operation). Of the 531 patients included, 43 underwent cholecystectomy postoperatively for an incidence of 8.1% over the last 5–7 years. The two patient populations did not have statistically significant differences in age, type of bariatric operation, or rates of diabetes, hypertension, hyperlipidemia, and GERD. However, the patient populations did differ significantly in gender (cholecystectomy population 97.6% female vs 76.1%, P 0.001), as well as BMI (37.2% of cholecystectomy population BMI > 50 vs 22.7%, P.033). When only female patients were evaluated, this group was found to have an even greater statistically significant difference (35.7% BMI > 50 in cholecystectomy population vs 19.9%, P 0.018), with a 16.7% incidence of postoperative cholecystectomy in female patients with super obesity vs 8.1% overall.

Conclusion: While the incidence of postoperative cholecystectomy in all bariatric surgery patients in this study is relatively low (8.1%), the characteristics of female gender and super obesity (BMI > 50) were found to correlate with a significantly increased risk of cholecystectomy. When we analyzed only female patients with super obesity, the incidence of postoperative cholecystectomy was 16.7%, or 1 in 6. When considering the increased difficulty that potential unresolved obesity and postoperative adhesions add to performing a cholecystectomy, we believe this number is sufficiently high to warrant consideration of prophylactic cholecystectomy during bariatric surgery in this patient population.

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Effect of metabolic and bariatric surgery and time from surgery to birth on maternal and newborn outcomes among morbidly obese women

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Introduction: After having metabolic and bariatric surgery (MBS), national clinical guidelines recommend that women wait for 12–24 months before conception to prevent complications from rapid maternal weight loss. However, these recommendations are based on limited evidence and may result in women having difficulties with pregnancy and delivery because of advanced age. We examined the relationship between MBS and maternal and newborn outcomes and whether delivery before or after the recommended waiting period following MBS affected these outcomes.
Methods and Procedures: Utilizing New York State's Statewide Planning and Research Cooperative System (SPARCS), we identified morbidly obese (body mass index ≥ 40) mother-newborn dyads among women (01/2005–11/2019) who did (MBS) or did not (No MBS) undergo MBS. Using bivariate and multivariate analyses, we examined characteristics and maternal and 30-day newborn outcomes in unmatched and propensity score-matched (on age, race, insurance status, smoking during pregnancy and pre-pregnancy diabetes and hypertension) samples of MBS and No MBS mothers as well as MBS mothers (2008–2015) who delivered ≤ 18 (≤ 18 m) and > 18 months (> 18 m) following surgery.
Results: We analyzed 79,536 mother-newborn dyads among whom, there were 74,625 No MBS and 4911 MBS mothers. Among 4042 mothers who had MBS between 2008 and 2015, 604 (15%) delivered ≤ 18 m and 3438 (85%) delivered > 18 m. Compared to No MBS women, MBS women were older, more likely to have private insurance, hemorrhage during early pregnancy and newborns with low birth weight (< 2500 g), and less likely to have gestational diabetes and hypertension, cesarean delivery, and preterm births ($p < 0.01$ for all). Compared to ≤ 18-m mothers, > 18-m mothers were less likely to have public insurance ($p = 0.03$), hemorrhage during early pregnancy ($p = 0.04$), cesarean delivery ($p < 0.01$) and newborn (≤ 30 days) deaths ($p = 0.01$). Among mothers who underwent gastric bypass, < 18-m group were less likely to have hemorrhage during early pregnancy ($p = 0.03$) and newborn deaths ($p < 0.01$) compared those > 18 m group. These differences were not seen among mothers who underwent sleeve gastrectomy.
Conclusion: We did not find strong evidence to support the current 12–24-month post-MBS waiting period for conception. However, earlier post-MBS pregnancies may require careful and more frequent monitoring, especially among women who had gastric bypass. The risks of earlier pregnancy should be weighed against those associated with advanced maternal age. Post-MBS contraception counseling should consider reliable and affordable options and explore any access barriers.

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Preoperative Bariatric Surgery for Oncologic Disease in Severely Obese Patients

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Background: Surgery for patients with severe obesity is technically challenging. Preoperative weight loss is expected to improve short-term outcomes.
Objectives: To evaluate the short-term outcomes of bariatric surgery followed by tumor resection in patients with severe obesity.
Methods: We report the short-term results of two cases: a case in which radical resection was performed after laparoscopic sleeve gastrectomy (LSG) for a large gluteal lipoma that had prolapsed into the pelvis, and a case in which LSG was performed after preoperative chemoradiation therapy (CRT) for advanced rectal cancer, followed by radical surgery.
Results: Case 1: Female, 40 s. Height was 162 cm, weight was 110 kg, and BMI was 41.9 kg/m^2. MRI showed a size of $23 \times 15 \times 13$-cm gluteal lipoma that prolapsed into the pelvis and compressed the rectum. LSG was performed to reduce preoperative weight and lipoma volume. 39 weeks after LSG, the patient weight was 82.4 kg and BMI was 31.4 kg/m^2. The tumor had shrunk by 10% and was resectable percutaneously. No postoperative complications were observed. Postoperatively, defecation disorder improved. Case 2: Male, 30 s. Height was 159.4 cm, weight was 150.3 kg, and BMI 59.2 kg/m^2. He was diagnosed with lower advanced rectal cancer (cT3, cN2a, cM0, cStage IIIb). Preoperative CRT was performed for rectal cancer, and LSG was performed 2 weeks after CRT. 8 weeks after surgery, multiple liver metastases were detected and the patient received preoperative chemotherapy. 26 weeks after LSG, the robot-assisted abdominoperineal rectal amputation and simultaneous urethral resection were performed for rectal cancer. At the time of surgery, the weight was 95.2 kg and BMI was 37.6 kg/m^2. Postoperatively, the patient had an intra-abdominal abscess of Clavien–Dindo grade 2.38 weeks after LSG, the patient underwent laparoscopic partial hepatectomy for liver metastasis. At the time of surgery, the weight was 82.2 kg and BMI was 32.4 kg/m^2. There were no postoperative complications. The patient is currently under observation with no recurrence.
Conclusion: Bariatric surgery prior to radical surgery for oncologic diseases may be useful for patients with severe obesity.

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Outcomes following mesh reinforced and primary sutured cruroplasty during concurrent roux-en-y gastric bypass and hiatal hernia repair: a comparative analysis of the MBSAQIP database (2017–2019)

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Introduction: Hiatal hernias (HHs) are frequently repaired at the time of roux-en-y gastric bypass (RYGB) for obesity. Mesh-reinforced cruroplasty may decrease HH recurrence rates when placed during concurrent hiatal hernia repair (HHR) and RYGB. We seek to evaluate the frequency of mesh reinforced cruroplasty during RYGB with concurrent HHR, patient factors associated with mesh placement, and the safety of its use.
Methods and Procedures: We queried the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Project (MBSAQIP) database to identify patients undergoing concurrent RYGB and HHR between 2017 and 2019. Patients with a prior bariatric/foregut surgery, an American Society of Anesthesiologists (ASA) classification of 5, an emergent or open operation, and any other concurrent procedures at the time of RYGB were excluded from analysis. Univariate analysis and multivariable logistic regression were used to identify factors associated with mesh placement. Patients undergoing mesh repair were 1:1 propensity score matched for patients' characteristics,

demographics, comorbid conditions, and surgical approach to patients receiving cruroplasty alone. The perioperative outcomes of the matched cohorts were compared using Pearson's Chi-squared and Fisher's exact tests where appropriate.
Results: 5,074 patients underwent RYGB with HHR. 431 (8.5%) patients had mesh implanted, while 4,643 (91.5%) underwent primary HHR. On univariate comparison of baseline characteristics, patients undergoing mesh repairs were more likely to be current smokers (9.3% vs 6.3%, $p = 0.02$) but less likely to have obstructive sleep apnea (OSA) (33% vs 41%, $p = 0.01$) and diabetes mellitus (22% vs 27%, $p = 0.03$). On multivariable regression modeling, current smokers were more likely than nonsmokers to have mesh repairs (OR 1.47, 95% CI[1.02,2.06]) and those with OSA were less likely to have mesh placed (OR 0.75, 95% CI[0.6,0.93]). On comparison of propensity-matched cohorts, the cohort undergoing mesh repair had a significantly longer mean operative duration (118 min. vs. 131 min., $p < 0.001$). There were no differences in perioperative outcomes including leak, surgical site infection, outpatient dehydration treatment, blood transfusion, reoperation, readmission, and re-intervention between matched cohorts (all $p > 0.05$).
Conclusion(s): Mesh-reinforced cruroplasty is performed relatively infrequently in concurrent RYGB and HHR. The use of mesh in these cases is associated with longer operative duration but equivalent perioperative outcomes compared to primary sutured cruroplasty. The use of mesh at the hiatus during concurrent HHR and RYGB is safe. Additional studies are needed to determine the efficacy of mesh in decreasing the rate of long-term HH recurrences in this patient population.

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Comparing perioperative outcomes among conversions from sleeve gastrectomy

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Background: Sleeve gastrectomy (SG) is the most common bariatric surgery performed in the USA. Despite its ubiquity, complications associated with SG include insufficient weight loss, weight recidivism, and development or exacerbation of reflux. The most frequently performed conversion is the SG to RYGB, but other conversions are being increasingly utilized. The objective of this study was to compare perioperative outcomes among different SG conversion procedures to each other as well as to the most performed conversion (SG to RYGB).
Methods: Conversions from SG to other procedures were compared utilizing the 2020 MBSAQIP PUF data registry. Primary outcomes for this study include post-conversion days until discharge, extended length of stay (LOS), length of operation, total complications, major complication (per MBSAQIP definitions), 30-day readmission, 30-day reoperation, 30-day intervention, and 30-day mortality. 7016 patients were included.
Results: Conversions to single anastomosis gastric bypass (SAGB) were associated with a significantly shorter length of stay than other procedures (median 1 vs 2 days; $p < 0.0001$). Operative length was shortest for SAGB and longest for SADI (129.08 vs 156.42 min; $p = 0.0024$). No significant differences among the conversions were found in total complications, major complications, 30-day reoperation, readmission, or intervention, although a trend toward a statistically significant increase in major complications was seen for SAGB ($p = 0.1061$). When SAGB was compared directly to RYGB, the increase in major complications was significant (OR 3.036, 1.208–7.628 95% CI, $p = 0.018$).
Conclusion: SG conversions to SAGB were associated with shorter LOS and faster operative times but with increase in post-op sepsis relative to other conversions, and SAGB had a higher incidence of major complications when compared to the RYGB. This may be explained by relative inexperience with SABG and may offset the small benefits seen in operative times and LOS. Overall, there appears to be a negligible difference in perioperative outcomes between conversion surgeries. Long-term data are needed to compare efficacy between conversions.

Table 1 Major complications—multivariate analysis

	OR	95%	CI	p value
RYGB	–	–	–	–
BPD	1.482	0.76	2.889	0.248
RYdGB	1.202	0.521	2.775	0.666
SADI-S	1.96	0.951	4.04	0.068
SAGB	2.637	1.019	6.829	0.046

P163

The Impact of Social Determinants of Health (SDOH) on Completing Bariatric Surgery at a Single-Academic Institution

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Objective: Underutilization of bariatric surgery in patients with obesity is multifactorial. The aim of this project was to understand the impact of SDOH on achieving surgery, in a time frame commensurate with insurance requirements (6–9 months), in a cohort of patients who applied to our program.
Methods: Surgery candidates who applied for primary bariatric surgery from January to December 2021 were included and stratified into 3 groups including, those who completed surgery within 6–9 months, those who are still in the pre-surgery process > 9 months, and those who never started. Data from the application included zip-codes, age, and insurance. Given clinical data could not be collected for candidates who never started, zip codes were used as a surrogate to determine SDOH, using the most recent 5-year American Community Survey results (2015–2020), to ensure equal treatment of groups. Data were derived for SDOH based on 4 domains: demographic (gender/race), social (education/disability), economic (income/food stamps/poverty status), and housing (internet access, rent/own). Insurance and age data were specific to each patient. Zip code-level characteristics were summarized as medians and compared between study groups using non-parametric tests. Chi-square tests were used to compare insurance and age.
Results: 1098 applicants were included in the analysis of which 33% completed surgery (COM:n = 362), 51% were still in process (IP:n = 555), and 16% never started (NS:n = 181). Compared to the COM group, IP patients were more likely to be younger (16.5% vs 11.8%, $p = 0.03$), covered by Medicare (41.3% vs. 26.2%, $p < 0.0001$), reside in zip codes characterized by a larger proportion of people whose rent was $\geq$ 50% of their income (9% vs 8%, $p = 0.04$), and a larger proportion of households below the poverty level (16.8% vs 14.6%, $p = 0.01$). Zip code characteristics did not

differ in race, gender, public assistance/food stamps need, internet access, or disability.
Comparison of NS to COM demonstrated the former was more likely to be younger (19.1% vs 11.7%, p = 0.02) covered by private insurance (75.1% vs 66.3%, p = 0.054) and reside in zip codes having a greater proportion of white population (85% vs 80%, p = 0.044). No other differences were significant.
Conclusion: Differences in zip code-level SDOH were identified between the IP and COM group. This suggests efforts must be focused on granular analyses of barriers faced by this population to decrease time to surgery and associated attrition rate.

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Enhanced Recovery After Surgery (ERAS) protocol development and modification in Bariatric Surgery leads to decreased Length of Stay (LOS) and Post-Operative Narcotic Use (PONU) during the hospital stay and after discharge

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Background: ERAS pathway protocol developed initially for colorectal surgery patients has been shown to minimize hospital costs, reduce LOS and decrease PONU. A correlation between adoption of ERAS protocol and reduction in length of stay without increased emergency department visits or re-admissions has been demonstrated in bariatric surgery. However, attempts to tailor these protocols to the special perioperative needs of bariatric patients are ongoing. We retrospectively assess the evolution of initial and modifications to the ERAS protocol at a large single-academic institution.
Methods: This is a series of single-center observational studies evaluating the outcomes of variable changes to the institutional perioperative recovery protocol for bariatric patients from the period between 2014 and 2021. Data were collected for patients undergoing both primary and revisional bariatric procedures. We compared 417 patients during the first 15 months of use of intraoperative Exparel transversus abdominis plane blocks to historical controls. Primary outcomes were PACU Narcan use, LOS, and PONU. In 2015 and 2017, LOS and PONU data were again collected in conjunction with participation in the DROP and ENERGY MBSAQIP projects. Adoption of these pathways included prescribing discharge narcotics at the initial H&P visit, prescribing multimodal non-narcotic pain and nausea medications 24 h preoperatively with pre-op carb loading. Finally, from April 2020 to March 2021, institutional data were collected on 150 patients in conjunction with the BSTOP MBSAQIP national quality improvement projects. These patients received 3 days of non-narcotic pain medication preoperatively as well as 3 to 5 days postoperatively. Primary outcomes included narcotic administration after PACU, morphine equivalents after PACU, and mean morphine equivalents prescribed after discharge.
Results: Introduction of intraoperative liposomal bupivacaine use reduced length of stay overall from 3.5 days to 2.97 days ($p < 0.05$) for all bariatric patients. Following the rollout of DROP and ENERGY protocols, institutional bariatric length of stay decreased again to 1.8 days. By 2021 with the inclusion of the BSTOP pathway, only 49 of the 150 patients studied in this period received narcotics after PACU and of those who were discharged with narcotics, 59% reported that they did not use them. Total MME prescribed was reduced from 750 before 2015 to 60 in 2021.
Conclusion: A series of interventions to implement an ERAS pathway for bariatric surgery patients has been associated with decreased length of stay and decreased inpatient and outpatient narcotic use.

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Sleeve gastrectomy to roux-en-y gastric bypass revisional surgery, is it worth it? A single-institution experience

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Introduction: While the sleeve gastrectomy has remained the most predominant bariatric surgery nationally, this does not preclude the potential downfalls related it to. Revision rates have been quoted as high as 12% at 10 years. The majority of revisions done are for either GERD or weight recurrence. As we see more revisions necessary, knowing the best revisional options for patients becomes key. Our goal was to look at patients within our institution who underwent revision from a sleeve gastrectomy (SG) to a roux-en-y gastric bypass (RYGB) and assess their post-operative outcomes.
Methods: Using our pooled MBSAQIP data from 2010 to 2020, we identified all patients who underwent revisional bariatric surgery. We then narrowed this groups to patients who underwent an initial procedure of a SG and underwent a revision to a roux-en-y gastric bypass (RYGB). From this, we identified 60 patients. We analyzed their post-operative outcomes and complications to assess efficacy and safety of revisional surgery.
Results: In total, we had a 1027 sleeve performed with 60 requiring revision, making our conversion rate around 5.9%. There was an average weight loss of 3.8% (4.2 kg), 13.8% (14.6 kg), and 22.5% (24.6 kg) at 30 days, 6 months, and 1 year, respectively. Follow-up rates were 100% at 30 days, 48% at 6 months, and 28% at 1 year. 24 patients had GERD at time of revision. Of these 17 were seen in follow-up and 10 had resolution of symptoms and were free of medication (59%).

Complications are described in Table 1.

Complication	# of patients	Percentage (%)
superficial surgical site infection	1	1.7
need for blood transfusion	2	3.3
post-operative sepsis	1	1.7
ICU admission	1	1.7
seen in ED	8	13
Re-operations	4	6.7

Conclusion: Revision from SG to RYGB appears to be a feasible option for management of GERD as well as for patients who experience weight recurrence. Furthermore, revisional surgery appears to be safe with a low percentage of patients experiencing complications.

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Higher Rates of Emergency Department Utilization by Female Gastric Bypass Patients of Childbearing Age and Post-Menopausal Age: Propensity Score-Matched MBSAQIP Analysis

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Introduction: Bariatric patients are predominantly female despite a nearly equal incidence of obesity among the sexes. Prior research indicates that perioperative and bariatric-specific outcomes are worse for male patients. However, it is not known if this sex disparity persists with aging amid an expected rise in cardiovascular disease and decrease in estrogen production among female patients. We sought to evaluate the comparative safety and efficacy of bariatric surgery in female patients in ages of expected high (18 to 35 years old) and low (55 to 65 years old) estrogen levels compared with males.

Methods: Male and female patients between 18 to 35 years old and 55 to 65 years old who underwent RYGB were identified in the MBSAQIP 2019–2020 dataset. Using Propensity Score Matching analysis, the cohorts were matched for 26 preoperative characteristics. We compared 30-day outcomes and bariatric-specific complications between males and females from 18 to 35 years old and from 55 to 65 years old.

Results: There were 17,165 patients from 18 to 35 years old who underwent RYGB. The matched cohorts (n = 2,156) for two groups had similar pre-operative characteristics. Propensity-matched outcomes showed that females had significantly more emergency visits than males (14.3% vs 9.0%, $p < 0.001$). Males had longer operative times (114.85 + 51.96 min vs 118.57 + 54.87 min, p = 0.023) and higher rates of postoperative bleeding (0.2% vs 0.5%, p = 0.003).

Of 14,609 patients from 55 to 65 years old who underwent RYGB, Propensity Score Matching analysis produced two groups (n = 2,814) with similar pre-operative characteristics. Females had significantly higher emergency visit rates than males (8.0% vs 6.8%, p = 0.049), while males had longer operative times (127.51 + 56.92 min vs 132.51 + 65.97 min, p = 0.002).

For both groups, general 30-day complications such as mortality, cardiac complications, pulmonary complications, renal complications, unplanned ICU admission, blood transfusions, readmissions, intervention, reoperations, length of stay, and bariatric-specific complications such as anastomotic leak were not significantly different.

Conclusion: In this propensity score-matched analysis, there was no difference between male and female patients in mortality, cardiopulmonary complications, or bariatric-specific outcomes in either age cohort. Female bariatric patients at ages of expected high and low estrogen levels are at higher risk for postoperative emergency visits compared with males. This sex disparity is consistent with outcomes of other surgical procedures, such as hernia repair. Additional research is needed to determine the driving factors for this difference in emergency care.

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Bariatric Surgery Versus Medical Weight Loss Therapy for Class II Obesity—A Retrospective Cohort Study

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Introduction: The purpose of this study is to compare the effectiveness and outcome profiles of bariatric surgery, medical weight loss therapy, and combined surgical and medical weight loss interventions for patients with obesity. The prevalence of obesity has increased markedly over the last two decades, costing billions of extra healthcare dollars and leading to significantly more preventable deaths. While both surgical and medical weight loss treatment options are available, few studies exist comparing these options in patients with obesity, with even fewer comparing outcomes of either treatment modality alone versus combined therapy.

Methods: A retrospective cohort analysis was carried out of 119 patients with Class II obesity (BMI > 35) undergoing elective weight loss surgery, medical weight loss therapy, or both at a single institution between January 2020 and August 2022. Bariatric surgery (Roux-en-Y gastric bypass, gastric sleeve, or gastrojejunostomy revision) was performed by a single surgeon and medical therapy (appetite suppressants or glucagon-like peptide inhibitors) was administered by a single endocrinologist at Houston Methodist Hospital in Houston, Texas. Data collection included patient demographics, BMI (kg/m2), medical problems, surgical complications, length of stay, readmissions, medicine side effects, laboratory values, and outcomes. Differences across groups were determined by Fisher's exact test for categorical variables. A p value of < 0.05 was considered statistically significant.

Results: Out of 119 patients analyzed, 37 underwent bariatric surgery (13 robotic Roux-en-Y gastric bypasses (RNYGB), 21 robotic sleeve gastrectomies, and three robotic gastrojejunostomy revisions), 76 underwent medical therapy, and six underwent both. Hypertension, diabetes mellitus, dyslipidemia, and GERD were among the most common obesity-associated medical problems identified across cohorts, with nearly half of these patients requiring dual-anti-hypertensive or dual-anti-hyperglycemic drug therapy. Sleeve gastrectomy patients exhibited significantly shorter operative times (116 vs 178 min; p = 0.001) and less estimated blood loss (22.5 vs. 33.1 mL; p = 0.01) compared to RNYGB patients. Patients undergoing bariatric surgery achieved significantly greater reductions in BMI compared to those undergoing medical therapy (5.49 vs 3.04 kg/m^2; p = 0.001). Patients undergoing both bariatric surgery and medical weight loss therapy did not exhibit significantly greater reductions in BMI compared to patients undergoing either treatment modality alone ($p > 0.12$ for both).

Conclusion: In conclusion, bariatric surgery alone may offer greater reduction in BMI in patients with Class II obesity compared to medical weight loss therapy alone or combined medical and surgery treatment. Future studies are necessary to further compare the effectiveness of single versus combined weight loss treatment modalities.

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Third time's a charm—band to sleeve to bypass

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Objective: The 2020 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) started reporting reasons for conversions and detailing previous bariatric surgeries. Prior to 2020, it was impossible to know the reason for revision or conversion. We examined the MBSAQIP to evaluate patients undergoing multiple revisions.
Methods: The 2020 MBSAQIP Participant Use File was examined to evaluate the conversions of adjustable gastric bands (AGB) to sleeve gastrectomy (SG) and then to Roux-en-Y gastric bypass (RYGB). Patient and operative characteristics were examined, as were outcomes. Descriptive statistics were applied.
Results: There were 94 patients who went from AGB to SG to RYGB. The primary reason for the second conversion was gastroesophageal reflux disease (GERD) at 57.4%. The second most common reason was inadequate weight loss or weight regain (IWL/WG) at 34.1%. The other reasons were dysphagia, nausea, and vomiting or other. There was a female predominance for both subgroups ($p = 0.004$). Mean BMI was 38.8 and 45.7 kg/m^2, respectively, for the "GERD" and "IWL/WG" subgroups ($p < 0.01$). Procedure outcomes were evaluated after 30 days, showing no difference in readmissions, reinterventions, or reoperations between the subgroups ($p > 0.05$). Finally, the mean 30-day follow-up BMI was lower for patients in the "GERD" cohort ($p < 0.01$).
Conclusions: Patients who converted from AGB to SG to RYGB do so primarily for GERD or IWL/WG. Further efforts to define the best primary operation for each patient are needed to prevent further conversions.

Table 1. Comparison of baseline characteristics (A) and outcomes (B) by conversion reason

	GERD *(n=54)*	IWL/WG *(n=32)*	Total *(n=86)*	*p*-value
A. Baseline Characteristics				
Sex				0.004[2]
Female	51 (94.4%)	23 (71.8%)	74 (86.04%)	
Male	3 (5.6%)	9 (28.2%)	12 (13.96%)	
Age at surgery				0.82[1]
Mean, in years	49.35 ± 9.36	49.87 ± 11.62	49.54 ± 10.2	
BMI				<0.01[1]
Mean, in kg/m2	38.77 ± 7.31	45.67 ± 7.39	41.33 ± 8.03	
OP length				0.83[1]
Mean, in min	162.27 ± 66.94	165.93 ± 92.20	163.64 ± 76.79	
Length of stay				0.24[1]
Mean, in days	1.66 ± 1.00	1.4 ± 0.94	1.57 ± 0.98	
B. Outcomes				
Reoperation in 30-day window				0.43[2]
No	53 (98.15%)	32 (100%)	85 (98.84%)	
Yes	1 (1.85%)	0 (0%)	1 (1.16%)	
Readmission in 30-day window				0.83[2]
No	50 (92.6%)	30 (93.8%)	80 (93.02%)	
Yes	4 (7.40%)	2 (6.2%)	6 (6.98%)	
Reintervention in 30-day window				0.7[2]
No	53 (98.15%)	31 (96.88%)	84 (97.67%)	
Yes	1 (1.85%)	1 (3.12%)	2 (2.33%)	
30-day follow-up BMI				<0.01[2]
Mean, in kg/m2	35.74 ± 5.97	42.04 ± 6.62	38.02 ± 6.88	

1 Student Test
2 Chi-square Test

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Safety and outcomes of bariatric surgery in patients with inflammatory bowel disease: a systematic review and meta-analysis

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Introduction: Prevalence of obesity in patients with inflammatory bowel disease (IBD) is increasing; however, few studies have evaluated bariatric surgery outcomes in this unique patient population. We aimed to perform a systematic review and meta-analysis evaluating the safety and efficacy of bariatric surgery in patients with IBD.
Methods and Procedures: This systematic review and meta-analysis was performed in keeping with the PRISMA and MOOSE guidelines. We evaluated adult subjects (> 18 years) with IBD undergoing any bariatric surgery compared to those without IBD. Our primary outcome was complications, while secondary outcomes evaluated anthropometric outcomes and IBD disease control.
Results: We reviewed 2703 studies with 11 (6 retrospective cohort studies, 4 retrospective observational studies, and 1 prospective descriptive study) meeting inclusion. Within included studies, there were 1,595 (0.5%) patients with IBD and 314,267 (95.5%) patients without IBD. There was a similar female predominance in both groups and ages were similar (55.7% and 46.0 years IBD vs 78.3% and 45.5 years non-IBD).
Meta-analysis revealed that patients with IBD had significantly increased likelihood of post-operative complications (RR 2.14; 95% CI 1.87–2.44; $p < 0.00001$; $I^2 = 0\%$) compared to patients without IBD. Mortality and length of hospital stay were similar between groups. Despite risks, patients with IBD achieved on average a 55.1% excess weight loss. Additionally, de-escalation of IBD medication was achieved in 11.4% of participants, while 9.7% required escalation of medication and 38.9% had no change in medication.
Conclusion: While bariatric surgery presents an effective weight loss option for patients with IBD, these patients are associated with higher rates of post-operative complications but no difference in mortality. The role of bariatric surgery on modifying IBD course remains unclear. Literature evaluating this topic is limited, highlighting the need for future research to better delineate the optimal bariatric procedure, long-term nutritional outcomes, and impact on IBD disease course.

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The Slow Rise of Bariatric Revisions in Men and Women: a MBSAQIP Analysis

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Background: Bariatric surgery has grown in recent years as an effective and durable treatment of severe obesity and its comorbidities. However, over the past twenty-five years, bariatric surgery patients have been disproportionately women. As more patients undergo primary bariatric surgery, many expect a subsequent rise in revisional procedures as well. The purpose of this study is to quantify the recent rise in primary bariatric volume, revisional volume, and the proportions of men and women undergoing these procedures.
Methods: The MBSAQIP public use files for 2015–2018 were queried for all primary and revisional bariatric procedures and relative

proportions of each were determined. The groups were then stratified by sex and relative proportions for each year were obtained.
Results: From 2015 to 2018, primary bariatric procedures increased from 144,516 to 172,745 (19.5% increase). Revisional procedures increased from 23,576 to 32,111 (36.2% increase). The proportion of primary procedures performed in male patients decreased from 21.1% to 19.9%. The proportion of revisional procedures performed in male patients slightly increased from 14.1% to 14.7%.
Conclusions: From 2015 to 2018, the growth of revisional bariatric cases has outpaced the growth in primary procedures. However, male patients represent a lower percentage of these bariatric revisions compared to primary surgeries. It is unclear at this time why fewer revisions are performed in men, but it may be possible that the same social factors that prevent men from pursuing primary bariatric surgery are also a factor in the decision to pursue revision. More studies are needed to determine these social determinants.

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Preoperative markers of post-operative weight changes following bariatric surgery

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Background: There are currently few recognized preoperative predictors of long-term weight changes following bariatric surgery. Both inadequate postoperative weight loss and weight regain (WR) are important considerations that determine long-term success of bariatric surgery. Our prospective cohort study sought to identify possible preoperative predictors of inadequate weightloss as well as WR.
Methods: We recruited 121 consecutive adult patients undergoing laparoscopic roux-en-y gastric bypass. Baseline measurements were recorded and include sex, age, race, diabetic status, preoperative body mass index (BMI), as well as preoperative weight loss. Furthermore, baseline fasting serum measurements were recorded in the form of ghrelin, leptin, glucagon, insulin, HbA1c, CRP, and HOMA-IR. We categorized leptin (ng/ml) and ghrelin (pg/ml) into low (< 35x/ml), intermediate (35-70x/ml), and high (> 70x/ml). CRP was dichotomized into low (< = 10 mg/l) and high (> 10 mg/l). Preoperative weight loss was categorized as percentage of baseline weight lost into low (< 5%), intermediate (5–10%), and high (> 10%). Maximal weight loss (WLmax) calculated as postoperative nadir weight for our cohort at 3 years postoperatively as a percentage of the difference to baseline weight. WR was calculated as the percentage of body weight regained at 5 years compared to the nadir weight at 3 years.
Results: We analyzed five years of postoperative data. Patient demographics are summarized in Table 1. We found mean maximal weight loss (WLmax) of 32.5% (SD 10.4) at 3 years, mean 5-year weight regain of 10.6% (SD 5.4) and 31 patients (25.6%) were diabetic. In our crude analysis, baseline increasing ghrelin was found to be significantly associated with increasing WLmax among our diabetic patients, while HbA1c was found to have in inverse relationship with WR ($p < 0.05$). Our adjusted regression analysis demonstrated high baseline leptin category and diabetic status were significantly associated with 5-year WR at the 0.05 level. We found high-CRP category and decreasing HbA1c level were significantly inversely associated with 5-year WR at the 0.05 level in our adjusted analysis. Moderate preoperative weightloss category was significantly associated with WLmax at the 0.05 level in our adjusted analysis. Age was found to have significant inverse association with WLmax with a reduction of approximately 0.25% per year of age.
Conclusion: We found mixed results in comparison with similar studies with respect to baseline predictors especially with leptin, age, and their relationship to post-operative weight changes over time. Further large sample studies are needed to explore these relationships with the goal of providing accurate postoperative weight loss predictive models.

	Overall mean (SD)	Non-DM mean (SD)	DM mean (SD)	p-value
WLmax (%)	32.47 (10.40)	33.74 (11.03)	28.79 (7.30)	0.456
WR at 5yr (%)	10.57 (5.43)	10.71 (5.08)	9.96 (7.13)	0.478
Age (years)	43.89 (12.71)	41.29 (12.38)	51.45 (10.59)	0.018
Female (%)	77.69%	81.11%	67.74%	0.123
Race (W%/B%/H%)	65.29%/15.70%/18.18%	66.67%/14.44%/18.89%	61.29%/19.35%/16.13%	0.764
Preop BMI (kg/m2)	45.56 (7.07)	45.84 (6.47)	44.72 (8.65)	0.496
Ghrelin (pg/ml)	54.46 (22.24)	55.20 (21.86)	52.60 (23.47)	0.395
Leptin (ng/ml)	53.87 (30.83)	56.24 (31.43)	46.65 (28.27)	0.482
Glucagon (pg/ml)	65.03 (25.76)	62.60 (25.27)	71.11 (26.41)	0.311
HOMAIR	3.36 (5.17)	2.24 (2.64)	7.27 (8.90)_	0.289
Insulin (IU/ml)	13.22 (18.53)	9.52 (10.27)	24.88 (30.69)	0.393
A1C (%)	5.97 (0.87)	5.66 (0.36)	7.03 (1.91)	<0.001
Glucose (mg/dl)	99.77 (25.26)	92.80 (15.17)	122.31(36.43)	0.128
CRP (mg/l)	6.59 (6.15)	6.21 (4.95)	7.58 (8.63)	0.355
Pre-op WL (%)	4.56 (3.59)	4.40 (3.64)	5.04 (3.48)	0.396

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A case of postoperative hemorrhaging after revisional sleeve gastrectomy for gastric plication

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Background: Few reports have described revisional sleeve gastrectomy for gastric plication, and none have mentioned its perioperative complications. We report a case of postoperative hemorrhaging after revisional sleeve gastrectomy.
Objectives: We discuss the causes of postoperative bleeding following revisional sleeve gastrectomy.
Methods: A 48-year-old woman underwent gastric plication at another institution 10 years ago. She was 158.2 cm tall, weighed 117.3 kg, had a body mass index of 47.9 kg/m^2, and was being treated for type 2 diabetes mellitus. Upper gastrointestinal endoscopy showed gentle elevation of the greater curvature from the antrum to the fundus.
Results: Laparoscopic revisional sleeve gastrectomy was performed using a 37.5-Fr bougie. Intraoperative findings showed little invagination of the gastric wall, so gastric transection was performed without reversing the plication. However, the gastric wall was hard, especially at the incisura angularis, and the staple line bled after transection, hampering hemostasis. On postoperative day (POD) 1, hemoglobin decreased by 3 g and computed tomography showed perisplenic hematoma. We transfused 4 units of packed red blood cells, but reoperation was unnecessary. Postoperative upper gastrointestinal series showed no stenosis or leak. The patient was discharged on POD 3 as the hemoglobin level did not decrease after blood transfusion. Three months postoperatively, weight loss was 25 kg without any complications.
Conclusion: The distance from the bougie must be carefully secured when performing sleeve gastrectomy, especially at the incisura angularis. However, in this case, the plication was not reversed, and the stomach at the incisura angularis was transected in the thick part affected by the plication. This might have resulted in insufficient staple formation, leading to postoperative bleeding. When revisional sleeve gastrectomy is performed after plication, the plication must be reversed, especially at the incisura angularis.

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Safety and feasibility of destination care for bariatric surgery—a single-institution retrospective study

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Introduction: Increasing emphasis on value-based healthcare has prompted both employers and healthcare organizations to develop innovative strategies to supply high quality care to patients. Destination surgery is one such alternative that seeks to connect patients with high-value surgery programs that may be located hundreds of miles away. Our institution created a novel approach to bariatric care, incorporating our entire multidisciplinary team, leveraging virtual care, and partnering directly with employers. We sought to investigate comparative outcomes for the first 100 patients who completed the destination bariatric program. We hypothesized that there would be no difference in patient outcomes or complications between destination and local patient groups undergoing sleeve gastrectomy (SG) or Roux-en-Y gastric bypass (RYGB).
Methods and Procedures: A retrospective cohort analysis of patients undergoing bariatric surgery at a MBSAQIP-accredited bariatric surgery center between May 2019 and October 2021 was conducted. Patients were divided into destination or local patient groups based on participation in the established destination surgery program. Patient demographics, perioperative clinical outcomes, and complications were compared and statistically analyzed using Chi-square tests, Fisher's Exact tests, and univariate logistics regression.
Results: This study identified 296 patients, which consisted of destination (n = 110) and local (n = 186) patient cohorts. Patients in the destination group had higher rates of diabetes mellitus (29.1% vs 24.2%, p = 0.029), but otherwise cohorts had similar basic demographics and comorbidities. Outcomes revealed no significant difference in ED admission (p = 0.3053), hospital readmission (p = 0.8927), surgical reintervention (p = 0.9741), endoscopic reintervention (p = 0.7144), or patient complications between the destination and local patient groups in the postoperative period (30 days).
Conclusion: Participation in destination care programs for bariatric surgery was found to be both safe and feasible. These destination programs represent an opportunity to provide a broader patient population access to complex surgical care.

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Impact of Bariatric Surgery on Asthma Severity and Medication Use

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Background: Bariatric surgery provides significant improvement of many obesity-related comorbidities, yet the published literature remains inconclusive on the long-term benefits of bariatric surgery for asthma and gastroesophageal reflux disease (GERD). The primary objective of this study was to identify the long-term impact of bariatric surgery on GERD and asthma severity.
Methods: A retrospective review was completed of all patients with a diagnosis of asthma who underwent bariatric surgery from January 1, 2010 through December 31, 2020 at a single bariatric center of excellence. Analysis comparing laparoscopic sleeve gastrectomy (LSG) to laparoscopic Roux-en-Y gastric bypass (LRYGB) was also performed. Primary outcomes were the number of asthma and GERD medications prescribed at five time points (preoperative, postoperative < 18 months, 19–36 months, 37–60 months, 60 + months) after bariatric surgery. Secondary outcomes were spirometry results and BMI.
Results: The study cohort consisted of 260 patients with an 84.6% female predominance. Subgroups included 168 (65%) LSG patients and 92 (35%) LRYGB patients. Mean preoperative age was 47.6 ± 10.7 years, mean BMI was 46.0 ± 6.8 kg/m2, 9.6% were current tobacco users, 45.0% were previous tobacco users, 35.0% had diabetes, and 11.9% had GERD. The total number of patients on two or more asthma medications decreased from 46% preoperatively to 41% at 18 months, to 36% at 36 months, and to 32% at 60 months after surgery. The total number of patients free from asthma medication use increased from 25% preoperatively to 33% at 60 months postoperatively. Asthma medication use decreased with time in both groups with neither operation demonstrating a significant superiority for long-term reduction in asthma medication use. No significant improvement nor differences were found between the two surgery groups at any time point regarding FEV1/FVC ratio spirometry measures. The total number of patients taking GERD medication decreased from 70% preoperatively to 42% at 60 months after bariatric surgery with LRYGB demonstrating a greater reduction in GERD medication use at < 18 months postoperatively (p = 0.02).
Conclusion: Bariatric surgery reduces the use of asthma and GERD medications, and the amount of medication usage decreases with time and is sustained at 60 months after bariatric surgery.

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Duodenal-jejunal bypass liners are superior to optimal medical management in ameliorating metabolic dysfunction: a systematic review and meta-analysis

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Introduction: DJBLs are reversible, intraluminal devices that promise substantial weight loss and metabolic improvements for patients with obesity. We aim to evaluate metabolic and anthropometric outcomes of duodenal-jejunal bypass liners (DJBLs) compared to optimal medical management for the treatment of obesity and its associated metabolic complications.
Methods and Procedures: A systematic search of MEDLINE, Embase, Scopus, and Web of Science databases was conducted on April 4, 2022. Studies were reviewed and data extracted following PRISMA guidelines. Primary outcome was HbA1c change at device explant with secondary outcomes including body mass index (BMI), weight, fasting plasma glucose (FPG) changes, and device-related adverse events.
Results: Of 1336 search results, 28 unique studies met inclusion criteria, including 7 RCTs, evaluating a total of 1229 patients undergoing DJBL treatment. When compared to optimized medical management, DJBLs provided superior reductions in HbA1c (mean difference, MD − 0.96%; 95% CI − 1.43, − 0.49; p < 0.0001), FPG (MD − 1.76 mmol/L; 95% CI − 2.80, − 0.72; p = 0.0009), BMI (MD − 2.80 kg/m^2; 95% CI − 4.18, − 1.41; p < 0.0001), and weight (MD − 5.45 kg; 95% CI − 9.80, − 1.09, p = 0.01). Post-explant data reveal a gradual return to baseline status. Incidence of early device explant was 20.2%. Complications were resolved conservatively or with device explant without long-term morbidity or mortality.
Conclusion: DJBLs provide significant metabolic and anthropometric improvements for patients with obesity. Weight recurrence to baseline status after device explant is substantial and may limit the use of

DJBLs as a standalone treatment for obesity and its associated metabolic complications.

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Assessment of gastroesophageal flap valve improves diagnostic accuracy of hiatal hernias during pre-operative endoscopy for bariatric surgery

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Introduction: Routine pre-operative esophagogastroduodenoscopy prior to bariatric surgery has long been a controversial topic. The most recent American Society for Metabolic & Bariatric Surgery guidelines states that routine pre-operative endoscopy can be justifiable as it can identify upper gastrointestinal pathologies common in the bariatric population. One such finding is hiatal hernia. However, previous studies have noted that many hiatal hernias diagnosed on pre-operative endoscopy are not significant and ultimately do not require repair at time of bariatric surgery. The purpose of this study is to evaluate whether assessment of the gastroesophageal flap valve during pre-operative endoscopy allows for more accurate diagnosis of hiatal hernias which require repair during bariatric surgery.
Methods: A retrospective chart review was performed on all pre-operative endoscopy performed by a single bariatric surgeon from June 2020 to May 2022. Patients with previous bariatric surgery or hiatal hernia repair were excluded. Data collected included presence of hiatal hernia on pre-operative endoscopy, hiatal hernia repair at time of bariatric surgery, and assessment of the gastroesophageal flap valve using the Hill classification.
Results: A total of 506 patients were included in this study. Overall, hiatal hernias were identified on pre-operative endoscopy in 175 patients with 77 undergoing hiatal hernia repair at time of bariatric surgery. An additional 35 hiatal hernias that were not identified on pre-operative endoscopy were repaired during surgery. On pre-operative endoscopy, a normal gastroesophageal flap valve (Hill grade I–II) was found in 394 patients, while an abnormal gastroesophageal flap valve (Hill grade III–IV) was found in 110 patients. In the normal gastroesophageal flap valve group, 68 were found to have hiatal hernia on pre-operative endoscopy with 22 (32.3%) undergoing repair. In the abnormal gastroesophageal flap valve group, hiatal hernias were identified in 107 patients with 55 (51.4%, $p = 0.013$) undergoing repair. Furthermore, of the 20 patients with Hill grade IV gastroesophageal flap valve, 17 (85%) had an operable hiatal hernia at time of bariatric surgery.
Conclusion: In the bariatric population, pre-operative endoscopy can often over-estimate the incidence of hiatal hernias requiring operative intervention. Assessment of the gastroesophageal flap valve can be a useful tool for improving the accuracy of pre-operative endoscopy in identifying hiatal hernias which warrant repair during bariatric surgery.

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Implementing Novel Modalities into an Institutional Enhanced Recovery after Bariatric Surgery (ERABS) Protocol

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Introduction: Enhanced Recovery after Bariatric Surgery (ERABS) pathways are associated with improved postoperative outcomes. This study aims to assess efficacy and safety of three novel protocol contributions, transversus abdominis plane (TAP) blocks, ketamine, and fosaprepitant with regard to length of stay (LOS) and postoperative complications.
Methods: Effectiveness and safety were retrospectively investigated in patients who underwent Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) over a 6-year period in a single institution. Group 1 patients were not exposed to any of our suggested interventions, whereas Group 2 were exposed to all of three.
Results: Between January 2015 and August 2021, 1480 patients underwent primary SG (77.6%) or RYGB (22.4%); of those,1132 (76.5%) and 348 (23.5%) were in Groups 1 and 2, respectively. Mean BMI and age were 45.87 vs 43.65 kg/m^2 and 45.53 vs 44.99 years in groups 1 and 2, respectively. Suggested interventions were associated with lower operative times (84.79 ± 24.21 vs 80.78 ± 32.8 min, $p = 0.025$). In Group 2, the mean LOS decreased in 0.18 day (1.79 ± 1.04 vs 1.60 ± 0.90; $p = 0.004$). Overall complication rates were 8% and 8.6% for groups 1 and 2, respectively; readmission rates were 5.7% (64 pts) vs 7.2% (25 pts), $p > 0.05$. Reoperations were less prevalent in Group 2 (1.5% vs 1.1%; $p = 0.79$).
Conclusion: Our study demonstrated that proposed contributions in perioperative care may reduce LOS without increasing overall complication rates for patients undergoing LSG and LRYGB.

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The ability of healthcare and non-healthcare providers to predict bariatric surgery outcomes: a prospective observational study

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Introduction: Patients with obesity seeking bariatric surgery undergo an extensive evaluation by a multidisciplinary team to determine their eligibility for surgery. Healthcare professionals' assessment of patient compliance and other factors may affect eligibility decisions. Understanding the degree to which healthcare providers (HP) can predict surgery outcomes may inform patient selection. This study aimed to investigate team member ability to predict patient outcomes after bariatric surgery.
Methods and Procedures: In this prospective, observational study, HP and other clinic staff (CS) independently completed surveys related to postoperative success of adult patients seeking bariatric surgery at a Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP)-accredited center from July 2019 to July 2020. HP and CS weight loss at 6 and 12 months, 30-day complications, and comorbidity resolution predictions were compared with actual patient outcomes through review of the MBSAQIP database. Linear and logistic regression models were used to investigate the HP and CS ratings as a predictor of postbariatric surgery outcomes. Regression models were adjusted for possible confounders, including ASA classification, preoperative BMI, procedure type, and surgeon. The team member predictions between the subgroups were compared using Chi-square test.
Results: 658 predictions on 240 patients who underwent bariatric surgery during the study period were provided by 11 HP and 6 CS. After correcting for possible confounders, HP were able to predict patient weight loss, comorbidity resolution, and length of hospital stay (LOS), while CS accurately predicted only LOS (Table 1). Additionally, the remission of at least one comorbidity at 6 months

was predicted by the HP (OR 1.51, p = 0.025) but not by CS (OR 1.26, p = 0.511). Both groups were unable to predict complications (HP: OR 1.10, p = 0.610; CS: OR 1.42, p = 0.316), readmissions (HP: OR 1.14, p = 0.594; CS: OR 1.75, p = 0.231), or emergency department (ED) visits (HP: OR 0.81, p = 0.309; CS: OR 0.78, p = 0.425) within 30 days from surgery. The HP predicted "significantly below the average" weight loss for patients who experienced total weight loss (TWL) < 20% at 6 months vs. TWL ≥ 20% (3.9% vs. 1.1%; p = 0.05).

Conclusion: HP were able to predict weight-loss outcomes and comorbidity resolution after bariatric surgery but unable to predict surgical complications, 30-day hospital readmissions, and ED visits. Team input may, thus, guide preoperative counseling of patients and help identify patients in need for additional support after surgery, while it may be better to rely upon clinical calculators for risk prediction.

Table 1. Linear regression of postoperative outcomes as predicted by HP and CS

	Unadjusted			Adjusted		
	Coef	95% CI	p-value	Coef#	95% CI	p-value
Length of Hospital Stay (days)						
Healthcare provider predictions	0.27	(0.09, 0.45)	**0.003***	0.26	(0.08, 0.45)	**0.005***
Clinic staff predictions	0.27	(0.01, 0.52)	**0.039***	0.29	(0.04, 0.54)	**0.025***
BMI at 1 Year						
Healthcare provider predictions	-3.21	(-4.63, -1.78)	**<0.001***	-2.02	(-3.07, -0.97)	**<0.001***
Clinic staff predictions	0.12	(-2.10, 2.34)	0.915	0.79	(-1.23, 2.82)	0.437
TWL at 1 Year						
Healthcare provider predictions	6.62	(1.91, 11.33)	**0.006***	5.01	(0.35, 9.66)	**0.035***
Clinic staff predictions	3.73	(-7.69, 15.15)	0.517	-0.97	(-13.22, 11.28)	0.875
N of resolved comorbidities 6mo						
Healthcare provider predictions	0.24	(0.10, 0.38)	**0.001***	0.16	(0.02, 0.29)	**0.027***
Clinic staff predictions	0.13	(-0.14, 0.40)	0.340	0.04	(-0.23, 0.31)	0.770

Notes: # Adjusted for ASA classification, procedure type, surgeon, preoperative BMI. Abbreviations: Coef, coefficient; CI, confidence interval; HP, healthcare providers; CS, clinic staff; BMI, body mass index; TWL, total weight loss; N, number; * The difference is significant at the 0.05 level

P179

Sleeve Gastrectomy Morphology and Weight loss and Gastroesophageal Reflux Disease Outcomes at Two Years

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Introduction: The relationship between sleeve gastrectomy (SG) morphology and weight loss and gastroesophageal reflux disease (GERD) outcomes is not defined.

Methods: A retrospective study of all patients (n = 882) undergoing SG was performed at a single-academic institution from 2015 to 2019. Postoperative day 1 upper gastrointestinal series (UGIS) and two-year weight loss and GERD outcomes were available for 493 patients. Images were independently categorized as Dumbbell (14.0%), Lower Pouch (65.5%), Tubular (18.5%), or Upper Pouch (2.0%) by the Radiologist and Surgeon. Interrater agreement was 90.6%. Univariable analyses were conducted to explore associations between SG morphology, weight loss, and GERD outcomes.

Results: Follow-up was 25.6 ± 3.9 months. Baseline characteristics included age of 45.5 ± 11.7 years, female sex in 81.9%, hiatal hernia (HH) in 34.9%, and HH repair (HHR) performed at index SG in 23.5%. Body mass index (BMI) (49.4 ± 10.3 vs. 37.0 ± 8.8 kg/m2; p < 0.00001) and average obesity-associated diseases (4.0 ± 2.1 vs. 2.6 ± 1.9; p < 0.00001) and medications (3.7 ± 3.2 vs. 2.8 ± 2.6; p < 0.00001) significantly decreased postoperatively. GERD was more prevalent at follow-up (52.3% vs. 39.6%; p = 0.00006). GERD-specific outcomes included de novo (40.6%), persistent (29.7%), worsened (28.2%), improved (11.8%), and resolved (29.7%) disease. Twenty-four percent of patients underwent upper endoscopy and 6.9% a metabolic or foregut re-operation during the study period. Compared to other SG morphologies, Lower Pouch resulted in higher GERD resolution (31.7% vs. 21.1%; p = 0.0867), although this difference was not statistically significant.

Conclusion: Our data suggest no statistically significant associations between SG morphology classification and weight loss or GERD outcomes at two years. Future efforts should utilize a prospective design to definitively answer these questions.

P180

Revisional surgery after sleeve gastrectomy: a MBSAQIP analysis

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Introduction: The objective was to evaluate revisional procedures after sleeve gastrectomy (SG), indications for surgery, and 30-day outcomes. Despite the proven efficacy and safety of SG, there is an increasing need for revisions after SG mostly due to gastroesophageal reflux disease (GERD), weight recurrence, or inadequate weight loss. Evidence reporting outcomes for revisions after SG remains limited to small series and single-institution experiences.

Methods and Procedures: This was a retrospective study of the MBSAQIP database. Individuals undergoing revisional procedures after initial SG were included. Data were limited to 2020 as this year included key details on revisional cases. A descriptive analysis was performed to determine indications for revision and types of revisional procedures performed. Univariate analysis was performed to compare outcomes by revisional procedure. The primary outcome was serious complications which included cardiac complications, pneumonia, renal failure, reoperation, reintervention, deep surgical site infection, wound disruption, stroke, venous thromboembolism, leak, and bleed.

Results: 7,839 revisional procedures were performed after SG. Mean age was 45.7 ± 10.4 years and not significantly different among procedures (p = 0.764). When including patients who underwent revision for weight-related indications, the mean body mass index (BMI) was 40.2 ± 8.1 kg/m^2 and not statistically different between procedures (p = 0.474). Patients who underwent revision for GERD had a significantly lower BMI compared to revisions for inadequate weight loss or weight recurrence (37.5 vs 43.6 kg/m^2, p < 0.001). Indications for revisional surgery were GERD (45.7%), weight recurrence (28.5%), and inadequate weight loss (15.9%). Revisional procedures performed included Roux-en-Y gastric bypass (RYGB, 78.9%), re-sleeve (8.4%), biliopancreatic diversion with duodenal switch (BPD-DS, 6.1%), single-anastomosis duodeno-ileal bypass (SADI, 3.8%), and one-anastomosis gastric bypass (OAGB, 1.3%). For patients with GERD, the majority underwent RYGB (96.1%) followed by re-sleeve (3.1%) and OAGB (1.3%). When the indication was inadequate weight loss or weight recurrence, RYGB was the most common (65.4%), followed by BPD-DS (12.8%), re-sleeve (13.9%), SADI (8.0%), and OAGB (1.2%). Patients with higher BMI were increasingly revised to BPD-DS or SADI. Serious complications were highest after OAGB (9.2%), followed by RYGB (7.7%), BPD-DS (7.0%), SADI (5.8%), and re-sleeve (4.4%); with statistical significance (p = 0.04). Mortality was uncommon (0.09%) and not significantly different among procedures.

Conclusion: SG is most often revised to RYGB, however, for higher BMI, more patients are being revised to BPD-DS or SADI. Complication rates were highest after OAGB and lowest after re-sleeve. Standardizing practices for revision after SG have the potential to improve surgical outcomes.

P181

Perforated gastric remnant ulcer after Roux-en-Y gastric bypass successfully treated with partial remnant gastrectomy: a case report

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Gastric remnant perforation secondary to ulcer disease is a rare complication of Roux-en-Y gastric bypass surgery. Awareness of this complication as well as early diagnosis and treatment is crucial to minimize associated morbidity and mortality. In this case report, we present a 62-year-old male patient with remote history of open RYGB who presented with acute abdominal pain, tachycardia, and diffuse peritonitis. Abdominal computed tomography revealed peri-gastric edema and small foci of pneumoperitoneum in the upper abdomen with small-volume ascites. The differential diagnosis included perforated marginal ulcer versus perforation of a gastric or duodenal ulcer in the excluded segments. The patient was taken to the operating room for emergent diagnostic laparoscopy. Upon exploration, a large volume of succus and bile was noted in the left upper abdomen. After extensive lysis of adhesions, a one-centimeter perforation in the proximal body of the gastric remnant along the greater curvature was identified. The patient was successfully treated with partial remnant gastrectomy, effectively removing the perforated ulcer. Final pathology revealed a benign focal gastric perforation. No helicobacter organisms were identified on immunostaining. Currently, there is no consensus regarding the optimal surgical management of perforated gastric remnant ulcers. We argue that partial remnant gastrectomy should be considered over Graham patch repair in order to eliminate the risk of missed malignancy and need for further endoscopic surveillance.

P182

Results of failed RYGB reversal—marginal ulcers and partial obstruction

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Objectives: With the growing obesity epidemic, surgeons are performing more bariatric surgeries, including RYGB reversals. Although studies have identified indications for RYGB reversals, little information is available about the long-term effects of the procedure. We wish to highlight a case with long-term complications of RYGB reversal and subsequent management.
Methods: We present a patient with multiple abdominal surgeries including a RYGB reversal that was complicated by a stenosed gastrogastric anastomosis that caused several gastrojejunostomy ulcerations and malnutrition secondary to intractable nausea and vomiting.
Results: A 51-year-old female with a complex surgical history including a RYGB reversal in 2019 presented to the ER with complaints of abdominal pain, uncontrolled diarrhea, and an inability to tolerate food for 6 months. Work-up revealed multiple marginal ulcers at the gastrojejunostomy and a stenosed gastrogastrostomy placed high along the cardia of the remnant stomach and pouch. This stenosis resulted in a nonfunctional, nondependent reversal that only drained when filled. Ultimately, a large gastrotomy was performed and an endoscope was utilized to identify a small pinhole connection between the patient's pouch and remnant stomach along the superomedial portion of the remnant stomach's fundus. The anvil of a 60-mm GIA black load stapler was guided through and fired twice to come across the stricture. After the stricture was completely crossed, the endoscope was passed through, confirming that it was widely patent. The postoperative course was uneventful and the patient was discharged with TPN on post-operative day 15 before being discontinued at her follow-up visit. She reported that she had been gaining weight and eating well.
Conclusion: Long-term complications following RYGB reversal are not well-discussed in the literature. This case offers insight into such complications, discusses the surgical technique utilized to fix them, and calls for further research on the topic to better inform surgeons and patients alike.

P183

Prehabilitation with anti-obesity medications in patients with a BMI > 50 kg/m2 prior to bariatric surgery: a case–control study

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Introduction: Patients with a BMI > 50 kg/m^2 are of high risk for post-operative complications from bariatric surgery (BS). There is reluctance to consider these patients for BS due to peri-operative risk and the long-term outcomes. Anti-obesity medications (AOM) have been effective for weight loss. The aim of this study is to evaluate the efficacy and safety of using AOMs preoperatively for patients undergoing BS.
Methods: Patients with a BMI > 50 kg/m^2 were evaluated and treated at a MBSAQIP bariatric center of excellence. All patients who enrolled into the program after March 2021 and who had coverage for AOMs were given AOMs for prehabilitation. All patients who did not have insurance coverage for AOMs and those enrolled before March 2021 compromised the control group. All patients received the same medical, surgical, psychiatric, and nutritional interventions. BMI, weight, Hgb A1c, time to surgery, co-morbidities, complications, and weight change were analyzed.
Results: 31 (32.9%) out of 94 patients in this program had initial BMI > 50 kg/m^2. The average BMI in these patients was 58.1 kg/m^2 (range 50.1–73) and weight was 154.3 kg (range 111.1–222.7). 19 patients were given an AOM preoperatively and 11 were not. The average decrease in BMI and increase in weight loss prior to surgery was significantly greater in the AOM group. (See table) The average length of the preoperative period was equivalent. All cases were completed laparoscopically. 11 patients underwent Sleeve Gastrectomy, 16 patients underwent RYGB, and 4 patients underwent a SADI-S. There were 3 complications in the AOM group, 1 VTE, 1 bleeding, and 1 TIA, and none in the no-AOM group but this was not statistically significant.
Conclusion: The population of extremely high BMI patients is prevalent. The use of AOMs in BMI > 50 kg/m^2 patients is safe and results in significant reduction in BMI and weight prior to BS. AOMs do not increase the complication rate of surgery, nor do they prolong the time to surgery. More studies are needed to determine optimal timing and duration of preoperative AOMs therapy. Ultimately, this may improve the outcomes in this very high-risk population.

	+ AOM	− AOM	p-value
Change in BMI	− 4.8 kg/m^2	− 2.5 kg/m^2	0.006
Change in weight	− 13.7 kg	− 7.2 kg	0.002
Complications	3	0	0.265

P184

Calculated resting energy expenditure and other predictors of weight loss after bariatric surgery

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The prevalence of obesity and severe obesity continues to increase worldwide resulting in bariatric surgery being one of the fastest growing elective operative procedures performed worldwide. Bariatric surgery is a blunt instrument applied widely; $\geq$ 30% may have suboptimal weight loss or weight regain. The aim of our study is to identify risk factors for failure of optimal weight loss after surgery including the effect of initial predicted resting energy expenditure (REE), as higher REE may predict better weight loss.

Methods: We performed a retrospective review of primary gastric sleeve (GS) and Roux-en-Y gastric bypass (GB) surgery records from 2016 to 2021 at a single hospital system. Univariate analysis was performed to compare characteristics between outcome groups (< 50% excess weight loss versus $\geq$ 60% excess weight loss [EWL]) after bariatric surgery at 1 year, 3 years, and 5 years. Longitudinal weight loss, Harris-Benedict, and Mifflin St Jeor equations for resting energy expenditure (REE) rates were evaluated. We further performed stratified analysis by procedure performed.

Results: Of the 1675 patients analyzed, 857 had GS and 810 patients had GB. The median age was 47 years; the majority were females (76.3%) and Caucasians (58%). Initial median BMI was 43.3 kg/m2?with height 65.5 inches; median weight was 121 kg; and median REE was 1942 (Harris-Benedict)/ 1893 (Mifflin St. Jeor). Patients experiencing $\geq$ 60% EWL at 1 year were younger ($p = 0.01$), male ($p = 0.03$), Caucasian ($p = < 0.001$), had lower initial BMI ($p < 0.001$), lower initial REE ($p = 0.007$), and were taller ($p = 0.004$) than patients with < 50% EWL. Patients with $\geq$ 60% EWL also had fewer comorbidities (e.g., hypertension, diabetes; $p < 0.001$). At 3 years, race ($p = 0.05$), initial weight ($p = 0.03$), and initial BMI ($p < 0.001$) correlated with $\geq$ 60% EWL. Of patients with 3-year follow-up, Black patients had less EWL than Caucasian patients. Of patients with 5-years follow-up, those with initial lower weight, BMI, and REE had better weight loss. The correlation with race was not significant at 5 years. When analyzed by procedure type, the relationship of race with weight loss was significant with gastric bypass but not with sleeve gastrectomy.

Conclusion: Race was associated with significantly decreased weight loss after bariatric surgery, especially in black patients. Interestingly this relationship was present in gastric bypass patients but not sleeve gastrectomy patients. We hypothesized that having a higher initial predicted REE will be associated with higher weight loss, but we discovered the opposite. Further multivariate analysis may clarify these relationships further.

P186

Using Anxiety and Depression as Predictors of Emergency Department Visits and Body Mass Index Reduction Post-Bariatric Surgery

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Introduction: The purpose of this study is to investigate emergency department (ED) visits after bariatric surgery among patients with a history of anxiety and/or depression. Psychological evaluations before bariatric surgery help assess patient readiness and motivation behind seeking surgical intervention; however, there remains debate on the effectiveness of these measures. We predict that patients with a reported history of anxiety and/or depression will have more ED visits in the year following surgery than patients without a history of mental illness. Additionally, we predict that those with anxiety and/or depression will have a slower weight reduction following bariatric surgery.

Methods and Procedures: Following IRB approval, data points were retrospectively collected from the charts of 1,298 patients who underwent either sleeve gastrectomy or gastric bypass surgery between March 2012 and December 2019. Of the 1,298 patients, 545 (41.9%) patients reported no anxiety or depression, 147 (11.4%) patients had only anxiety, 177 (13.6%) patients had only depression, and 429 (33.1%) patients had anxiety and depression. Variables, including patient demographics, mental health history, baseline BMI, BMI reduction, and emergency department visits, were retrospectively reviewed over the first year following surgery.

Results: Patients with a history of depression were not found to have an increase in ED visits when compared to patients without depression ($p = 0.076$). Similarly, those with a history of anxiety were not found to have an increase in ED visits when compared to patients without anxiety ($p = 0.234$). Patients who reported a history of both anxiety and depression were not found to have an increase in emergency department visits in the first year following bariatric surgery ($p = 0.383$). Regarding weight reduction, BMI decrease over time was not different among patients with depression ($p = 0.717$), anxiety ($p = 0.825$), or both depression and anxiety ($p = 0.188$) when compared to patients without reported mental illness.

Conclusion: Patients with a history of anxiety, depression, or anxiety and depression did not have an increased rate of emergency department visits within the first year following bariatric surgery. This finding contradicts current literature that has shown an increased ED visit rate following bariatric surgery among patients diagnosed with bipolar or schizophrenia. Data suggest that there is variability within mental illness and that patients with anxiety and depression should be offered bariatric surgery. This is further supported by evidence of a similar rate of BMI reduction among patients with and without anxiety and depression.

P187

Medium-term Outcomes of Bariatric Surgery in Adolescents: The First Reported Multidisciplinary Experience from Quebec, Canada

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Introduction: Obesity and related comorbidities are rapidly growing health problems among adolescents. Bariatric surgery as the definitive treatment for severe obesity and related conditions is now also accepted for adolescents. However, access to surgery in this population remains a challenge and at times controversial. Our aim is to improve access to surgery in this vulnerable population in a multidisciplinary adolescent bariatric program. Here, we report the outcomes of the first group of adolescents with obesity who have undergone bariatric surgery at our center.
Methods: This is a retrospective review of adolescent patients who underwent bariatric surgery during 2018–2021. All patients were referred for surgery after a multidisciplinary discussion with members of the Center of Excellence in Adolescent Severe Obesity (CEASO), which includes a dedicated adolescent medicine physician, pediatric endocrinologist, pediatric dietitian and nurse, pediatric psychologist, and a social worker. Prior to referral, CEASO maximizes non-surgical treatment. CEASO also continues to follow the patients after surgery allowing for a safe transition of care to an adult obesity medicine team. Baseline demographics, body mass index (BMI), comorbidities, and postoperative outcomes were recorded. Descriptive statistics are displayed as count (percentage) or median (range).
Results: During 2018–2021, 14 patients were referred for bariatric surgery by CEASO and 13 patients (93%) underwent bariatric surgery. Median age was 17 (15–19) years old and nine patients (69%) were female. Median baseline BMI was 50.2 (38.4–75.2) kg/m^2. The most common comorbidities among those patients were obstructive sleep apnea 8 (61%) and non-alcoholic fatty liver disease 8 (61%). Twelve patients underwent sleeve gastrectomy (92%), while one patient underwent a primary Roux-en-Y gastric bypass. During the follow-up period, one patient underwent a second-stage single anastomosis duodenal switch after a previous sleeve gastrectomy due to inadequate weight loss (baseline BMI = 70.3 kg/m^2) and refractory diabetes. All procedures were performed laparoscopically, and the median length of hospital stay was 1 (1–2) day. Median follow-up time was 24 (3–24) months and was complete. The median postoperative BMI was 40.1 (25.9–58.6) kg/m^2 equivalent to a median percent excess weight loss (%EWL) of 54.7 (15.3–94.8) at last follow-up. There were no 90-day postoperative complications observed in this study cohort.
Conclusion: Bariatric surgery in adolescents in the context of a multidisciplinary bariatric program involving adolescent medicine specialists, is safe and effective as evident by our preliminary results. Longer follow-up with a larger volume of patients are needed to consolidate our conclusions.

P188

Does age matter? The risks and benefits of bariatric surgery in our aging population

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Introduction: As bariatric surgery has continued to evolve, it has become safer with a more routine peri-operative course. However, like all surgeries, it does not remain without its risks. Likewise, as we see our population continue to age, the patient population within the bariatric field is doing the same. This then probes the questions of is bariatric surgery worth it? Is it safe for these older patients? There is some literature regarding these questions that have mixed results. Our goal was to assess our patients based on age and determine both the effectiveness and efficacy of bariatric.
Methods: We used the MBSAQIP data from our institution from the past 10 years. We divided our patients into two subgroups, those over the age of 65 (> 65), and those 65 years and younger (< 65). Using a retrospective review, we compared weight loss as well as post-operative complications between these two groups.
Results: In total we had 1,490 patients (174 > 65 and 1316 < 65). The majority of our patients underwent sleeve gastrectomy with the rest undergoing roux-en-y gastric bypass (sleeve rate 70% > 65 and 67% < 65). We found there was no significant difference in weight loss (WL) between the two groups at 30 days, 6 month, or 1 year. Additionally, there was no difference in post-operative complications (Table 1).

	< 65 years old	> 65 years old	p-value
WL 30 days	6.7 kg	6 kg	0.08
WL 6 months	27 kg	26 kg	0.94
WL 1 year	34 kg	27 kg	0.12
post-operative pneumonia	0%	0%	
post-op pulmonary embolism	0%	0.11%	
post-op CVA	0%	0%	
post-op MI	0%	0%	
ICU admissions	0.01%	0.02%	
ED visits	0.09%	0.04%	
Deaths	1 death	0 deaths	
Readmissions	0.06%	0.05%	
Reoperation	0.03%	0.04%	

Conclusion: Overall bariatric surgery remains both as of effective and safe within our older population when compared to those of a younger cohort.

P189

Should we leave a drain in patients on chronic steroids during laparoscopic Roux-en-Y gastric bypass surgery?

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Introduction: Drain use in bariatric surgery is still common especially in high-risk patients. As previous research suggest, patients on chronic steroids might be at increased rate of complications following major surgery. We sought to evaluate the value of drain placement in bariatric patients on chronic steroid use during Laparoscopic Roux-en-Y gastric bypass (LRYGBP).
Methods and Procedures: Data from Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) from 2015 to 2020 were evaluated for drain placement during

LRYGBP. Both 30-day outcomes and bariatric surgery specific complications were evaluated.

Results: 2296 patients were included in the study after adjusting for preoperative characteristics, using propensity score matching. Length of post-operative stay was longer in drain placement group (2.82 ± 1.82 vs. 2.00 ± 3.89 $P < 0.001$). There was significantly higher reoperation rate in the drain group (2.8 vs.4.6 $P < 0.028$) but no significant difference in mortality or surgical site infection. There was significantly higher rate of anastomotic/staple line leak and intestinal obstruction in drain placement group (0.4 vs.1.2 $P < 0.038$) and (0.6 vs.0.5 $P < 0.040$), respectively.

Conclusion: Drain placement in patients on chronic steroid use during LRYGPB is not associated with improved 30-day outcomes or a decrease in bariatric surgery-specific complications.

30-Day outcomes in non-drain placement versus drain placement in patients with history of chronic steroids during LRYGBP

	Non-drain placement (n = 1148)	Drain placement (n = 1148)	*p*-value
30-day outcomes			
Mortality	4 (0.3)	4 (0.3)	0.754
Reoperations	32 (2.8)	53 (4.6)	**0.028**
Venous thromboembolism	6 (0.5)	10 (0.9)	0.108
Surgical site infection	9 (0.8)	14 (1.2)	0.405
Postoperative-LOS (days)	2.00 ± 1.82	2.82 ± 3.89	< **0.001**
Operative time (minutes)	138.30 ± 63.69	139.91 ± 76.89	0.585
Bariatric-specific complications			
Anastomotic/staple line leak	5 (0.4)	14 (1.2)	**0.038**
Postoperative bleeding	8 (0.7)	13 (1.1)	0.383
Intestinal obstruction	7 (0.6)	17 (1.5)	**0.040**
Internal hernia	0 (0.0)	3 (0.3)	0.250
Gastrointestinal perforation	8 (0.7)	3 (0.3)	0.227
Anastomotic ulcer	8 (0.7)	6 (0.5)	0.791

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Selective Serotonin Reuptake Inhibitors weight effects after Vertical Sleeve Gastrectomty.

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Introduction: Mental health diseases such as depression are prominent in the bariatric population. In fact, among bariatric patients, antidepressants are among the most commonly used drugs. There is mixed evidence in bariatric outcomes and weight loss within patients with mood disorders and antidepressant use. The most common type of antidepressant utilized are serotonin reuptake inhibitors (SSRIs). Most research looks into gastric bypass and pharmacodynamics. We focused our study on Vertical Sleeve Gastrectomy (VSG). The purpose of our study was to review and compare weight loss outcomes after VSG in patients with and without SSRIs.

Methods: We performed a retrospective chart review at a single bariatric center on patients that underwent VSG from 2011 to 2018. Patients were followed up to 2 years after surgery. 351 patient charts were reviewed. The patients included were adults (> 18 years of age) who qualified for bariatric surgery based on the National Institute of Health guidelines. Two main groups were obtained, the first one included patients taking an SSRI prior to undergoing surgery and the second one, patients who never took an SSRI from preoperative time to 2 years after surgery. Patients were excluded from the study if they had to undergo revisional surgery during the 2 years of follow-up. Comparisons were made based on compliance in taking the SSRI, having depression, anxiety, both or none. Statistical analysis was performed using T test and chi-square for the multiple variables, and significance was considered for a $p < 0.05$.

Results: In the SSRI group the preoperative weight and BMI were 263.64 lbs (± 2.92) and 43.52 (± 0.38), respectively; in the no SSRI group 307.87 lbs (± 22.90) and 45.97 (± 0.67). At 2 years, the BMI and %EWL were 33.39 (± 0.56, $p > 0.05$) and 46.94% (± 2.36, $p > 0.05$) in SSRI group. In no SSRI group 35.43 (± 1.72, $p > 0.05$) and 47.66% (± 4.09, $p > 0.05$), respectively. At 1 and 2 years the %EWL were 47.74 (± 1.21, $p > 0.05$) and 46.94 (± 2.36, $p > 0.05$) in SSRI group. In no SSRI group 53.25 (± 2.18, $p > 0.05$) and 47.66 (± 4.09, $p > 0.05$), respectively.

Discussion: Based on this data we have concluded that patients with depression on SSRI undergoing VSG do not have statistical significant weight loss difference from surgery up to 2 years after VSG compared to patients not on SSRI.

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Randomized trial comparing medical and surgical weight loss as pathway to renal transplant listing.

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Introduction: Severe obesity remains a major barrier to listing for kidney transplant in dialysis patients with end-stage renal disease (ESRD). Current medical weight loss strategies achieve < 10% total body weight loss (TBWL). Limited data are available regarding the efficacy and morbidity of metabolic surgery (MBS) in ESRD patients. This study prospectively compares the efficacy of MBS to medically managed weight loss (MM) in ESRD patients. We hypothesize that MBS will provide greater weight loss and increased likelihood of successful listing for transplant.

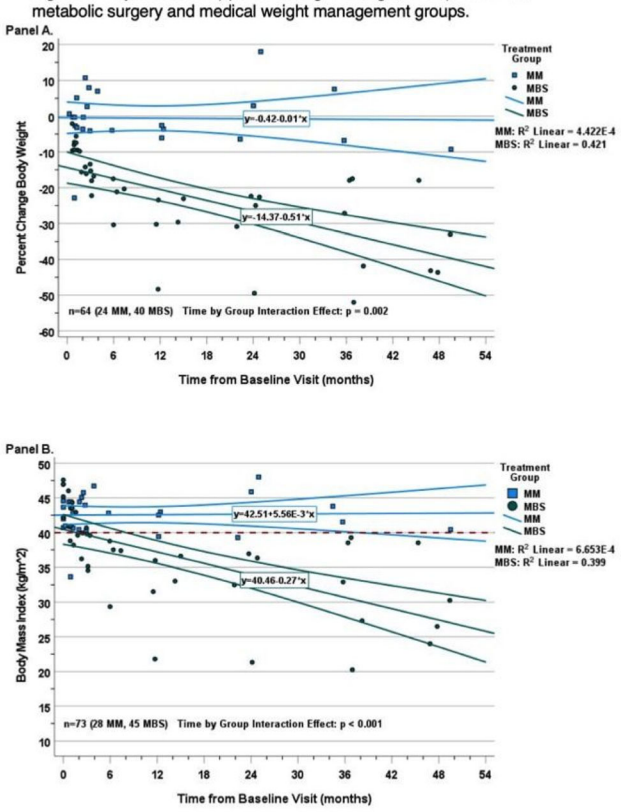
Methods and Procedures: This is a randomized controlled trial enrolling patients with BMI 40–55 kg/m2 currently receiving dialysis. Patients were randomized to MBS with roux-en-y gastric bypass or MM. Patients with MM received standard of care at the medical weight loss center. The primary outcome was successful listing for renal transplant < 1 year. Secondary outcomes were TBWL (% weight change), BMI, weight loss trajectories, morbidity, and mortality. Data were analyzed using comparisons of proportions, analysis

of variance, and mixed effects models comparing the trajectories of weight change (%) and BMI between MBS and MM.

Results: Twenty patients were enrolled; 9 (5 MBS, 4 MM) completed the comprehensive baseline evaluation and received treatment and follow-up. There were no between-group differences in age, gender, or race ($p \geq 0.530$). MBS patients had longer average follow-up than MM (45 ± 5 vs. 30 ± 16 months, $p = 0.075$). Longitudinal analyses (all observations) demonstrated that the trajectories of weight, % change in weight (Fig. 1a), and BMI (Fig. 1b) differed significantly between MM and MBS (time by group interaction effects $p \leq 0.002$). Temporal trajectories indicate that BMI declined to < 40 by month 12 in MBS patients and remained > 40 in MM patients (Fig. 1b). After adjusting for follow-up time, overall % weight loss was greater in MBS patients ($31 \pm 13\%$ vs. $3 \pm 7\%$, $p = 0.046$). The primary endpoint analysis was not statistically significant in this limited sample, with 2 MBS (40%) and 0 MM patients listed < 12 months ($p = 0.44$). To date, 100% of MBS and 25% of MM patients have been listed for transplant ($p = 0.048$). One death occurred in the MM group at 4.5 years due to complications from COVID-19. One MBS patient was treated for myocardial infarction 3.75 years after the baseline visit.

Conclusions: In a randomized trial comparing MBS to MM in dialysis patients, surgery provides greater weight loss and improved overall likelihood of being listed. Larger studies could determine whether MBS achieves greater rates of listing for transplant within 1 year.

Figure 1: Trajectories of a) percent weight change, and b) BMI in the metabolic surgery and medical weight management groups.



P192

Impact on carotid intima-media thickness after laparoscopic sleeve gastrectomy in patients with morbid obesity

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Introduction: We aimed to investigate the impact of laparoscopic sleeve gastrectomy (LSG) on carotid intima media thickness (CIMT) & left ventricular dysfunction (LVD) which are the independent predictors of subclinical atherosclerosis.

Objective: To assess the change in CIMT & echocardiographic parameters of left ventricular function and correlate with %EWL 6 months after LSG.

Methods: The mean CIMT of bilateral common carotid arteries were measured at 3 different places and 7 parameters were assessed for left ventricular dysfunction after 6 months of LSG & correlated with the %EWL.

Results: A total of 30 patients (27 (70%) women and 3 (30%) men) with the mean age of 38 ± 7.84 were prospectively enrolled. BMI was significantly reduced from 42.66 ± 3.79 to 37.93 ± 3.60 kg/m2 six months after LSG. CIMT values were significantly decreased after surgery (0.50 ± 0.11 mm vs. 0.46 ± 0.09 mm; $p < 0.01$). However no significant change was observed in the right mean CCA values (0.50 ± 0.11 mm vs 0.47 ± 0.09 mm: $p < 0.08$) as compared to left mean CCA values (0.50 ± 0.11 vs 0.45 ± 0.09: $p < 0.01$). On 2D ECHO, ejection fraction was increased from 60.80 ± 5.89 to 61.93 ± 4.47: $p < 0.5$, Wave deceleration time [E] (170.36 ± 36.80 vs 150 ± 28.82: $p < 0.02$), Intraventricular septum thickness [IVSD] (0.99 ± 0.14 vs 0.91 ± 0.14: $p < 0.03$), Intraventricular relaxation time [IVRT] (94.33 ± 21.71 vs 84.36 ± 14.85: $p < 0.03$), Left atrial volume index [LAVI] (38.08 ± 11.23 vs 30.93 ± 7.16: $p < 0.01$), Left ventricular diastolic dysfunction [LVIDD] (4.32 ± 0.52 vs 4.11 ± 0.52: $p < 0.02$, PwD (1.00 ± 0.19 vs 0.87 ± 0.10: $p < 0.01$), LV mass (148.37 ± 33.09 vs 117 ± 29.90: $p < 0.001$), and Left ventricular mass index [LVMI] (70 ± 16.89 vs 59.626 ± 15.35: $p < 0.001$).

Conclusion: We observed a significant reduction in CIMT and improvement in 2D ECHO parameters 6 months after LSG although no statistically significant change was observed in mean right CIMT and EF.

P193

Comparison of total inpatient opioid usage in postoperative bariatric patients managed with and without continuous lidocaine infusion

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Introduction: Enhanced recovery after surgery (ERAS) protocols have shown to decrease morbidity and length of hospital stays, but remain highly variable by institution for bariatric surgery. Bariatric surgery patients may also have greater risk of chronic opioid prescription in the opioid naive. Our study aimed to determine the effectiveness of continuous lidocaine infusions in reducing postoperative opioid use in bariatric surgery patients.

Methods: We conducted a retrospective cohort study of 116 elective bariatric surgery patients who underwent robotic sleeve gastrectomy, Roux-en-Y gastric bypass, or bypass revisions between 9/3/2021 and 3/1/2022. Our institution's incorporation of continuous lidocaine infusion into our ERAS protocol initiated on 11/1/2021. There were

46 patients from 9/3/2021 to 10/29/2021 under the non-lidocaine infusion protocol and seventy patients from 11/1/2021 to 3/1/2022 under the lidocaine infusion protocol. Our exposure variable was whether or not patients received lidocaine infusions postoperatively. Our main outcome variables were total opioid use during the hospitalization calculated in morphine milligram equivalents and length of hospital stay in hours. Study variables were selected based on previous literature and potential confounding effects without our exposure or outcome variables. Subgroup analyses between the total MME used in the lidocaine infusion and non-infusion groups were performed by surgery length in hours, gender, and BMI subgroups. Continuous variables were compared using Student's t test and categorical variables using Chi-square tests. Analyses were performed using SAS 9.4.

Results: No significant differences were observed between lidocaine infusion and non-lidocaine infusion groups with age, gender, race, BMI subgroups, past surgical history, chronic pain history, chronic pain medication and opioid use, 30-day readmission rates, type of surgery (robotic sleeve gastrectomy, Roux-en-Y gastric bypass, or gastric bypass revision), whether or not a hiatal hernia repair was also performed, surgery time in hours, or type of TAP block used. Patients that underwent robotic sleeve gastrectomies demonstrated significantly lower overall MME use during their hospitalization in the lidocaine infusion group compared to those in the non-infusion group (118 MME versus 94 MME, $p = 0.03$).

Conclusion: Patients undergoing robotic sleeve gastrectomies have shown to require significantly less opioid medication by MME during their hospitalization in those receiving continuous lidocaine infusion compared to those who did not. This present study suggests that incorporating continuous lidocaine infusion postoperatively for bariatric sleeve patients may reduce the need for opioid dependence during the recovery period.

P197

Teamwork Makes the Dream Work: Combining Interventional Radiology and General Surgery Approaches to Excise Dropped Gallstones

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Symptomatic retained gallstones are a rare but potentially morbid condition. When dropped stones become symptomatic, they require drainage and prolonged antibiotics. With the increase in laparoscopic cholecystectomies, incidence of retained gallstones has risen. Post-cholecystectomy patients presenting with vague complaints or perihepatic abscesses should be considered for retained gallstones.

Traditional treatment of dropped stones was incision and drainage or exploratory laparotomy with washout. The current standard of care is intervention by interventional radiology. Radiologists use a "step-up" concept, much like is used for necrotizing pancreatitis. The hard wall of the abscess cavity provides a contained environment where stone retrieval basket or lithotripsy device can effectively retrieve stones. In this case report of two patients with dropped stones – two different and unpublished combination methods were used to obtain the retained stones.

The first patient, a male in his 60 s, had undergone laparoscopic cholecystectomy two years prior. Recovery was complicated by a bout of cholangitis requiring endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy a year later. He presented to the emergency department a week after his ERCP and was noted to have a firm, painful, nodule in his right upper quadrant. CT scan showed three calcifications within the abdominal wall just below the level of the ribs. Due to the stone depth, it was decided that surgical excision would be the best treatment. As the stones exact position was difficult to identify, needle-wire localization was used preoperatively. The surgeon cut down along the wire and was able to excise the stones.

The second patient, a female in her 60 s, had undergone laparoscopic cholecystectomy six months prior for a diagnosis of acute cholecystitis. She complained of flank and right shoulder pain for a few months postoperatively and underwent a thorough work-up including CT scans of her shoulder to rule out a musculoskeletal etiology. The CT scan of her abdomen/pelvis showed a retained gallstone with associated perihepatic abscess. Interventional radiology placed a 10-French drain in the abscess. She underwent definitive surgical management a month later. The stone was extracted surgically by cutting down on the 10-French drain and following it to the abscess cavity, where the drain's pigtail and retained stone were located.

Both procedures were completed without complication and the patients recovered well and symptoms resolved. Based on this case report, we propose using the successful method of combined interventional radiology and general surgery procedures to excise larger retained dropped gallstones.

P198

Initial experience with disposable single-use cholangioscope during laparoscopic common bile duct exploration

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Introduction: For patients with choledocholithiasis, laparoscopic common bile duct exploration (LCBDE) is more cost effective than endoscopic retrograde cholangiopancreatography (ERCP) and results in shorter hospital length of stay. However, LCBDE can be technically challenging to perform. Using a disposable single-use cholangioscope (DSUC) for LCBDE has several advantages. First, it can allow clearance of common bile duct (CBD) through a cystic ductotomy, thereby potentially avoiding a choledochotomy. Second, as it is disposable, it does not require infrastructure for cleaning, maintenance, or service, thereby expanding access to cholangioscopes. Here we present our initial experience with the DSUC in LCBDE.

Methods: An IRB-approved, retrospective chart review from 2021 to 2022 was conducted for patients who underwent concurrent minimally invasive cholecystectomy (laparoscopic or robotic) and LCBDE with a novel DSUC (SpyGlass^{TM} Discover, Boston Scientific, Natick, MA) for the management of choledocholithiasis diagnosed either preoperatively or during intraoperative cholangiogram (IOC). Primary endpoint was successful clearance of biliary duct stones. Patients undergoing percutaneous endoscopic biliary lithectomy (PEBL) via DSUC were excluded from the study.

Results: Eight patients were identified with a mean age of 57.5 years (SD $\pm$ 14.5). Mean operative time was 199 min (SD $\pm$ 66.4) and mean follow-up was 24 days (SD $\pm$ 18.0) from surgery. Preoperatively, six patients presented with symptomatic cholelithiasis, one patient presented after an episode of gallstone pancreatitis, and one patient presented after a failed ERCP. Complete stone clearance was achieved in six out of eight (75%) patients. The seventh patient had a mildly dilated CBD on both preoperative imaging and IOC but was discovered intraoperatively to have benign ampullary stenosis with no choledocholithiasis. The eighth patient had a mildly dilated CBD with distal filling defects but was found to have sludge and a benign-appearing stricture of the distal biliary tree. Mean length of stay from

operation to discharge was 2 days (SD ± 0.93). There were no intraoperative or postoperative complications and no need for repeat procedures.

Conclusion: LCBDE with a DSUC is safe and efficacious for clearing stones and identifying pathology of the common bile duct. Familiarity with this device is especially useful for surgeons who want to simultaneously manage choledocholithiasis at the same time as cholecystectomy. Access to sterile, functional, reliable cholangioscopes should assist surgeons in making LCBDE a more routine part of their surgical practice, regardless of the availability of ERCP.

P199

Hemorrhagic shock secondary to cystic artery pseudoaneurysm

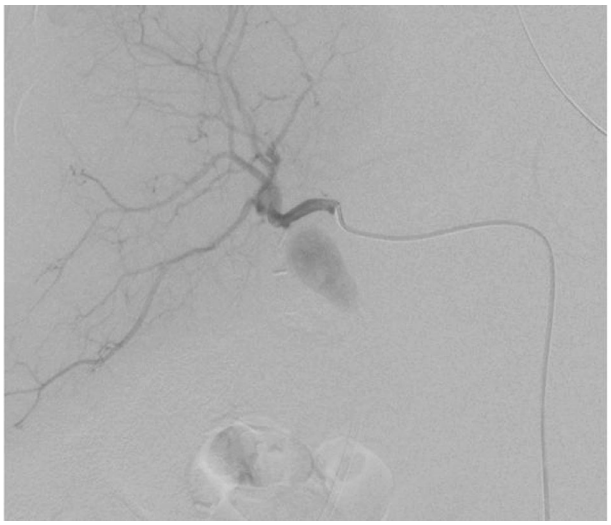
Tébar-Zamora Aída; Sánchez Sánchez Íñigo; Sánchez Iglesias Saúl; Rodríguez-Carreño Lucas; Fraile Alonso Iñaki; HUT

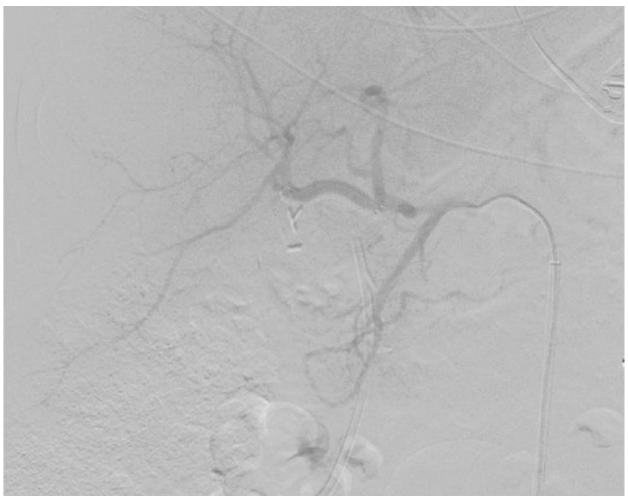
Introduction: The laparoscopic approach has become the gold standard for acute cholecystitis. However, it could have some major complications, such as bile duct injury or bleeding. Cystic artery pseudoaneurysms are rare. Requires a high index of suspicion and it may be present with complications that include hemobilia, biliary obstruction, and hemorrhage.

Methods and Procedures: We present a 60-year-old man who underwent scheduled surgery for symptomatic cholelithiasis. As personal history, he had previously been admitted to the hospital for acute lactic cholecystitis, treated with cholecystostomy drainage and antibiotic. During surgery, the main bile duct was accidentally injured and repaired with primary suture. During the immediate postoperative period, the patient developed a biliary leak requiring stent placement. At 30 days postoperatively, the patient started with hemodynamic instability and anemia. An abdominal CT scan was performed and showed a cystic artery stump-dependent pseudoaneurysm (Imagen 1).



The interventional radiology service successfully placed a stent (Imagen 2 and 3).





Conclusion: Cystic artery pseudoaneurysms are rare complications of a common operation but often caused by cholecystitis or iatrogenic biliary injury. The most common clinical presentation is haemobilia and therefore gastrointestinal bleeding postlaparoscopic cholecystectomy is an alarm symptom that missed diagnosis could cause significant morbimortality. Angiographic approach should be the treatment of choice.

P200

Comparison Of Outcomes Of Primary Laparoscopic Common Bile Duct Exploration And Following Failed Endoscopic Retrograde Cholangiopancreatography In Patients With Choledocholithiasis: A Prospective Study

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Background: Laparoscopic common bile duct exploration (LCBDE) has recently gained popularity in patients with concomitant gallstones and common bile duct (CBD) stones. However, many centers still prefer attempting ERCP prior to CBD exploration. Failed ERCP

clearance mandates CBD exploration, which has been shown to be technically more difficult than a primary LCBDE. This study was conducted to compare the efficacy and perioperative outcomes between primary LCBDE and LCBDE following failed ERCP.
Methods: Between 2012 and 2021, 308 patients underwent LCBDE, of which, Group I or primary LCBDE comprised 150 patients, and Group II, or LCBDE following ERCP failure, included 158 patients. The primary outcome measure was successful laparoscopic CBD clearance. Secondary outcome measures were operative difficulty (as defined by degree of adhesions, need for conversion, and operative time), postoperative complications, and length of hospital stay.
Results: Successful CBD clearance was comparable in both groups, 83.3% in primary LCBDE group and 77.8% in ERCP failure group. Operative difficulty was observed to be significantly higher in ERCP failure group ($p = 0.014$), due to greater degree of adhesions and statistically significant larger stone size ($p = 0.0004$) and choledochotomy size ($p = 0.0009$). Postoperative complications were higher in ERCP failure group, although not statistically significant, but resulted in significantly prolonged hospital stay ($p < 0.05$).
Conclusion: LCBDE following failed ERCP is technically more difficult and at higher risk of complications and prolonged hospital stay, as compared to primary LCBDE. A primary LCBDE may be thus considered in patients with large impacted stones, not in cholangitis, to offer better outcomes, especially in centres equipped with advanced laparoscopic surgery.

P202

Laparoscopic partial cholecystectomy for challenging gallbladder: An alternate Approach.

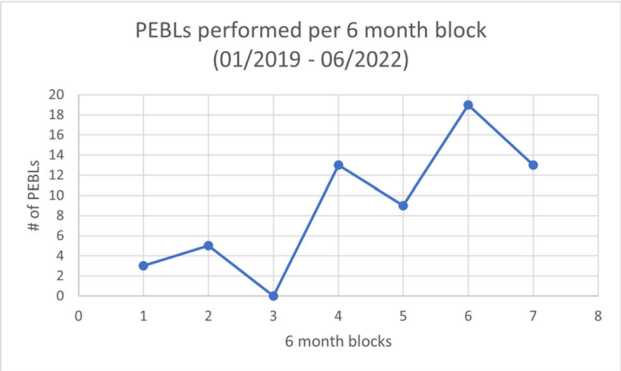
Felipe Girón[1]; Ricardo Núñez-Rocha[2]; Laura Parra[2]; Mario Latiff[2]; Lina Rodríguez[2]; Andrés Mauricio García[2]; Ricardo Nassar[1]; Juan David Hernández[1]; [1]Fundación Santa Fe de Bogotá; [2]Universidad de los Andes

Background: Laparoscopic cholecystectomy (LC) is the gold standard treatment for gallstone disease, being the most frequent procedure performed in acute cholecystitis. Strasberg's critical view of safety is a key point while performing LC. Notwithstanding, when it cannot be obtained conversion and partial cholecystectomies must be considered. In terms of safety and efficacy of partial LC evidence is still scarce. Therefore, we introduce an alternate technique for partial LC in which extraction of gallstones is performed by opening of gallbladder, with posterior identification of cystic duct ostium and closure with long-term absorbable suture. Most gallbladder tissue is removed if possible. Remnant tissue is cauterized.
Methods: Retrospective review of a prospectively collected database including patients who underwent laparoscopic subtotal cholecystectomy with this alternate technique. Demographic, preoperative, intraoperative variables, complications, morbidity, mortality, and early follow-up of patients were documented.
Results: A total of 11 patients were included in the study, and all underwent subtotal LC using this technique. Mean age was 65 years (± 19,8). 54.5% of patients were female (n = 6). Mean height, weight, and BMI were 164.5 cm (± 9.39), 69.9 kg (± 11.6), and 25.8 (± 3.97), respectively. No statistical differences between genders were found. Preoperative diagnosis were acute cholecystitis Tokyo I (n = 5) and II (n = 6). All patients were classified as Parkland 5. All patients were classified as grade IV in Nassar's scale. Two patients required cholecystostomy due to previous active SARS COV2 infection. Mean intraoperative blood loss was 304 cc and mean surgical time was 162,8 min. No conversion nor reintervention were necessary. 3 patients developed mild complications (Clavien–Dindo I). No common bile duct injury, surgical site infection, nor lymphocele cases were presented. Mean in-hospital stay was 5.36 days (± 1.62). No readmissions were reported. 0% mortality rate was documented.
Conclusion: This alternate surgical technique of partial LC seems to be a feasible and safe approach for difficult LC with 0% conversion rate and good results in 30-day follow-up. Prospective studies are required to validate our results.

P204

Development of Surgeon-performed Percutaneous Endoscopic Biliary Lithectomy (PEBL) Programs for Management of Complex Gallstone Disease

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Introduction: For many patients who undergo percutaneous biliary drainage for gallstone disease, the intervention represents destination therapy requiring lifelong drainage and tube exchanges. Percutaneous endoscopic biliary lithectomy (PEBL) is a novel, effective technique which enables biliary clearance and drain removal. However, PEBL has not been widely adopted by most general surgeons and is often absent from treatment algorithms for gallstone disease.
Methods: Retrospective review of all patients who underwent PEBL by one of four minimally invasive trained general surgeons from 01/2019 to 07/2022 was performed, including demographic, operative, and postoperative details. All patients who underwent biliary endoscopy through percutaneous drain tracts for gallstone disease were included. PEBL was performed using readily available endoscopy and fluoroscopy equipment. Modalities for stone removal included electrohydraulic lithotripsy, laser lithotripsy, and basket retrieval.
Results: 38 patients underwent a total of 63 PEBL procedures; 18 (47.4%) patients underwent repeat intervention. The primary diagnoses leading to PEBL were cholelithiasis with prior acute cholecystitis (28), choledocholithiasis (9), and recurrent pancreatitis (1). Fifteen patients (39.5%) had altered abdominal wall or gastrointestinal anatomy and 25 (65.8%) patients had strict medical contraindications which limited conventional surgical or endoscopic interventions. 16 (42.1%) patients remained on therapeutic anticoagulation or antiplatelets during PEBL. The number of PEBLs performed per year has steadily increased from 8 in 2019 to 28 in 2021 (Fig. 1). Referrals for PEBL were made from within the primary

health system in 26 (68.4%) cases and externally in 12 (31.6%). Mean operative time was 71.8 ± 43 min. The mean number of days from initial presentation with acute biliary disease until PEBL was 119 ± 98 days and this referral time has declined over time (m = -1.96, R2 = 0.041). Patients underwent a mean of 2.3 ± 1 (range 2–6) interventional radiology procedures for biliary drain placement and exchange prior to PEBL. Complete biliary clearance and drain removal was achieved in 32 (84.2%) patients. Two (6.3%) patients developed recurrent biliary disease after prior drain removal during a mean follow-up of 480 ± 341 days, one of which required replacement of a biliary tube and repeat PEBL.

Conclusion: A unique subset of patients with gallstone disease can benefit from PEBL. Establishing a program with surgeons who consistently perform this procedure leads to a broad referral base of patients who might otherwise endure the morbidity of lifelong percutaneous biliary drainage. Wider provider familiarity with the technique may lead to earlier referral and more streamlined care.

P206

Is the Critical View of Safety Flawed?

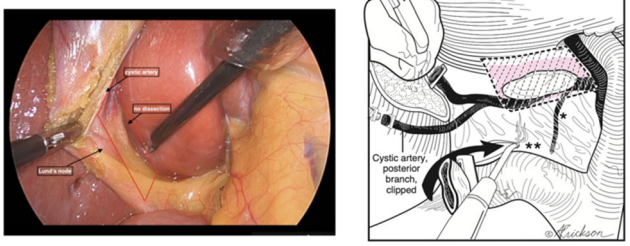
Chau M Hoang, MD, MSCI[1]; George Ferzli, MD, FACS[2]; [1]NYC Health + Hospitals/Kings County; [2]NYU Langone

Introduction: The critical view of safety (CVS) has been widely used for identifying the cystic duct and artery during laparoscopic cholecystectomy. However, the steps of clearing the fat and fibrous tissue off the hepatocystic triangle and circumferentially dissecting the cystic artery can lead to potential injuries, particularly in cases of aberrant anatomy.

Methods: In our method of laparoscopic cholecystectomy, we purposely follow a plane of dissection lateral and parallel to the artery, dropping the cystic artery medially. The artery is not dissected circumferentially. This differs from the CVS technique. Also distinct from the CVS technique is what we term the "trapezoid of no dissection," bound medially by the common hepatic duct, inferiorly by the sentinel node of Lund, laterally by the anterior cystic artery after it emerges from behind the node of Lund, and superiorly by the inferior margin of the liver. By not dissecting in this zone, potential injury to the common bile duct and hepatic duct can be avoided. Following this principle is helpful particularly in cases of severely inflamed gallbladder, fibrosis or stone impaction at the neck, and contracted gallbladders. Techniques are demonstrated in videos.

Results: From January 2010 to December 2021, we performed laparoscopic cholecystectomies on 1,687 patients. 18% were nonelective cases and 76% were female. One case was converted to open. Another case required intraoperative cholangiogram to confirm identification of a right sectoral duct. There were 4 cystic stump leaks. There was no bile duct injury.

Conclusion: Our technique is safe and aids in avoiding potential ductal injury. There is no evidence to support the superiority of CVS over other techniques for identification of anatomy, especially in cases of aberrant anatomy. Regardless of techniques, safe cholecystectomy should start and end with the understanding of anatomy and recognizing possible anatomic variations.



P207

Ectopic Liver on Gallbladder during Laparoscopic Cholecystectomy- Case reports

Olivia Angelette, PAC; Kishore Malireddy, MD; Minden Medical Center, Minden, LA

Introduction: In this report we present two cases of incidental ectopic liver tissue found during laparoscopic cholecystectomy within a span of 5 months at rural health center. Ectopic liver tissue is an exceptional atypical finding with an incidence of 0.24% to 0.47%

Case Presentation

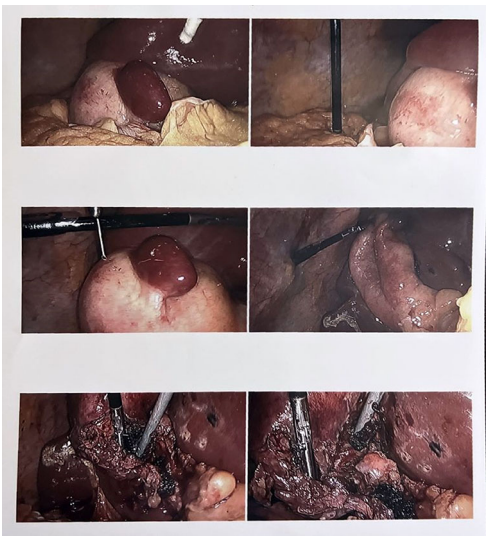
Case 1

A 53-year-old male presented to the Emergency Department with complaints of right upper quadrant pain. Gallbladder ultrasound showed multiple gallstones with gallbladder wall thickening and normal liver function tests.

We scheduled for laparoscopic cholecystectomy. Intraoperatively omentum wrapped around the gallbladder. After meticulous dissection, the gallbladder was identified and it was inflamed, distended with thick wall.

An approximately 2 × 1-cm accessory liver tissue noted on the medial side of gallbladder separate from the liver. Gallbladder was tensely distended and thick, so aspirated to get a hold of gallbladder and after getting critical angle of safety, we removed the gallbladder along with accessory tissue intact.

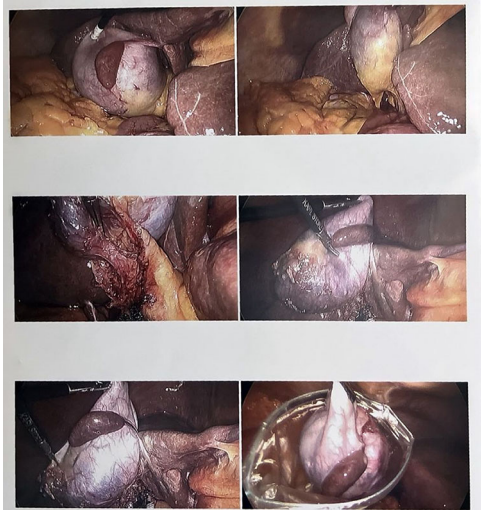
Pathology showed acute cholecystitis and small fragment of benign liver parenchyma with mild steatosis and portal inflammatory changes.



Case 2
A 66-year-old male presented recurrent episodes of cholecystitis. We scheduled him for laparoscopic cholecystectomy.

He had low platelets so 1 six-pack unit of platelets were administered preoperatively. During the procedure he was noted to have a large fatty liver and what appeared to be a small ectopic 2 × 3-cm liver tissue attached to the fundus of the gallbladder, separate from the liver. After critical angle of safety was identified, the gallbladder was removed along with accessory tissue intact.

Pathology showed chronic cholecystitis and 2.7-cm fragment of benign hepatic parenchyma without steatosis nor fibrosis.



Discussion: Ectopic liver is a noteworthy atypical finding. Ectopic liver is defined as hepatic tissue that is not directly connected to the liver proper whereas accessory liver lobe has communication with the liver proper. The most common site of ectopic liver is attached to the gallbladder.
From a surgical stand point, it is very important to identify if there is any additional blood supply to the accessory liver tissue to avoid any inadvertent surgical bleeding.

Hepatic tissue found during both cases was ectopic because no accessory blood supply was identified supplying the tissue, nor was there drainage from the tissue to the liver proper.
Conclusion: Encountering ectopic liver tissue during laparoscopic cholecystectomy is rare and special attention should be paid to identify its blood supply.

P210

Mixed Neuroendocrine-Non-Neuroendocrine Neoplasm of the Gallbladder: Case Report and Review of Literature

Carlos Delgado, MD[1]; William Cobb, MD[1]; Lauren Dobrie, MD[2]; Armando Rosales, MD[1]; [1]AdventHealth Orlando; [2]University of Central Florida, College of Medicine

Mixed neuroendocrine-non-neuroendocrine neoplasm (MiNEN) is rare with an incidence of less than 0.01/100,000 cases per year. Our case is of a 67-year-old female, referred to us with work-up from an outside institution revealing a gallbladder polyp. The patient reported a sharp right upper quadrant and flank pain of three-year duration. Magnetic Resonance Imaging (MRI) of the abdomen showed a broad-based contrast enhancing 1.9 × 1.2-cm lesion adherent to the inferomedial gallbladder wall, consistent with a polyp. Exploratory laparoscopy with cholecystectomy with intraoperative frozen pathology revealed gallbladder adenocarcinoma, this was followed with laparoscopic liver wedge resection of segment 4B/5 and hepatoduodenal lymphadenectomy. Final pathology revealed a 3.5-cm mixed neuroendocrine and adenocarcinoma neoplasm (MiNEN) with perineural invasion staged at a pT3N0. The tumor is positive for AE1/AE3 and shows variable immunoreactivity for synaptophysin, chromogranin, and INSM1. Scattered tumor cells are positive for CK20 and tumor is negative for CK7. Surgery was followed by FOLFOX chemotherapy regimen.

P211

Umbilical port site metastasis following laparoscopic removal of gallbladder with high-grade dysplasia

Dondre C Irving, DO; Dosuk Yoon, DO; Sameh Elrabie, DO; Paritosh Suman, MD; Wyckoff Heights Medical Center

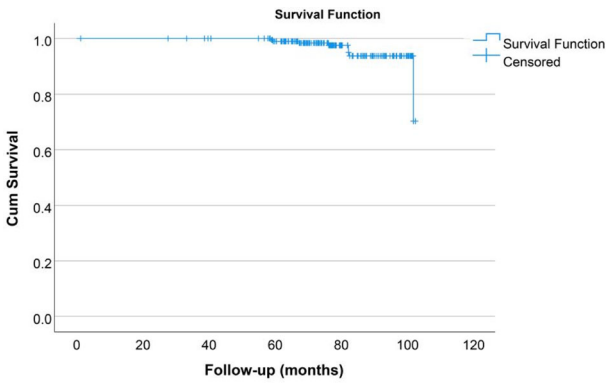
Introduction: Unsuspected gallbladder carcinoma, defined as malignancy confirmed after cholecystectomy for benign disease, has an incidence of approximately 3% and carries a known complication of port site metastasis which is described in the literature. On the other hand, the incidental histopathologic finding of dysplasia without invasive carcinoma on routine cholecystectomy is poorly described due to its low incidence. Furthermore, discovery of an associated metastatic lesion in the years following resection is undocumented to our knowledge.
Case: We present the case of a 73-year-old male status post-routine Laparoscopic Cholecystectomy with pathology significant only for multifocal high-grade dysplasia, who returned to the operating room three years later for removal of suspected painful fibrotic tissue at the umbilical port site. That tissue pathology revealed metastatic adenocarcinoma of unknown origin but suspected pancreaticobiliary or upper gastrointestinal tract origin based on tissue markers. Oncologic workup with EGD, Colonoscopy and CT/PET scan failed to identify any primary lesion, but did show residual tumor at the umbilical port site. Patient ultimately underwent wide local excision of the full thickness abdominal wall mass at the umbilicus leaving a large abdominal wall defect, repaired with dual anterior and posterior compartment release with abdominal wall reconstruction with mesh.
Discussion: Gallbladder carcinoma, the most common carcinoma of the biliary tree, has proposed carcinogenic pathway of either dysplasia progressing to carcinoma in-situ and invasive carcinoma or the adenomatous polyp pathway. As patients with confirmed carcinoma have a 3% prevalence of adenomatous remnants compared to the 80% prevalence of dysplasia, the latter pathway is thought to be of greater clinical significance. Though it is common to detect areas of dysplasia in specimens with confirmed carcinoma, it is far less common to discover foci of invasive carcinoma in gallbladder specimens incidentally found to have dysplasia. This raises the question of possible management and surveillance of this patient group moving forward after detection. Further analysis of additional cross-sections of gallbladder upon detection to look for missed invasive carcinoma has been proposed and has shown to be unproductive. Knowledge of the dysplasia to carcinoma timeline is purely deductive as progression of this epithelial lesion cannot be followed after gallbladder removal. Thus, there is no basis for reliable surveillance recommendations for detection of concomitant pancreaticobiliary lesions.
Conclusion: Detection of dysplasia without associated invasive carcinoma after routine cholecystectomy is a rare finding but not one completely without clinical significance. Further database analysis will help determine the appropriate surveillance.

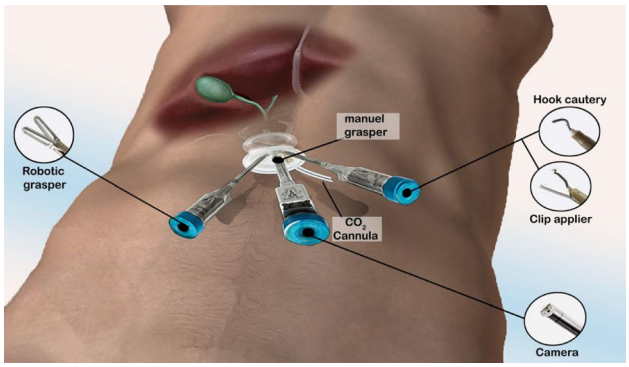
P213

Long-Term Results of Single-Site Robotic Cholecystectomy

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Objective: To evaluate long-term complications and incisional hernia rates after single-site robotic cholecystectomy.
Methods: All patients who underwent single-site robotic cholecystectomy between February 2014 and December 2017 were reviewed. Pre-, intra-, and postoperative variables were analyzed. Complications were assessed using the Clavien–Dindo Classification (CD) and Comprehensive Complication Index (CCI®) scoring system. Follow-up consisted of a combination of telehealth visits, physical examination, and imaging studies in order to assess for occurrence of incisional hernias. Kaplan–Meier's time-to-event analysis was performed to calculate the estimated freedom from an incisional hernia.
Results: 211 patients who underwent SSRC were included. Mean ± Standard Deviation (SD) for age and body mass index were 45 ± 16.6 years and 28 ± 5 kg/m^2, respectively. 141 patients had an American Society of Anesthesiologists score of 2. The median (interquartile range) console time and skin-to-skin time were 18 (14–27) and 38 (29–51) minutes, respectively. No intraoperative complications or conversions to other approaches occurred in the cohort. Pathology most commonly revealed chronic cholecystitis and cholelithiasis (185 and 164 cases, respectively), with a fewer number of acute cholecystitis (32). Over an average follow-up period of 77 months, nineteen (9%) patients experienced adverse postoperative events. Of those, eleven were surgical site complications. Clavien–Dindo grades were primarily CD-1 (3.3%) and CD-3B (3.8%) complications. CCI® scores ranged from 0 to 39.7. Two patients underwent postoperative endoscopic retrograde cholangiopancreatography (ERCP) due to suspicion for common bile duct stone; however, both ERCPs were unremarkable. Eight (3.8%) patients experienced an incisional hernia. Estimated hernia-free time was found to be 100 months (95% confidence interval = 99–101) for the cohort.
Conclusion: This is the first study to describe long-term follow-up in single-site robotic cholecystectomy. In our experience, we demonstrated a low incisional hernia rate and overall favorable outcomes.





P214

Evaluation of the association of the preoperative severity and the intraoperative complexity (using the Parkland Grading Scale) in the Patients Treated with Laparoscopic Cholecystectomy in Mexico City

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Introduction: The Tokyo guidelines(TG) standardized the diagnosis and severity of acute cholecystitis(AC) using preoperative parameters that do not necessarily translate to an intraoperative complexity by inflammation and fibrosis around the gallbladder, and the Parkland Grading Scale (PGS) evaluates this complexity. Our study aimed to evaluate the relationship between the TG and the PGS.
Methods: A retrospective study was performed analyzing the data and videos from patients with AC treated with a Laparoscopic Cholecystectomy(LC) from 8 hospitals in Mexico City for 2 years.
Results: A total of 390 patients and videos were collected; 52 were excluded due to missing data or problems with the video, leaving 338 patients for analysis; all patients met the criteria for acute cholecystitis by the Tokyo Guidelines and were treated with an emergency laparoscopic Cholecystectomy. 234 patients were women (69.23%), and the mean age of the sample was 49.61(SD ± 11.82) years. Preoperative severity was assessed using the TG; 122 (36.09%) patients were classified as Grade 1 AC, 170 (50.3%) grade II, and 46 (13.61%) grade III. The interobserver coefficient of the assessment of the PGS by the two surgeons was 0.809; the most frequent classification was a PGS of 3 with 134 patients (39.64%), using the PGS as a continuing variable the mean PGS was 3.63 (SD 0 0.96). However, when dichotomizing the PGS the majority of the patients (301,88,52.07%) presented a complex LC(CLC, PGS of 4 or 5). Statistical significant differences were found when comparing the PGS) and the frequency of CLC between the groups of preoperative severity ($p = < 0.001$). Using logistic regression an increase in the TG wasn't significantly associated with an increase of the PGS (OR 1.05, CI 95% 0.36–3.04, $p = 0.914$) or presenting a CLC (OR 1.39 CI 95% 0.76–2.55, $p = 0.276$). Highlighting that a Severity grade of 1 was a significant protective factor associated with not presenting a CLC (Table 2). Evaluating the variables that classify the severity following the TG we found as a significant risk factor to presenting a CLC the Leukocytes count more than > 18,000 (OR1.91,$p = 0.0047$), palpable mass in RUQ (OR3.12,$p = 0.004$), highlighting that the presence of symptoms for more than 72 h was not significant (OR1.54,$p = 0.21$).

Conclusion: Although no significant association was found; the recognition of the severity preoperatively and the intraoperative complexity would let the surgeon establish strategies like bailouts procedures or ask for assistance before the presentation of complications and their added morbidity.

P215

Laparoscopic Cholecystectomy in Cardiogenic Shock and Heart Failure

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Introduction: Patients in cardiogenic shock or with heart failure can develop ischemic cholecystitis from a systemic low-flow state. Identification of gallbladder pathology by physical exam, labs, or imaging is often unreliable due to confounding signs and symptoms from cardiac disease. Operative management of cholecystitis in high-risk surgical patients is controversial. Treatment of cholecystitis in patients with heart failure or cardiogenic shock often includes a percutaneous cholecystostomy tube (PCT) due to this presumed risk. Data on PCT as definitive treatment for cholecystitis has been conflicting, and there are a paucity of data regarding surgical management. This retrospective review discusses outcomes after laparoscopic cholecystectomy in this high-risk patient population.
Methods: A retrospective review of patients who underwent laparoscopic cholecystectomy from 2015 to 2019 while hospitalized for cardiogenic shock or heart failure. Surgical services were provided by fellowship-trained minimally invasive surgeons at a single, academic, tertiary-care center. Patient characteristics were reported as frequencies' percentages for categorical variables. Odds ratio was used to determine association between comorbidities and complications.
Results: 24 patients hospitalized with cardiogenic shock or heart failure underwent laparoscopic cholecystectomy for cholecystitis. Most patients were white (83%) and male (79%). Many patients were anticoagulated (88%), with Class IV heart failure (63%), and required pressor support (46%) at the time of surgery. 14 out of 24 patients (58%) had at least one of the following cardiac devices present at time of surgery: extracorporeal membrane oxygenation, left ventricular assist device, Impella, tandem heart, or total artificial heart. 4 patients (17%) had a PCT preoperatively. Interval between diagnosis and surgery was 15 days. Pneumoperitoneum was tolerated by all patients, 0% converted, average operative time 83 min. Most common complication was bleeding (52%). 9 patients (37.5%) underwent 21 reoperations. Only one reoperation out of 21 (4%) was related to the cholecystectomy. Average LOS 24.7 days. Mortality occurred in 5 patients (20.8%), with the interval between cholecystectomy and mortality ranging 6 to 30 days. Reoperation was more likely in patients with an Impella (OR 17.5; CI 1.22 to 884.45), vasopressors (OR 6; CI 0.66 to 75.61), inotropes (OR 32; CI 2.25 to 1532.93), oxygen dependence (OR 7; CI 0.8 to 85.88), dialysis dependence (OR 5.5; CI 0.68 to 48.77).
Conclusion: Laparoscopic cholecystectomy for ischemic cholecystitis in patients with cardiogenic shock remains high risk. In patients who would otherwise die from sepsis, surgery is an option to treat their disease after thoughtful discussions with the patient and family.

P216

LCBDE vs IO-ERCP in Low-Resource Settings

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Introduction: Minimally invasive procedures such as laparoscopic common bile duct exploration (LCBDE) and intraoperative endoscopic cholangiopancreatography (IO-ERCP) have replaced open surgery in the management of common bile duct (CBD) stones. Both approaches, however, require dedicated instruments and expertise, which may be lacking in the developing world and other low-resource settings. Despite these limitations, at our hospital, we prefer to attempt an MIS approach before considering conversion to open surgery. Currently, no consensus exists on the ideal management of this condition, with most studies comparing LCBDE and IO-ERCP having failed to demonstrate superiority of either procedure over the other. Additionally, there is little evidence comparing outcomes of LCBDE and IO-ERCP in low-resource settings, where dedicated instruments (such as choledochoscopes) may be lacking.
Methods and procedures: This study was performed at a public, resource-constrained hospital in Monterrey, Mexico. A retrospective analysis comparing LCBDE and IO-ERCP for management of CBD stones in emergency settings was made. Primary outcome was CBD clearance rate. Secondary outcomes include intraoperative time, in-hospital stay length, complications, conversions, and retained stones at 30 days.
Results: 74 patients (39 IO-ERCP and 35 LCBDE) were analyzed. Demographics between groups demonstrated homogeneity. Acute cholecystitis was the prevalent preoperative diagnosis. More than half of patients presented > 1 CBD stone. CBD clearance rate was 79% and 62% for IO-ERCP and LCBDE, respectively ($p = 0.12$). Mean operative time was 205 and 193 min for IO-ERCP and LCBDE, respectively ($p = 0.95$). In-hospital stay length was 1 day for IO-ERCP and 2 days for LCBDE ($p = 0.002$). Complication rate was 12% and 0% for IO-ERCP and LCBDE, respectively ($p = 0.03$). Conversion rate was 10% and 28% for IO-ERCP and LCBDE, respectively ($p = 0.04$). Retained stone rate was 12% and 5% for IO-ERCP and LCDE, respectively ($p = 0.26$). Choledochotomy in LCBDE was associated with better outcomes compared to trans-cystic approach ($p = 0.006$).
Conclusion: Successful, minimally invasive treatment of CBD stones in our low-resource environment remains challenging. Perceived barriers to success include lack of direct CBD visualization. In our series, a tendency toward a better performance for IO-ERCP was reported. Complication rate was higher for IO-ERCP, yet this was not reflected in the in-hospital days of stay length, where IO-ERCP patients were discharged earlier. Conversion rate was higher for LCBDE, leading to a higher in-hospital stay length.

P217

A Surprising Cause of Biliary Tree Obstruction

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Introduction: Post-cholecystectomy clip migration (PCCM) is a rare complication and can occur shortly after laparoscopic surgery and often goes unrecognized. PCCM can lead to sequale including cystic duct stump leak that can be managed in multiple ways. We present the case of bile leak from Hem-o-lok clip migration into the common bile duct, IR-guided clip retrieval, and coil embolization of a cystic duct leak.
Case Report: A 73-year-old man with a past medical history of Roux-en-Y gastric bypass (RYGBP) initially presented at a small community hospital with sepsis from cholecystitis and choledocholithiasis. The rural hospital did not have ERCP capabilities and he was emergently treated with a cholecystostomy tube. Though he recovered from cholecystitis, interval cholangiograms showed a patent cystic duct and residual choledocholithiasis. He was referred to our center to for further care.

The patient underwent laparoscopic cholecystectomy with intraoperative cholangiogram, which again showed persistent choledocholithiasis. A trancystic CBD exploration was performed and three stones were successfully retrieved. Completion cholangiogram confirmed duct clearance and two Hem-o-lok clips were placed on the cystic duct stump.

The patient presented to the hospital two weeks later with recurrent abdominal pain and fevers. His initial work-up was concerning for a retain stone for which MRCP was performed and showed a fluid collection in the gallbladder fossa and filling defect in distal CBD. Interventional radiology placed a drain in the gallbladder fossa and a Percutaneous Transhepatic Cholangiogram (PTC) with internal and external drainage after a cystic duct stump leak was identified. The PTC drain tract was dilated to allow passage of a cholangioscope where a retained Hem-o-lok clip was identified and removed (Fig. 1). IR subsequently coil embolized the cystic duct stump and used N-butyl cyanoacrylate to close the bile leak (Fig. 2). His post-procedural course was uneventful and in follow-up all drains have been removed and he is doing well.
Conclusion: This case highlights that Hem-o-lok clip migration into the biliary tree may be a cause of biliary tree obstruction and leak. RYGBP adds another level of complexity to the management of CBD obstruction and biliary leak and often times creative measures are required for their treatment. This case report emphasizes the importance of collaboration between general surgery and interventional radiology to intervene in this uncommon situation.
Fig. 1 The hem-o-lok clip causing CBD obstruction

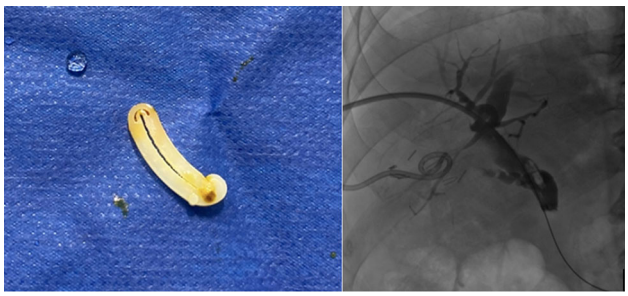


Fig. 2 The coils act like scaffolding for occlusion with N-butyl cyanoacrylate glue



P218

A simplified risk stratification in early cholecystectomy for acute cholecystitis based on age: A single-center retrospective study from an institution with no mortality

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Background/Purpose: The existing risk stratification for early cholecystectomy in patients with acute cholecystitis (AC) is complex because various factors have been reported. It may have a different perspective when research is performed on a cohort with no mortality. The purpose of this study is to determine predictive risk factors for complications according to the Clavien–Dindo (CD) classification based on age.
Methods: This single-center retrospective study enrolled 350 patients diagnosed with AC who underwent early cholecystectomy within 72 h of diagnosis from 2013 to 2021. Patients were divided into 3 subgroups based on age: young (< 65 years), elderly (65–79 years), and very elderly (≥ 80 years). Since no mortality was observed, risk factors for CD grade ≥ II complications were identified within the whole cohort and each subgroup.
Results: There were 120 young, 130 elderly, and 100 very elderly patients. The prevalence of complications with CD grade ≥ II was 12% in the entire cohort, with no mortality. Age (OR 1.05; 95%CI 1.01–1.09; P = 0.01) and Tokyo Guidelines 18 (TG18) severity of moderate or worse (OR 3.08; 95%CI 1.15–8.25; P = 0.03) were independent risk factors for CD grade ≥ II complications in the whole cohort. Subgroup analysis revealed that age was an independent risk factor in the elderly group (OR 1.22; 95%CI 1–1.47; P = 0.03) and TG18 severity in the very elderly group (OR 4.72; 95%CI 1.02–21.8; P = 0.04). No independent predictive factor was detected in the young group.
Conclusion: When surgical safety is secured, evaluation based on age and advanced TG18 severity might be able to simplify the risk stratification of AC. Since every single patient could recover from

their morbid conditions, early surgery for AC is further recommended.

P221

Cystic duct melanoma presenting as acute cholecystitis

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Melanoma with intraperitoneal metastases is most commonly associated with small bowel implants. Rarely though, melanoma may metastasize to the cystic duct causing obstruction and acute cholecystitis. There have been about 40 case reports of gallbladder metastases causing melanoma. There are much fewer cases of cystic duct implants leading to cholecystitis though. This case report and review of the literature will discuss an 80-year-old man who presented with classic symptoms of acute cholecystitis with pathology demonstrating cystic duct obstruction from melanoma.

P222

High-Grade Neuroendocrine Tumor of the Gallbladder

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Background: Neuroendocrine tumors (NET) arise from various neuroendocrine cells throughout the body. The most common sites of NETs are the gastrointestinal tract and the respiratory tract, respectively. Of those NETs noted in the gastrointestinal tract, NETs of the gallbladder account for less than 0.3% of these neoplasms. Due to the rarity of NETs of the gallbladder, information regarding the presentation, diagnosis, management, and prognosis of said NETs is sparse. The aim of our study is to present a unique case report of a high-grade neuroendocrine carcinoma found in a 53-year-old female with an unremarkable past medical history in hopes of providing further insight into this disease process and to allow for further studies elucidating the management and prognosis of NETS of the gallbladder.
Case Summary: A 53-year-old female with a fairly unremarkable past medical and past surgical history presented with a few months of abdominal pain, nausea, and vomiting. Work-up with ultrasound, CT and endoscopic ultrasound (EUS) revealed gallstones, a large 4.8 cm × 4.0 cm × 3.8 cm loculated mass located centrally within the gallbladder fundus and multiple porta hepatis lymph nodes. The patient had EUS and porta hepatis lymph node biopsy which was positive for neoplasm with neuroendocrine features. Patient underwent diagnostic laparoscopy, exploratory laparotomy, two core needle biopsies of gallbladder fundus, pancreatic head mass biopsy, intraoperative ultrasound, and open cholecystectomy. Pathology revealed a high-grade gallbladder neuroendocrine tumor with metastasis to the porta hepatis large lymph nodes and liver involvement. The patient then underwent post-operative chemoradiation therapy. The patient is still alive one year after surgery with disease improvement on imaging.
Conclusion: Neuroendocrine tumors (NET) of the gallbladder remain a rare neoplasm in the vast array of NETs noted throughout the body. These neoplasms can be managed with a combination of resection and selective post-operative chemoradiation therapy. The key to a favorable prognosis is early detection and multidisciplinary management although further studies must be conducted to provide more concise and systematic recommendations on current practice.

P224

Hepaticojejunostomy to treat medically refractory bile reflux after esophagectomy with gastric pull-up

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Introduction: Bile reflux is a common functional complication after esophagectomy with gastric pull-up. Normal anti-reflux mechanisms are disrupted by the operation, with vagotomy and pyloroplasty increasing the potential for bile reflux. Current strategies for symptomatic bile reflux focus on dietary modifications, bile binding medications, and elevation of the head of bed at night. Persistent symptoms or complications of bile reflux, such as nocturnal aspiration events, remain troublesome. Surgical management for medically refractory bile reflux after esophagectomy is a challenge. A small number of case reports have described using a roux-en-y duodenal diversion (duodenal switch) approach. While described, there are little data on outcome with this method. Further, injury to the right gastroepiploic artery during the procedure could lead to graft ischemia. Herein we describe our experience using a roux-en-y hepaticojejunostomy for medically refractory bile reflux after esophagectomy with gastric pull-up.
Methods and Procedures: Retrospective chart review from 2017 to 2022 was performed for all patients who underwent an esophagectomy with a gastric pull-up by a single surgeon.
Results: Ninety-seven patients underwent an esophagectomy with gastric pull-up, with malignancy the most common indication (n = 82, 84.5%). All patients were routinely placed on proton pump inhibitor (PPI) after surgery. Fourteen patients (14.4%) experienced bile reflux symptoms with the majority (n = 11, 78.6%) having resolution of mild symptoms with dietary modifications and elevation of the head of bed at night. We identified 2 patients that underwent bile diversion with a roux-en-y hepaticojejunostomy. Both patients initially underwent an esophagectomy for end-stage reflux disease with long segment Barrett's esophagus after prior fundoplication. Both had symptoms of severe nocturnal regurgitation with one having unrelenting nausea, hiccups, and bilious emesis. Los Angeles (LA) Grade D esophagitis and bile pooling in the graft were found on EGD, despite being on bid PPI and Carafate. After undergoing roux-en-y hepaticojejunostomy, both made an uncomplicated recovery. At four months follow-up, both patients reported persistent improvement; one with complete resolution of the nocturnal regurgitation and the other with resolution of bilious emesis.
Conclusions: Medically refractory bile reflux after esophagectomy with gastric pull-up is a challenging surgical problem and may be more of an issue in patients that undergo esophagectomy for end-stage reflux disease without cancer. The roux-en-y hepaticojejunostomy, a common and safe operation for biliary diversion, is feasible in these patients, provides symptomatic relief and should be considered in patients with refractory bile reflux after esophagectomy.

P225

Evaluation of the complexity and its association with the presence of complications in ERCP during the Covid 19 pandemic at the "Dr. Manuel Gea González" General Hospital

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Introduction: Endoscopic retrograde cholangiography (ERCP) is an advanced endoscopic procedure, with a variety of therapeutic procedures which will depend on the indication and diagnosis of the patient. Few studies evaluate the complexity of the therapeutics used during ERCP and the impact that the Covid 19 pandemic had on the performance of these procedures and the decrease in exposure and training of endoscopists in training. The objective of the study was to describe the complexity of ERCP according to the ASGE classification and its relationship with demographic characteristics and complications during the pandemic.
Material and Methods: A Retrospective, observational study of the electronic registry of patients undergoing ERCP during the years 2019 to 2021 at the General Hospital "Dr. Manuel Gea González" was performed. Comparing the frequencies and means of demographic and procedural variables, as well as the association of the complexity with these variables.
Results: A total of 980 patients were evaluated; 613 (62.55%) women and 367 (37.45%) men, with a mean age of 49.56 years. During 2019, 485 (49.49%) were carried out, 2020 (242, 24.69%) and during 2021 (253, 25.82%). The most frequent indication for performing ERCP was suspected or already confirmed stone pathology in 699 (71.33%). The most frequent complexity was grade 4 (345, 35.2%), followed by grade 3 (342, 34.9%), grade 2 (140, 14.29%), and grade 1 (121, 12.35%), with a success rate of the treatment carried out up to 96.73%. 30 (3.06%) presented complications. No significant difference was found when comparing the complexity according to sex, age, or year performed; nor association of complexity with the presentation of complications.
Conclusions: Despite the reduction in the number of procedures, the complexity of ERCP in a referral center like our hospital remained constant despite the pandemic, due to the precise indications that the ERCP has. It is important to highlight that the recognition and classification of the complexity of the procedure during the training and formation of endoscopists give us the amount of exposure to the required variety of procedures during the formation of our young endoscopists with the aim of avoiding complications. This recognition is also part of the quality criteria proposed internationally.

P228

Laparoscopic cholecystectomy with and without Indocyanine green (ICG) fluorescent cholangiography: a systematic review and meta-analysis

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Fluorescence cholangiography is hypothesized to improve safety during laparoscopic cholecystectomy (LC) by utilizing the excretion of indocyanine green (ICG) to delineate biliary anatomy. Though ICG has proven to be safe and feasible, comparative review to determine its advantage over LC without ICG is lacking. Our study aimed to systematically review the effect of ICG on operative time, conversion rate, and biliary injury compared to LC without ICG.

Comprehensive search of MEDLINE, EMBASE, and CENTRAL was performed from database inception to May 2022. All prospective randomized and non-randomized studies which reported on comparison of LC with and without ICG were included. The primary outcome was operative duration, secondary outcomes included conversion rate and biliary leak. Inverse variable random effects meta analyses were performed.

Following screening of relevant articles, 2 prospective cohorts and 3 randomized controlled trials met inclusion criteria. Overall, 256 patients were in the LC + ICG group (mean age 57 $\pm$ 12, 53.2% female) and 260 patients were in the LC alone group (mean age 56 $\pm$ 14, 53.5% female). No significant difference between operative time (mean difference 4.38, 95% CI = -20.86, 29.61, p = 0.73) or conversion rate (OR 0.90, 95% CI = 0.31, 2.59, p = 0.84) between the two groups was found. The incidence of biliary leak and bile duct injury was low in both groups (< 5%).

The use of ICG during laparoscopic cholecystectomy does not influence operative time or the rate of conversion. Both procedures are safe with low rates of bile leak and bile duct injury. Future studies standardizing the indication for LC and method of ICG delivery would allow for better delineation of the role ICG may play during management of biliary disease.

P230

Novel low-cost laparoscopic cholecystectomy simulation for third-year medical students

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Introduction: Simulation in medical education has been established for enhancing student skills and learning. More specifically, simulations have been utilized to train residents, fellows, and faculty in both hands-on laparoscopic and VR modalities for cholecystectomy. The results of the cholecystectomy simulation training(s) were enhanced clinical learning, faster procedure completion time, and fewer adverse events. Interventions with medical students have also been successful in enhancing student learning. One barrier to training students is cost: many simulators cost several hundred dollars per use. Therefore, we propose a low-cost hands-on laparoscopic cholecystectomy simulation to increase operating room comfort and enhance knowledge of essential anatomy in third-year medical students.
Materials and Methods: A store-bought green 12-in balloon was used as a gallbladder model. Two 6.5-cm straws with corrugation were inserted into the balloon body. A red straw was used to represent the cystic artery and a green straw was used to represent the cystic duct. The structures were secured with a conventional office stapler. The gallbladder model was secured to a ring stand. Cling wrap was used to simulate the fibrous tissue layer. The assembled gallbladder model was then placed in the laparoscopic simulator and a pipe cleaner was used to represent the intraoperative cholangiogram catheter.



Class of 2024 Marshall University Joan C. Edwards School of Medicine (JCESOM) surgery clerkship students from rotations 2 (n = 8) and 3 (n = 11) completed an IRB-approved questionnaire regarding comfort level in OR. Additionally, medical interest and prior OR experience were measured as well. Questions were graded on a 5-point Likert scale and mean values were determined with Graph Pad Prism 9 software (La Jolla, California). Statistical inference was conducted using an unpaired t-test, $p < 0.05$ was considered to be statistically significant.

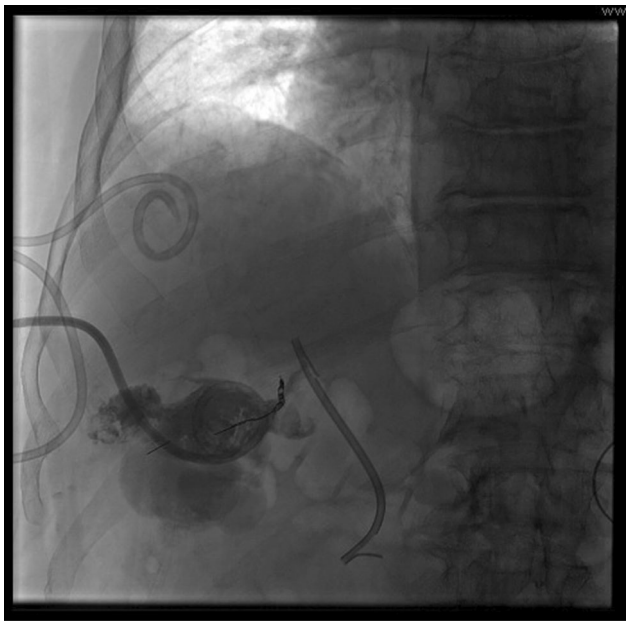
Results: There was a statistically significant increase in identification of the critical view of safety and its associated anatomical features in the post-simulation survey (pre-simulation anatomical identification was corrected by 56.25% and improved by 68.75% upon post-simulation, $p < 0.05$). Additionally, there was a statistically significant improvement in identifying indications for intraoperative cholangiogram (IOC) post-simulation (pre-simulation identification for indications of IOC was corrected to 56.25% and improved to 81.0%, $p < 0.01$).

Conclusion: Using low-cost cholecystectomy simulation is an effective teaching modality for third-year medical students in clerkships.

P231

Hemorrhagic Cholecystitis Leading to Gallbladder Perforation with Subsequent Biliothorax, a Rare Case Report with Literature Review

David Roberge Bouchard, DO; Joseph Kuiper, MD; Christiana Care



Introduction: We present a rare complication of cholecystitis leading to an exceedingly rare diagnosis of biliothorax. This patient required multiple modalities of biliary drainage to include percutaneous cholecystostomy tube, sphincterotomy along with pleural drainage via tube thoracostomy to adequately drain thoracic bilious output. A literature review was performed for biliothorax with only one other case being identified stemming from cholecystitis without fistula.

Case Presentation: An 89-year-old male maintained on anticoagulation who presented with epigastric abdominal pain underwent CT imaging showing active bleeding into his gallbladder lumen with pericholecystic fluid. His coagulopathy was reversed and he underwent percutaneous cholecystostomy first to control severe cholecystitis as the cause of hemorrhagic cholecystitis due to degree of inflammation.

His cholecystostomy drain continued with high-volume sanguinobilious fluid prompting interventional radiology angiogram which showed extravasation controlled by cystic artery embolization. He developed a right sided pleural effusion prompting tube thoracostomy. Output was high with characteristics found to be sero-bilious with elevated pleural laboratory bilirubin.

Sphincterotomy with stent placement, along with upsizing his cholecystostomy tube was performed to allow improved biliary drainage and diversion from pleura cavity. Cholecystogram during tube exchange showed contrast extravasation from the gallbladder to the abdomen without overt fistula. With time his chest tube output became less bilious and voluminous allowing his chest tube to be removed without effusion re-accumulation.

Discussion: A MEDLINE search from 2000 to present yielded 66 relevant cases with biliary pleural effusions. Trauma (59%) was the most common etiology, followed by radiofrequency ablation versus chemo-embolization (10.6%), hepatic biliary instrumentation (10.6%), and liver surgery related (7.6%).

Only two other cases of biliothorax stemming from cholecystitis in the acute phase were identified. One with a cholecystopleural fistula identified on upfront laparoscopic cholecystectomy with fistula

takedown. The next with bilious fluid throughout the abdomen identified on laparotomy for severe gallstone pancreatitis with post-operative large right bilious pleural effusion.

Our case is unique in etiology of biliary thorax from ruptured cholecystitis without fistula and the first treated percutaneously and endoscopically. Theories on pathway of bile to the pleural cavity include diaphragm disruption from infection versus occult diaphragmatic hernias.

Conclusion: We present a case of hemorrhagic cholecystitis leading to gallbladder rupture with subsequent development of a biliary thorax not related to identifiable fistula. This is the first case presented able to be managed percutaneously and endoscopically. This is the second case of a biliary thorax reported related to gallbladder rupture found.

P232

Single-port laparoscopic cholecystectomy with 2 fine needle forceps

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Introduction: Single-port surgery (SPS) has been reported to reduce the abdominal wall damages. To reduce the length of umbilical scar and to keep the triangulation, we use 2 additional fine needle forceps for laparoscopic cholecystectomy (LC).

Patients and Methods: From 2007 to August 2022, 1060 consecutive LC patients were retrospectively investigated. There were 564 male and 496 female. Severe cholecystitis was observed in 30% of the cases. We use two 5-mm ports (1 for the scope and 1 for the operator's right hand forceps) through an umbilical multi-channel port and 2 additional 2.4-mm fine needle instruments are pierced. One of the needle forceps is put on the right side of the lower end of sternum and the other is on the right side of abdomen. A 5-mm flexible scope allows to keep the triangular formation easily. We performed cholecystectomy named Plus Two Punctures SPS (PTP-SPS) for 684 patients. The rest of patients were operated by one 11-mm port, one 5-mm port, and some other ports. We have performed cholecystectomy by PTP-SPS from 2012 to now. We studied the safety and usefulness of PTP-SPS from the viewpoints of operation time and the complications.

Results: Median operation time of PTP-SPS (758 cases) was 83 (28–227) minutes, while that of the rest cases (161 cases) was 84 (26–191) minutes. In PTP-SPS, 95 cases (13.3%) needed some additional ports and 10 (1.4%) were finally converted to open surgery. Postoperative complications were conservatively treated 3 bile leakage (0.3%) and 3 incisional hernia (0.3%). There was no severe wound infection in our series. In other cases, 4 cases were converted to open surgery (2.4%). Severe postoperative complication was 1 incisional hernia (0.6%) that needed surgical repair. Umbilical scars and the pierced needle instrument scars became gradually invisible within 1 or 2 months. There was no apparent learning curve with operators changing over from conventional to PTP-SPS method.

Conclusion: There were no differences between PTP-SPS and others, including conventional method in operation time and complications. Operative scar of PTP-SPS is smaller because of using the fine needle forceps instead of 5-mm port. Therefore, the scars of patients operated by PTP-SPS are less visible and have better cosmesis than the conventional LC. PTP-SPS may be considered alternative approach as laparoscopic cholecystectomy.

P234

Laparoscopic cholecystectomy with resection of the gallbladder mesentery for suspected gallbladder cancer

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Introduction: Owing to the lack of specific clinical manifestations in the early stage, gallbladder cancer (GBC) is difficult to diagnose and has a high misdiagnosis rate. Furthermore, treatment strategies according to the cancer stage are controversial. Herein, we report laparoscopic cholecystectomy (LC) with resection of the gallbladder mesentery (GBM) for suspected GBC.

Methods: LC with resection of the GBM was performed on 25 patients with suspected GBC, excluding hepatic or serosal invasion. LC with resection of the GBM was performed as follows: after lymph node dissection around the bile duct, the root of the cystic duct was divided. The gallbladder was dissected from the liver exposing Laennec's capsule. We reviewed the outcomes of LC with resection of the GBM and compared them with those of extended cholecystectomy (ExC) for T1 and T2 lesions in GBC cases.

Results: The operation time and blood loss volume in 25 patients who underwent LC with resection of the GBM were 135 ± 35 min and 3 ± 7 mL, respectively. No intra- and postoperative complications occurred. The postoperative hospital stay was 6 ± 2 days. Of the 25 patients, 8 were diagnosed with GBC, and there were 1, 2, and 5 cases of m, mp, and ss T factors, respectively. Vascular invasion was noted in three patients, and extended surgery was performed in one patient according to the patient's intent. The mean follow-up period was 29 months, and there was no recurrence in eight patients. Compared with 17 patients who underwent ExC, LC with resection of the GBM had a shorter operation time (131 vs. 257 min), smaller amount of blood loss (0 vs. 263 mL), and shorter postoperative hospital stay (7 vs. 21 days). No difference was found in the pathological factors, and three recurrence cases were recorded in the ExC group.

Conclusion: LC with resection of the GBM was safe and had a favorable prognosis. Further studies may reveal the appropriate indications of LC with resection of the GBM according to the cancer stage.

P235

A Culture of Cholangiography: A single-institution perspective on the benefits of routine Intraoperative Cholangiography

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Introduction: Intraoperative cholangiography (IOC) provides a mechanism of diagnosing choledocholithiasis, defining biliary anatomy, and preventing bile duct injuries during laparoscopic cholecystectomy. We present the impact of instituting routine IOC at a single tertiary academic hospital.

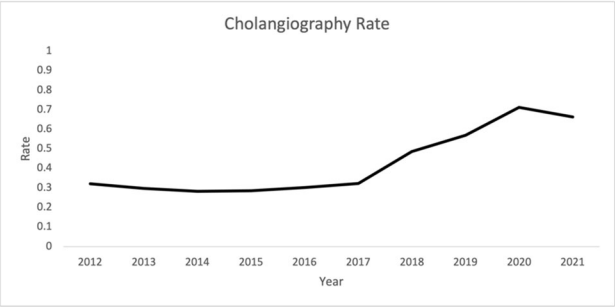
Methods: We analyzed retrospective CPT codes from our health system and divided the sample into two groups: 2012–2017 (before instituting routine IOC) and 2017–2022 (after instituting routine IOC). We employed a Chi-square test between the two timeframes comparing the observed versus expected event rates of IOC, attempted laparoscopic trans-cystic common bile duct exploration (LTCBDE), and successful LTCBDE, defined as successful clearance

of the duct without an endoscopic retrograde cholangiopancreatography within 30 days of the index operation.

Results: The implementation of routine IOC resulted in an increased rate of cholangiograms from approximately 30 percent of cholecystectomies to over 50 percent in a 5-year period. During this time, we also found a 2.6 times greater success rate at LTCBDE (27.9% vs. 73.8%, $p < 0.001$).

Conclusion: A culture of routine cholangiography can result in improved outcomes with the potential for decreased procedural interventions.

	2012-2017	2017-2022	P value (from Chi square test)
Laparoscopic cholecystectomy (47562, 47563, and 47564)	6751	7308	
Laparoscopic cholecystectomy with IOC (47563)	1982 (29.36%)	3739 (51.16%)	< .00001
LTCBDE (47564)	86 (1.27%)	168 (2.30%)	.000014
Successful LTCBDE	24 (27.9%)	124 (73.8%)	.00013



P236

Discussion on the management of rare variant of carcinoma gall bladder: an intracholecystic papillary neoplasm

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Background: A relatively new concept and a rare tumor of the gallbladder is intracholecystic papillary neoplasm (ICPN). The natural history and imaging characteristics of ICPN have yet not been fully documented. Moreover, very few number of cases have been reported who underwent curative resection for remnant gallbladder cancer, including ICPN. We report a resected case of ICPN of the remnant gallbladder with associated invasive carcinoma for which we could observe a temporal change in imaging findings until malignant transformation.

Case Presentation: A 44-year gentleman presented to surgical OPD with complains of pain in right upper quadrant of abdomen for 2 months which is episodic, sudden onset, rapidly progressiv,e and colicky in nature. No history of jaundice, nausea, vomiting, fever, malena. On presentation patient was conscious, oriented with blood pressure of 120/86 mmHg, pulse rate of 79 per minute, respiratory rate of 15 per minute, and saturation of 98% on room air. Abdomen is soft, non-tender with no guarding or rigidity with bowel sound present and normal. Rest of systemic examination was normal. As a routine investigations, ultrasonography was suggestive of echogenic, non-dependent polypoidal lesion of size 24X19mm, with multiple small well-defined echogenic lesion in liver parenchyma present in segment 7/8, likely Hemangioma. A CECT was planned and was suggestive of enhancing hyper dense lesion in gall bladder of size 3 × 1.8 cm with no GB wall edema with no calculus, likely CA Gall Bladder. The patient was taken up for laparoscopic extended cholecystectomy with intraoperative findings suggestive of A 3 × 2-cm growth present at fungus of gall bladder with visualized liver, omentum, and bowel healthy with no SOLs found on the surface of liver. Cystic duct and artery clipped and cut. Gall bladder with 2-cm wedge resection of liver done and the specimen sent for histopathological examination. In the post-operative period, patient was kept under observation and was discharged when patient tolerated orally well and passed feces and flatus with drain removed on post-operative day 2. On follow-up, patient's histopathology report was suggestive of intracholecystic papillary neoplasm.

Conclusion: ICPN is an uncommon tumor of the gallbladder that can be challenging to identify and diagnose both clinically and radiographically especially when accompanied by a different pathological process. And any suspicious case must be managed by conducting cholecystectomy. This case report demonstrates the diagnostic challenge in a case presenting with symptoms obscuring an underlying ICPN.

P237

Current Status of Minimally Invasive Cholecystectomy: Umbrella Review and Our Single-Surgeon Experience

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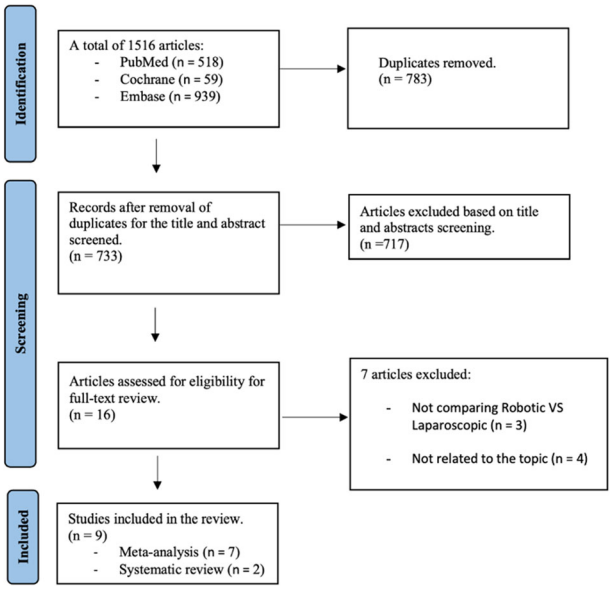
Background: Cholecystectomy can be performed open or using minimally invasive approaches, laparoscopic, or robotic assisted. Published systematic reviews and meta-analyses reported discordant results regarding the superiority of laparoscopic versus robotic-assisted cholecystectomy.

Method: An umbrella review was performed of published systematic reviews and meta-analyses using PubMed, Cochrane, and EMBASE databases on August 15, 2022. We further report on our single-surgeon experience. A single-institution retrospective chart review was performed of patients that underwent a laparoscopic or robotic-assisted cholecystectomy by a single surgeon from November 2020 to June 2022.

Results: Seven meta-analyses and 2 systematic reviews were included in the final analysis. Five of the 7 meta-analyses reported less operative time for laparoscopic cholecystectomies with differences ranging from 0.42 to 31.22 min, while 2 reported no difference. Two of the 7 meta-analyses reported reduced length of stay for robotic-assisted cholecystectomy with differences ranging from 0.73 to 0.26 days. Two of the 7 meta-analyses reported that laparoscopic cholecystectomies were associated with reduced development of incisional hernias with an odds ratio of 4.23 or average relative risk of 3.33. Not all meta-analyses reported all the categories were analyzed. If reported, meta-analyses saw no differences between laparoscopic and robotic-assisted cholecystectomies on intraoperative complication rates, open conversion rates, estimated blood loss, postoperative complication rates, readmission rates, and postoperative pain scores. From our institutional data, a total of 103 patients who underwent a minimally invasive cholecystectomy were identified. Of the 103 patients, 61 underwent laparoscopic cholecystectomy and 42 underwent robotic-assisted cholecystectomy. Patients were older in the robotic-assisted group than laparoscopic (44.78 vs 57.02, $p < 0.001$). There was no statistically significant difference in operative time (120.67 min vs 121.3 min), need for postoperative ERCP (6.56% vs 11.90%), readmissions, 30-day mortality, and 30-day morbidity between laparoscopic and robotic assisted. Interestingly, a sub-analysis of robotic cases showed that 3-port robotic-assisted cholecystectomies were associated with reduced operative time compared to 4-port (101.28 min vs 150.76 min, $p < 0.001$).

Conclusion: Robotic-assisted cholecystectomy is non-inferior to laparoscopic in many patient outcomes statistically and clinically. Laparoscopic cholecystectomies may be associated with a lower risk of incisional hernia development.

Figure 1. PRISMA Flow Diagram



P238

Outcomes of difficult laparoscopic cholecystectomy using various bail out strategies—experience of over two decades from a single surgical unit at a tertiary care teaching hospital

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Introduction: A difficult laparoscopic cholecystectomy if not handled appropriately can lead to devastating complications. We hereby describe our experience and outcomes of patients with difficult laparoscopic cholecystectomy managed with various bail out strategies to achieve a very low conversion rate and bile duct injury rate over the last two decades.
Methodology: This was a retrospective analysis of patients labelled as difficult laparoscopic cholecystectomy in a single surgical unit at a tertiary care teaching hospital from January 2004 till December 2020. The preoperative, perioperative, and follow-up data of all these patients were obtained from a prospectively maintained electronic database. The difficulties encountered were categorized into 7 categories along with the bail out strategies used. The various bail out strategies included Palmer's point for insufflation, decompression of gall bladder, use of extra ports, use of endo GI staplers/intracorporeal suturing and near total cholecystectomy with gall bladder stump closure.
Results: Between January 2004 and December 2020, 3726 patients underwent elective laparoscopic cholecystectomy out of which 649 (17.4%) cholecystectomies were deemed difficult. Difficulty in initial access was encountered in 94 cases and frozen Calot's triangle in 54.5% cases. Endo GI stapler was used in 9.6% cases and near total cholecyustecomy was done in 125 cases. Using the various bail out strategies we were able to achieve a conversion rate of 4.9% and bile duct injury rate of 0.1%, with an overall morbidity of 8%.
Conclusion: The present series reiterate the use of bail out strategies to not only decrease conversion but achieving a minimal BDI rate.

P240

An evaluation of titanium versus polymer clips in laparoscopic cholecystectomy

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Introduction: Surgical clips have been utilized for tissue hemostasis since the advent of laparoscopic surgery in the early twentieth century. As the field of minimally invasive surgery has developed, so has the variety of surgical clip options. Today, the most commonly used clips include titanium and polymeric clips. Given the cost-saving potential, design advantages, and decreased incidence of complications associated with polymer clips, we sought to study whether a clinically significant functional difference exists between polymer and titanium clips in laparoscopic cholecystectomies.
Methods: A retrospective review of adult patients who have undergone standard laparoscopic cholecystectomy with or without intraoperative cholangiography by a single surgeon at Novant New Hanover Regional Medical Center between November and April 2022. Fifty stratified consecutive cases utilizing titanium clips, followed by 50 stratified consecutive cases utilizing Weck® Hem-o-lok® polymer clips were evaluated for the following primary outcomes: incidence of bile leaks, postoperative bleeding, need for additional procedures, and hospital length of stay. Index operation cost was measured as a secondary outcome. Stratification occurred for sex, age, and race.
Results: Significantly more misfires occurred with the use of the polymer clips (n = 17) than with the titanium clips ([n = 2], $p < 0.001$). Nine cases (18%) required the opening of an additional polymer clip cartridge to complete the operation. Despite this additional expense, the total cost as it pertained to clip usage was still lower ($52.28) when compared to that performed using metal Ligamax™ 5-mm clips ($139.17). While not statistically significant, there were three cases with bile leaks and need for additional procedures, all of which were performed with metal clips. There were no postoperative bleeds identified and there was no difference in hospital length of stay, with most patients discharged same day.
Conclusion: Laparoscopic cholecystectomies performed with polymer clips have comparable clinical outcomes to those performed with titanium clips, while decreasing operative cost. We hope that this study will ignite the transition to standard usage of polymer clips in laparoscopic cholecystectomy as a cost-saving measure and set the groundwork for evaluating polymer clip outcomes in other laparoscopic procedures.

P241

Transversus abdominis plane blocks with dexamethasone and dexmedetomidine decrease opioid consumption, length of stay, and ileus after laparoscopic colorectal resection

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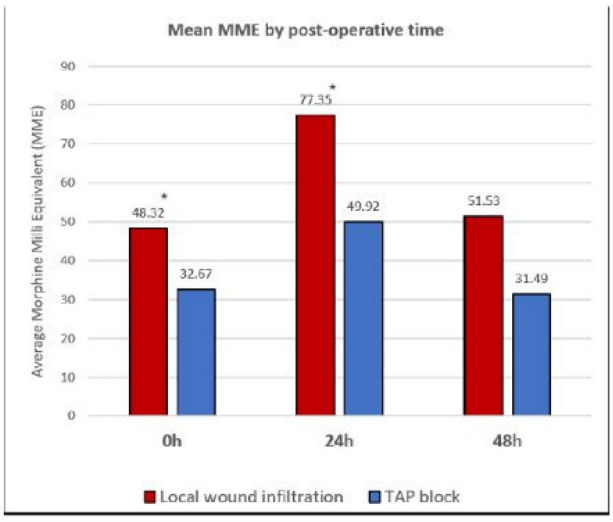
Introduction: In the era of Enhanced Recovery After Surgery (ERAS) protocols, transversus abdominis Plane (TAP) blocks have slowly gained popularity. Dexamethasone and dexmedetomidine can be added to TAP blocks to increase the duration of analgesia. The purpose of this study was to assess the association of TAP blocks containing both dexamethasone and dexmedetomidine with post-

operative opiate consumption after laparoscopic colorectal resections; secondary outcomes included ileus and length of stay.

Methods: After IRB approval, a single-institution retrospective cohort study was performed including all patients who had undergone elective laparoscopic colorectal resections for malignant and benign disease between 2019 and 2022. Patients with preoperative opioid use or with missing opioid consumption data were excluded. Patients received either local wound infiltration or TAP blocks. All TAP blocks were performed by the operating surgeon and comprised bupivacaine hydrochloride, dexamethasone, and dexmedetomidine. Local infiltration was with bupivacaine alone. Demographic, operative, and post-operative outcomes were compared between groups. Postoperative Morphine Milliequivalents (MME) and Visual Analogue Scores (VAS) at 24, 48, and 72 h after surgery were compared. Predictors of MME and LOS were investigated by multiple linear regression.

Results: Of 338 laparoscopic colorectal resections, 195 patients met inclusion criteria. Of these, 90 (46.1%) patients received local wound infiltration and 105 (53.9%) received TAP blocks. The mean age and BMI of the entire cohort were 64.5 ± 6.74 years and 26.8 ± 14.7 kg/m^2, respectively. There was no significant difference between groups with regards to Pfannenstiel extraction site (71.5% vs 71.8% p = 0.16), use of patient-controlled anesthesia (PCA) (58% vs. 48% p = 0.15), or creation of stoma (18% vs 16.1% p = 0.77). Patients who received a TAP block had lower MME at 24 h. (49.9 mg vs 77.33 mg, p = 0.028), 48 h. (31.4 mg vs 51.5, p = 0.12), and 72 h. (12.7 vs 27.14, p = 0.19). Visual analog scales remained statistically similar between treatment groups. LOS was shorter for those receiving TAP blocks (4.4 ± 2.2 days vs 6.1 ± 5.1 days, p = 0.001). TAP blocks were also associated with decreased post-operative ileus (0% vs 5%, p = 0.01). Multiple linear regression, accounting for relevant covariates, demonstrated that TAP blocks were independently associated with lower MME at 24 h after surgery (β = − 31.3, 95% CI [− 31.64, − 31.56], p < 0.001) and shorter LOS (β = − 1.6,95% CI [− 1.92, − 1.33]).

Conclusion: TAP blocks using bupivacaine, dexamethasone, and dexmedetomidine following laparoscopic colorectal resections are associated with decreased opioid consumption at 24 h, shorter length of stay, and decreased ileus. TAP blocks with these 3 agents should be further investigated for standard use in ERAS protocols.



P242

Comparison of Short-Term Outcome Between Single-Port Robot-Assisted and Laparoscopic Surgery in colorectal cancer

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Purpose: The newly launched single-port robot (SPR)-assisted colorectal surgery is being used in many hospitals for the treatment of colorectal cancer. The purpose of this study was to compare the short-term outcomes between single-port robot-assisted surgery and single-incision laparoscopic surgery in colorectal cancer.

Materials and Methods: From April 2019 to April 2020, a retrospective study was conducted with 141 patients diagnosed with rectal cancer who underwent surgery. This study compared the short-term outcomes of single-incision laparoscopic surgery (SILS) group and SPR-assisted surgery group. The operation was performed by a single surgeon. We identified the patient's baseline characteristics, perioperative characteristics, post-operative pathology, and postoperative complications. This study was reviewed and approved by the institutional review board.

Results: Of a total of 141 patients, 134 were enrolled (SILS = 53, SPR = 81). The number of patients who underwent low anterior resection (LAR) was 83 (SILS = 35, SPR = 48) and the number of patients who underwent ultra low anterior resection (uLAR) was 32 (SILS = 13, SPR = 19) which were the second most common. When the perioperative outcome between the two groups was confirmed, there was no statistically significant difference other than the operation time. When comparing the TNM stage in the pathologic outcome obtained after surgery, the SILS group had a higher overall stage outcome. However, there was no significant difference between the two groups in pathologic results. There was no mortality after surgery. Postoperative morbidity was classified by Clavien–Dindo classification (CD). Comparing complications according to CD, severe complications occurred in 3 of 14 patients in the SILS group and 5 out of 28 patients in the SPR group. There was no statistically significant difference between the two groups. The most common minor complications were urinary retention.

Conclusion: SPR for rectal cancer is a technically safe and feasible, less scar-making procedure. And SPR showed no significant difference in short-term outcome when compared to SILS.

P243

Robotic right versus left colectomy for colon neoplasm: A systemic review and meta-analysis

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Introduction: Previous studies comparing right and left colectomies have shown variable short-term outcomes. Despite rapid adoption of robotics in colorectal operations, few studies have addressed outcome differences between robotic right (RRC) and left colectomies (RLC). Therefore, we sought to compare short term outcomes of RR and RL colectomies for benign and malignant neoplasm.

Methods: This is a systematic review and meta-analysis of articles published from the time of inception of the datasets to May 1, 2022. The electronic databases included English publications in Ovid MEDLINE, Ovid EMBASE, and Scopus.

Results: A total of 13,514 patients with colon neoplasia enrolled in 9 comparative studies were included. The overall mean age was 64.1 years, (standard deviation [SD] ± 9.8), and there was a minor female predominance (52% female vs. 48% male). 8,656 (64.0%) underwent RRC and 4,858 (36.0%) underwent RLC. In the meta-analysis, there was no statistically significant difference between RRC and RLC in sex, age, ASA score, or mean Charlson Comorbidity Score. There was a significantly lower rate of ileus in RLC (7%) compared to RRC (10%) (OR 0.69, 95% CI 0.60-0.79). Moreover, operative time was significantly longer by 22.6 min in RLC versus RRC (95%CI 7.8-37.4). There were no statistically significant differences between RRC an RLC in conversion to open operation, estimated blood loss, wound infection, anastomotic leak, reoperation, readmission, or hospital length of stay.
Conclusion: This is the only meta-analysis comparing RRC and RLC for neoplasia. While RRC is a shorter operation compared to RLC, it is associated with a higher rate of ileus.

P244

A novel approach to removal of a massive rectal foreign body: a case report

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Introduction: The incidence of polyembolokoilamania, the insertion of foreign object into a body orifice, has recently been on the rise. Entrapped rectal foreign objects are increasingly common in the practice of surgeons and gastroenterologists. There are many well-established techniques for removal of medium to large rectal foreign bodies. Our case demonstrates a unique technique for the removal of a very large, rigid foreign object lodged within the rectum between the anal verge and the sacrum.
Presentation of Case: We present a case of a 51-year-old male with prior history of a low rectal perforation secondary to a foreign body who presented with a PVC pipe trapped in his rectum for twenty-four hours. A bedside removal was attempted, without success. He underwent a subsequent rectal exam under anesthesia, which required conversion to an exploratory laparotomy. Despite the laparotomy and a subsequent proctotomy for proximal manipulation, the object was still unable to be dislodged. Removal of the object was finally achieved by drilling a hole into the object using a Dual-function electric surgical bone drill 8 mm. Then, utilizing a 10-mm Volkmann bone hook on the drill hole, the foreign object was able to be dislodged from the sacral hollow and removed in a retrograde fashion.
Discussion: Management of rectal foreign bodies remains a complicated process. Several case reports have previously identified the utility of an exploratory laparotomy in removal of a large rectal foreign object. There have been no case studies where the foreign object was so large that it was unable to be removed even after creation of a colotomy. We present a novel technique in removing a large rectal foreign body with a smooth surface lodged between the anal verge and the sacral promontory,
Conclusion: In some instances, large rectal foreign bodies with a difficult orientation may require creative techniques and uncommonly used instruments for successful removal. It helps to be familiar with instruments available to other specialties to help with these difficult and unique circumstances. There are no cases in the literature when a rectal foreign body could not be removed after a laparotomy and proctotomy. Our case presents a novel methodology that can be considered for removal of a very large, rigid intrarectal foreign body.



P245

Peristomal Medical Adhesive-Related Skin Injury (MARSI): a new observation

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Introduction: Peristomal Medical Adhesive-Related Skin Injury (MARSI) is a known entity that affects quality of life after surgical creation of an ostomy. About 80 percent of patients with a newly created ostomy will experience peristomal complications within 2 years of ostomy creation. Erythema, skin erosion or tears, bullae, or vesicles caused by adhesive ostomy pouching appliances are considered peristomal MARSI. MARSI is caused when the skin to adhesive attachment is stronger than the skin cell to cell attachment, causing the superficial epidermal layers to separate from the dermis. Our aim is to highlight a unique case series of three patients with peristomal MARSI, believed to result from stretching of the abdominal wall skin post-laparoscopic pneumoperitoneum creation.
Case Series: We observed three patients with peristomal epidermal damage at the first ostomy appliance change after laparoscopic ostomy creation. Of note, the ostomy appliance in all patients was applied after desufflation of abdomen and closure of incisions in the operating room. Standard ostomy appliances available at our institution were used. In all three cases, peristomal skin damage, as shown in the figure was seen at the first ostomy appliance change. MARSI occurred under the border adhesive tape component of the appliance and not the hydrocolloid adhesive skin barrier. These findings were reported by our ostomy nurses. The skin damage in all patients was managed with local wound care and subsequently resolved.
Discussion: Peristomal MARSI generally develops over a few months of ostomy adhesive appliance use. It is rarely observed within the first 1–2 days of ostomy appliance use. In our cases, the peristomal skin damage was related to the tape border and not the hydrocolloid ring immediately surrounding the stoma. We hypothesize that this may result from residual inflation or stretch of the skin of the abdominal wall as a result of pneumoperitoneum which subsequently improves after the first few days after laparoscopic surgery. Skin tearing is painful and greatly impacts patient satisfaction. We suggest that the protective paper covering the adhesive tape border be left in place following laparoscopic ostomy surgery, which might prevent this complication. As the hydrocolloid adhesive skin barrier immediately surrounding the stoma is the most important component of the seal, the nursing staff can remove the protective paper backing from the adhesive tape border at a later time.



P246

A Rare case of Colon Cancer from an Esophageal Primary

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Introduction: Esophageal cancer represents only 4% of all cancers in the USA but, has a 5-year-survival rate of less than 25%. A patient recently presented to us with an obstructing colonic mass that was then surgically resected. The mass was later pathologically staged and identified as a metastatic mass from an esophageal adenocarcinoma primary. This triggered our review of the literature for this rare form of metastasis.
Methods: Using the NCBI PubMed Database, we searched for all previous publications which described metastasis of both esophageal adenocarcinoma and esophageal squamous cell carcinoma to the colon. This included case reports, case series, and meta-analyses published within the past 10 years (2010–2020).
Results: We discovered that this type of metastatic mass was exceptionally rare, with only a total of five such cases reported in the literature. More typical sites for esophageal carcinoma metastases included the liver, lungs, skin, bones, adrenal glands, and brain.
Conclusions: Up to 40% of patients with this type of cancer present with locally advanced or metastatic disease, making this type of cancer clinically significant in terms of early detection. The very low number of reported cases could also be due to patients' late presentation and high mortality. Some cases, such as with our patient, would initially be thought to be a primary colon cancer mass until further pathologic workup is obtained. Maintaining a high index of suspicion for rare and distant metastases, especially in patients with a history of esophageal adenocarcinoma, helps with early recognition and allows for the timely delivery of life-prolonging.

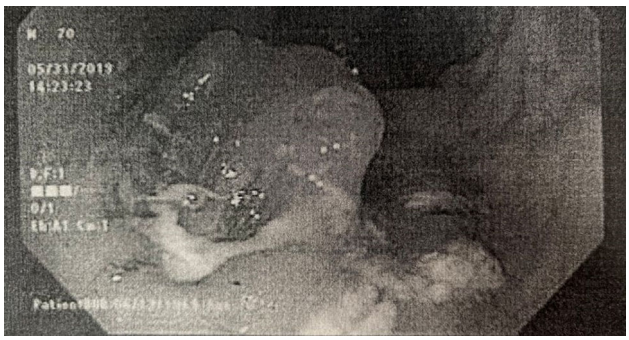
P247

Spacer Gel Erosion Through the Rectal Wall. A Case Report Detailing an Unfortunate Side Effect of the Protective Treatment of Prostate Cancer During Radiotherapy

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SpaceOAR Hydrogel is a Food and Drug Administration-approved bioabsorbable hydrogel injection that creates space between the prostate and rectum during prostate radiation therapy. The technology is new, with initial trials showing high safety and efficacy in reducing radiation toxicity to the rectum. Here, we describe a case report that outlines the diagnosis and management hydrogel spacer erosion through the rectal wall.

The patient is a 71-year-old male who was diagnosed with prostate cancer who underwent injection of a spacer gel anterior to the rectum in anticipation of radiotherapy. He subsequently underwent several rounds of radiation therapy however was unable to successfully achieve placement of radiation seeds. The patient developed increased rectal pain, hematochezia, and straining with smaller than normal caliber stool for two weeks before presenting to the emergency department. Workup was initiated and CT scan showed a low attenuating 2.3 × 2.2-cm structure in/adjacent to wall of rectum. Evaluated further by MRI. The patient was prepped and taken for flexible sigmoidoscopy, which demonstrated a small erosion of the anterior rectal wall with a gelatinous mass extruding into the lumen, although not obstructive, consistent with the gel spacer.



Under direct vision a Debakey forceps was placed onto the foreign body. The very superficial portion of the mass came apart easily and as much was removed as safely as possible. The deeper portion was surrounded by inflammation therefore was left in place. The patient was kept for observation and treated with a short course of broad-spectrum antibiotics. A repeat sigmoidoscopy was performed 3 weeks later at which time no further spacer was seen.

Insertion of several types of injectable agents such as hyaluronic acid, collagen, and bioabsorbable hydrogel rectal spacers have been proposed as solutions to side effects of radiotoxicity for prostate cancer. Although early clinical studies have shown few adverse events related to the insertion of these spacers, there have been very few studies that have outlined the post-procedural complications of it's insertion. Here, we present a case of rectal wall erosion that we attribute to a hydrogel spacer and its management.

P248

Elective Colorectal Cancer Surgery during the COVID-19 Pandemic: A Peruvian Single-Center Experience

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Introduction: The COVID-19 pandemic had a great impact in the global healthcare system. The aim of this study is to analyze our results in colorectal cancer surgery during the COVID-19 pandemic in Almenara Hospital, Lima, Peru.

Methods: A retrospective study was conducted using the Almenara hospital database of patients with CRC who underwent elective surgery between July 1, 2020 and June 30, 2022.

Data collection included gender, age, tumor location, preoperative staging, surgical procedure, number of lymph nodes harvested; morbidity, mortality, complications, and reoperation rates.

Results: We included 196 patients, 135 (69%) with colon and 61 (31%) with rectal cancer. Among these patients, 105 (53.6%) were male, with a mean age of 66 years (35–91 years).

The histopathological diagnosis was adenocarcinoma in 175 patients (89.2%).The most common site for colorectal cancer was the right side (cecal, ascending, right, hepatic flexure, and transverse colon cancers) accounting for 49% of the patients; left-sided tumors (splenic flexure, descending colon, and sigmoid colon tumors) accounted for 20% and rectal cancer (rectosigmoid and rectal tumors) constituted 31%.

The disease stage at presentation was stage I in twelve patients (6.1%), stage II in forty (20.4%), stage III in 134 (68.3%) and stage IV in ten (5.1%). Eighty-six % of stage II–III rectal cancer.

Laparotomy and laparoscopic surgery were performed in 139 (71%) and 57 patients (29%), respectively.

The mean ± SD number of lymph nodes harvested in colon cancer was 26.8 ± 12.24; 28.5% of all studied cases had lymph nodes affected; 37.2% of the studied cases had positive lymphovascular and 6.1% had perineural invasion.

The main complications seen were anastomotic leakage in 5.1%, wound site infection in 6.1%, and intra-abdominal abscess in 9.6%; the mortality rate was 1.5% and the rate of reoperation was 8.1%. The median length of postoperative in-hospital stay was 7 days (1 day: TAMIS and 88 days: pelvic exenteration) and 57% of colorectal cancer patients received adjuvant therapy.

Conclusion: We follow the recommendations of SAGES to not postpone surgical treatment for colorectal cancer. During the pandemic, 29% of the colorectal cancer surgeries were performed by laparoscopy at our unit and before the pandemic this percentage was higher (57%).

Some changes in practices may have occurred since the COVID-19 pandemic emerged, but these findings represent the most recent report on practices in CRC in Almenara Hospital and offer a useful approach for assessing quality of oncological care.

P249

Incidence and risk factors for anastomotic bleeding after robotic ileocolonic anastomosis

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Introduction: Major anastomotic bleeding following robotic colonic surgery is considered infrequent. However, it can potentially be life-threatening if not properly managed. The objective of this study was to assess the incidence of postoperative stapled anastomotic bleeding following right hemicolectomy and to identify the potential risk factors.

Methods and procedures: We conducted a single-center, single-surgeon (RAG) retrospective cohort study of 171 patients who underwent robotic right colonic resections with stapled anastomosis for both benign and malignant diseases. The procedures were performed between July 2012 and January 2021. Various characteristics of the bleeding cohort were compared with the non-bleeding cohort using Fisher's exact and Mann–Whitney's U test where applicable. P value = 0.05 was considered statistically significant.

Results: A total of 9 out of 171 patients (5.3%) experienced intraluminal bleeding in the postoperative period. The average length of hospital stay (LOS) before discharge was 3 days (median = 2 days), with median LOS = 2 days for both the bleeders and non-bleeders. Only 2 of 9 (22.2%) patients who bled required a blood transfusion. No patient required endoscopic intervention for bleeding. Patients with intraluminal bleeding had a significantly lower BMI, i.e., 24.4 ± 2.72 vs BMI in non-bleeders, i.e., 29.4 ± 7.12 (p = 0.022). No significant difference was found among the characteristics of bleeders versus non-bleeders with respect to hypertension, coronary artery disease, anticoagulant/antiplatelet use, steroid intake, alcohol use, and indication for surgery.

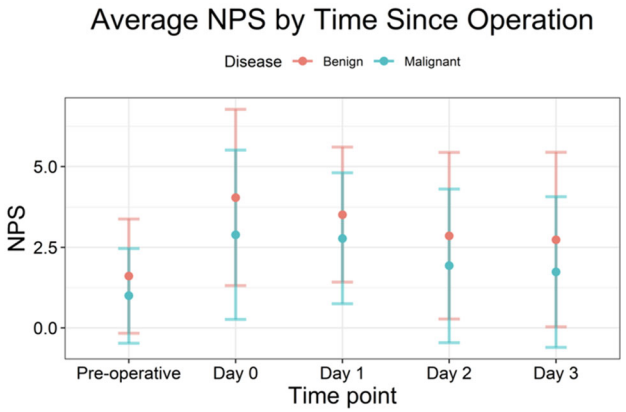
Conclusion: Postoperative staple line bleeding following robotic right hemicolectomy is infrequent and self-limiting. Lower BMI seems to correlate with increased incidence of postoperative anastomotic bleeding. However, postoperative bleeding did not significantly increase the length of hospital stay or need for blood transfusions as compared to those patients without anastomotic bleeding.

P251

Pain and opioid use after colorectal resection for benign and malignant disease: A single-institution analysis

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Figure 1. Mean Numeric Pain Scores plotted by disease and time point relative to operation.



Background: Opioid dependence and overdose are public health issues resulting in morbidity, mortality, and increased healthcare utilization. Studies suggest that opioid needs and risk for persistent opioid use differ between benign and malignant colorectal diseases, but the results are inconclusive. This study compares perioperative pain and opioid use for patients undergoing colorectal surgery for benign and malignant diseases in a pharmacist-led enhanced recovery pain management pathway.
Methods: This is a single-institution retrospective cohort study of elective open, laparoscopic, and robotic colorectal operations for colorectal cancer and benign diseases in a prospectively maintained database over 3 years. Numeric pain scores (NPS) were obtained on the day of surgery (POD 0) and 3 days postoperatively. Descriptive statistics were performed on study variables. Multiple regression analyses were done on NPS and opioids prescribed at discharge.
Results: There were 641 patients in the Benign group and 276 in the Malignant group. Unadjusted comparison revealed that NPS were significantly higher for the Benign than the Malignant group at all time periods—preoperative, postoperative day (POD) 0 (after surgery), POD 1, POD 2, and POD 3 (all $p \leq 0.001$). Opioids prescribed at discharge were also significantly higher in the Benign group when compared to Malignant (60.0% vs 51.1%, $p = 0.018$). After controlling for patient demographics and comorbidities, regression analysis showed that there was no longer a significant difference in NPS ($B = 0.703$, $p = 0.095$) and opioids prescribed at discharge between groups [OR = 0.803 (95%CI 0.586, 1.1), $p = 0.173$].
Conclusion: This study shows no significant difference in perioperative pain and opioids prescribed at discharge when comparing benign and malignant diagnoses for colorectal operations in a pharmacist-led enhanced recovery pain management pathway that maximizes non-opioid multimodal analgesic strategies. Continued data monitoring will determine if other factors that impact pain and opioid use warrant further targeted investigation.

P253

Laparoscopic sigmoidectomy should be the standard of care for complicated fistulizing diverticular disease

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Introduction: The objectives were to assess the feasibility and safety of laparoscopic sigmoidectomy for complicated fistulizing diverticular disease in a tertiary care center. We hypothesized that conversion to open surgery and postoperative morbidity would be low.
Methods and Procedures: Single-center retrospective observational study of all consecutive patients undergoing sigmoidectomy for fistulizing diverticular disease between 2011 and 2021. Chi-squared test and Wilcoxon–Mann–Whitney test were used for comparisons between the groups with and without $\geq$ grade III Clavien–Dindo complications.
Results: 675 colonic resections for left-sided diverticulitis were performed. Among the 104 patients with a fistula, 52 (50%) had previous abdominal surgeries, including 34 (33%) laparotomies. Ninety (87%) sigmoidectomies were elective surgeries. Fistula types are reported in Table 1. Laparoscopy was the initial approach in 103 (99%) patients and conversion to laparotomy was performed in six (6%). Stappled circular end-to-end anastomoses were realized in all patients. Median operative time, blood loss, and postoperative hospital stay were of 193 min (interquartile range: 163, 238), 100 ml (50, 250), and 4 days (3, 7), respectively. Within 30 postoperative days, 10 patients (10%) had experienced a grade $\geq$ III Clavien–Dindo complication, including two anastomotic leaks. Seven (7%) underwent reoperation and six (6%) were readmitted following discharge. Twelve (12%) diverting ileostomies were created at primary surgery and two following anastomotic leaks. At their last follow-up, 101 (97%) patients were stoma free. One patient decided to receive palliative care following her diverting ileostomy for an anastomotic leak and died within 30 days.
Patients with grade $\geq$ III Clavien–Dindo complications were significantly older (64 vs 76 years, $p = 0.03$) and had more emergent surgeries (11 vs 40%, $p = 0.03$), more multiple concomitant fistulas (10 vs 50%, $p = 0.02$), longer operative time (192 vs 240 min, $p = 0.04$), and higher blood loss (75 vs 300 ml, $p = 0.01$).
Conclusions: Laparoscopic sigmoidectomy for complicated fistulizing diverticular disease should be the standard of care. In our series, the laparoscopic approach was offered to almost all patients and was associated with a low conversion rate, few postoperative serious complications, and a high rate of restoration of bowel continuity. These patients could benefit from referral to centers with expertise in minimally invasive colorectal surgery.

Table 1 Fistula types

	n = 104 (%)
Colovesical	60 (58)
Colovaginal	20 (19)
Coloenteric, colocolonic or colorectal	3 (3)
Others	7 (7)
Multiple fistulas	14 (13)

P254

Case Report: EBV Colitis Associated with Abdominal Compartment Syndrome in an Immunocompetent Pediatric Patient

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Introduction: We describe a rare pediatric case of Epstein-Barr Virus (EBV)-associated colitis which was complicated by abdominal compartment syndrome (ACS).
Presentation: Our patient is a 15-year-old immunocompetent female with a remote history of COVID-19 infection who presented with abdominal pain and hematochezia. Initial computerized tomography (CT) scan showed pancolitis with diffuse wall thickening and associated cystitis. Patient remained symptomatic despite resuscitation and ultimately a CT scan was repeated showing increased colonic distention suggestive of toxic megacolon. Due to the concern for abdominal compartment syndrome, she was taken to the operative room and underwent a subtotal colectomy for gross colonic necrosis. Patient underwent multiple re-operations to evaluate her genitourinary organs as well due to concern for ongoing necrosis. She subsequently underwent bilateral salpingo-oophorectomy with total abdominal hysterectomy, completion colectomy with end ileostomy creation, and bilateral percutaneous nephrostomy tube insertions for severe hydronephrosis. Pathology of her colon showed transmural congestion with hemorrhage and necrosis. Immunohistochemical stain of this specimen returned positive for EBV.
Discussion: Generally asymptomatic, EBV is a herpesvirus that has infected and become latent in more than 90% of the global population. Commonly, it presents in the pediatric population as infectious mononucleosis, but can also appear as nasopharyngeal carcinoma, Burkitt's lymphoma, Hodgkin's disease, or post-transplant lymphoproliferative disease. Colonic involvement in EBV is exceedingly rare. When diagnosed, there is usually a correlation with EBV in adults with inflammatory bowel disease (IBD) or other immunocompromised states. Additionally, EBV colitis is poorly described in the pediatric population (defined as 18 years of age or younger). Other than a remote history of COVID-19, our patient did not have signs or symptoms of immunocompromise, and our patient was well under the adult age limit.
Conclusion: To our knowledge, this case report of an immunocompetent pediatric patient with biopsy-proven EBV colitis developing ACS is a rare presentation that has not been previously described in the literature. We continue to learn more about these individually rare conditions in order to promote awareness and improve accuracy in future clinical settings.

P255

Splenic flexure volvulus: a rare case report

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Colonic volvulus, where the colon twists around its mesentery, commonly occurs in the sigmoid and cecum. However, colonic volvulus of the splenic flexure is quite rare. Reported cases are limited but suggest that prolonged constipation in patients with either congenital anomalies, history of prior abdominal surgery, and or psychiatric history are described as common risk factors for large bowel volvulus. Here, we discuss a case of a 56-year-old man with a history of chronic constipation and no previous abdominal surgeries who presented to the emergency department with abdominal pain and distention. Further workup including a computed tomography imaging and decompressive via limited colonoscopy confirmed diagnosis of colonic volvulus of the splenic flexure. Surgical management of colonic volvulus is patient specific but invariably involves partial colectomy, as was performed in this case.

P256

Robotic-assisted right hemicolectomy with complete mesocolic excision: first experience compared to conventional robotic right hemicolectomy in a single non-academic institution

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Introduction: Colorectal cancer is currently ranked as the 3rd highest in incidence and 2nd place for mortality out of all cancer. Heald et al. introduced the total mesorectal excision for the management of rectal cancer, but it was until 2009 when it was adapted for colon cancer as a Complete Mesocolic Excision (CME) along with central vascular ligation. By performing a CME utilizing minimally invasive techniques, we can correctly identify critical anatomy segments, perform a complete lymphadenectomy, and ensure the correct plane of dissection. More recently the CME technique has been controversial amongst colorectal surgeons due to the lengthy time that the procedure adds when it is compared to a standard right colectomy. Therefore, the aim of our study is to compare the feasibility, efficacy, and safety of performing a complete mesocolic excision versus a conventional right colectomy, in a single, non-academic hospital.
Method: A comparative retrospective study of 10 patients who underwent a robotic-assisted right hemicolectomy versus 2 patients who underwent robotic-assisted right colectomy with complete mesocolic excision was performed. All cases were performed using a robotic platform by a single board-certified colorectal surgeon in a non-academic institution. All patients were placed on a standardized enhanced recovery program.
Results: A total of 12 patients met the inclusion criteria. Ten patients underwent conventional right colectomy and two patients underwent robotic CME. The mean operative time was (CME 215-min vs 194-min control group). Postoperative 30-day complications and readmission rates were lower in the CME group (0 vs 10%). The number of harvested lymph nodes was higher in the CME group (mean 44 vs 25) The difference between groups for hospital length of stay (2 vs 1.5 days). There were no intraoperative complications in either group.
Conclusion: Our current results showcase that a complete mesocolic excision was on favor when compared to a traditional right hemicolectomy. The number of lymph nodes retrieved without an increase in complications and only a mean increase of 21 min to the total operative makes the CME technique a feasible and safety alternative to perform even in the setting of a non-academic institution.

P257

Colorectal Adeno-squamous Carcinoma: Incidence, Survival Analysis, and Management: A Study from the SEER Database (2000–2019)

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Introduction: Colorectal adenosquamous carcinomas **(CR-ASC)**, first described in 1907 by Herxheimer, are rare malignant tumors of the epithelial lining of the intestine. Most of the information regarding CR- ASC is limited to case reports and very few intuitional studies. The current study aims to describe a large cohort of patients with CR-ASC from the Surveillance, Epidemiology, and End Results (SEER) database to identify better the demographic, clinical, and treatment modalities that impact clinical outcomes.
Methods: Demographic and clinical data were abstracted on 344 patients with colorectal adenosquamous carcinomas from the SEER research plus database (2000 – 2019).
Results: 344 cases of CR-ASC were identified, comprising 176 female and 168 male patients. Most patients (n = 289) were diagnosed after the 5th decade of life and belonged to Caucasian ethnicity (n = 287). The most common primary tumor sites were the rectum (n = 96), cecum (n = 66), sigmoid colon (n = 48), ascending colon (n = 45), rectosigmoid junction (n = 25), transverse colon (n = 24), splenic flexure (n = 10), descending colon (n = 10), hepatic flexure (n = 9), large intestine, NOS (n = 7), and appendix (n = 4). When grading information was available (n = 283), most of the CR-ASC tumors were of grade 3 (poorly differentiated; n = 181), followed by grade 2 (moderately differentiated; n = 74), grade 4 (Undifferentiated/anaplastic; n = 20), and grade 1 (well differentiated; n = 8). When information regarding tumor spread was available, most CR-ASC had regional spread (n = 141), followed by distant spread (n = 123) and localized (n = 48). Also, when the tumor size information was known (n = 202), most of the tumors were $\leq$ 5 cm in size (n = 118), followed $\geq$ 5 cm (n = 84). Almost (n = 280) patient received surgery, followed by chemotherapy in (n = 172) patients and radiation (n = 4 (adjuvant = 4, neoadjuvant = 0)). The overall survival was noticed to be 35.3 months, while African American race (odds ratio (OR) = 1.2), positive lymph node status (OR 1.4) size $>$ 5 cm (OR 1.7), age $>$ 50 (OR 1.7), regional spread (OR = 1.5), and distant spread (OR = 7.2) were found be to be independently associated with the increased mortality, $p < 0.001$.
Conclusion: CR-ASC is a rare neoplastic disorder of the colon and rectum primarily affecting Caucasians over 50. Surgery is the treatment of choice and is associated with significantly prolonged survival, while radiation offers a limited role. All patients must be enrolled in national and international registries to understand the multimodal management of CR-ASC better.

P258

Update and lessons learned regarding the ex vivo bovine large bowel ESD training model

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Introduction: The ex vivo bovine large bowel model has been promoted for teaching ESD and bowel wall injection as well as for studies comparing ESD methods, knifes, tools, or lift solutions. Bovine colon offers the following advantages over in vivo or ex vivo gastric models: smaller diameter and thinner wall (more realistic) and longer length which allows more proximal training. This report's purpose is to suggest modifications regarding colon preparation/storage and to identify the best segments for training and research based on over 5 years' experience.
Methods: Bovine large bowel (2–2.5 feet long, including anus/sphincter) is obtained from a slaughterhouse, mechanically cleansed and instilled with antibiotic and anti-protease solution $\times$ 12 h, and then stored at $-$ 80C; prior to use it is thawed on ice $\times$ 10 h. Lesions are "branded" onto the mucosal surface via a longitudinal colotomy that is suture closed. The colon is affixed via rubber bands to a Peg board just proximal to the sphincter. The proximal end is closed with a zip tie. The colon's shape (straight or curved) can be altered. ESD is then carried out to remove the branded lesions.
Results: It is clear from over 400 cases that tissue quality varies from colon to colon. [Poor-quality tissue impacts the ability to make submucosal injections and mucosal lifts which greatly impacts ESD]. It is difficult to make mucosal lifts and to do ESD in poor-quality tissue. Mucosa with poor integrity bursts when the submucosa is injected and lift duration is brief; ESD dissection in poor tissue is difficult and more repeat injections are needed. Also, tissue quality is inversely related to distance from the anus (likely related to wall thickness). Thus, results differences may be due to lesion location and tissue quality rather than other factors. Only the distal 30 cm should be used; 2–3 lesions should be placed circumferentially at each distance from the anus to control for tissue quality and to allow best comparisons and colon utilization.
Conclusion: The ex vivo bovine colon model is a good advanced training and research tool. A freeze thaw cycle is advised after antibiotic/anti-protease treatment. Use for ESD should be limited to the distal 30 cm and 2–3 lesions should be placed circumferentially at each level to best utilize each colon. Prompt use after final thawing is recommended.

P260

Small Bowel Adenocarcinoma Arising in the Setting of Crohn's Disease Stricture

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Introduction: The associated complications of Crohn's disease include a variety of both gastrointestinal and extra-intestinal disease. Stricture formation remains one of the more highly prevalent associated complications. Small bowel malignancy associated with, or arising from, a formed stricture remains a rarity and presents further challenges to the management of both the malignancy and underlying Crohn's disease.
Methods and Procedure: A 51-year-old male with a history of Crohn's Disease, diagnosed in early adulthood and not previously on budesonide therapy, presented with a 2–3-month history of right-sided abdominal pain and post-prandial nausea and vomiting. His surgical history was additionally significant for previous exploratory laparotomy for suspected small bowel obstruction with subsequent small bowel resection performed at an outside hospital over 20 years prior to this presentation. CT and MRE were obtained which showed the presence of small bowel obstruction at a point of fibro-stenotic change coinciding with the anastomotic line from his previous surgery. He subsequently underwent operative intervention with diagnostic laparoscopy, laparoscopic lysis of adhesion, and mobilization of the right colon with conversion to exploratory laparotomy with ileocecectomy and primary anastomosis. Diagnostic laparoscopy would reveal a large, phlegmonous-appearing mass at the site of the suspected stricture which was then resected. Pathology of the specimen would show the presence of a 7-cm tumor with invasive moderately differentiated small bowel adenocarcinoma, Stage IIB, arising from the area of stricture formation.

Conclusion: Few reported cases of small bowel adenocarcinoma in the setting of Crohn's disease related stricture formation exist; however, in nearly all cases, diagnosis of underlying malignancy was only able to be obtained after surgical resection. With a paucity of data to inform guidelines and limitations to imaging studies to detect underlying lesions, emphasis should remain on limiting disease relapse and subsequent inflammatory insult to the bowel with further medical optimization. Surgeons should, however, exercise a higher level of suspicion for malignant potential in younger patients with worsening symptoms or those with suspicion for stricture formation. A lower threshold should be utilized in these cases to pursue surgical resection where medical management has failed and the likelihood for bowel obstruction is increased. Subsequent management of diagnosed small bowel adenocarcinoma in the setting of Crohn's disease should be completed with the understanding that care and therapeutic choices will rely on patient-specific factors and will require a multidisciplinary approach.

P261

Less aggressive approach to pilonidal non-deterrent to military service

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Introduction: Pilonidal disease is a suppurative condition of the sacro-coccygeal region. There are a variety of surgical techniques to treat the condition with greater than fifty percent resulting in an open sacrococcygeal wound necessitating daily local wound care. Pilonidal disease can lead to significant morbidity with days to months of lost productivity and lost days from work or combat effectiveness often termed "readiness." Minimizing the morbidity of any open wounds, and getting the service member back into the fight, are key concepts to preserve readiness and the overall fighting strength for battle. Civilian patients can also be significantly impacted by lost work hours related to care for pilonidal disease and profile days can be a surrogate for time lost. The objective of this paper is to evaluate the impact of pilonidal disease on lost productivity.
Materials and Methods: This was a retrospective chart review of patients at a single military treatment facility (MTF) from 2009 to 2017. 75 active-duty soldiers identified by their procedure code for pilonidal disease on multiple demographics including age, body mass index (BMI), race, gender, tobacco smoking, recurrence, duty limiting profiles, and ultimate disposition from the military via various avenues to include medical board. Operative intervention compared with outpatient management for pilonidal disease. Main outcome measures were incidence of healing, recurrence rates and timeline to recurrence, number of clinic visits, and profile days.
Results: Patients in the operative group on temporary profile only were on a limited duty profile for 72.4 days, while the outpatient group spent an average of 15.8 days on limited duty profile ($p = 0.05$).
Conclusion: Patients undergoing surgical management of pilonidal disease have a significantly higher number of clinic visits and profile days when compared to outpatient therapy.

P262

Ileostomy volvulus as an under-reported problem causing small bowel obstruction in patients living with ostomy: a case report and systematic review

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Background: Ileostomy volvulus is a rare cause of small bowel obstruction. We present an unusual case of ileostomy volvulus without the presence of adhesions. Additionally, a systematic review was performed to collate the current literature on causes, diagnosis, treatment, and preventative measures of ileostomy-related small bowel obstruction.
Methods: PubMed (Medline), Embase, Google Scholar, Scopus, and Cochrane CENTRAL databases were searched from infinity up to August 2022. PRISMA guidelines were adhered to and the study was registered on PROSPERO. The primary outcomes included patients' demographics, imaging modality, indication for initial surgery, type and configuration of stoma, surgical treatment, and recurrence of volvulus. The quality assessment of included studies was performed using Murad tool.
Results: A total of 7 studies were included comprising 974 patients. Stoma outlet obstruction (SOO) was reported in all patients and 380 had ileostomy volvulus as the cause. The majority of the patients had loop ostomies for ileostomy volvulus. No complications or mortality were reported in the included studies. Half of the included studies were good.
Conclusion: The case report demonstrates that SOO should be of high clinical suspicion for patients with loop ileostomy and rapid management should be undertaken. While several factors are found to be associated with SOO including loop ileostomies, increased rectus abdominal muscle thickness, and lower preoperative total glucocorticoid dosage, further large-scale studies are needed to validate our findings.
Keywords: Stoma; stoma outlet obstruction; ileostomy; volvulus; bowel obstruction.

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Short-term Outcomes of Single-port da Vinci Robotic System Versus Xi daVinci Robotic system for Rectal Cancer Surgery

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Introduction: Single-port (SP) robotic system offers potential advantages over other robotic systems, most notably enhanced visualization, and multiple jointed articulating instruments through one single arm. The clinical outcomes, however, have not been adequately evaluated. We aimed to report our first cases in SP system and compare the short-term outcomes after both systems in rectal surgery.
Methods: In a single-center, retrospective observational cohort study was performed of consecutive rectal cancer patients from October 2021 to September 2022. All patients were performed by a single surgeon within the Enhanced Recovery after Surgery (ERAS) perioperative program. Operative, demographic, and outcomes which includes pain score and length of hospital stay were compared between da Vinci SP and Xi robotic system groups. All analyses were performed using R statistical software. Results were considered significant when p-values are ≤ 0.05.
Results: A total of 59 patients underwent robotic total mesorectal resection (TME) and were grouped based on the robotic system used

(SP, n = 29 vs. Xi, n = 30). Xi group was associated with a significantly longer operative time [median, IQR 180.0 (150.0–195.0) versus 202.0 (171.5–242.5), $p < 0.0001$,resp, Mann–Whitney tests], higher blood loss [median, IQR 20.00 (20.00–50.00) versus 75.00 (50.00–135.0), $p < 0.0001$, resp, Mann–Whitney tests], and longer console time [median, IQR 72.00 (60.00–90.00) versus 134.5 (86.75–154.5), $p < 0.0001$, resp, Mann–Whitney tests]. The types of operations did not differ significantly between groups; however, Pelvic lymph node dissection (PLND) was performed more frequently in Xi compared to the SP group (34.5% vs 0.0%, $p < 0.001$, respectively). Additionally, more advance cancer stages were more frequent in the Xi group compared to the SP group (71.4% vs 17.9% for stage III and 14.3% vs 3.6% for stage VI, respectively). No significant differences were noted in the demographic characteristics of patients (age, gender, and BMI), length of hospital stay, docking time, ASA classification, and pain scores.

Conclusion: Although SP system has shorter operative time in comparison to Xi robot system and a single incision but postoperative pain scoring in the majority of the patients were similar in both groups which may relate to a strict multimodal pain management protocol. The operative time and postoperative pain may improve in the future after overcoming the learning curve in operating with the SP system.

P264

Utility of Diastolic Shock Index at Admission as a Predictor of Severity in Patients with Diverticulitis

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Introduction: Diastolic shock index (DSI) represents the ratio between heart rate and diastolic blood pressure. Previous research has suggested DSI could predict severity of disease in infectious conditions where the peripheral vasculature becomes dilated as a physiologic response to shock. A progressive increase in DSI greater than 2.5 has previously demonstrated increased risk of death in patients with septic shock. Here we aim to understand the utility and use of DSI to predict the severity of disease in patients admitted with diverticulitis to a community hospital.

Methods: We conducted a retrospective review of patients admitted to a single community hospital from July 2017 to July 2020 with a diagnosis of diverticulitis (complicated vs uncomplicated) based on International Classification of Disease 10th edition (ICD-10). The initial vitals on presentation were utilized to calculate the DSI. Demographic statistics were collected and outcomes between patients were analyzed including need for operation, intensive care unit admission, and mortality. Patients were stratified into complicated and uncomplicated based on ICD-10 codes.

Results: A total of 323 patients were identified who met inclusion criteria for analysis with 224 (69.4%) classified as non-complicated. The mean DSI in the complicated group was statistically greater than the non-complicated group (1.23 vs 1.14, $p = 0.0062$). DSI was not shown to be significantly different for non-complicated and complicated groups in terms of mortality. However, in the complicated group a higher DSI was significantly associated with the need for intensive care unit monitoring (1.37 vs 1.19, $p = 0.0089$).

Conclusion: In a community sample of patients with diverticulitis DSI represents a useful marker for the identification of patients who may require more advanced care. We would suggest use of DSI to help guide the management decisions for both complicated diverticulitis. Further research should provide prospective use of DSI and its application to the treatment of diverticulitis.

P265

Laryngeal edema after robotic low anterior resection

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Introduction: Trendelenburg position is used in colorectal procedures. Several complications can occur in patients who remain in steep Trendelenburg for a prolonged period. Laryngeal edema is one of them, it may develop due to impeded venous return from the head and consequent swelling of the larynx. This can result in prolonged intubation time and inability to safely extubate the patient.

Most cases reported are during robotic prostatectomy. Solutions for mitigating the risk of laryngeal edema are minimizing the time on Trendelenburg, corticosteroids, and minimizing fluids.

We describe a case of laryngeal edema after Trendelenburg for 6 h during a robotic low anterior resection for rectal cancer(R-LAR).

Methods and Procedures: 75-year-old female with history of COPD, obesity, and rectal cancer, presented for a R-LAR. The duration of the case was 10 h, 4 h of open adhesiolysis, through an upper midline incision that was partially closed with a gel port to continue the surgery robotic that took 6 h on steep Trendelenburg. At conclusion of the case the patient failed a cuff leak test and had considerable facial edema, signs consistent with laryngeal edema.

The patient remained intubated, failed extubation next day, remained intubated for 5 days due to failed spontaneous breathing trials, and was extubated on post-op day 6.

Results: Trendelenburg causes a variety of physiological changes, and the addition of pneumoperitoneum increases these changes:

During pelvic surgery the intrabdominal viscera are displaced toward the diaphragm. Trendelenburg and capnoperitoneum worsen ventilation perfusion mismatch, decrease functional residual capacity, decrease pulmonary compliance, and increase the peak airway pressures.

The respiratory function does not recover to normal after surgery, and the lung function recovers after approximately 5 days and with COPD it can take longer.

The increase in pressure impedes the Venus blood flow return from the head causing edema of the larynx.

Trendelenburg position is associated with cognitive decline and in some reports of permanent blindness.

Obesity decreases the chest compliance up to 60% and the functional residual capacity, during general anesthesia.

Discussion: The patient had a difficult, narrowed, and deep pelvis, and risk factors like obesity and COPD.

There is no documentation on what's the safest degree of Trendelenburg to avoid complications and obtain and adequate exposure.

Measurements to decrease the risk of laryngeal edema are decreasing the time on Trendelenburg. IV/inhaled corticosteroids 4 h prior extubation, avoiding fluid preload before the case.

More studies are required to decrease complications after Trendelemburg positioning.

P266

The treatment outcome of CMV infection in critically ill patients who have received gastrointestinal surgery

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Purpose: CMV infection is a self-limited disease in healthy group. However, for immunocompromised patients, this infection could bring severe complications and could even be life threatening. This retrospective study was aimed to find out the treatment outcome of

CMV-infected patients in intensive care unit who have received gastrointestinal operations.
Method: This retrospective study collected patients' data between March/2012 and May/2022. The inclusion criteria of this study are 1. CMV positive (i.e., IgG, IgM positive, or CMV QPCR positive, or CMV positive in pathologic specimen), 2. Patients who have been diagnosed with CMV infection after admitted to intensive care unit, and 3. Received gastrointestinal surgery 3 days before ICU admission or after ICU admission. Exclusion criteria included patient age under 18 years old. The primary outcome is the survival rate between ganciclovir administration or not. The secondary outcome further compared the survival rate between patients who have previously received organ transplant and immunotherapy or not.
Result: 575 patients were enrolled in CMV infected group, 82 patients have received gastrointestinal operations. Among them, there were 32 patients were dead, mortality rate is as high as 39%. The survival rate between administration of ganciclovir or not has no statistically significance.
Conclusion: High mortality rate of CMV infection in ICU setting was observed in this study; further study should be made in the effect of ganciclovir dosage.

P267

Is Laparoscopic Surgery for Pathological T4 Colorectal Cancer Safe?

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Background: Locally advanced colorectal cancer accounts for 11% of reported colorectal cancers. Combined resection of other organs can afford improved long-term results. We examined patients with [A1] locally advanced colorectal cancer who underwent surgery at our hospital, presenting results and surgical techniques.
Surgical Technique: Descending colon cancer with splenic invasion. D3 lymphadenectomy is performed around the origin of the inferior mesentery artery (IMA). The lateral attachment of the left colon and the abdominal wall were invaded by the cancer. Transection of the distal descending colon using a laparoscopic linear stapler. While the resected descending colon is rolled, a sharp borderline dissection of the tumor is performed at the Gertoa's fascia. By opening the bursa omentalis, transection of proximal transverse colon is performed using a laparoscopic linear stapler. The tumor invaded the lower pole of the spleen, and in order to en bloc resect it, the short gastric vessels, and the splenophrenic ligament are dissected. Ligation of the inferior polar vein and the inferior polar branch of the splenic artery using clips. Exposure of the splenic hilum, and ligation using a laparoscopic linear stapler.
Methods and Subjects: From April 2012 to August 2022, 205 patients with T4 pathologic depth were treated at our hospital. We excluded patients who underwent emergency surgery and those diagnosed with stage 4 cancer. Patient background and surgical and long-term outcomes were examined in 71 and 59 patients in laparoscopic and open surgery groups, respectively.
Results: There were no significant differences in age, gender, body mass index, or lesion location. The American Society of Anesthesiologists [A2] score and performance status were significantly lower in the laparoscopic group than in the open surgery group [A3] ($P = 0.029$, $P = 0.04$). No significant differences in operative time and postoperative complications were documented. The open surgery group exhibited greater blood loss than the laparoscopic surgery group ($P < 0.001$). The laparoscopic surgery group had a significantly shorter postoperative hospital stay than the open surgery group ($P < 0.001$). Pathological findings did not differ significantly considering tumor diameter, oral and anorectal margins, and the number of metastatic lymph nodes. The number of lymph nodes removed was significantly high in the laparoscopy group [A4] ($P = 0.0091$). Overall survival (73.2% vs. 40.5%, hazard ratio [HR]:0.740, confidence interval [CI] 0.37–1.44, $P = 0.386$), and disease-free survival (75.4% vs. 65.9%, HR: 0.859, CI 0.408–1.796, $P = 0.685$) did not differ significantly.
Conclusion: We presented results and surgical techniques for T4 colorectal cancer.

P268

Transanal total mesorectal excision and transanal endoscopic intersphincteric resection in low rectal cancer: a single-center retrospective study

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Background: Total mesorectal excision (TME) is the gold standard for oncologic resection in low and mid rectal cancers. In obese and male patients with advanced low and mid rectal cancers, laparoscopic approach to TME can be hampered by poor visibility, inadequate retraction, and distal margin delineation. Transanal TME (taTME) may help overcome the difficulties with adequate visibility, retraction, and distal margin delineation encountered in abdominal approaches to low proctectomy. TaTME was developed to optimize the circumferential resection and distal margins. Intersphincteric resection (ISR) is an alternative for ultra-low rectal cancer. Transanal intersphincteric resection (taISR) technique combines the advantages of taTME in terms of surgical field exposure with the benefits of ISR in surgical precision.
Aims: To assess the surgical and short-term oncological outcomes of patients with low and mid rectal cancer who underwent taTME and taISR at National Center for Minimally Invasive Surgery in Havana, Cuba.
Methods: This study was a prospective review of patients with low and mid rectal cancer that underwent taTME and taTME with taISR from April 2019 to February 2022 at a tertiary referral university-affiliated center specializing in laparoscopic surgery. We performed taTME which uses the technology of transanal endoscopic microsurgery (TEM) and laparoscopic surgery for the abdominal approach.
Results: Ten male patients underwent taTME, (three taTME and seven taTME with taISR) and all of them after neoadjuvant radiochemotherapy. Three patients underwent laparoscopic low anterior resection with taTME and colorectal anastomosis, while seven patients underwent simultaneous laparoscopic ultralow anterior resection with taISR-taTME and coloanal anastomosis. The mean age was 56.7 years (range 28–56), the mean operation time was 180 min (range 120–240) and the mean estimated blood loss was 58 ml (range 40–100). The median lesion size was 4 cm (2–5) and hospital stay was five days. Pathological results indicated that seven patients were stage III and three patients stages II. Negative circumferential resection margin and distal resection margin were reached in all

patients. Morbidity rate was 20%, one patient with rectal abscess solved with medical treatment (Clavien–Dindo grade II), and one patient with stenosis that received endoscopic treatment (Clavien–Dindo grade III). The patients had not local recurrence, while one patient had distant metastases. The 5-year disease-free survival was 88.9% and 5-year overall survival 88.9%.

Conclusion: Our experience has shown that performing taTME and taISR to treat low and mid advanced rectal cancer after neoadjuvant radiochemotherapy appears to be an oncologically safe and effective procedure.

P269

Non-antibiotic treatment in uncomplicated acute diverticulitis: a meta-analysis of randomized trials

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Introduction: Despite being used for many years as a standard treatment, the usefulness of antibiotics in acute uncomplicated diverticulitis (AUD) has been a point of controversy. Some recent studies show that antimicrobial treatment in immunocompetent patients does not reduce complications or improve recovery time. Thus, the most recent guidelines for the management of acute colonic diverticulitis recommend not prescribing antibiotics to these patients. However, their degrees of evidence is highly variable.

Therefore, this investigation aimed to perform a meta-analysis evaluating the efficacy and safety of a non-antibiotic treatment of AUD.

Methods: PubMed, Embase, and Cochrane databases were systematically searched for randomized controlled trials (RCTs) that compared antibiotic *vs.* non-antibiotic treatment in patients with AUD until March 21, 2022. The main outcomes of interest were treatment failure, readmission rates, recurrent diverticulitis, and mortality. Statistical analysis was performed using RevMan 5.4.1. Heterogeneity was assessed with I^2 statistics.

Results: The systematic search resulted in 361 studies. Five RCTs were included with a total of 1934 patients, of whom 971 (50,2%) were treated without antibiotics. All studies used tomographic criteria for diagnosis and classification of acute diverticulitis, with most studies using the modified Hinchey classification. Overall, the pooled analyses of the studies showed no statistically significant difference between groups in any of the outcomes: treatment failure (OR = 1.51; 95% CI, 0.77–2.98; p = 0.23; I^2 = 47%; Fig. 1A); readmission rates (OR = 1.09; 95% CI, 0.75–1.58; p = 0.65; I^2 = 18%); recurrent diverticulitis (OR = 1.04; 95% CI: 0.71–1.52; p = 0.85; I^2 = 0%); and mortality (OR = 1.27; 95% CI 0.14–11.76; p = 0.83; I^2 = 27%). However, in a subanalysis restricted to patients who received inpatient treatment, the incidence of treatment failure was higher in patients treated without antibiotics (OR = 1.96; 95% CI 1.16–3.30; p = 0.01; I^2 = 0%; Fig. 1B).

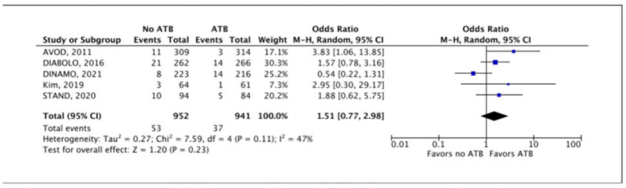


Fig. 1A

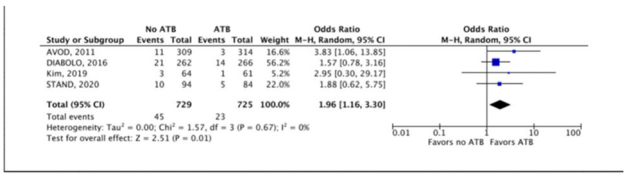


Fig. 1B

Figure 1. A Forest plot of incidence of treatment failure in patients who received treatment with no antibiotic (No ATB) compared with antibiotic groups (ATB). **Figure 1A.** The pooled analysis. **Figure 1B.** Sub-analysis studies with patients who received initial inpatient treatment.

Conclusion: The findings suggest that there is no significant difference in clinical outcomes between patients treated with or without antibiotics in the general population of patients with AUD. However, for patients that require hospitalization, failure to use antibiotics may increase treatment failure rates.

P270

Laparoscopic ovarian transposition prior to pelvic radiation in young female patients with gastrointestinal malignancies: A systematic review

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Background: Young women undergoing radiation therapy (RT) for pelvic malignancies are at risk of developing premature ovarian insufficiency (POI). Ovarian transposition (OT) aims to preserve ovarian function in these patients. However, its role in gastrointestinal malignancy has yet to be firmly established. The aim of this review was to determine the effectiveness of laparoscopic OT in preserving ovarian function in premenopausal women undergoing neoadjuvant pelvic RT for gastrointestinal malignancies.

Methods: Medline, EMBASE, and CENTRAL were systematically searched from inception through to May 2022. Articles were included if they evaluated ovarian function after OT before RT in women with gastrointestinal malignancies. The primary outcome was ovarian function preservation. The secondary outcome was thirty-day postoperative morbidity following OT.

Result: From 207 citations, 10 studies with 133 patients with rectal or anal cancer who underwent OT prior to RT were included. Meta-analysis of pooled proportions of preserved ovarian function demonstrates an incidence of 66.9% (95%CI 55.0–79.0%, I2 = 43%). The thirty-day postoperative morbidity rate was 1.2% (n = 1). There was heterogeneity in interventions and outcome reporting.

Conclusion: Laparoscopic OT in premenopausal patients undergoing pelvic radiation for gastrointestinal malignancies can preserve ovarian function in two-thirds of patients (66.9%, 95%CI 55.0–79.0%, I2 = 43%). The pooled data and meta-analyses must be interpreted within the context of clinical heterogeneity of the included studies. Further studies are required to fully investigate the outcomes of OT in patients undergoing pelvic radiation for gastrointestinal malignancies.

P271

Actinomycotic ileal perforation: a rare case report

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Human actinomycosis is a chronic suppurative granulomatous infection caused by Actinomyces species most commonly Actinomyces israelii. Cervicofacial region is the most common site of involvement followed by abdominal region with bowel perforation being very rare. Abdominal actinomycosis can mimic a malignant mass or cause multiple abscesses and bowel perforation. Diagnosis of abdominal actinomycosis is even more challenging before surgery due to the lack of specific clinical, laboratory and radiological features. Here, we present a rare case of abdominal actinomycosis presenting as abdominal wall abscess with ileal perforation. A 51-year-old gentleman presented with abdominal pain and swelling in epigastric region (size 4×5 cm) of 15-day duration. Blood tests revealed leukocytosis. Abdominal computed tomography revealed a non-enhancing hypodense lesion in anterior abdominal wall (Intermuscular plane) in right hypochondrial and epigastric region with sub-cutaneous fat stranding. MRI showed abscess collection ($1.8 \times 5 \times 4.5$ cm) within right rectus abdominus muscle with possible disruption of parietal peritoneum and focal adherence to small bowel loop. Diagnostic laparoscopy revealed unhealthy omentum with loop of ileum adherent to anterior abdominal wall forming a mass. Laparotomy was done and omentum was excised. Ileal loop was resected and anastamosed. Ileal perforation was identified. Abdominal wall abscess drained through a small incision anteriorly. The histological examination of the specimens revealed an infection by Actinomyces israelii. The postoperative course of the patient was uneventful. Antibiotic therapy with combination of amoxycillin and clauvulanic acid was started once histological results were obtained. Patient was followed up regularly for 3 months after surgery; no recurrences or other complications were observed.

P272

Cancer or not cancer: Presentation of a rectal mass in high-risk patient for syphilis

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The prevalence of syphilis has been increasing over the past two decades. Numbers were at an all time low 2000 and since have increased nearly every year. From 2019 to 2020, the number of cases increased 6.8%. As cases increase, a challenge is presented as syphilis has been known to be easily misdiagnosed as other disease, earning its name, "The great imitator." Here, we present a case of a patient who initially presented with findings concerning for rectal cancer, but had a negative oncological workup.

A 34-year-old male was referred to us by his PCP. He initially presented with concerns for hematochezia and underwent a colonoscopy by his PCP and was found to have a rectal mass. The patient is a sexually active homosexual male who had been on PrEP therapy prior to these symptoms. He states that he has been tested for STDs in the past, but unsure of what tests were performed. A CT scan was performed which showed splenomegaly and lymphadenopathy in addition to the rectal mass. A repeat colonoscopy, as well as lymph node biopsy of a cervical lymph node that was enlarged, showed no sign of cancer or lymphoma.

The symptoms of syphilis can vary greatly. While rare, there are cases of syphilis reported that present with lower GI symptoms. Most cases the patients describe hematochezia and rectal pain. Physical findings of a rectal mass and lymphadenopathy are also commonly shared traits. Screening for high-risk individuals and obtaining a sexual history is vitally important for the work-up of a rectal mass. Misdiagnosis can lead to delayed or improper management and treatment of these patients.

P274

Four cases of Hartmann's surgery for rectal cancer with TaTME approach

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Introduction: Transanal total mesorectal excision (TaTME) is a method of minimally invasive surgery for rectal cancer, which has enabled surgery in compliance with radical TME into narrow pelvis. TaTME is often used in surgery which needs intestinal anastomosis/ such as low anterior resection, and we have recently introduced to perform in Hartmann's surgery for rectal cancer in our department.
Case Presentation: We reported four cases of rectal cancer performed Hartmann's surgery with TaTME in January 2022 to September 2022. After total mesorectal excision, the anal edge of the rectum was closed with a continuous suture by a monofilament absorbable yarn in taTME.
For patients ranging in age from 49 to 87 years diagnosed rectal cancer. Three of them had residual paralysis due to cerebrovascular disease and poor performance scale (PS) with performance status 2 to 3. For all cases, a combination of laparoscopic surgery and transanal approach was performed. One of the cases was converted to laparotomy due to severe adhesions. The median operation time was 292 min (209–390), and the median blood loss was 152 ml. There were no major intra- and postoperative complications. The average length of postoperative hospital stay was 23.5 days, which prolonged due to coordinate of discharge of the elderly patients. The depth of cancer was deeper than T3 in all cases and oncologic resection margins were complete.
Discussion: Even in cases of advanced rectal cancer, including elderly patients, the use of taTME allowed for safe radical Hartmann's surgery. Although continuous suture closure for the anal edge of the rectum demanded technically difficult, it has the advantage of avoid to use the automatic suture machine.
Conclusion: Laparoscopic Hartmann's surgery with taTME for rectal cancer considered to be a useful procedure for treatment.

P275

The use of indocyanine green and its usefulness in laparoscopic colorectal surgery: experience of an oncologic hospital in Brasil

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Introduction: Anastomotic leaks are dreaded complications in colorectal surgery that lead to a rise in the mortality rates and an increase in the costs of the total treatment.
The feasibility of the use of indocyanine green (ICG) for near-infrared fluorescence angiography has been demonstrated in several studies. However, data of its clinical use in Latin America are still limited.

In this study, we performed a retrospective analysis of the surgical outcomes from all the laparoscopic colorectal procedures using

indocyanine green and compared it with a database of patients undergoing colorectal surgeries without ICG.
Methods and Procedures: This is a retrospective, single-center, observational cohort study, with patients that underwent laparoscopic colorectal surgery with intraoperative ICG (ICG group) from December 2017 until June 2022 and compared with a historical database of laparoscopic colorectal surgeries without ICG (control group). Included patients were 18y or older, with confirmed (or precursor of) colorectal cancer. All colorectal surgeries were elective, with intestinal anastomosis, with or without divert ostomy. Anastomotic leakage was confirmed with CT scan. All surgeries were performed at the Hospital de Amor Barretos-SP, Brazil. Basic statistical analysis was performed with SPSS software package v.29.
Results: A total of 684 patients, 199 in the ICG group (December 2017 – June 2022) and 475 in the control group registered in a database (January 2016—May 2022) were included. Baseline characteristics were similar in both groups. Anastomotic leakage was found in 1.5% of the ICG group (3/199) and in 2.9% in the control group (14/475) ($p > 0.05$). No allergic reaction was reported. No statistical difference was found in total surgical time and intraoperative bleeding between both groups, changes in the level of the anastomosis were not included in the analysis. No association with neoadjuvant therapy and anastomotic leakage was observed. No statistical association among the other complications (ileus, bowel obstruction, etc.) was found.
Conclusion: Although there is evidence of fluorescence angiography with indocyanine green potential in helping reduce the incidence of colorectal leaks, we found no statistical difference in the current study. Fluorescence angiography with indocyanine green is a safe and feasible tool for routine use in colorectal surgery that could be helpful in some challenging cases to assessed doubtful blood flow perfusion.

P277

A case of endometriosis of the appendix in the presence of low-grade appendiceal mucinous neoplasm

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Introduction: Endometriosis, a disorder predominantly attributed to the uterus and characterized by abnormal and painful growth of endometrial-like tissue outside the uterus, can present in the appendix. Obstruction due to appendiceal endometriosis tissue can, in rare cases, cause the appendix to swell and fill with mucus, known as an obstructive appendiceal mucocele. The simultaneous occurrence of appendiceal endometriosis and a non-neoplastic appendiceal mucocele is exceedingly rare having been described only 12 times in medical literature, while occurrence with a low-grade neoplastic appendiceal mucocele has not previously been described.
Methods and Procedures: We present the case of a 63-year-old woman presenting with right flank abdominal pain for the past 24 h admitted for consultation about possible appendicitis. CT scans revealed a distended appendix containing fecalith with possible appendicular neoplasm. She underwent a colonoscopy which revealed diverticular disease and benign polyps and underwent laparoscopic appendectomy. Pathology revealed a 4.5-cm low-grade appendiceal mucinous neoplasm (LAMN) with luminal calcification, as well as mural and subserosal appendiceal endometriosis. Margin was negative for neoplasia. She recovered without complications.
Results: Endometriosis is characterized by endometrial tissue growth outside the uterine cavity, predominantly in the ovaries. Endometriosis affects 4%-50% of reproductive age women, commonly resulting in infertility and pain. 2.8% of endometriosis cases occur at the appendix. Appenidceal endometriosis can lead to an appendiceal mucocele. Mucoceles can be further categorized as neoplastic or non-neoplastic, with neoplastic mucoceles, including low-grade appendiceal mucocele neoplasms (LAMN). LAMN is a rare finding and accounts for only 1% of gastrointestinal neoplasms and is present in merely 0.3% of appendectomy specimens. We reported a rare discovery of LAMN in the presence of an obstructive appendiceal mucocele caused by appendiceal endometriosis.
Conclusion: Endometriosis of the appendix is a very rare finding, with the definitive diagnosis usually coming from pathologic evaluation. Appendiceal endometriosis leading to LAMN has not previously been described. Further research of the relationship between appendiceal neoplasms and appendiceal endometriosis is required to improve operative treatment.

P278

Teaching advanced colonoscopic skills: A modular approach utilizing both inanimate and ex vivo bovine and porcine models

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Introduction: It is difficult to learn and become proficient doing advanced colonoscopic interventions, such as bowel wall injection (tattoo, mucosal lift), ESD, EMR, and mucosal wound closure. If all training is done clinically, the time between cases may be long and it can take years to become competent for a technique. The use of inanimate and ex vivo models to learn and practice new skill sets in a defined time window should shorten the training period and get trainees to clinical cases more rapidly. ESD and EMR can be broken up into different steps or components. Our hypothesis is that it is easier to learn the subcomponents and full procedure using inanimate and ex vivo modes via repetition and practice.
Methods: An advanced colonoscopic teaching program that includes the following 5 components or modules was designed: 1) bowel wall injections, 2) inanimate figure tracing model (teaches scope tip control), 3) ESD in plastic tube with window over which a full-thickness square of colon wall is placed, 4) ESD in ex vivo bovine colon, and 5) mucosal wound closure. There are a mandatory teaching video and quiz for each module that must done before hands on training. Trainees must be able to generate mucosal lifts and to finely control the scope tip before starting the ESD modules. For each module, repetition of the skill or procedure is central. We believe these skills can be acquired by doing inanimate/ex vivo models cases that substitute for clinical cases. An endoscopic tower, dedicated non-clinical scope, and an assistant is needed. All sessions were videotaped, timed, and scored. The number of repetitions required for each skill/procedure varies from 16–35.
Results: The didactic and hands on programs have been formulated and the number of trainees, thus far, for each section are injection, 6 (60–80 each); figure tracing, 9; inanimate ESD, 4 (> 20 cases each); bovine ESD, 1 (> 20 cases); and wound closure, 1 (18). It is anticipated that it will take 1 year to complete the full training with the main limiting factor being the availability of the fellows and residents. Preliminary results, which are promising, and a summary of didactic modules will be presented.
Conclusion: Results suggest that a concentrated teaching skill component and repetition-based approach using inanimate and ex vivo models allows for rapid acquisition of skills and case experience. Further testing and more trainees are required to vet the program.

P279

Case Report: a diagnostic dilemma from abdominal tuberculosis to metastatic mucinous adenocarcinoma!

Prof Humad Naeem Rana; Dawood Morad; Maham Tahira; Shalamar Medical And Dental College

Introduction: Cystadenocarcinomas develop frequently in the ovaries, where pseudomucinous and serous types are recognized. A cystadenocarcinoma contains complex multi-loculated cyst but with exuberant solid areas in places. It usually presents with omental metastases which cause fluid accumulation in the peritoneal cavity. In the majority of instances preoperative diagnosis of these lesions is not possible because computed tomography (CT) scans or magnetic resonance imaging (MRI) is not able to distinguish the exact origin of the lesion. The most common presumptive diagnosis at surgery is abdominal mass.

We present a case of 19-year-old JANNAT who repeatedly came to medical outpatient department for last 1.5 Years with progressive weight loss, altered bowel habits, vomiting, low-grade fever, and pain abdomen. After work-up she was treated in line of abdominal tuberculosis. She remained well over a period of 7 months after starting A.T.T.

But again after a period of 11 months she presented with significant weight loss, pain abdomen, abdominal distension, and absolute constipation for 3–4 days and was admitted in medical ward with working diagnosis of subacute intestinal obstruction secondary to abdominal tuberculosis.

Surgery department got a call from medicine department to assess for surgical / acute abdomen.

X-RAY abdomen shows distended small bowel loops and multiple air fluid levels.

C.T abdomen and pelvis showed Ascites, enhancing peritoneal nodularity with matted bowel loops in pelvic cavity along with omental thickening and significant abdominal lymphadenopathy. Inflammatory stricture in sigmoid colon leading to proximal bowel dilatation.

EXPLORATORY LAPAROTOMY was done with operative findings OF.

1-liter ascitic fluid

Omental caking.

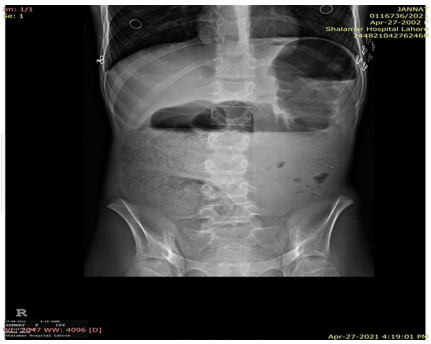
Tumor involving right colon, transverse colon, descending colon, and sigmoid colon.

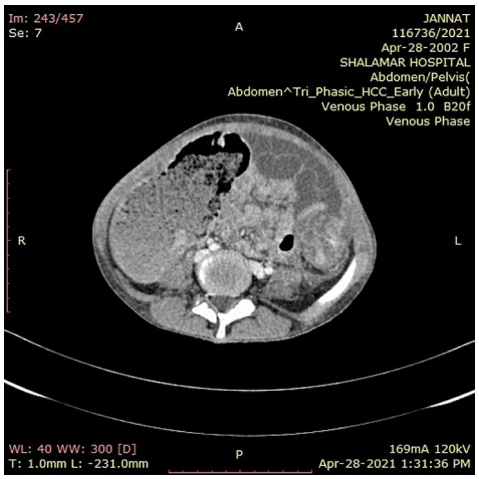
Multiple tumor deposits all over the peritoneal cavity, small, and large intestines.

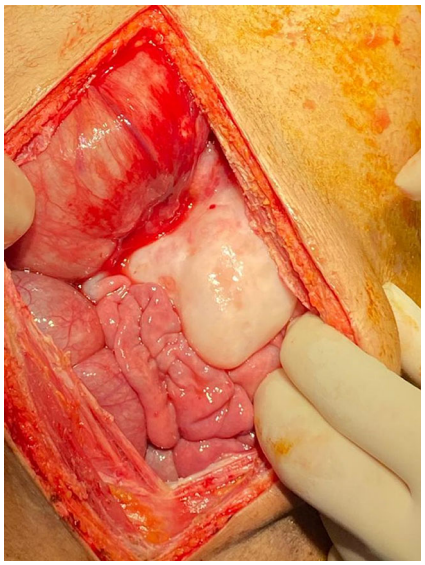
Large gut has multiple areas of distension.

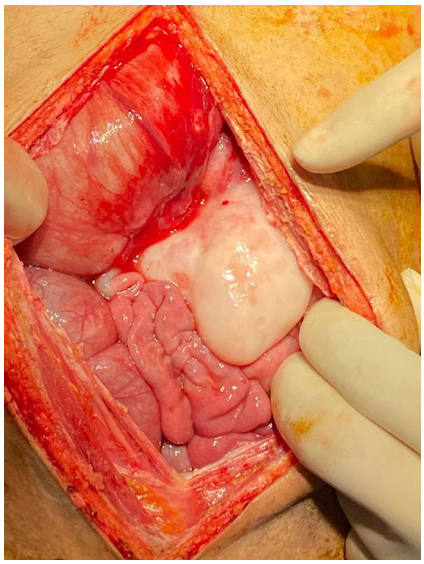
Multiple incisional biopsies were taken and sent for histopathological analysis that turned out as Metastatic mucinous adenocarcinoma in a fibromyxoid background.

Conclusion: This case remained a diagnostic dilemma from abdominal tuberculosis to metastatic mucinous adenocarcinoma. It has however been shown that MAC is less likely to be resected with negative surgical margins more often metastasizes to lymph nodes and generally presents at later stage.









P280

Long-term Surgical and Functional outcomes of Laparoscopic Rectopexy for Rectal Prolapse

Sameer Rege, MS; Sulay Shah, MS; Vivek Salvi, MS; Jayati Churiwala, MS; Vishal Sangade; Yash Jain; Seth GS Medical College and KEM Hospital Mumbai

Introduction: Surgical management of Rectal Prolapse includes a variety of procedures from abdominal to perineal approaches. We studied various minimal access procedures performed, including laparoscopic posterior, ventral mesh ,and suture rectopexy in terms of operative and post-operative parameters.
Materials and Methods: Demographic data, operative parameters, and post-operative outcomes were evaluated in patients who underwent laparoscopic rectopexy for rectal prolapse from 2008 to 2022. Patients were followed up postoperatively for median time period of three years.
Results: In our study, 122 patients with full-thickness rectal prolapse underwent laparoscopic rectopexy. Median age of patient was 61 years (42–78) with male:female ratio of 44:78. Operative parameters are as shown in Table 1. All patients (except resection) returned to oral on post-operative day 1. Median hospital stay was 4 days (3–6 days). Post-operative parameters on follow-up of 3 years are as shown in Table 2. There was 1 (1.3%) recurrence in posterior Mesh Rectopexy which was managed conservatively. Post-operative constipation was reported in 5.2% of posterior Rectopexy and 4.7% in ventral Rectopexy, all of which were managed conservatively.

Table 1

Procedure(n = 122)	Number of cases (%)	Mean Operative time (in minutes)	Hospital stay (Days)
Suture Rectopexy	19 (15.6)	53.5 (44–63)	4–6
Ventral Mesh Rectopexy	21 (17.2)	100 (78–122)	3–5
Posterior Mesh Rectopexy	77 (63.1)	95 (71–110)	3–5
Resection	5 (4)	100 (80–115)	5–7

Table 2

Procedure (n = 122)	Post-operative Constipation (%)	Recurrence (%)	Post-operative erectile dysfunction (%)
Suture Rectopexy	None	None	1 (5.3)
Ventral Mesh Rectopexy	1 (4.7)	None	None
Posterior Mesh Rectopexy	4 (5.2)	1 (1.3)	None
Resection	None	None	1 (20)

Conclusion: Laparoscopic Rectopexy is an effective surgical technique for repair of rectal prolapse with acceptable operative time and short hospital stay in equivalence to perineal techniques. Posterior rectopexy, in particular, has equivalent long-term results with very low recurrence rate and few complications on such a large cohort. Laparoscopic rectopexy in expert hands has excellent post-operative outcomes and can be recommended as a first-line surgical technique for full thickness prolapse in all age groups.

P281

Prophylactic appendectomies: a Chilean 10-year report

Lia Moyano, Physician; Natalia Villalon, Physician; Ignacio Cruz, Medical Student; Fernando Muñoz, Digestive Surgeon; Hospital Militar de Santiago, Chile

Introduction: In Chile, prophylactic appendectomy (PA) is performed as a public policy for patients who go to Antarctica as a military since the first permanent destination in the territory in 1969. By the risk of not having opportune surgical management in the case of acute appendicitis, this policy is still being carried out today, despite the improvement in territorial connectivity over the years.
Objective: The aim is to report short and early complications of PA at a hospital in Santiago, Chile in patients who are destined to Antarctica.
Materials and methods: Charts review and retrospective analysis of electronic and physical medical records of patients who underwent laparoscopic PA between years 2012 and 2022 at a hospital of Santiago, prior approval of the Institutional Ethics Committee, were conducted. Data corresponding to medical and surgical history of patients and short and medium-term complications of the surgery, classified according to Clavien–Dindo Classification for surgical complications, were recorded.
Results: Data from 215 patients were reviewed, all of them were male with a mean age of 38 years old at the time of surgery. Seven patients were excluded due to association with other concomitant surgeries. All patients included in the study correspond to laparoscopic appendectomies. Complications were analyzed, the majority corresponded to grade I complications, 0.96% to patients with grade II complications, and 0.48% to grade III complications, according to Clavien-Dindo Classification. Only 1 patient required reintervention within 30 days due to intestinal obstruction. There was no mortality associated with this procedure. As a secondary outcome, the histological finding showed 2 neuroendocrine tumors and 1 appendicular mucocele.

Conclusion: Although PA is mainly associated with mild complications, we reported a case of severe complication in a small cohort. This warrants the need to generate more evidence to identify post-surgery morbidity.

Keywords: appendectomy, prophylactic procedure, surgical complications.

P282

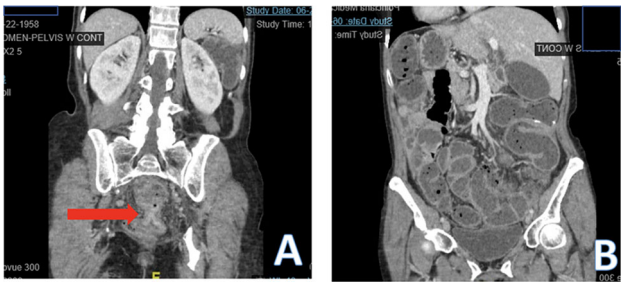
Challenges associated with low rectal malignant obstruction stenting

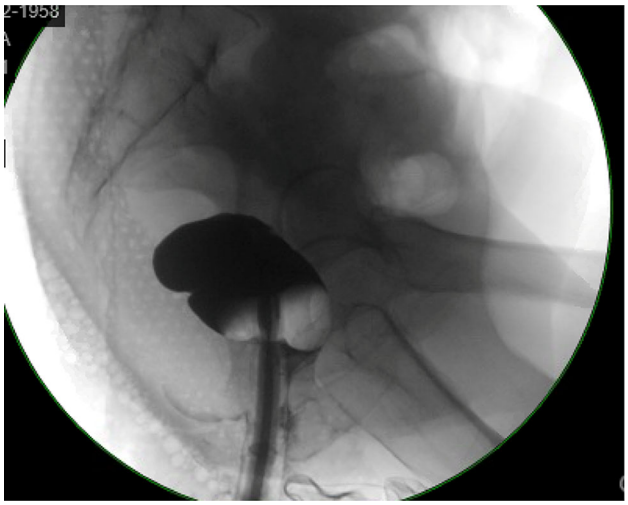
Victor Cabrera Bou, MD; Philip Kondylis, MD, FACS, FASCRS; Luis Serrano, MD; UCF/HCA Florida Osceola Hospital

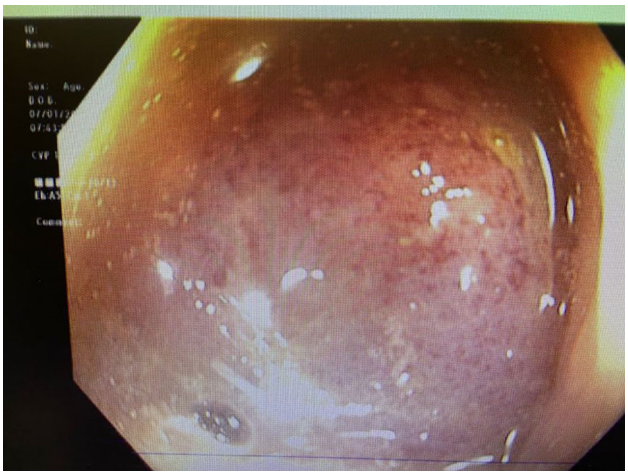
Introduction: There is ongoing debate regarding whether self-expanding metallic stent (SEMS) placement within 5 cm of the anal verge is feasible. Traditionally, SEMS has been considered contraindicated for patients with malignant rectal obstruction within 5 cm of the anal verge because of potential impact on the anorectal ring or within the anal canal, causing incontinence, proctalgia, and tenesmus.

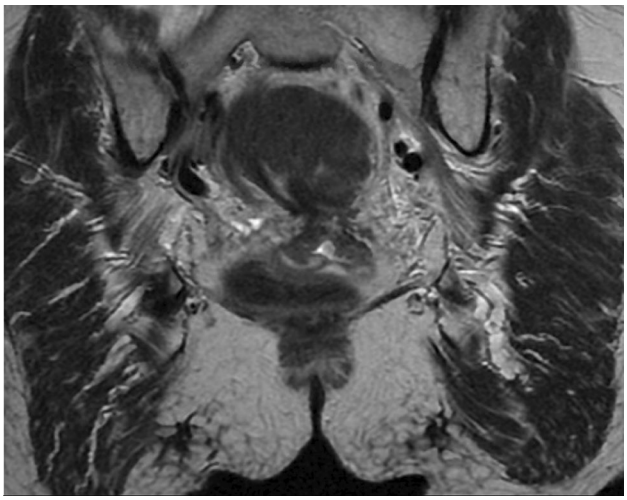
Case Presentation: The patient is a 63-year-old female who presented with distention, abdominal pain, and diminishing stool output. Rectal exam identified a bulky fixed mass. Imaging studies revealed large bowel obstruction and high-grade stricture, with a miniscule residual lumen. Endoscopy identified a bulky mass obscuring the lumen at 5 cm from the anal verge. Biopsy identified adenocarcinoma. 1.5-Tesla Pelvic MRI demonstrated an apple core lesion, staged at least mT3N0. A 2.5 cm × 9.0 cm colonic stent was deployed with brisk colonic decompression. She had voluminous fecal incontinence for 12 h before spontaneous resolution. Prior to discharge a contrast enema demonstrated stent patency and excluded synchronous lesions. She was promptly able to undergo chemoradiotherapy.

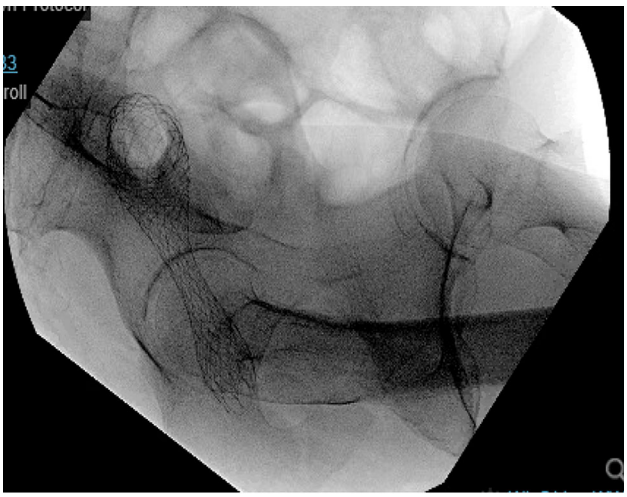
Discussion: Historically, SEMS has been avoided in low rectal position lesions. Our case is an example of the uncommon complication of self-limited fecal incontinence with very low rectal stenting. The substantial potential energy stored in a distended colon rapidly dissipates through the relatively generous caliber stent. This pressure head overwhelms the short distal rectal segment resulting in anal incontinence, until the pressure equilibrates across the stent. Baron et al. previously described the importance of deploying at least 2 cm above the anal canal to avoid incontinence. In this patient, we were only able to deploy just above the anorectal ring. She had been consented for a transanal revision of the stent, we would have truncated the caudal aspect of the stent, if necessary. Vanbierliet et al. had previously described argon beam trimming of metallic stents. We avoided this in the patient with an unprepped bowel, given concern for combustible gas. Bayraktar et al. similarly reinforced that the distal aspect of the stent should be deployed as proximally as possible to avoid tenesmus. This case illustrates stenting can be very effective in the low rectum. However, it has a greater technical challenge and patient teaching requirement. The risk of transient incontinence, proctalgia, and tenesmus is greater in this position. As more easily removable metal stents become more commonplace, more endoscopists may be willing to place stents in this previously relatively contraindicated position.











P283

Gastrointestinal Amyloidosis Masquerading as Complicated Diverticulitis

Roberto M Torres-Aguiar, MD; Philip Kondylis, MD, FACS, FASCRS; UCF/HCA Osceola Hospital

Amyloidosis is a rare disease with an incidence of 1 in 100,000(1). It is characterized by the extracellular deposition of insoluble misfolded proteins causing architectural distortion and organ dysfunction. Gastrointestinal infiltration of these proteins can be seen in different layers of the gastrointestinal tract. The clinical manifestations of GI amyloidosis vary with the amount and location of amyloid deposits.

A 71-y/o female presented to the colorectal surgery clinic for evaluation of a presumed diverticular abscess, refractory to extensive courses of IV antibiotics. Synchronous symptoms included fecal incontinence, hematochezia, and diarrhea. Follow-up imaging revealed a persistent 7-cm intramural sigmoid collection and a 4-cm distal ileal mass. Preop CTA chest for a known abdominal aortic aneurysm revealing multiple pulmonary nodules. Biopsy pertinent for large aggregates of amyloid deposition consistent with amyloidosis. Colonoscopy was performed with findings of pan colonic diverticular disease. No masses, strictures, or mucosal abnormalities were identified. She underwent surgical resection of sigmoid colon and distal ileum. Surgical pathology confirmed bulky amyloid deposits at both intestinal sites. Following surgical resection, she reported complete resolution of her GI symptoms.

Gastrointestinal amyloidosis is defined as the presence of GI symptoms coincident with biopsy proven amyloid deposits. This is a relatively rare reported occurrence. Retrospective studies in known amyloidosis patients report that only 16.8% of patients develop GI signs and symptoms(2). Of those, only 3.3% of patients have biopsy proven gastrointestinal amyloidosis(3). Amyloidosis affects all areas of the GI tract including small intestine, stomach, colorectum, and esophagus. AL Amyloid deposition may occur in the muscularis propria, muscularis mucosa and submucosa leading to protrusions that may cause bowel obstruction. AA amyloid deposition is seen mainly in the mucosa and may lead to friability and ulcerations presenting with diarrhea and malabsorption. Neuromuscular infiltration can affect the intrinsic nerve plexus and muscularis externa leading to abnormal peristalsis and dysmotility(4). Bleeding may result from mucosal lesions, vascular friability, and ischemia. Patients may even develop pneumatosis intestinalis or present with bowel perforation.

Diagnosis requires a high degree of clinical suspicion given the non-specific presentation. It should be suspected in patients with chronic GI symptoms, amyloidosis-associated conditions, or familial history of amyloidosis. Imaging is usually non-specific. A definitive diagnosis requires tissue biopsy with Congo Red (CR) staining which shows characteristic green birefringence on polarized light microscopy. Treatment for gastrointestinal amyloidosis involves symptomatic management and surgical excision of localized disease in patients presenting with severe or recurrent symptoms.

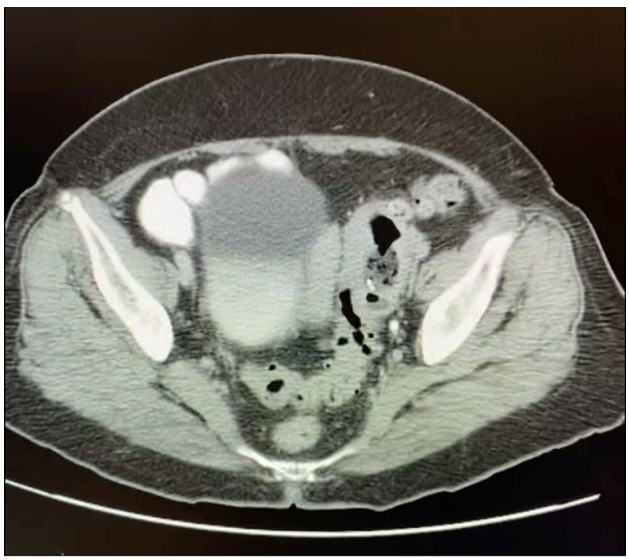


Figure 1: CT abdomen and pelvis, axial view

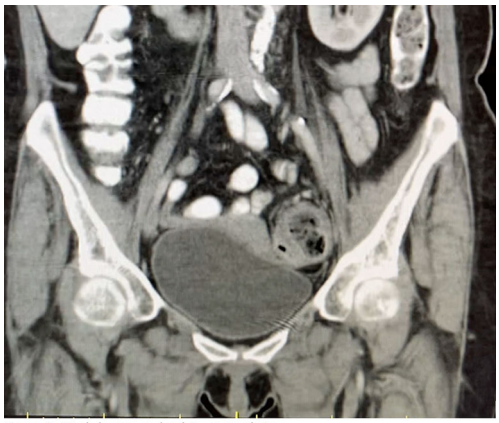


Figure 2: CT abdomen and pelvis, coronal view

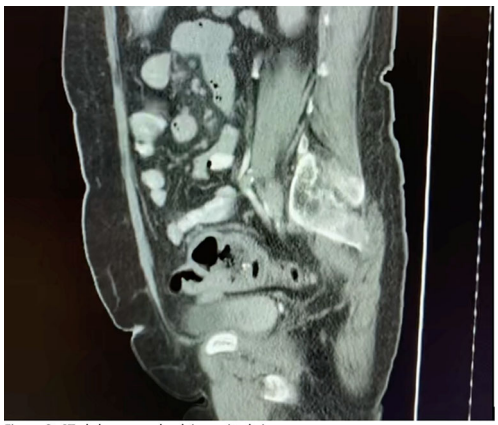


Figure 3: CT abdomen and pelvis, sagittal view

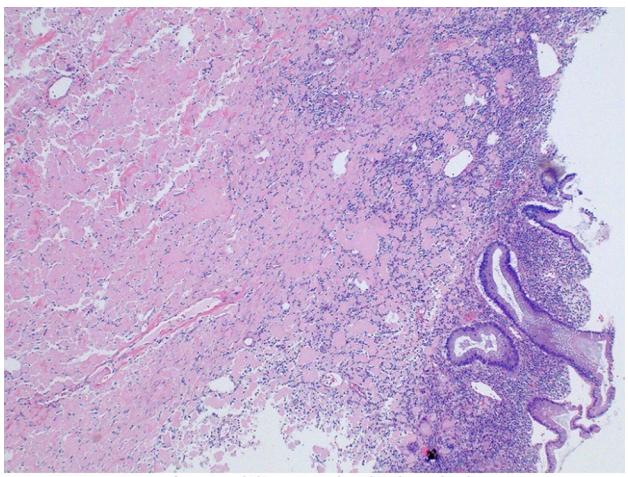


Figure 4: Deposition of eosinophilic material within bowel submucosa

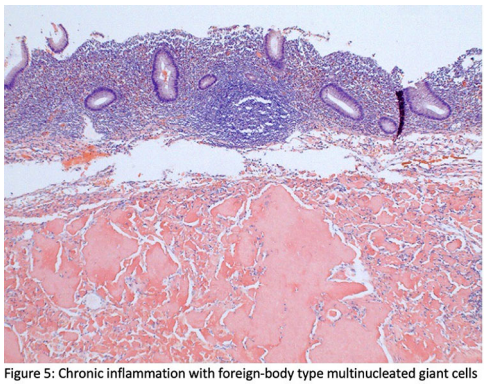


Figure 5: Chronic inflammation with foreign-body type multinucleated giant cells

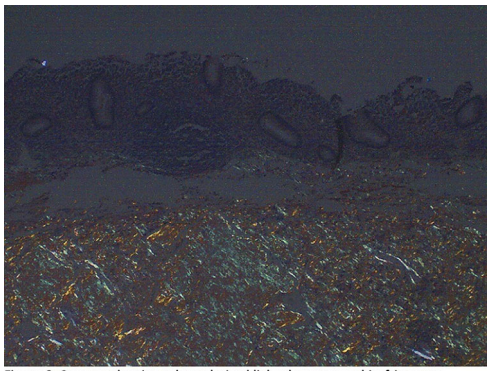


Figure 6: Congo red stain under polarized light shows green birefringence

P284

Emergency colonic resection in patients with colon cancer who did not know were carriers experience in a third-level reference hospital in Mexico

Jeziel Karina Ordonez Juarez, MD; Jose Luis Gomez Goytortua, MD; Victor Manuel Pinto Angulo, MD; Dania Ramirez Gonzalez, MD; Gavin Americo Carrion Crespo, MD; Ivan Calderon Lopez, MD; HJM

The colon is one of the intra-abdominal organs that require surgical management to resolve a large part of the pathologies it develops. Emergency colonic resection is mostly due to low intestinal occlusion, perforation, bleeding, or ischemia that does not respond to conservative management or minimally invasive therapies. The main causes of low intestinal occlusion are colon cancer in 60 to 70% of cases, diverticular disease in 15 to 20%, and sigmoid or cecal volvulus in 10 to 15% of cases. Only 1 to 2% of cases of low intestinal occlusion evolve to a perforation. In the literature, it is reported that in 15% of emergency colonic resections were colon cancer, in which, the patient was not previously known as carrier.

The objective of this study is to know the frequency of emergency colonic resection for colon cancer in patients who were not known as carriers between 2017 and 2021.

This is an observational, retrospective, and descriptive case review study.

We included 150 patients in this study, who underwent colonic resection in the OR, between 2017 and 2021 at a third-level reference hospital in Mexico city by general surgeons, 40% were women and 60% men. In this study, 11 patients with Colon Cancer were found, which corresponds to 7.3%. 90% of colon cancer cases worldwide

appear in people over 50 years of age (1). Regarding the age of the patients in this study, a range of 30 to 75 years was obtained, with an average age of 49 years and 54.5% (6 patients) over 50 years (5). 100% of the patients in this study presented with diagnosis of intestinal occlusion, which agrees with literature where it is mentioned that 1 to 2% are due to hemorrhage, 3 to 10% as perforation (7). and 8 to 40% with occlusion (3).

It was concluded that the frequency of colon cancer in emergency colonic resection in patients who did not know were carriers are very low in our hospital, most patients were in an advanced clinical stage, they debuted with intestinal occlusion due to adenocarcinoma, and in most of them R0 resection could have been performed and the segment more affected is sigmoid. The most frequent post-surgical complication is anastomosis leak and hospital stay is short in most patients. The pathology that requires emergency colonic resection in most cases is the complicated diverticular disease.

P285

Anal squamous cell cancer: a retrospective review of a large colorectal practice

Michaela Gaffley, MD; Justin Hutchinson, MD; Renee Mueller, MD; Samuel DeJesus; Paul Williamson, MD; Joshua Karas, MD; Marco Ferrara, MD; Joseph Gallagher, MD; Andrea Ferrara, MD; Colorectal Clinic of Orlando, Orlando, FL

Introduction: Although anal canal is only 3% of all gastrointestinal malignancies1, the rate of new anal cancer cases has been rising about 2.2% each year (2010–2019) with death rates rising 3.9% each year2. Anal squamous cell cancers constitute about 80% of anal cancers3 and since the 1970s treatment is based on Dr. Nigro's protocol: chemotherapy with 5-fluorouracil and mitomycin C with 45 Gy to 59 Gy radiation with survival rates of 70–90%. 3,4 We sought to evaluate the experience in a large colorectal practice with a high volume of anal squamous cell cancer.
Methods and Procedures: All patients were included from a large private practice of 7 colorectal surgeons in a retrospective chart review. Patients treated between January 2017 and September 2022, pulled by diagnosis codes of squamous cell carcinoma of anal skin, malignant neoplasm of anus, malignant neoplasm of anal canal, and unspecified malignant neoplasm of anal canal. These were reviewed for age, sex, stage at diagnosis, chemoradiation treatment, and survival.
Results: 130 patients were reviewed of which 100 (76.9%) were found to have been diagnosed with squamous cell cancer of the anal canal (SCCa). 67% patients were women, median age at diagnosis was 62 years (range 41–87), and median age for men 61 years (range 39–89)($p = 0.06$). 24.6% of patients had history of HIV. Stage II accounted for 41.8%, stage III 34.5%, followed by 9.1% for stage I and 3.6% for stage IV. Data regarding radiation was available for 66% of patients with average duration 41 days (SD $\pm$ 12.2) for average total dose of 51.6 Gy (SD $\pm$ 9.5 Gy). 12.3% of patients had treatment interruptions. 4.6% of patients who underwent chemoradiation therapy underwent APR.
Conclusion: No difference was found between men versus women in age at diagnosis. Most patients were diagnosed with stage II or III disease. 89% of patients underwent radiotherapy with an overall low rate of treatment interruptions compared to those reported of 35–80% in literature. Further review could include chemotherapy regimens in conjunction with radiation and surgical interventions.

P286

Title: Does Total Neoadjuvant Therapy for Rectal Cancer impact the technical difficulty of proctectomy?

Cheryl Chong, Associate Consultant; Sengkang General Hospital, Singapore

Background: In recent years, total neoadjuvant therapy (TNT) has emerged as the standard of care for locally advanced rectal cancer. TNT defers surgery several months after completion of radiotherapy, which has a perceived association with dense tissue fibrosis and increased technical difficulty of surgery.
Aims: Our aim is to assess if TNT (TNT RAPIDO) is associated with increased technical difficulty of total mesorectal excision (TME) compared with long-course chemoradiotherapy (LCRT) and upfront surgery (UPFRONT).
Methods: 12 laparoscopic videos of ultra-low anterior resection with TME for mid/low rectal cancer were prospectively collected from January 2020 to October 2021. There were 4 cases in each category—TNT RAPIDO, LCRT, and UPFRONT. Cases were anonymized, order randomized, and labeled A to L. 7 colorectal surgeons assessed the videos independently and graded the difficulty of the TME dissection with a visual analogue scale ranging from 0 to 100. The surgeons also had to identify which category (LCRT, TNT RAPIDO, UPFRONT) the operative videos belonged to. The data were analyzed with statistical software.
Results: The median age of the patients was 67 years, with 10 males and 2 females. Median interval from completion of radiation therapy to surgery was 13 weeks for the LCRT group and 24 weeks for the TNT RAPIDO group.
There was no significant difference in the visual analogue scores for difficulty in TME dissection between the 3 groups (32 (LCRT) vs 46 (TNT RAPIDO) vs 41 (UPFRONT), $p = 0.115$). The graded difficulty of surgery was similar between LCRT and TNT RAPIDO (32 vs 46, $p = 0.053$) and TNT RAPIDO vs UPFRONT (46 vs 41, $p = 0.535$). There was overall good correlation of responses between assessors for 9 out of 12 of the videos.

The assessors were correctly categorized the videos 42% of the time. On further analysis, the TNT RAPIDO videos were easier to identify compared to the LCRT and UPFRONT surgery groups (71% vs 29% vs 25%, $p = 0.01$).

Secondary observations such as operative time in minutes (278 (LCRT) vs 350 (TNT RAPIDO) vs 283 (UPFRONT), $p = 0.33$) and length of stay in days (5 (LCRT) vs 5 (TNT RAPIDO) vs 6 (UPFRONT), $p = 0.27$) were similar. Morbidity occurred in 1 out of 12 patients (Clavien–Dindo Classification Grade 2, blood transfusion was required) and 30-day mortality rate was 0%.
Conclusion: Proctectomy after TNT does not appear to be associated with increased technical difficulties during surgery. Further studies are required to investigate this.

P287

How well do we measure the impact of bowel dyfunction on health-related quality of life after rectal cancer surgery?

Michael F Maalouf, BSc; Stephan Robitaille, MD; Ruxandra Penta, MD; Anna Wang, MD; Alexander Sender Liberman, MD; Julio F Fiore Jr, PhD; Liane S Feldman, MD; Lawrence Lee, MD; Department of Surgery, McGill University Health Centre

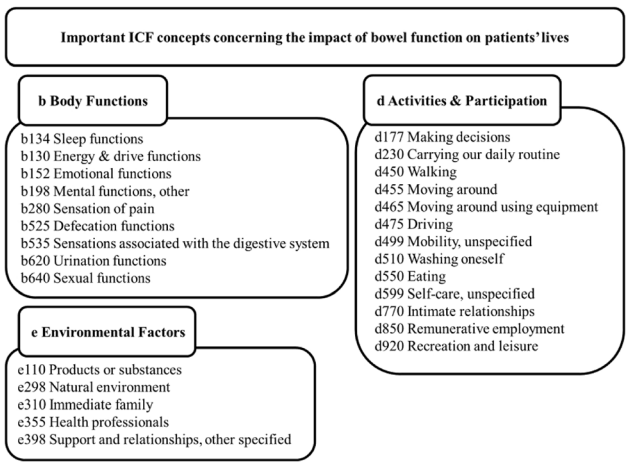
Introduction: Rectal cancer surgery risks causing bowel dysfunction, which may have a negative effect on health-related quality of life (HRQOL). However, HRQOL is specific to each individual and

generic HRQOL instruments may not contain all of the relevant domains for patients experiencing symptoms of bowel dysfunction after rectal cancer surgery. This study aims to determine the content validity of generic HRQOL instruments in the setting of bowel dysfunction.

Methods and Procedures: Adult patients who underwent rectal cancer surgery with sphincter preservation from 07/2017 to 10/2020 were recruited from a university-affiliated colorectal referral center. Patients were excluded if they developed local recurrence or metastasis, required a permanent stoma, or had surgery < 1- ear since recruitment. Telephone-based semi-structured interviews with patients were performed and recorded. Through qualitative content analysis of interview transcripts, HRQOL areas affected by bowel dysfunction were identified (important concepts) and linked to the WHO's International Classification of Functioning (ICF) framework. Similarly, the content of commonly used HRQOL tools was assessed using ICF codes. Content validity was measured by comparing ICF-linked concepts identified from qualitative interviews to those contained in the instrument itself. Five instruments commonly used to measure HRQOL were analyzed: Short Form-36 (SF-36), European Organization for Research and Treatment of Cancer Quality-of-Life-Questionnaire-C30 (EORTC-QLQ-C30), Euro-Qol-5 Dimension (EQ-5D), Fecal Incontinence Quality-of-Life scale (FIQL), and Psychological General Well-Being Index (PGWBI). Bowel dysfunction was measured using the Low Anterior Resection Syndrome (LARS) score, which categorizes patients into no, minor, or major LARS.

Results: A total of 54 interviews were performed, with 39% of participants reporting major LARS. A total of 28 important bowel dysfunction-related HRQOL impairment concepts were identified during qualitative interviews (Figure). The concepts "Mental functions," "Defecation functions," "Emotional functions," "Recreation and leisure," and "Intimate relationships" were most commonly reported. The mean number of important bowel dysfunction-related concepts identifed within each instrument was 7.8 concepts. The EORTC-QLQ-C30 (n = 11) and the SF-36 (n = 9) covered the greatest number of important bowel dysfunction-related concepts, but no instruments covered all of the important concepts identified. The longer instruments (SF-36, EORTC-QLQ-C30, and FIQL) also had a high number of irrelevant items that did not cover an important concept. Conversely, the shorter instruments (EQ-5D and PGWBI) had more relevant items but covered fewer important concepts.

Conclusion(s): Bowel dysfunction has impacts on HRQOL which are not captured by generic tools. The important gaps identified in this study helps inform the development of improved patient-centered decisional aids for rectal cancer patients.



P288

Novel single-port robotic right hemicolectomy surgical robotics platform: access and reach

Eduardo Parra-Davila, MD[1]; Matthew T McKittrick[2]; Chris Lightcap[3]; Hamed Yaghini[3]; Michael Conditt[2]; [1]Palm Beach Health Network; [2]Momentis Surgical; [3]KCL Consulting

Purpose: Single-port laparoscopy for abdominal surgery is technically challenging due to surgical technique and technology limitations, specifically in right hemicolectomy, which has traditionally shown high herniation rates due to the number of abdominal ports. In comparison with the standard laparoscopic procedure, single port-access, as well as NOTES, may provide improved aesthetic benefit, decreased postoperative pain and a shorter duration of hospitalization1. The functionality of a novel single-port robotics platform may enable the benefits of the single port-access and NOTES, while alleviating the latter challenges.

Materials and Methods: A transformative robotics platform has been developed that allows the articulation to occur inside the abdomen by 2 arms inserted through a single incision or natural orifice. This system features miniature humanoid-shaped robotic arms that provide human level dexterity, multi-planar flexibility and 360 degrees of articulation for various access configurations. This study measured the manipulability of this new robotic platform throughout its entire reachable workspace in the abdomen by first generating a set of 200,000 configurations of the robot arms and secondly calculating the manipulability index according to robotics literature2.

Results: The results show that, due to the shoulder, elbow and wrist joints of the arms that perform all their articulation after entry, the reachable workspace encompasses the entirety of the average male and female abdomen from the para-aortic nodes to the pelvic floor, across from abdominal sidewall to sidewall and from the abdominal wall to vertebrae, thus allowing multi-quadrant surgery, enabling a feasible and effective approach to single port right colectomy. Because the wrist joints have unlimited rotation and the shoulder and elbow joints allow the arms to function as they cross over each either, the manipulability index remains high (high usability) within the abdominal cavity and particularly around anatomy of interest such as the distal ileum, cecum, ascending colon, and proximal to mid-transverse colon.

Conclusion: The design of this new robotic technology has the potential to provide surgical treatment during a single port right hemicolectomy, including improved triangulation, reduced instrument clashing and optimized visualization3. The use of a single-port access through a transumbilical incision and avoiding additional trocars and drains could increase patient satisfaction, based on reduced pain and increased cosmetic results4. Nevertheless, further prospective studies are needed.

P289

The impact of the COVID-19 pandemic on the length of stay in elective ventral hernia repair

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The COVID-19 pandemic has significantly impacted healthcare systems and the delivery of surgical care worldwide. Adjustments have been made to reduce the likelihood of transmission of the disease and the outcomes for patients, including those undergoing elective surgical procedures. The goal of this study was to evaluate for any difference in length of stay (LOS) that may exist for patients undergoing elective ventral hernia repair (VHR) before and during the COVID-19 pandemic. The LOS for patients who were not allowed

visitors was assessed due to hospital policies limiting visitors during the pandemic. LOS was also evaluated in relation to patient comorbidities, complications, age, race, and gender. It was hypothesized that LOS would be decreased during the COVID-19 pandemic but increased for patients with comorbidities, complications, and increasing age.

Methods: A retrospective analysis of patients from a single Memphis-based academic institution who underwent elective VHR between 2015 and 2021 was conducted. Admissions during the COVID-19 pandemic were defined as those after March 1, 2019. Factors associated with LOS were assessed including comorbidities, complications, and age. Due to changing policies during the COVID-19 pandemic, the ability to have visitors was also evaluated. Variables were evaluated for association with LOS by Chi-square or Student's t test as appropriate. Variables with $p < 0.05$ after univariate analysis were considered for inclusion in multivariate logistic regression modeling.

Results: A total of 549 patients were included in the study with 93 patients defined as during the COVID-19 pandemic. Race was divided into white and non-white categories with 247 and 302, respectively. A significant difference in LOS was found between white and non-white patients ($p < 0.001$). Patients who developed a postoperative complication had significantly increased LOS by multivariate analysis ($p < 0.001$). No significant difference in LOS was found between patients before and during the COVID-19 pandemic. There were 29 patients that were unable to have visitors during the COVID-19 pandemic due to hospital policy and they were found to have a significantly longer LOS ($p = 0.007$). As expected, patients that were older or had comorbidities were independently associated with increased LOS ($p < 0.001$ and $p = 0.006$, respectively).

Conclusion: It was hypothesized that patients who underwent ventral hernia repair during the COVID-19 pandemic would have decreased LOS; however, no significant difference was found. Interestingly, patients that were not allowed visitors during the pandemic had significantly longer LOS. Further studies to investigate inpatient visitation and LOS would be of interest to elucidate the reason for this difference.

Variable	All N= 549	Male N= 243	Female N= 306	*p*-value	White N= 247	Non-white N= 302	*p*-value
Age (years; mean, std)	50.49 ± 14.13	54.51 ± 12.17	47.34 ± 14.77	**<.001**	55.19 ± 13.53	46.65 ± 13.45	**<.001**
Race							
White	247 (45)	146 (60.1)	101 (33.0)	**<.001**	---	---	---
Non-white	302 (55)	97 (39.9)	205 (66.9)				
Comorbidities							
Any	450 (82)	200 (82.3)	250 (81.6)	0.855	219 (88.7)	230 (76.2)	**<.001**
None	99 (18)	43 (17.7)	56 (18.3)		27 10.9)	72 (23.8)	
Complication							
Any	93 (16.9)	41 (16.9)	52 (16.9)	0.970	50 (20.2)	43 (14.2)	0.062
None	456 (83.1)	202 (83.1)	254 (83.0)		197 (79.8)	259 (85.8)	
Post COVID							
Yes	93 (16.9)	38 (15.6)	55 (17.9)	0.470	34 (13.8)	59 (19.5)	0.073
No	456 (83.1)	205 (84.4)	251 (82.0)		213 (86.2)	243 (80.5)	
Visitors allowed							
Yes	520 (94.7)	233 (95.9)	287 (93.8)	0.482	237 (95.9)	283 (93.7)	0.243
No	29 (5.3)	10 (4.1)	19 (6.2)		10 (4.0)	19 (6.3)	
LOS (days; mean, std)	1.38 ± 2.13	1.39 ± 2.29	1.37 ± 1.99	0.897	1.75 ± 2.22	1.08 ± 2.01	**<.001**

Table 1. Characteristics of cohort and evaluation of baseline characteristics by gender and race

	β	Standard Error	95% CI	*p* value
Post COVID	-0.00573	0.22801	-0.454 – 0.442	0.9799
Any Complication	-2.93926	0.20065	-3.333 – -2.545	**<0.001**
Any Comorbidity	-0.54423	0.19686	-0.931 – -0.158	**0.006**
Age	0.02206	0.00542	0.011 – 0.033	**<0.001**
Visitors allowed	1.02785	0.38147	0.279 – 1.777	**0.007**

Table 2. Multivariable logistic regression by LOS

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The Long Haul to Surgery: Investigation into the Burden of Long COVID on Surgical Departments

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Background: Many patients infected with the COVID-19 virus continue to experience symptoms for weeks to months following the initial infection that are believed to be caused by the virus—thus referred to as "Long COVID." While there have been many investigations into the incidence and symptomatology of Long COVID from a medical perspective, there has been minimal study into the burden of disease affecting Surgical Departments.

Methods: A database was previously constructed from results of a population-based electronic survey of patients who tested positive for COVID-19 at UCSDH between March 1, 2020 and July 1, 2021. The survey was sent at least 90 days from the initial infection date and was utilized to identify patients who reported experiencing symptoms consistent with Long COVID. Additional chart review was conducted to determine if respondents had undergone a surgical or non-routine invasive procedure on or following the date of survey completion. The burden of Long COVID on the UCSDH Surgery Department was determined through comparison of the number of surgeries performed on patients who reported having Long COVID symptoms to those on patients who did not report having symptoms, and whether those surgeries were classified as emergent/urgent/time-sensitive/elective, inpatient/outpatient, ICU/non-ICU, along with length of stay and complication rate.

Results: 999 of 9,619 (10.4%) patients responded to the original survey, 421 (46.3%) of whom reported experiencing symptoms consistent with Long COVID. Most commonly reported symptoms included weakness/tiredness, sleep disturbances, and difficulty thinking/concentrating ("brain fog"). 0.174 (17.4%) of all respondents were found to have undergone surgery or a non-routine invasive procedure on or following the date of survey completion. 85 (48.8%) of these patients reported experiencing symptoms consistent with Long COVID. Surgery patient class and outcomes analyses are reported in Table 1. There were no statistically significant differences between groups.

Discussion: Hospital systems are widely impacted by the COVID-19 pandemic and substantial numbers of Long COVID patients are seeking care. One known impact of the pandemic on Surgical Departments is later presentation of diseases such as appendicitis, however, these phenomena have not been directly connected with Long COVID. The results of this analysis demonstrate that Long COVID does not appear to have created a significant burden of surgical disease processes on the hospital system. This knowledge can help guide operational resource allocation as a result of the pandemic and its longer-term sequelae.

	Total number surgical patients	n (%) Emergent/Urgent/ Time-sensitive cases	n (%) Inpatient cases	n (%) ICU post-op destination	Length of Stay (LOS) - mean	n (%) Complications within 30 days post-op
Long COVID symptoms reported	85	37 (43.5%)	21 (24.7%)	4 (4.7%)	5.05 days	4 (4.7%)
No Long COVID symptoms reported	89	39 (43.8%)	26 (29.2%)	1 (1.1%)	2.77 days	9 (10.1%)
p-value		*0.97*	*0.61*	*0.20*	*0.24*	*0.25*

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Characterisation and mitigation of gas leaks at laparoscopy—an international prospective, multicenter clinical trial

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Introduction: Gas leaks are common in laparoscopy and pollute the surgical airspace despite positive pressure room ventilation. Such aerosolisation precipitated a global moratorium on minimal access surgery early in the COVID-19 pandemic and continues to generate local environmental concern and discord regarding surgical plume and biological effluvium. Studies defining methods for sensitive leak characterisation and mechanical mitigation in real-world settings are lacking.

Methods: To define gas leaks at laparoscopy, mobile optical gas imaging methodology was developed (both a miniaturised Schlieren system and a tripod-mounted near-infrared carbon dioxide imager (GF343, FLIR)) and deployed in a prospective clinical series of planned laparoscopic interventions at two university hospitals in France and Ireland. Optical flow velocity estimation (validated via Particle Image Velocimetry) was applied to any recorded spontaneous or instrument exchange related leak using a boutique Matlab-based analyser (now open sourced on GitHub https://github.com/nolankucd/PORSAViz) enabling four-way categorisation (Type 0-No observable leak; Type 1-Marginally detectable leak; Type 2-Short lived plume; Type 3-Energetic, turbulent jet). Concurrently, the usefulness of a novel vacuum- ring device (LeakTrap, Palliare, Ireland) designed as a universal adjunct for standard laparoscopic ports at both abdominal wall and port valve level was determined similarly in a phase I/11 clinical trial along with the device's useability through procedural observation and surgeon questionnaire.

Results: Following ethical and regulatory approval in both countries, 40 patients undergoing planned laparoscopic cholecystectomy (n = 36) and hernia repair (n = 4) were studied comprising both control (n = 20) and device intervention (n = 20) cohorts. Patient demographics and operative parameters were typical for such procedures and similar in both groups. Optical gas imaging was successfully performed across all procedures with minimal impact on procedural flow generating 4.7 TB of video data. Gas leaks were commonly visualised at all laparoscopic ports, most notably upon instrumentation with significant abrogation in those in the device intervention group. In total, 1244 instrument exchanges were examined, 663 in the control group and 581 in the intervention group with a mean(range) of 44.2 (9–102) and 38.7(11–101) per procedure, respectively. Type 0 leaks were observed in 14.6% (97/663) of instrument exchanges in control patients versus 62.8% (365/581) in interventional group patients ($p < 0.05$). Type 3 leaks were observed in 52.3% (347/663) of instrument exchanges in control group patients versus 6.0% (35/581) in the interventional group.

Conclusion: Laparoscopic gas leaks can be sensitively detected and effectively mitigated broadly using straightforward available now technology with most impact on the commonest, highest energy instrument exchange leaks.

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Donning and Doffing Simulator for Healthcare Workers Caring for COVID-19 Patients

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Personal Protective Equipment (PPE) is used by healthcare workers to minimize exposures to environmental hazards and to prevent the spread of pathogens. With the untimely introduction of COVID-19 into our lives, PPE standards and procedures assumed an even more crucial role in protecting healthcare workers and patients. Established training methods for donning and doffing PPE exist, such as instructor-led training and video lessons. While instructor-led training is practical, it also requires instructor time and PPE resources for implementation, both of which were limited during the pandemic. Conversely, video-based lessons are affordable, safe, and require fewer resources, but they lack the practical hands-on experience essential for learning. In this study, we developed a VR-based training environment to simulate donning and doffing PPE for rapid sequence induction (RSI) with a COVID-19-positive patient. The simulation places the learner in a virtual environment that includes an anteroom and a contaminated operating room; both were designed with guidance from medical experts to ensure we replicated the physical training environment. Learners are instructed on donning and doffing procedures, interact with the virtual PPE to test their knowledge and skills, and receive feedback. Our VR-based simulation provides an alternative learning environment that utilizes the advantages of more traditional training methods (e.g., hands-on, low-cost, preserved situational context of a simulated OR) while limiting their disadvantages (e.g., in-person instruction, use of limited resources) and introducing advantages (e.g., quantitative feedback, 24/7 availability). At the end of this virtual training experience, learners will be able to protect themselves and their patients by taking the proper safety precautions while also remaining safe and utilizing fewer precious healthcare resources.



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Resuming surgical outreach during the COVID-19 pandemic

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Introduction: There remains a substantial global burden of surgical disease worldwide, a large proportion of which is represented by untreated inguinal hernias. Due to the rapid spread of coronavirus disease 19 (COVID-19) and travel-related restrictions, global surgical efforts have declined and, consequently, resulted in a higher volume of patients in need of surgical care. There are limited reports of re-initiating global surgical efforts following the COVID-19 pandemic. The aim of this study is to evaluate resuming global surgical outreach after COVID-19.
Methods: We retrospectively reviewed two surgical mission trips coordinated by Surgical Outreach for the Americas (SOfA), 501(c)(3), following a 2-year hiatus due to COVID-19. The 7-day surgical brigades were to the Dominican Republic (DR) in January 2022 and to El Salvador (ES) in May 2022. We reviewed the number and type of hernia repairs performed compared to prior mission trips, the incidence of COVID-19 transmission among patients and volunteers, and evaluated implementation of safety measures and procedures.
Results: There were two volunteers who tested positive for COVID-19 before the trips and were unable to travel. All patients underwent COVID-19 antigen testing preoperatively. A total of 85 and 73 procedures were performed during the post-pandemic trips to the DR and ES, respectively. The majority of procedures were inguinal and ventral hernia repairs (85% for DR and 86% for ES), and no immediate perioperative complications were observed except urinary retention (n = 2) and postoperative wound hematoma (n = 1). The number of procedures performed during post-pandemic trips exceeded prior trips to each respective country (range of DR 63–73 cases and ES 65–69 cases). No volunteers tested positive for COVID-19 during the trip or within the first 2 weeks after returning home.
Conclusion: Implementation of safety measures and procedures enabled the safe and successful re-initiation of global surgical efforts during the COVID-19 pandemic. By reporting our COVID-19-related safety measures and considerations, we hope to provide guidance for the safe resumption of global surgery efforts.

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The Implications on the Rate of Hospital Admissions and Financial Outcomes in Patients with Acute Cholecystitis during Covid-19 Pandemic

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Introduction: This study aims to investigate the implications of the Covid-19 pandemic on the number of acute cholecystitis (AC) cases and the financial burden imposed on patients due to rising healthcare costs in the USA. We hypothesize that the average number of patients admitted for AC will be decreased.
Methods and Procedures: ICD10 codes were used to identify patients diagnosed with AC at Maury Regional Medical Center from 2019–2021. The average length of stay (ALOS) and hospital costs for these patients were compared. Differences in these parameters were determined using linear regression analysis.
Results: As compared to total inpatient admissions, the percentages of AC cases in 2019, 2020, and 2021 were 0.21%, 0.29%, and 0.30%, respectively, and the average length of stay was 2.68, 2.95, and 3.66 days, respectively. The direct cost per case ranged from $4,900 to $6,100. This data suggests a slight increase in each parameter over time. Linear regression analysis confirms these results, revealing a progressive increase in the number of AC cases, ALOS, and direct cost per case ($R^2 > 80\%$). While the slopes of these regression lines are significantly different ($P < 0.01$), the lines themselves do not deviate significantly from zero.
Conclusion: The ALOS and direct cost per case increased at a greater rate than the number of AC cases during 2019–2021. However, this observation is dubious since the slopes of the regression lines did not deviate from zero. It may be possible to achieve a more robust change if the time period was expanded.

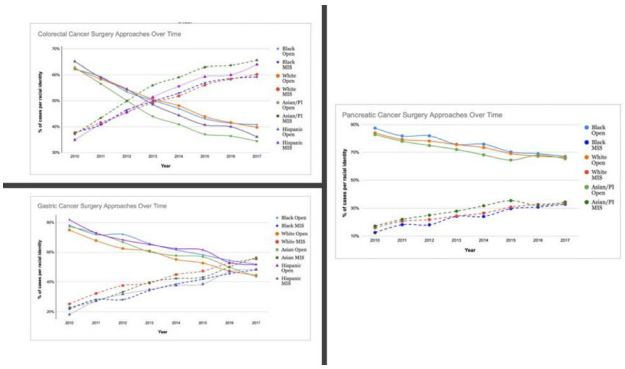
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Disparities in Open vs. Minimally Invasive Surgery for Colorectal, Gastric, and Pancreatic Cancers

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Background: The use of minimally invasive surgery (MIS) for management of intra-abdominal malignancies is on the rise. Several studies have shown presence of disparities in access to MIS compared to open surgery in patients of different race, insurance type, and income level. The aim of this study is to assess disparities in access to MIS for the management of the most common intraabdominal malignancies.
Methods: We performed an 8-year analysis using the NCDB (2010–2017) and included patients who underwent colorectal, gastric, and pancreatic cancer resections. Patients were excluded if they did not undergo surgery or surgical approach was not specified. Demographic variables relevant to socio-economic status and ethnoracial identity were analyzed. Our outcome measures were socioeconomic and racial disparities, in addition to trends in MIS and open surgery over the study period.
Results: A total of 231,336 surgical patients were analyzed and included in the study: gastric cancer (n = 52,038), colorectal cancer (n = 126,220) ,and pancreatic cancer (n = 53,078). The minimally invasive approach accounted for 40.8%, 51%, and 26.4% of cases in gastric, colorectal, and pancreatic cancer resections, respectively. For gastric cancer, a greater proportion of patients identifying as white underwent a MIS approach compared to patients identifying as black (41.9% v. 35.9%, $p < 0.01$). Colorectal and pancreatic cancer surgery patients had equitable distribution among white and black-identifying patients. Hispanic-identifying patients were less likely to undergo MIS as compared to open surgery for gastric cancer; however, this trend was not seen in colorectal or pancreatic cancer surgery. Asian/Pacific Islanders were more likely to undergo MIS compared to open than patients in other racial groups. Across all types of cancer operations, patients with higher incomes, private insurance, and treated in an urban location were more likely to undergo MIS. On trend analysis (Graphs 1–3), there is an overall increase in MIS over time, especially in colorectal cancer surgery.
Conclusion: In this national retrospective study, there is unequal access to MIS for cancer treatment in disfavor of black race, lower income, and treatment in a rural setting. For gastric cancers, Hispanic ethnicity is associated with lower access to MIS; however, this relationship was not seen in colorectal or pancreatic cancer. Interestingly, Asian/Pacific Islanders had a higher proportion of MIS as compared

to white and black-identifying groups across all three types of cancer operations.



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Benign tumor in a transgender woman on hormone therapy: a case report

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Introduction: Transgender persons may receive Hormone Therapy (HT) to affirm their gender identity. Many male-to-female individuals, or transgender women, receive life-long exogenous estrogen to develop female secondary sex characteristics. Long-term HT has been associated with the development of breast tumors in cis women, but most existing literature reports on malignant tumors in transgender women, rather than benign tumors.

Case Description: We present the fourth case of fibroadenoma in a transgender woman receiving long-term HT. She initiated HT at 31 years old and after four years, she developed a 1.5-cm smooth, well-circumscribed nodule at the 9 o' clock position of her left breast. Breast ultrasound, diagnostic mammography, and core biopsy demonstrated that this was a fibroadenoma. The decision was made for conservative management with regular surveillance, and the patient continued their HT.

Discussion: In transgender women, HT transforms breasts to be histologically akin to cisgender women, conferring a 33–46-fold increased breast tumor risk relative to cis men. Our patient developed their tumor after four years of HT, whereas prior cases recorded fibroadenomas at 7–19-year post-HT (Table 1). Similarly, cisgender women typically develop fibroadenomas before 30 years old, but prior cases in transgender women have occurred between 34 and 41 years of age (Table 1).

Fibroadenomas are benign breast masses with a 2–threefold higher risk of developing a future breast cancer. Their prevalence among transgender women is under-reported, but likely comparable to cisgender women. Increased education about breast tumors associated with long-term HT are needed among transitioning individuals and their physicians. Additionally, Canadian breast cancer screening guidelines do not consider transgender women. Moreover, the duration of HT which increases the risk of developing a future breast tumor is unclear among transgender women. Finally, long-term data are needed to inform the risks and benefits of continuing HT in transgender women to enable patient-centered treatment decisions.

Table 1. Cases of Fibroadenoma in Transgender Women.

Case	HT Regimen		Clinical Presentation
Kanhai 1999	Cyproterone acetate 50mg po daily Ethinyl estradiol 100 µg po daily		15 x 15mm firm, smooth mass in medial upper quadrant of the right breast
	22 y/o*		41 y/o*
Lemmo 2002	Cyproterone acetate unknown dose	Ethinyl estradiol unknown dose	Round 1.5cm smooth, mobile, painless, well-defined mass in upper outer quadrant of the right breast (detected on mammogram)
	22 y/o*	15 y/o*	34 y/o*
De Faria 2019	Ethinyl estradiol 125 µg po daily		1cm mobile, fibroelastic, retroareolar nodule
	29 y/o*		36 y/o*

*y/o = years of age

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The link between Augmented Reality surgical training and improved operative efficiency and reduced costs

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Aim: To assess the impact of simulated laparoscopic trainers on improving surgical trainees technical ability in completing a laparoscopic appendicectomy by measuring effect on completion time and distance travelled with standard instruments.

Method: Four CT1 (early-stage) trainees with little prior operative exposure were selected from the North West of England Deanery to perform × 10 appendicectomy simulated exercises with the Augmented Reality Laparoscopic Simulator (LapAR^{TM}), interspersed by × 9 Lapass exercises. Metrics including 'Time of completion' and 'Distance travelled were collected by the simulators and analyzed.

Results: Repeated laparoscopic appendicectomies with the LapAR^{TM} improved performance time for 100% of trainees, with an average of 55% (Regression coefficient -0.65) and improved distance travelled for 75% of the trainees with an average improvement of 39% (Coefficient -2.67). Improvement in instrument smoothness, acceleration, and ambidexterity were also observed.

Conclusion: LapAR^{TM} use has improved all performance metrics for most surgical trainees and proves to be an invaluable tool for surgical training.

Key Statement: Simulation has a key role to play in surgical training amidst growing challenges in post-Covid era to train junior surgeons. Larger samples of trainees from across the country are needed to further evaluate the efficacy of LapAR^{TM} as a training tool.

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What Motivates Referrals of Colonic Polyps? A Needs Assessment of GI Endoscopists

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Introduction: Endoscopic resection is first-line treatment for benign colonic polyps, while surgical referral is often reserved for polyps that appear malignant or are unsuitable for endoscopic resection. Advanced techniques such as endoscopic mucosal resection (EMR) and endoscopic submucosal dissection (ESD) have expanded these indications and have been shown to be safer and more cost-effective than surgery. Despite these advances, 25–33% of surgically resected polyps are ultimately benign. Factors that influence referral for surgery have been proposed, but not widely evaluated. The

objective of this study was to analyze gastroenterologists' motivations for referral of patients with colonic polyps and to evaluate their interest in additional endoscopic training.

Methods: From Jun to Sep 2022, gastroenterologists in a regional health system received a quantitative survey with Likert scale questions that assessed demographics, training and work characteristics, factors in the referral of patients with colonic polyps, and interest in further endoscopic training. Outcomes were analyzed with descriptive statistics in Stata.

Results: Of the 39% (53/135) of gastroenterologists who completed the survey, 66% were male, 70% worked primarily at an academic center, and 45% had been in practice for 0–10 years. In their work, 53% performed 1–5 EMRs per month (30%: 0; 17%: 6 +) and none performed ESDs. The evaluation of potential factors that influenced referrals are shown in Table 1. Regarding additional training, 53% and 59% of respondents were moderately/very/extremely interested in visual characterization of polyps during endoscopy and EMR, respectively. The most significant barriers to additional training were "Time commitment" (79% of respondents), "Distance to in-person training" (68%), and "Finding work coverage" (66%).

Conclusion: This is the first study to evaluate factors influencing the referral of patients with colonic polyps. Practicing gastroenterologists have a strong interest in additional endoscopic training. The development of novel educational initiatives to address this unmet need is currently underway.

Table 1 How frequently have these reasons influenced your decision to refer patients?

Reasons for referral	Never, rarely, or sometimes (% who chose one of these)	Often or Always (% who chose one of these)
The polyp has malignant characteristics	26	74
Endoscopic resection of the polyp would require skills outside of my comfort level	49	51
Inadequate reimbursements for endoscopic resection	100	0

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Collaborative Grand Rounds: A Tool To Engage And Support The Community Surgeon

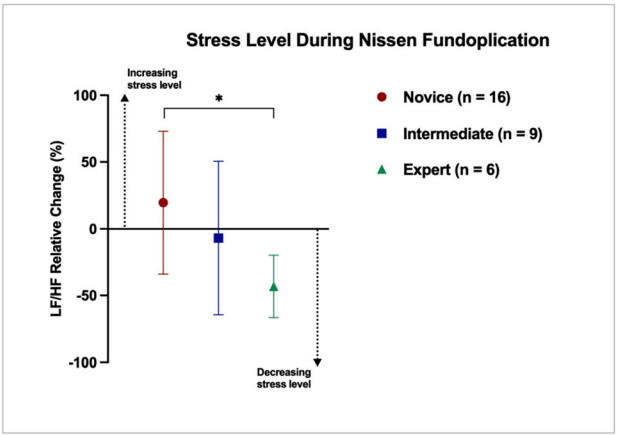
Robert A Catania, MD[1]; Laura M Doyon, MD[2]; Igor G Elyash, DO[3]; Fernando Mier, MD[4]; Salim Hosein, MD[5]; Faique Rahman[6]; Subhashini Ayloo, MD[7]; Samer Sbayi, MD[8]; Sunjay S Kumar, MD[9]; Bethany J Slater, MD[10]; Danielle S Walsh, MD[11]; Paul D Colavita, MD[12]; Rohan A Joseph, MD[13]; Kimberly F Schuster[14]; Bhargav Ayloo[15]; Caitlin A Halbert, DO[16]; [1]Southern New Hampshire Medical Center; [2]Emerson Hospital; [3]Valley Medical Group; [4]University of Oklahoma Health and Science Center; [5]New Life Weight Loss Center; [6]Jawahazlal Nehru Medical College; [7]Rholde Island Hospital; [8]Stony Brook University Hospital; [9]Thomas Jefferson University Hospital; [10]University of Chicago Medicine; [11]University of Kentucky Children's Hospital; [12]Carolinas Medical Center; [13]Capital Regional Medical Center; [14]Tufts University School of Medicine; [15]Wayne State University; [16]Christiana Care Health System

The SAGES Community Practice Committee in conjunction with the Guidelines, Foregut, and Education Committees have designed a process to create peer reviewed, Grand Rounds Presentation slide sets for use by the SAGES membership when delivering lectures at the local, regional, national, and international level. Topics of wide interest to the SAGES membership are chosen and a team of SAGES members are gathered to research and debate the topic using monthly meetings to refine the data for the presentation. The team uses existing SAGES educational material such as guidelines and consensus statements as well as current literature review to ensure the presentation is relevant and up to date. A slide set is then developed from the data which can be obtained by SAGES members at large to utilize when giving presentations at educational events. There are opportunities to personalize the presentation to highlight local practice patterns while emphasizing data driven diagnostic and treatment algorithms. Target audiences for these presentations include referring providers (primary care, hospitalist, gastroenterologist), residents, and medical students. The presentations are also appropriate for regional medical and surgical meetings. Accompanying the slide set is a presentation text, video, and comprehensive bibliography. When the project is completed, SAGES members will have a library of ready to use "Grand Rounds" presentations pertinent to minimally invasive surgery available on the SAGES website. Periodic review of topics ensures that the slide sets will remain up to date and relevant as standards of care evolve. Participation in the development process is open to all SAGES members who are interested in maintaining a presence in a supportive academic environment regardless of the location or nature of their practice. Members who volunteer to work on the development process will be credited with authorship of peer-reviewed presentations and members who utilize the slide sets will be able to deliver a personalized and meticulously sourced presentation without the traditional investment in time and effort required to create a high quality slide set. The initial Collaborative Grand Rounds topic is Anti-reflux Surgery and the presentation is in development. Recruitment for the next team and topic will begin at the SAGES 2023 meeting. All members interested in participating in the process are welcome.

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The impact of surgical expertise on heart rate variability and mental stress

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Introduction: Recently, there has been an increased interest in measuring mental stress in the surgical setting. Heart rate variability (HRV) is an objective surrogate metric for intra-operative stress assessment. HRV refers to the variations between serial heartbeats, which is controlled by a balance of the sympathetic/parasympathetic nervous system. There are a lack of data regarding the variability in a surgeon's HRV at different stages of a surgical procedure. In this IRB-approved study, we investigated the HRV in a cohort of 30 resident and attending surgeons performing a laparoscopic Nissen fundoplication simulation on a porcine model.
Methods: Participants were assigned to three groups: Novice (PGY 1–2), Intermediate (PGY 3–4-5), and Expert (fellow/attending). Following a standard protocol, whole-procedure ECG data were measured using the BIOPAC data acquisition system. We used predefined frequency bands of adult humans to evaluate HRV: low-frequency (LF) 0.04–0.15 Hz and high-frequency (HF) 0.15–0.4 Hz components. Recordings were visually inspected and manual artifact correction was performed by a physician blinded to participant expertise levels, prior to HRV analysis. Every attempt was divided into two equal focus areas for contrast analysis: first and second half of the procedure. LF/HF ratio, considered a surrogate for stress and mental strain, was computed to analyze the data. One-way non-parametric ANOVA (Kruskal–Wallis test) was used to analyze the data of the 3 groups, followed by post hoc testing with Bonferroni correction.
Results: Between the first and second half of the procedure, the relative difference in LF/HF ratio (stress level) changed by a mean of + 20% in the novice group, − 7% in the intermediate group, and − 43% in the expert group. The Kruskal–Wallis Test showed a significant difference in stress levels between the three groups ($p < 0.004$). Pairwise comparison of skill levels showed a significant decrease in stress when comparing expert to novice surgeon ($p < 0.003$). Comparison of stress levels between expert to intermediate and intermediate to novice surgeons were not statistically significant ($p < 0.183$ and $p < 0.202$, respectively).
Conclusion: Heart rate variability is an objective measurement of mental strain. Expert surgeons had a decrease in their stress levels as they progressed into the second half of the procedure. Conversely, novice residents had an increase in their stress level. This study highlights the value of surgical expertise in decreasing mental strain. Our future efforts will be focused on validating HRV analysis as an objective indicator of surgical expertise.

P302

Reducing healthcare delivery costs using Augmented Reality-based Surgical Simulation: A Health Economics Study

Elliot Street, Dr; David Rawaf, Dr; Jordan Van Flute; Harry Sharples, Dr; Luqman Tenang, Dr; Ross Davies; Inovus Medical

Aim: To understand the impact of AR training on patient and surgical outcomes.
Method: Needham et al. estimated costs of a laparoscopic appendectomy in 2007. Using this data, we estimate the financial impact the technology may have through improvement in surgical outcomes. The costs were estimated using the PSSRU hospital and community health services (HCHS) index. Currently, median times for a laparoscopic completed procedure and a laparoscopic conversion are estimated to be 59 min and 101 min, respectively. The median total hospital stay is 3 days and 0.22% of patients will have bowel perforation. Currently, median theater costs are £780 per patient, with ward costs at £776. Thus, the total in-patient cost for a laparoscopic appendectomy is £1,903. Using this estimate, we are able to calculate the possible cost savings per patient.
Results: The average cost in theatre is assumed to reduce from £780 to £702, and the cost of bowel perforations from £2,153 to £1,937. Thus, total cost difference per patient is estimated at £79. It should be noted that this cost difference assumes that all the benefit of the surgical technology will be realised in every procedure undertaken in theatre. This is based on a 10% efficiency saving of completion time. Study results indicate that up to 60% can be saved in total operative time.
Conclusion: Assuming a conservative 10% saving on total operative time, and 150 trusts with a total of 10,000 surgeries a day (including the fixed costs of equipment), total cost savings in the first year will be £777, 579 realized after the 115th surgery. In subsequent years, the cost savings will be £786,574 per trust.
This process was peer reviewed by the Inovus clinical excellence team and the British Medical Journal (BMJ).

P303

Simulated Laparoscopic Appendicectomy Project (SLAP) & its effects on objective performance metrics

Ross Davies[1]; David Rawaf, Dr[1]; Gurpreet Beghal, Dr[2]; Joseph Toms, Dr[2]; Anna Joynson[3]; Harry Sharples, Dr[1]; Noor Kaur[3]; Elliot Street, Dr[1]; Jordan Van Flute[1]; [1]Inovus Medical/NHS; [2]ESTH/NHS; [3]UoL/Inovus

Study Objective: To assess the impact of Augmented Reality Training on improving completion of Laparoscopic Appendicectomies using objective performance metrics.
Design: Utilising the LapAR™ by Inovus Medical Ltd (UK), we supervised surgical trainees performing several Augmented Reality simulated appendectomies interspersed with LapPass tasks*. Objective metrics measured include time to completion, distance travelled by instruments, instrument acceleration, hand dominance, and instrument time in view.
Comparison was made with a benchmark score set by an experienced minimally invasive surgery (MIS) surgeon. Subjective performance

feedback was also provided by experienced surgeons using the work-based assessment (WBA) framework.

*Activities including laparoscopically passing thread through a hoop, manipulating hoops between instruments, positioning hoops on posts, cutting simulated skin within guidelines, and placing sutures laparoscopically.

Setting: A National Health Service (NHS) University Teaching hospital in South London.

Patients or Participants: Surgical trainees (Senior House Officers and Registrars) qualified doctors of at least 1 year.

Interventions: During the course, benchmarks of both LapPass tasks and Appendicectomies were set by each trainee in addition to an experienced MIS surgeon. Trainees were then asked to perform a series of tasks, including further Appendicectomies and LapPass tasks. Following this period of intervention, trainees were set a final benchmark to compare to their original.

Measurements and Main Results: We found that the performance metrics improved when comparing initial & final benchmarks. In addition, the final benchmark metrics of the trainees were compared in a standardization exercise to the benchmark set by the experienced MIS surgeon. Of note, time to completion and distance traveled were both markedly reduced following the intervention period. WBA-based review of performance demonstrated a marked improvement in surgical skill.

Conclusion: Augmented Reality task training using a high-fidelity Laparoscopic box trainer such as the LapAR^{TM} improves objective and subjective performance in simulated appendicectomy completion. It can be inferred that this technique improves the surgical learning curve whilst safely taking it away from the live patient.

P304

Robotic Skills Acquisition in General Surgery Residency: A Retrospective Analysis of Performance Data on an Inanimate Deliberate Practice Model of an Intestinal Anastomosis

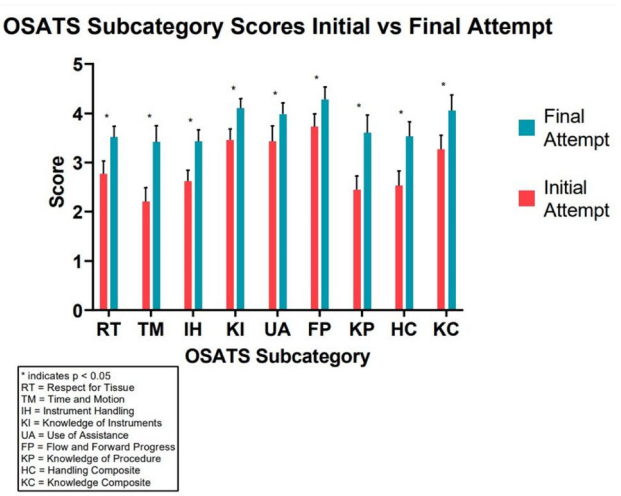
Benjamin Rail, BS; Andres A Abreu, MD; Emile Farah, MD; Rodrigo E Alterio, MD; Ganesh Sankaranarayanan, PhD; Herbert J III Zeh; Daniel J Scott, MD; Patricio M Polanco, MD; University of Texas Southwestern Medical Center

Introduction: The integration of robotic surgical training in a time-scarce residency program is a new challenge for programs and institutions. Simulation-based training allows residents to learn the necessary skills on the platform as efficiently as possible without compromising patient safety. There are lack of data regarding the learning curve for residents to master task-specific robotic surgical skills. The purpose of this study is to assess the rate of achievement of proficiency on an inanimate robotic tissue anastomosis drill across various performance metrics.

Methods: After completing a validated set of proficiency-based virtual reality and inanimate robotic curriculum, residents advance to bio-tissue drills, each meant to simulate a technically demanding component of an operation. One of these bio-tissue drills is a side-to-side intestinal anastomosis: a relevant skill for most gastrointestinal robotic surgeries. Each attempt was graded independently by two trained graders using the validated Objective Structured Assessment of Technical Skill (OSATS) scale, composed of seven subcategories, each graded out of 5, for a maximum possible score of 35. Proficiency was defined as OSATS score > 28. Residents must have had at least two consecutive attempts for inclusion. Performance data were gathered over a three-year period and analyzed using independent t test and Welch's ANOVA with the Games–Howell post hoc test.

Results: 37 residents performed a total of 133 attempts for an average of 3.2 attempts per resident. Total attempts ranged from 2 to 6 with an average of 3.6 attempts to achieve proficiency. Average OSATS score increased from 20.7 on initial attempt to 26.8 on final attempt ($p < 0.001$). Time to completion decreased from 47.1 min to 36.5 min ($p < 0.001$). Of the OSATS subcategories, time and motion showed the greatest average improvement of 1.31, 95% CI [0.90, 1.72] ($p < 0.001$). On average, knowledge-based subcategories improved the most between the first and second attempt, but handling-based subcategories improved more overall (Fig. 1). A low score on knowledge-based subcategories on initial attempt was found to be an independent risk for failure to achieve a passing score after five or more attempts.

Conclusion: All performance metrics improved over multiple attempts of our simulated, deliberate-practice model of an intestinal anastomosis. All residents who achieved proficiency did so within five attempts and those who did not pass after five attempts showed persistent deficiency in knowledge-based categories. Residents improved the most on OSATS subcategories related to handling and relatively less on the knowledge-based subcategories.



P305

Competition-based learning: Inspiring Interest In Surgical Skills Development

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Introduction: Competition based learning (CBL) involves student-centered teaching that facilitates learning through competitions. The acquisition of minimally invasive surgical (MIS) skills is done mainly in simulation laboratories. However, laboratory utilization by surgical residents is low due to an excessive clinical workload among other obligations. We hypothesized that the application of a CBL model

(Top Gun Shootout) as part of the validated Top Gun Laparoscopic Skills and Suturing Program (TGLSSP) can be an effective approach to inspire surgical learners to seek further training in technical skills development.
Methods: Participants competed in the Top Gun Shootout, a technical skills competition at the 2022 SAGES Meeting. Participant scores (time to task completion and errors) were recorded for the following tasks: FLS Peg Pass, Bean Drop Task, and intracorporeal suturing. The top three participants and three alternates were identified using a total combined score on all three tasks. The finalists competed in a final, head-to-head contest to determine a winner. After the competition, participants completed a 10-question satisfaction survey on a 7-point Likert scale, with questions assessing 3 domains: 1) capability/confidence in MIS skill performance prior to the competition; 2) applicability and satisfaction with TGLSSP's capacity to develop MIS skills; and 3) interest in seeking additional MIS training and appropriateness of CBL in MIS training.
Results: Sixty participants competed in the Top Gun Shootout. Forty-three particpants completed the satisfaction survey (72%). Geographically, 13 states and 9 different countries were represented among participants. The average participant age was 33.7 years. Sixty-seven percent were males (40) and thirty-three percent were females (20). Seventy percent of the participants were surgical residents (42), twenty percent were attending surgeons (12) and ten percent were non-surgical medical professionals (6) (Medical students, Med-techs, Researchers). On average, participants reported a survey score of 4.86 (± 0.29) for Domain 1, 6.22 (± 0.11) for Domain 2, and 6.55 (± 0.13) for Domain 3.
Conclusion: Current MIS skill training may not be effective and alternative training methods should be explored. Participants reported high satisfaction with the TGLSSP as a MIS skill development tool. This CBL application may be beneficial in the training of MIS skills and it can inspire surgical learners to seek further training in technical skills development.

P306

Central Venous Catheter Insertion Comfort Amongst Residents

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Background: Central venous catheter (CVC) insertion is a commonly indicated procedure which residents regularly perform. Complications include bleeding, infection, pneumothorax, hemothorax, arrhythmia, air embolism, stroke, lack of venous access, and death. Residents who perform simulation are more comfortable with the conduct of this skill and more likely to complete CVC insertion without complications. We have an ongoing simulation curriculum for CVC insertion at our institution. Three simulated exercises compose the curriculum with each including consent, identification of anatomy, sterile preparation, conduct of the procedure, identification of complications, and documentation.
Objective: Determine if resident comfort with CVC insertion was improved through our current simulation curriculum.
Methods: A validated, voluntary survey was administered to first-year residents before the curriculum. General Surgery residents were mandated to complete the training, and all other residents voluntarily participated. The survey was re-administered six months after the curriculum was completed. Pre- and post-surveys were compared for each resident.
Results: Data were collected from 2017 to 2022, a total of 44 surveys were returned. Confidence increased from 37% to 78.7% among residents. The largest increase in reported comfort was in indications for line placement (67.4%) and interpretation of results (65.9%). The least change in reported comfort was with sterile procedures (15.6%) and being supervised (11.1%).
Conclusion: Residents who completed the curriculum become more comfortable with CVC insertion. Comfort level increased in each training year, but may have been more significantly impacted by clinical duties during COVID. Limitations of this study include inability to correlate results with procedural competency and patient outcomes.

P307

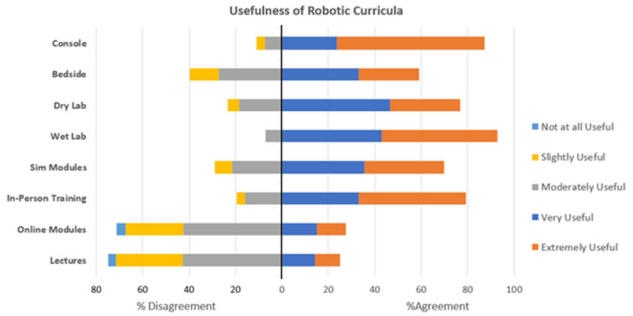
Survey of General Surgery Resident Experience with Robotic Surgery and Curricula

Audra J Reiter[1]; Amy L Holmstrom[2]; Charles D Logan[1]; Jonah J Stulberg[3]; Ezra N Teitelbaum[4]; Maura E Sullivan[5]; [1]Surgical Outcomes and Quality Improvement Center, Department of Surgery, Northwestern University Feinberg School of Medicine; [2]Department of Surgery, Weill Cornell Medical Center, New York, New York; [3]Department of Surgery, University of Texas McGovern Medical School, Houston, Texas; [4]Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, Illinois; [5]Keck School of Medicine, University of Southern California, Los Angeles CA

Background: Robotic surgery has become increasingly utilized in general surgery but there are currently no formal training or case number requirements for general surgery residents. Many general surgery residency programs are developing their own curriculum to train residents. The goals of this study were to assess general surgery residents' perceptions regarding the use of robotics and to identify components of and barriers to successful implementation of a robotics curriculum.
Methods: A 25-question survey regarding robotics training was distributed to a convenience sample of general surgery residents at 16 programs across the USA from March to May of 2020. Programs were identified through contacts of the Surgical Education Research Fellowship through the Association of Surgical Education. Questions focused on residents' career plans, specific components of robotic surgery curricula offered at their institution, perceived utility of curricular components, and assessment of their existing robotic training and clinical exposure.
Results: A total of 138 general surgery residents from 15 states responded to the survey with a response rate of 35%. The respondents were 54% female with a median age of 30 years (interquartile range: 29–32) and the majority (92%) were from university-based programs. Most residents plan to integrate robotic surgery into their future careers (n = 85, 62%) and want formal training in robotics during residency (n = 122, 88%). The majority of programs represented have robotic training with 59% of residents reporting the existence of a required curriculum, 31% reported an optional curriculum, and with only 4% reporting there was no formal curriculum at their program. When asked to rate how useful the components of their robotic curriculum were residents most frequently rated wet lab, console, simulation modules, and in-person training as very or extremely useful (Figure). When asked to identify barriers to clinical education in robotic surgery, 55% of residents reported complexity of the case, 53% reported attending inexperience, and 52% reported faculty limiting trainee autonomy as barriers.
Conclusion: Most residents plan to incorporate robotic surgery into their future careers, and the vast majority of residents want formalized training in robotics during residency. However, only 59% of residency programs have a required curriculum for robotic surgery and there are currently no national requirements for robotic surgery

curricula or case numbers during residency. Moving forward, it may be beneficial to develop standardized and/or required robotic surgery curricula to ensure all residents have access to robotics training.

Figure: Reported usefulness of curriculum components



P308

A Mentorship Model Residency and Robotic Training, A Revolutionary Approach

Jamie Whisler; Saniya Ablatt; Virginia Mason Franciscan Health

Introduction: Recent reports demonstrate that general surgery residents often complete their program with a lack of confidence in their abilities and attendings are similarly not confident in their residents. An increased number of residents are now pursuing fellowships, often citing a lack of confidence. This study presents the case of a residency based on a mentorship model to increase one-on-one instruction, operative exposure, and overall competency in surgical practice, with particular attention to robotic cases.
Methods: A systematic literature review was completed regarding trainee confidence and competency. The case logs and hours of all residents at the Virginia Mason Franciscan Health General Surgery Program in Tacoma, Washington were obtained. Publicly available ACGME case log data were also examined.
Results: Several recent studies demonstrated that 26–40% of graduating residents and even fellows do not feel confident performing many robotic procedures. Anecdotally, trainees at our institution reported increased confidence in their operative skills and abilities. Interns completed significant portions of approximately 40 robotic cases. PGY-2 levels averaged 50 colorectal, 65 bariatric, 6 foregut, and 26 general surgery robotic cases as surgeon juniors, while many traditional programs do not allow their residents to sit on the console until their PGY-4 year. Worth mentioning, these PGY-2 s are never scheduled with another resident, they run their own service, and are mentored extensively one-on-one. In addition, the typical PGY-2 here completes his/her year with 640 cases, compared to the 250 required by ACGME. Residents were able to complete all of this while averaging 65–70 h per week, well below the 80-h/week maximum that many programs struggle to stay under.
Discussion: The novel mentorship model presented by our program allows trainees an accelerated operative exposure, all while working less hours than most residencies. This appears to be associated with increased confidence and should be studied further to improve our education. Robotic training has not yet been well incorporated in more traditional programs, some programs have yet to obtain a robot, and having multiple residents on a service means only seniors get the robotic experience. Most Da Vinci representatives recommend 40–50 cases as the learning curve, which our residents will have completed early in their second year, hopefully giving themselves plenty of time to improve their craft and hit the ground running as not just competent attendings, but excellent ones.

P309

A Systematic Review on The Value of Robotic Surgery Simulation for Training Surgical Residents and Attendings

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Introduction: Simulation has been the go to option for robotic surgery education though little is known about the patient-related outcomes of this style of training. The purpose of this review is to summarize existing evidence on the outcomes of robotic surgery simulation using the ROI Methodology. This evidence-based evaluation framework breaks evidence into 5 discrete levels. These are defined as follows: level 1 = reaction, level 2 = learning, level 3 = application and implementation, level 4 = impact, and level 5 = return on investment. This review will answer the question: "To what extent are robotic simulations for training novice robotic general surgery residents and attendings associated with improved outcomes at levels 3–5 in comparison to no simulation training?".
Methods: The PRISMA-2020 statement was used to guide the conduct of the systematic review. A comprehensive search of four databases was performed using a combination of key words and terms. Abstract and title screening were performed by one individual. Level 1 and 2 outcome papers along with those not including general surgery residents were excluded. Full-text screening was then completed by two screeners independently and in duplicate. Data extraction and quality assessments were performed with findings synthesized in narrative themes.
Results: 1524 abstracts were imported into the Covidence systematic review software. Of those abstracts, 119 met criteria for full-text screenin, and a final set of 9 studies were selected for inclusion. Six studies with level 4 and three level 3 papers were available. The three level 3 studies available suggest that simulation does not increase usage of the robotic platform. What limited data exist point to a possible benefit in operating room time, cost, and blood loss but shows no congruency between the studies. There were no level 5 studies to evaluate.
Conclusion: Despite the increase in the use of simulation for robotic surgery training, there is limited evidence demonstrating the benefit of simulation on patient- and hospital-related outcomes. To fill these gaps significant increases in research will need to be done at higher outcome levels.

P310

Overcoming the learning curve: achieving surgical expertise through robotic simulation

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Introduction: The implementation of robotic surgery has increased over recent years; thus, surgical training programs have begun implementing robotic simulation curricula. However, these curricula are not standardized across programs, and the question of how to train surgical residents on the robot and measure their progress and proficiency remains difficult to answer. We aimed to measure the degree of the learning curve on robotic simulation modules of varying difficulty between junior and senior operators to determine which have a true impact on training.

Methods and Procedures: General surgery residents and attendings at a single institution were asked to complete nine robotic simulation modules on the DaVinci® skills simulator until mastery was reached within a 14-day timeframe. The nine modules consisted of Camera 0, 30-Degree Scope Swap, Clutch, Wrist Articulation 1, Sea Spike 1, Sea Spike 2, Ring Rollercoaster 1, Big Dipper Needle, and Combo Exercise. Mastery was defined as obtaining an aggregate score of ≥ 90. Operators were allowed a maximum of 10 attempts to reach mastery. If unable to attain mastery, an attempt value of 11 was assigned. Participants were placed into two cohorts: junior (n = 10, Clinical PGY-1/2/3 plus research residents) versus senior (n = 10, Clinical PGY-4/5 plus attendings) operators. The ability and number of attempts to reach mastery were compared between the two cohorts.
Results: All 10 senior operators achieved mastery in the nine modules. In contrast, 30% of junior operators failed to achieve mastery in at least one of the nine modules. Junior operators required more attempts to reach mastery compared to senior operators in the following modules: Camera 0 (3.0 vs. 1.0, p = 0.041), Ring Rollercoaster 1 (5.5 vs. 1.0, p = 0.007), Sea Spike 2 (8.5 vs. 2.0, p = 0.02), Big Dipper Needle (6.0 vs. 2.0, p = 0.017), and Combo Exercise (5.0 vs. 2.0, p = 0.015). There were no differences in attempts to reach mastery between the two cohorts in the following modules: 30-Degree Scope Swap (1.0 vs. 1.0, p = NS), Clutch (1.5 vs. 1.0, p = NS), Wrist Articulation (2.0 vs. 2.0, p = NS), and Sea Spike 1 (4.0 vs. 2.0, p = NS).
Conclusion: Exercises requiring a combination of fundamental skills such as spatial awareness, camera management, and needle control had a steeper learning curve for junior operators compared to modules focusing on a single task. This suggests the need for a standardized, dedicated robotic simulation training curriculum focusing on advanced modules at an earlier stage in a resident's training to ultimately prepare trainees for real-time robotic surgery.

P311

Years of Training and Operative Performance: Do More Senior Residents Perform Better? Advanced Laparoscopic Course in the Animal Lab

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Introduction: The objective of this was to examine the relationship between years of training and operative performance of residents in the advanced laparoscopic training course in the animal lab.
Methods: Senior surgical residents (PGY3-PGY5) performed laparoscopic splenectomy, Nissen fundoplication, low anterior colon resection, and small bowel anastomosis on live pigs. Assessment tools with proven validity evidence were used to assess their operative performance (global and procedure-specific rating tools). We used Global Operative Assessment of Laparoscopic Skills (GOALS) to assess the performance during laparoscopic splenectomy, a procedure-specific assessment tool and GOALS for Nissen fundoplication, and Operative Performance Rating System (OPRS) for low anterior colon resection and small bowel anastomosis. Assessments were completed immediately after each procedure by one faculty. The ANOVA tests were conducted to compare the average in the operative performance scores among PGY3-PGY5 residents.
Results: Between 2015 and 2022, 113 splenectomies, 133 Nissen fundoplications, 116 colectomies, and 27 small bowel anastomoses were assessed. Among the cases, only the laparoscopic splenectomy demonstrated a statistically significant improvement in performance score with advancement in training. Table 1 summarizes the average scores for 3 variables (average total scores for GOALS for splenectomy and Nissen fundoplication, average total score for procedure-specific assessment tool for Nissen fundoplication, and average OPRS scores for colectomy and small bowel anastomosis).
Conclusion: Our data showed no significant improvement with years of training in senior residents' operative performance in majority of advanced laparoscopic procedures. The only exception was splenectomy which could be due to the limitation of generic GOALS to measure the levels of performance. These findings may suggest that to improve operative performance, residents would benefit from more advanced laparoscopic suturing practice which is one of the skills that is involved with some of these procedures. These results underscore the importance of objective assessment of performance to determine the learning curve and competency levels in surgical residents.

Assessment Tool	Average Score (SD)			*p* Value
	PGY3	PGY4	PGY5	
Splenectomy (GOALS)				
Total Score*	15.14 (2.87)	16.07 (3.12)	17.92 (3.58)	**0.002**
Nissen Fundoplication (GOALS and a Procedure-Specific Tool)				
Total Score (GOALS)*	15.08 (2.85)	15.92 (3.29)	16.68 (2.93)	0.089
Total Score (Procedure-Specific) **	19.74 (4.40)	20.84 (5.99)	20.64 (5.44)	0.601
Colectomy (OPRS)				
Average OPRS score***	2.92 (0.72)	3.07 (0.83)	3.35 (0.84)	0.081
Small bowel anastomosis (OPRS)				
Average OPRS score***	2.38 (0.45)	2.60 (0.30)	2.64 (0.53)	0.407

* Total score for GOALS is out of 25.
** Total score for procedure-specific assessment tool for Nissen fundoplication is out of 35.
*** A Likert scale, 1-5 was used for all variables included in average OPRS score.

P312

Usability, Ergonomics, and Educational Value of a Novel Remote Telestration and Augmented Reality Device for Surgical Coaching

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Introduction: Feedback is the cornerstone of deliberate practice and acquisition of professional expertise—a process that is critical for effective surgical training. One challenge to surgical coaching is the communication barrier educators face when attempting to articulate feedback with direct reference to the surgical field—both intraoperatively and for postoperative video analysis. To augment the coaching experience, a prototype wireless handheld telestration device was developed, enabling interaction with the surgical field on a remote monitor. This study evaluates the tool's usability, ergonomics, and educational value.
Methods and Procedures: A prototype was developed with four core functions for video-based coaching: 1) free-hand annotations, 2) cursor navigation, 3) overlaying and manipulating ghost instruments, and 4) video feed navigation (play, fast forward, etc.) on a remote monitor (Fig. 1). The augmented reality (AR) system is tracked using Vive and Steam VR systems. After installation of a customized Unity-based software and device calibration, users interact on any video feed (prerecorded or live) playing on the monitor. Surgeons and trainees were invited to experience and test various features of the platform by performing standardized tasks. Usability, ergonomics and educational value were evaluated with 5-point Likert scale surveys and a validated System Usability Survey (SUS).
Results: Ten subjects (9 surgeons, 1 trainee; 5 male, 5 female) participated. Participants strongly agreed or agreed that it was easy to

perform annotations (90%; neutral = 0%), video feed navigation (85%; neutral = 15%), and manipulation of ghost instruments (60%; neutral = 33%) on the monitor, respectively. With regard to ergonomics, 40% of participants strongly agreed or agreed (neutral = 40%) that the device was physically comfortable to use and hold. These results are consistent with comments made on the device's size and weight. The median SUS was 75 (interquartile range [63–84]) indicating above average satisfaction. Participants responded favorably on the device's potential educational value, particularly for postoperative coaching (strongly agree = 40%; agree = 60%).
Conclusion: Preliminary testing of a wireless telestration and AR device customized for surgical coaching suggests favorable usability and potential educational value amongst users. Future prototypes should focus on improving design and ergonomics. Ultimately, such tools can be incorporated into pedagogical models of surgical coaching to optimize feedback and training.

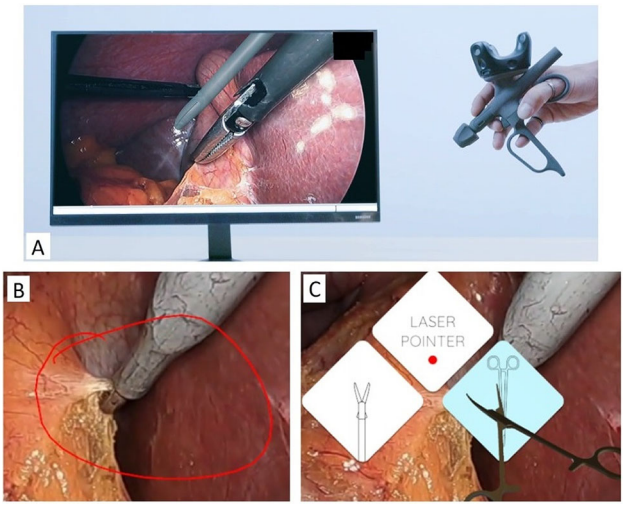


Fig. 1 Wireless telestration and AR device customized for surgical coaching, showing ghost laparoscopic instrument overlay (A), annotation (B), and its menu selection interface (C).

P313

Porcine potential: resident perceptions of a novel live animal tissue training session

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Introduction: The prevalence of robotic-assisted surgery has increased exponentially over the past two decades; however, no universal standard exists for robotic surgery training. Training curricula reported in the literature rely primarily on robotic console simulation with few incorporating live tissue models. We sought to determine the face and content validity of a live porcine tissue training session and evaluate current perceptions of robotic-assisted surgery.
Methods: This is a multi-institutional study including general surgery residents (PGY2-6) who were invited to participate in a live porcine tissue training session which consisted of the following components: port placement and docking, cholecystectomy, bowel resection, and anastomosis. We conducted participant surveys to assess perceptions of the exercise, confidence in technical skills, and attitudes regarding robotic surgery in practice using likert-like rating scales. Respondents rated exercise realism, educational benefit, and effectiveness in teaching robotic skills. Pre- and post-training skills and confidence assessments were compared using Wilcoxon signed-rank tests.
Results: Nineteen general surgery residents participated in the porcine training exercise and completed the survey. Among the technical components of the session, usefulness of basic robotic skills was rated highest (4.95 on a 5-point Likert scale) followed by port placement and docking (4.58), cholecystectomy (4.16), and bowel resection/anastomosis (3.26). Following the exercise, all participants reported improvement in robotic surgical ability. Respondents rated the realism of the exercise, educational benefit, and effectiveness in teaching robotic skills all highly (9.05, 9.42, and 9.53, respectively). Post-training ratings of skills and confidence levels were statistically higher than pre-training ($p < 0.001$ and $p = 0.001$, respectively).
Conclusion: Interest in robotic surgery continues to grow amongst general surgery residents underscoring the need for a standardized curriculum. Robotic surgery is overall viewed more favorably by our cohort when compared to previous studies. This study confirmed the face and content validity of this live porcine training exercise, which, if feasible, should be incorporated into such programs.

P314

Validating a simulation training model for ileo-transverse intracorporeal anastomosis

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Background: Intracorporeal ileo-colonic anastomosis has become the standard for laparoscopic right hemicolectomy, supported by evidence-based benefits, nevertheless the penetration of this technique has not been satisfactory. Laparoscopic suturing poses a challenge in colorectal surgery due position and mobility of the colon, but specific training alternatives for these procedures are scarce. We aim to describe the validation process of an ileo-transverse intracorporeal anastomosis (ITA) simulation-based training module.
Methods: A validation study was proposed. An ex vivo model was designed based on surgical videos and colorectal surgeons' experience. To test face and content validity residents and surgeons with variable levels of expertise were included. Previous surgical and training experiences were documented. Face validity was obtained using surveys, answered after testing the model. To assess content validity, participants were asked to perform an ITA in simulation scenario and performance between experts and the rest of the sample was compared. We defined "Laparoscopy Expert" as "having at least 200 laparoscopic procedures as first surgeon and at least 200 procedures in colorectal laparoscopy (no matter the role)." We also defined "ITA expert" by adding to the previous criteria "Uses intracorporeal anastomosis as the standard reconstructive procedure in right hemicolectomy". Two-blinded evaluators assessed the performance of the participants using validated scales (OSATS and a specific rating scale for intracorporeal anastomosis (SRS)). Participants assessed by a single evaluator were excluded. Non-parametric statistics were used. Median [IQR] are expressed.
Results: 18 subjects were included in the face validity process: 9(50,0%) colorectal surgery fellows, 6(33,3%) colorectal surgeons, 2(11,1%) surgery residents, and 1(5,5%) MIS surgeon. Regarding

colon and ileum, 83.3% and 61.1% of participants declared acceptable or maximum fidelity when compared to real cases. Considering ergonomics and anatomy, 55,5% and 72,2% declared that the model was like a surgical scenario. Regarding content validity, when considering "Laparoscopy experts" (n = 4), they obtained a significantly higher OSATS score (18.7 [17.7–19.5] vs 15 [14.5–15.5], p = 0.019). No other significant differences were found. Regarding "ITA experts" (n = 2), they performed significantly better in procedural time (21.26 [18.53–24] vs 36.35 [30.2–38.2] mins, p = 0.048) and obtained better scores, although not statistically significant (OSATS: 18.75 [18–19.5] vs 15 [14.5–16], p = 0.07; SRS:147 [13.5–16] vs 11.5 [11–14], p = 0,16).

Conclusion: An ex vivo tissue-based model for ileo-transverse anastomosis is feasible and can effectively represent the surgical scenario. We demonstrated how the performance in this model depends on prior surgical experience, specifically regarding laparoscopic colorectal surgery, thus obtaining content validity. Transfer of the simulation-based learning curve to the OR remains to be studied.

P315

Correlation between blinded expert subjective assessment and objective data on a laparoscopic cholecystectomy virtual reality simulator

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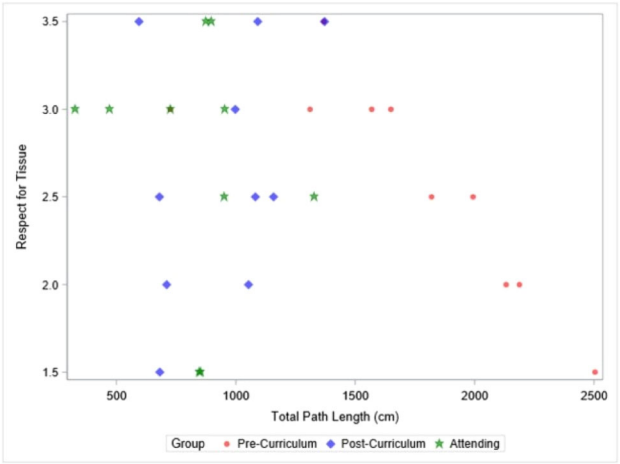
Introduction: Simulation has become a vital tool in surgical training. A virtual reality (VR) simulator allows trainees to repeatedly perform various complicated tasks, such as laparoscopic cholecystectomy (LC) without impacting patient care. Traditionally, a trainee's performance was assessed subjectively by an expert surgeon. However, the VR laparoscopic simulator can provide immediate objective data. We hypothesize there is a direct correlation between subjective assessment and objective data.

Methods and Procedures: We measured performances of PGY 2–4 general surgery residents and surgical attendings at a single institution who completed a LC simulation module using the LAP Mentor™ (Simbionix, Cleveland, OH). The residents participated in a one-month simulation curriculum. The resident's performance before and after the curriculum (pre-curriculum and post-curriculum) and attending doctor's performance were recorded. Randomly selected performances were evaluated blindly by two trained expert surgeon evaluators using the validated Global Operative Assessment of Laparoscopic Skills (GOALS) form, Objective Structured Assessment of Technical Skills (OSATS) form, and a LC-specific simulation assessment form (LC-SIM). Objective performance metrics were provided from the VR laparoscopic simulator. Spearman correlation coefficients were used to compare evaluator assessment to objective simulator metrics.

Results: Thirty simulated LC were randomly selected for review, 10 each from 17 pre-curriculum resident LC, 23 post-curriculum resident LC, and 11 attending LC. There were significant differences between resident and attending operative experience, as expected. There were no differences in simulator experience or Fundamentals of Laparoscopic Surgery (FLS) certification among groups. There was a strong correlation ($r < -0.60$, $p < 0.05$) between subjective scoring (OSATS, GOALS) and objective metrics among pre-curriculum resident performances. There was a significantly strong correlation between "Respect for tissue" and "Total path length" defined as the total number of centimeters that the tips of both instruments moved ($r = -0.90$, $p < 0.01$, Fig. 1) and "Path length of the right instrument" defined as the total number of centimeters that the tip of the right instrument moved ($r = -0.90$, $p < 0.01$), as well as the total score of GOALS and "Path length of the left instrument" ($r = -0.95$, $p < 0.01$). There were no significant differences between post-curriculum residents and attendings.

Conclusion: For pre-curriculum residents, there was a strong correlation between subjective and objective performance metrics on a VR laparoscopic simulator. A combination of subjective assessment and objective data might provide more accurate and instantaneous feedback for the trainee.

Fig. 1 Scatterplot of Total Path Length by OSATS Respect for Tissue, stratified by group



P316

Robotic General Surgery Training Curriculum for Residents at an Academic Medical Center

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Background: Robotic-assisted surgery is on the rise across the nation and across different specialties. While more prevalent in daily surgical practice, there are a paucity of standardized robotic curricula in general surgery training. The purpose of this study is to evaluate the effectiveness of a standardized robotics curriculum in the Houston Methodist Hospital general surgery residency program.

Hypothesis: The implementation of a formalized robotics general surgery curriculum will increase the robotic surgical ability of Houston Methodist General Surgery residents.

Methods: A single-institution formal education curriculum was developed to evaluate residents from levels PGY-1 to PGY-5. The standardized curriculum included two robotics training symposia as well as an evaluation form completed by operating faculty to score residents on ten metrics scaled 1–5 (1: Poor, 2: Fair, 3: Good, 4: Very Good, and 5: Excellent). These metrics included tissue dissection, tissue handling & retraction, robotic stapler use, arm exchange, endoscopic camera use, intracorporeal suturing, wristed articulation, port placement, robot docking, and "intangibles" such as ergonomic advantage and performance). Data on resident scores were collected over one academic year and analyzed.

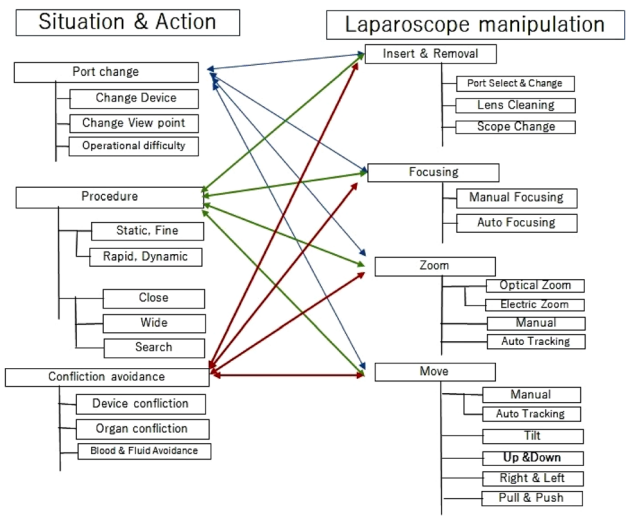
Results: A total of seven PGY-1, seven PGY-2, six PGY-3, four PGY-4, and five PGY-5 general surgery residents were evaluated during the course of the academic year. Aggregate average scores across all metrics increased with PGY-level as expected. Robot docking had the highest mean score across all PGY levels at 4.36, while robotic stapler use had the lowest score at 3.06. Interestingly, the largest average score advancements were observed between the PGY-1 to PGY-2 years and PGY-4 to PGY-5 years, indicating potential timepoints for targeted skill development.
Conclusion: As trainees gain more robotic surgery experience, the need for a standardized robotic general surgery curriculum increases. The establishment of a formal robotic surgery curriculum has the potential to provide key insights into the strengths, weaknesses, and learning trends of general surgery trainees at Houston Methodist Hospital.

P317

Ontological analysis of laparoscopic manipulation for the development of fully automated laparoscope manipulator

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Background and Objectives: For the development of fully automated laparoscope manipulator, ontological analysis of laparoscope manipulation is required for the artificial intelligence (AI). Ontology is defined as explicit formal specification of terms or concepts in a domain and relations in the field of AI. This study suggests a method of ontological analysis of laparoscope manipulation and investigates the feasibility of applying an ontological analysis for the developments of fully automated laparoscope manipulator.
Materials and Methods: Situation and action between surgeon and laparoscope during the endoscopic surgery were analyzed, and they were ontologically described and investigated.
Results: Situation and action of surgeon's manipulation of laparoscope, such as focus, zoom, tilt, search, and confliction avoidance during endoscopic surgery were successfully classified and described with reference to the ontological concepts.
Conclusion: Ontological descriptions of laparoscope manipulation are feasible and promising for the developments of fully automated laparoscope manipulator. Also, the ontological descriptions laparoscope manipulation can be applied in several areas, such as medical alert systems for patient safety and evaluation of surgeon's skill.



P318

A Bibliometric Analysis of General Surgery Residents Entering into Minimally Invasive Surgery

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Objective: The fellowship application for advanced GI/bariatric minimally invasive surgery (MIS) fellowships is competitive and involves screening applicants based on a series of factors – one of which is research productivity. Bibliometric methods have been developed to evaluate the quality and quantity of research output. This study investigates the research of general surgery residents who successfully entered an advanced GI/bariatric MIS fellowship.
Methods: Using the Fellowship Council website, the authors identified 106 advanced GI/bariatric MIS fellowships for the 2021–2022 academic year. Program websites displaying fellow names were selected for analysis and the fellow names were entered into Google Scholar, Scopus, and ResearchGate. Bibliometric variables were collected, including number of publications, number of MIS publications, and number of citations prior to entering fellowship. Factors associated with research output were assessed with regression models.
Results: Only 31% of advanced GI/bariatric MIS fellowships listed fellows on websites. 66% of fellowships were academic hospitals, 16% were community hospitals, and 18% were university-affiliated hospitals. 72% of fellowships had one displayed fellow, 25% had two displayed fellows, and 3% had three displayed fellows (1.31 ± 0.44 fellows on average per year). Only 10% of fellowship programs matriculated residents with a Doctor of Osteopathic Medicine (DO) degree compared to a Doctor of Medicine (MD) degree. The average number of publications for a general surgery resident entering advanced GI/bariatric MIS fellowship was 3, with an average of 1 publication within the field of MIS. On average, an incoming advanced GI/bariatric MIS fellow had 14 total citations. Fellows who trained at academic hospitals had a significantly higher number of total publications ($p < 0.05$). There was no significant different in scholarly activity and productivity by fellowship geographic region.
Conclusion: Most advanced GI/bariatric MIS fellowships are located at academic hospitals with an average of one fellow in-house. About 33% of general surgery residents' research output prior to MIS fellowship is related to the field. Academic training facilities may attract candidates with greater scholarly productivity and provide resources for succeeding in research moving forward.

P320

Video Assessment as an Integral Part of Resident Robotic Training Curriculum

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Introduction. Video review for improvement of individual performance is routinely used in many disciplines, including sports, dance, and music. However, it is infrequently used in surgical education, despite the similarities surgery shares with these other fields. In light of overall decreasing case volumes for graduating residents, we identified video review as a possible avenue to improve the quality of learning from operative cases. In the current resource and financial restricted healthcare environment in the fallout of the COVID-19 pandemic, video review presents an excellent opportunity to improve resident training with no increase in institutional cost.
Methods. We recently introduced a new mandatory robotics training curriculum that includes video review as a key component at our

General Surgery Residency Program of 33 residents. Videos of robotic cases are easily recorded using existing equipment. They are de-identified, edited by residents with open-use 3rd party software, and uploaded to a secure institutional server for review with faculty. The use of existing technology makes participation easier on the part of both residents and faculty, thereby improving compliance and feedback. At the junior level (PGY 1–2), residents are required to submit videos of basic skills, such as suturing and knot tying, to demonstrate competence and promote faculty feedback on operative technique. At the senior level (PGY 3–5), residents must submit full cases prior to completion of the curriculum. Self-review and review with faculty are both performed using standardized rubrics. Subjective metrics of resident satisfaction and faculty assessment of performance can be followed over time, as well as objective metrics, such as the percent of the case completed by the resident or the time taken to complete portions of cases, which are currently available and collected with use of robotic platforms.

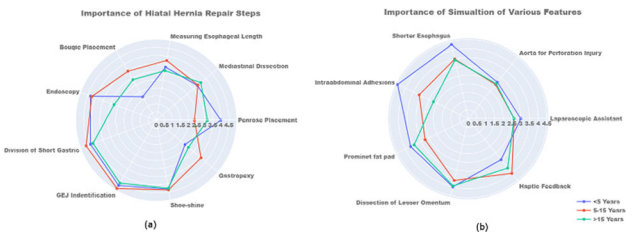
Results. Our initial surveys of residents show those who have engaged in video review found the experience helpful, especially if the review was done with an attending or senior resident who could provide feedback on operative performance; however, we remain in the early stages of the implementation.

Conclusion. We propose video review as a way to accelerate surgical training in the modern residency learning environment. We propose use of existing infrastructure and technology to make video review a standardized part of residency training that is easy to implement, participate in, and track at no increased institutional cost.

P321

Needs analysis for the development of a virtual laparoscopic hiatal hernia simulator

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Introduction: Laparoscopic hiatal hernia surgery is complex, advanced procedure and may be associated with high recurrence rates. Surgeon performance may be enhanced using simulation-based training, but platforms and data are lacking. Our goal is to develop a virtual reality simulator for laparoscopic hiatal hernia repair. The purpose of this project was to perform a needs assessment to inform these efforts.

Methods: An IRB-approved 48-item survey was created to assess demographics, prior experience, and preferences regarding technical details (such as the order of steps, use of mesh, and calibration). The items also evaluated the importance of various steps and features for the design of a suitable simulator. The survey was administered using a REDCap platform and distributed to experts (n = 250) via the SAGES Foregut Task Force and practicing foregut surgeons in north America. Descriptive statistics and Kruskal–Wallis test were used for analysis.

Results: Completed surveys were received from 33 experts (response rate 13%). Participants' clinical experience was > 15 years (60%), 5–10 years (30.3%), and < 5 years (9.1%). The top two learning methods included live intraoperative teaching (76.7%) and dedicated fellowship training (70%). The number of cases needed for proficiency was reported as 11–20 (23.3%), 21–30 (26,7%), 31–40 (23.3%), and > 40 (26.7%). Initiating the hernia sac dissection at the right crus was preferred by 72.4%. Minimum intraabdominal esophageal length was 2 cm (17.2%), 3 cm (41.4%), 4 cm (31%), and 5 cm (6.9%). For identification of GEJ, 41.4% preferred endoscopy, 51.7% laparoscopic visualization, and 6.9% both. Crural closure was performed using intracorporeal (72.4%) and extracorporeal (13.8%) suturing, with pledgets used routinely (34.5%), frequently (13.8%), rarely (27.6%), and never (24.1%). Relaxing incisions were used rarely (65.5%) and never (34.5%). Mesh was implanted frequently (34.5%), rarely (51.7%), and never (13.8%). Fundoplication preferences included Toupet (48.3%), Nissen (44.8%), Dor (3.4%), and LINX (3.4%). A bougie was used for calibration by 62.1%. Figure 1 shows weighted averages of importance ratings for procedural steps and 1b shows the weighted averages of the preferences in various simulation features in the virtual simulator for the three experience levels; Kruskul–Wallis tests showed that all groups agreed on these parameters ($p > 0.05$).

Conclusion: This study identified preferences of experts that will be useful in designing a virtual reality hiatal hernia simulator. Further, experts agreed on the relative importance of procedural steps which will facilitate performance assessment.

P322

The educational effectiveness of telementoring for continuing professional development in practicing surgeons: A systematic review

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Introduction: Expert surgeons can coach less-experienced surgeons in a remote location using video-conferencing communication referred to as telementoring. The accessibility and convenience of telementoring can provide opportunities for practicing surgeons to participate in continuing professional development activities. We performed a systematic review to determine the educational effectiveness of existing telementoring interventions for practicing surgeons.

Methods: We performed a comprehensive search of electronic databases (MEDLINE and EMBASE) using broad search terms from 1946 to August 2022. We included studies assessing the educational effectiveness of telementoring interventions for practicing surgeons. We excluded reviews and commentaries, studies with an in-person component, studies involving surgical trainees only, and studies not evaluating educational effectiveness. Two independent reviewers performed screening, quality assessment, and data extraction. We assessed the quality of evidence using the 18-point Medical Education Research Study Quality Instrument (MERSQI) and categorized educational outcomes using Moore's Expanded Outcomes Framework.

Results: We retrieved a total of 1325 records. After screening titles and abstracts for relevance, we excluded 96 duplicates and 1003 records, reviewed 226 full-text articles, and selected 22 studies for inclusion in our review. Almost all studies (21/22) described telementoring in minimally invasive surgery (MIS) in simulation or a patient setting. Telementoring was delivered across countries, low resource settings, and from tertiary to community hospitals. The average MERSQI score of included studies was 10.7 ± 2.4. Two studies described surgeons' satisfaction with telementoring (Moore's

Framework Level 2), 1 study reported declarative knowledge gains (L3a), and 1 reported procedural knowledge gains (L3b). Three studies assessed surgeons' competence in an educational simulated setting (L4). Five studies reported changes in surgical outcomes (L5) as a result of the telementoring intervention and 10 measured outcomes in patient health (L6). No studies reported changes in community health (L7).
Conclusion: Telementoring improves practicing surgeons' knowledge, competence, and performance. Additionally, telementoring has demonstrated potential to improve patient outcomes, yet further research is required to measure improvements in community health.

P323

Video-Based Feedback: Evaluating General Surgery Residents Perceptions

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Introduction: Video-based feedback (VBF) is an emerging tool in surgical technical skills acquisition. However, despite many studies demonstrating the utility and efficacy of this tool as an adjunct in surgical training, many obstacles remain prior to widespread implementation into surgical residencies. Our study aims to understand the resident perspective on key benefits and challenges to this format of surgical skills feedback in its pre-implementation phase.
Methods: An anonymous survey was distributed to general surgery residents (PGY-1 to PGY-7, N = 58) at a single-institution from 09/2022–11/2022. VBF was introduced as a potential program for residents involving intra-operative recording of all their minimally invasive surgical cases, which would then be de-identified, analyzed by expert surgeons, and returned to residents with personalized operative feedback. In addition, residents would have access to a feedback dashboard of all their cases, as well as a de-identified video library of annotated cases performed by other surgeons. The survey consisted of resident demographics, perceived benefits, and challenges of incorporating a VBF program into the general surgery residency. The survey format included multiple-choice, five-point Likert scale, rank order, and open-ended questions.
Results: The preliminary response rate from participants was 33% (N = 19). 62% of residents were extremely likely to participate in a VBF program. 85% of residents considered VBF very useful. 92% of residents thought this feedback tool would complement current forms of operative feedback. The most significant perceived benefits of VBF were receiving objective feedback (94%), increasing feedback content and frequency (78%), learning decision-making (65%), and receiving technical skills feedback from expert surgeons (63%). The biggest perceived challenges of VBF were increased technological burden on residents (59%), long turnaround to receiving feedback (57%), fear of negative repercussions from residency programs due to poor performance (53%), and privacy concerns (48%). Additionally, residents were concerned that VBF would be an overall time intensive process.
Conclusion: Video-based feedback is an invaluable tool in surgical technical skills feedback. There are many perceived benefits regarding VBF, and most residents felt it would complement current forms of operative feedback. However, prior to widespread implementation of VBF into surgical residency training, residency programs should address potential challenges to ensure seamless incorporation of this powerful educational tool.

P324

Resident hernia cadaver lab: an effective educational tool to address a surprising deficit

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Introduction: Hernia repairs are often a staple of a general surgery practice and thus account for 10% of the required case numbers for graduating general surgery residents. Despite this emphasis, general surgery trainees may continue to be uncomfortable with abdominal wall and groin hernia anatomy and repair techniques. The purpose of our study is to assess a single-institution general surgery residents' hernia experience and knowledge before and after a focused hernia cadaver lab.
Methods and Procedures: Twelve general surgery residents (PGY 3–5) at a single institution participated in a cadaver lab designed to address deficits in ventral and groin hernia anatomy and repair techniques. Pre-lab and post-lab surveys were distributed to the group that assessed previous operative experience, anatomy knowledge, and confidence in repair techniques and perceived helpfulness of the lab. The results were reported in frequency and percent.
Results: The lab participants included four PGY 3 residents, five PGY 4 residents and three PGY 5 residents. All (n = 12) residents reported having previously performed an open inguinal hernia repair, although only one-third of the residents (4/12) had previously performed an open femoral hernia repair. All residents reported previously performing a retrorectus ventral hernia repair, and 75% (9/12) had completed a transversus abdominis release (TAR). On the surveys, a likert scale was provided to assess knowledge and confidence in hernia anatomy and repairs. Pre-lab when provided with the statement "I understand the boundaries of the retrorectus space," 25% (3/12) of the residents were neutral, 66% (8/12) agreed and 8% (1/12) strongly agreed. Post-lab when given the same statement, 42% (5/12) agreed and 58% (7/12) strongly agreed. Pre-lab when provided with the statement "I could accurately identify the place to incise the transversus abdominus muscle to perform a release," 33% (4/12) of residents disagreed, 25% (3/12) were neutral, 42% (5/12) agreed, and 8% (1/12) strongly agreed. Post-lab, 8% (1/12) were neutral, 42% (5/12) agreed, and 50% (6/12) strongly agreed. Almost all of the participants strongly agreed (10/12) that the lab was helpful in their understanding of the hernia anatomy and repairs.
Conclusion: Despite 10% of graduating general surgery residents' required cases being hernia repairs, residents continue to have anatomic and technical deficits, especially femoral hernias and TARs. These deficits may require extra attention and a focused hernia cadaver lab appears to effectively address this gap.

P325

Robotic case time—assessing the impact of trainee participation at the console

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Introduction: Given the dual concerns that trainee participation in the operating room comes at the cost of longer cases times and that

the robotic platform can lengthen cases, we sought to determine if trainee participation impacted total robotic case time.

Methods: Using deidentified data from the MyIntuitive application, we conducted a retrospective cohort study of robot case times for three categories of procedures: bariatric, inguinal hernia repair (IHR), and ventral hernia repair (VHR) at our institution. Data from 2019 to 2021 were selected as 2019 is when dual consoles were routinely available to track the participation of more than one surgeon. Any cases where the second console was used for $> 1\%$ of the case was characterized as having trainee participation, while those cases with $< 1\%$ were categorized as solo cases. Average case times were then calculated by procedure, per year, based on trainee participation. Differences in average case time were compared using t tests and Mann–Whitney U tests as appropriate.

Results: 1160 robot cases were included in the study, the majority of which included trainees (686, 59.1%). Of the operations, 24.5% were bariatric cases, 39.3% IHR, and 36.2% VHR. Trainee involvement increased annually, with bariatric trainee case participation increasing from 51.5% in 2019 to 70.0% in 2020 and 75.2% in 2021. Similarly, IHR and VHR trainee case involvement increased from 18.7% to 22.6% to 75.0% for IHR and 63.7% to 74.8% to 96.3% for VHR. Average operative time per procedure and year is shown in the table. Overall, operative time decreased with trainee involvement in VHR and IHR cases, − 26.6 and − 6 min, respectively, which changes for bariatric surgery were only significant during a single year.

Conclusion: Trainee participation was associated with shorter operative time for IHR and VHR. While limited by sample size and selection bias, these results suggest that trainee participation does not significantly impact robotic OR time.

Table. Robotic Operative Time Based on Procedure Category and Presence of Trainee Across Three-Year Period

	Bariatric			Inguinal Hernia Repair			Ventral Hernia Repair		
	Average Case Time (min)			Average Case Time (min)			Average Case Time (min)		
	Solo Cases	Cases with Trainees	p-value	Solo Cases	Cases with Trainees	p-value	Solo Cases	Cases with Trainees	p-value
2019	67.5	57.2	0.14	85.5	86.5	>0.3	185	206.8	0.298
2020	48.6	86.4	<0.001	79.8	86.1	>0.3	237	166.1	<0.001
2021	57.9	60.3	>0.3	71.8	68.5	>0.3	141.3	174.1	>0.3
Overall	60.4	67.3	0.076	81.2	75.8	0.004	205.0	178.6	0.032

P326

Attending and Resident Expectations Compared with Resident Confidence Regarding PGY Competency for Laparoscopic Cholecystectomy

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Introduction: Laparoscopic cholecystectomy (LC) is defined as a core operation for which every graduating surgical resident must demonstrate proficiency; however, progression toward such proficiency is not defined or standardized. A curriculum to facilitate and standardize competency is needed and in the process of being developed nationally; however, many barriers to achieving competency based education currently exist, including agreement of expected step-wise progression. Current expectations regarding resident competency for LC is relatively unknown. Our purpose was to survey attendings' and resident'' expectations and confidence performing steps of LC.

Methods: In this exempt-approved study, attendings and residents within the general surgery department of three sites of Mayo Clinic (Rochester, Arizona, Florida) were recruited to take an online anonymous survey. A total of 28 residents (9 PGY-1, 5 PGY-2, 4 PGY-3, 2 PGY-4, and 7 PGY-5) and 22 attendings completed the survey.

First, participants rated each step of the LC regarding when they expected residents of each PGY to be able to competently perform the step. Next, residents were asked to rate their confidence in performing each step.

ANOVA was used to compare expectations of residents versus attendings as there were more than 4 levels of expectations.

Results: Almost all residents/attendings expected PGY-4 and PGY-5 residents to be able to dissect cystic structures; however, 100% of PGY-4 and 57% of PGY-5 residents felt confident performing this step. Expectations differed among attendings as well as between attendings and residents regarding performance and progression especially for more junior residents. For example, almost no residents or attendings expected a PGY-1 to be able to dissect cystic structures, whereas 57% of residents and 32% of attendings believed a PGY-2 should be competent in this step($F(1,48) = 5.32$, $p = 0.02$). However, only 16% PGY-2 residents felt confident in performing this step. Additional significant disagreements between residents and attendings existed about whether a PGY2 should be expected to perform abdominal access ($F(1,48) = 4.24$, $p = 0.04$), clip cystic structures ($F(1, 48 = 8.77$, $p = 0.005$), and dissect the gallbladder ($F(1,48) = 5.2$, $p = 0.02$).

Conclusion: Significant disagreements exist among, and between, attendings and residents within a multi-site single institution regarding step-wise progression of expected competencies per PGY-year for LC. In addition, our results demonstrate that residents may not feel confident in the steps they are expected to perform. This lack of consensus may represent a barrier to the development of a competency-based curricula within general surgical education.

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Understanding robotic surgical skill development: does acquisition of basic surgical skills during intern year improve robotic skill set?

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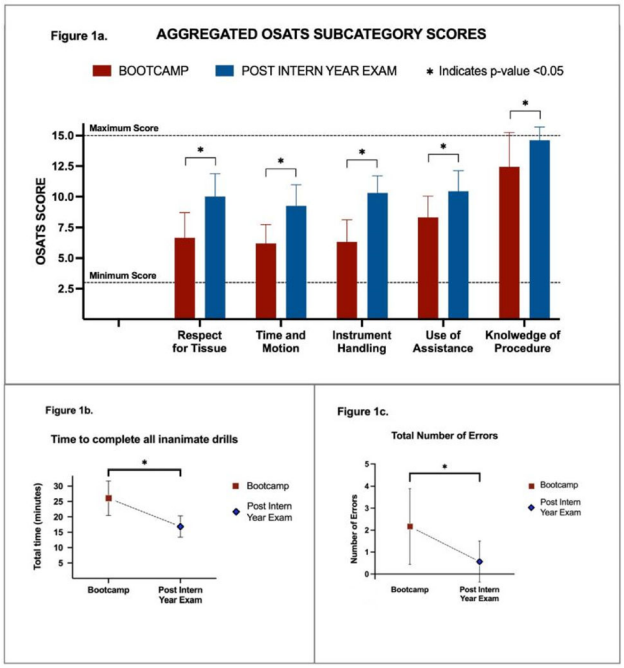
Introduction: The learning curve for robotic surgical skill acquisition is poorly understood and still being investigated. There are a lack of data regarding the transferability of skills from open and laparoscopic training to robotic surgery. Additionally, there are a lack of consensus regarding the appropriate timing for initiation of robotic training for surgical residents. In this study, we investigate the impact of skills acquired during intern year on the development of robotic skills in a cohort of novice general surgery residents.

Methods: A cohort of 30 novice general surgery residents underwent a robotic skill assessment through three validated inanimate drills (ring rollercoaster, interrupted suture/tying and around-the-world needle driving) during "bootcamp" before starting their intern year. Subsequently, they repeated identical robotic drills after intern year, the aim was to compare these two performances. Videos of each resident's attempts were independently assessed by two blinded trained graders using a validated modified Objective Structured Assessment of Technical Skill (mOSATS) scale. Each grader completed 21.45 h of video review. Data were analyzed using SPSS: a paired t test for normally distributed variables and a Wilcoxon signed rank test for skewed variables. We compared the total aggregated OSATS scores (sum of three drills), the time to complete the tasks, and the number of errors before and after intern year.

Results: The total time needed to complete all three drills decreased from a mean of 26 min at "bootcamp," to 17 min after intern year (35% decrease $p < 0.001$) (Fig. 1b). The overall mOSATS score for

each subcategory similarly increased by 14–26% ($p < 0.001$), with a greater increase in technical skill subcategories, compared to knowledge-based subcategories (Fig. 1a). The number of errors decreased from a mean of 2.16 errors per subject during bootcamp to 0.56 errors per subject after intern year ($p < 0.001$) (Fig. 1c). The interrater reliability between the two independent graders was $r = 0.84$.

Conclusion: Innate robotic surgical skills are limited without formal training. Our study showed that basic surgical skills acquired during intern year like knot tying, needle driving, and tissue handling resulted in improved performance on the robotic platform. This study highlights the transferability of basic open surgical skills to robotic inanimate drills in a cohort of novice surgical residents, prior to formal robotic training. Our future efforts will aim to further explore the transferability of skills from open and laparoscopic to robotic surgery and ultimately come up with a strategy for the optimal timing and sequence of surgical training across these platforms.



P328

Impact of the laparoscopic simulation program in hepatopancreatobiliary surgery

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Introduction: Hepatopancreatobiliary surgery (HPB) has been described as one of the most challenging surgical branches within laparoscopic surgery. Within this area, choledochojejunal anastomosis (CJA) and pancreatojejunal anastomosis (PJA) are considered complex procedures, therefore mastering their learning curves reduces morbidity. Simulated training facilitates the acquisition and transfer of skills in laparoscopic surgery. Currently, validated simulation programs with specialized feedback for the acquisition of surgical skills are limited. We present the results of an advanced laparoscopic simulation program for CYA and PYA training.

Materials and Methods: A quasi-experimental study was designed. Surgery residents or surgeons who had previously completed a simulation training program in basic and advanced laparoscopic skills were included. All participants who completed the course and had registered times were included in the study. Participants underwent a structured simulation program in which the performance of CJA and PJA was trained using ex vivo bovine tissue in addition to synthetic low-cost materials. Procedural time, patency, and leakage of the anastomoses were documented at the beginning and end of the training program. Statistical analysis was performed using RStudio, nonparametric statistics were used, with a significance of $p < 0.05$.

Results: A total of 11 participants were recruited and completed the structured simulation program. A maximum period of 6 months was needed to obtain approval. A total of 21 sessions were carried out, divided into two parts, 11 simulation sessions were dedicated to practice CJA, and 10 sessions for PJA. Time, permeability, and leakage were measured in each session. Training significantly decreased leakage rate from 54 to 0% and from 63 to 0% in CJA and PJA, respectively. No statistically significant changes were found in permeability regarding pre- and post-assesments. Meanwhile, in procedural time, a significant decrease was observed, from 29.0 (24–34) to 20.0 (17.2–22) minutes in CJA, and from 38.9 (32–41) to 24.6 (17–28) in PJA.

Conclusion: A structured simulation program with in-person feedback decreases CJA and PJA filtration rates and operative time under a simulated environment. Further studies are required to assess the transfer of these skills to the surgical ward. Based on this experience, this program is being mounted in an online platform which permits remote and asynchronous feedback in order to reach a larger number of participants worldwide and thus further validate the acquisition and transfer of the aforementioned skills.

P329

A prospecting interventional study on minimally invasive surgery skill acquisition

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Introduction: Evaluating the learning curve in surgical training is complex, as multiple factors influence the acquisition of new skills. The impact of technology is one critical factor. Several studies to date have evaluated the learning curves with new surgical technologies. However, few have assessed how technology can influence surgical skills acquisition especially with no surgical experience. Our goal was to compare the performance of novices with medical and no-medical experience during laparoscopic and robotic training exercises.

Methods and Procedures: A prospective interventional study was performed at an international minimally invasive training center from August 22nd to 26th 2022 to evaluate the technical performance of 2 groups novice to surgical skills: medical students (control) and non-medical students (experimental). Both groups were evaluated performing the same, defined simulation tasks: the Laparoscopic Assessment Skills Training Testing method (LASTT), with advanced peg transfer task also performed on four different robotic platforms

(Da Vinci X and SI, Versius CMR, and Intuitive Hugo). Performance was graded using the validated Global Operative Assessment of Laparoscopic Skills (GOALS) Score System for laparoscopic and the Global Evaluative Assessment of Robotic Skills (GEARS) Score System for robotic skills. The main outcome measure was the ability to complete the proposed exercises in the required times by comparing the LASTT, GOALS, and GEARS scores across groups.

Results: Twenty-nine 13 control and 14 experimental—participated. There was no significant difference in age or gender across groups. The control grouped performed significantly better in all LASTT exercises, reaching higher GOALS score in depth perception ($p = 0.008$), bimanual dexterity ($p = 0.008$), and efficiency ($p = 0.021$) defined as the ability to maintain focus on task and fluidly progress. In the robotic arm no differences between groups were observed in time to complete the tasks, depth perception, bimanual dexterity, autonomy, and robotic control with all the robotic platforms. Medical students showed a greater efficiency on the Hugo platform ($p = 0.029$) in comparison to no-medical students, while no difference in efficiency task was observed with the other robots.

Conclusion: While medical students seem to be more skilled in laparoscopy, no significant differences were found between the 2 groups in robotic platforms. Robotic platforms resolved the differences, accelerating learning for all experience levels and democratizing skills acquisition. Robotic technology could help augment skills acquisition at all levels of experience with more predictable learning curves.

P330

The impact of research grant funding beyond scientific productivity: lessons learned from the European Association of Endoscopic Surgery (EAES)

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Introduction: Research impact has been considered by many to be an elusive concept. It has been defined as the effect of research beyond academia. The European Association of Endoscopic Surgery (EAES) supports research through financial and training support. With the current project we aim to define and objectively measure the impact of research supported by one of the largest surgical societies in Europe.

Methods and Procedures: A Steering Committee constructed a questionnaire, finalized through a Modified Delphi process for consensus. The questionnaire was disseminated to all EAES Research Grant recipients since 2011. The results of the questionnaire were used to generate open-ended questions for semi-structured interviews, which were also conducted with recipients. The final list of interview questions reached consensus amongst steering committee members through a Delphi process.

Results: The questionnaire response rate was 22/28 (79%). The median number of presentations per recipient was 2.5, while recipients yielded a median number of 19 citations in a year. Seven respondents were invited to participate on guideline committees, while 15 were involved in further research, including six multicenter trials. Three studies instigated changes in clinical policies, while two intellectual property designs were produced. Eight recipients received further funding. Experts rated a median positive impact of 5/7 on their career progression, while supervised non-experts rated 6/7. Management (6/22, 27%) and technical expertise (5/22, 23%) were the most commonly encountered barriers by Research Grant recipients. Overall, 19/22 (86%) respondents indicated that funding improved their ability to network. The provisional framework from interview thematic analysis included the following topics: (i) clinical and academic career progression, (ii) skill development, (iii) main impact of project as perceived by recipient, and (iv) facilitating and hindering factors to achieving aim of project. A preliminary coding framework from semi-structured interviews is being constructed.

Conclusion: The impact of research funding by EAES was significant, both academically and outside academia. This included citations of publications, presentations, but also perceived change in clinical practice, participation in guidelines, and career progression. The semi-structured interviews are expected to identify the facilitating and hindering factors in achieving significant impact.

P331

Gender equity in the fundamentals of laparoscopic surgery exam

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Introduction: Passage of the Fundamentals of Laparoscopic Surgery (FLS) and Fundamentals of Endoscopic Surgery (FES) exams have been required for general surgery board eligibility since 2010 and 2018, respectively. Recent work by our group revealed gender disparity in FES pass rates attributable to differences in visuospatial ability (VSA). Given the importance of VSA in laparoscopy, we sought to assess whether similar disparities exist for FLS. We hypothesized that gender disparity would be appreciated in FLS pass rates.

Methods: Deidentified national FLS program data from the first 6 years of graduate resident performances after the implementation of the passing requirement for board eligibility were analyzed. The proportions of test takers fitting each measured demographic group were recorded. Univariate and multivariate logistic regressions were performed to examine the relationship of gender identity, PGY level, and specialty on first-time pass rate (which necessitates passage of both the cognitive and skills tests).

Results: The database included 7567 first-time test takers from 2008 (when the requirement was announced) to 2016. After eliminating non-residents and those who graduated prior to 2010 (when the requirement went into effect), 6408 participants were included in the analysis. Of these, 3965 (61.9%) were male and 2426 (37.9%) were female. The exam was taken by 106 (1.7%) PGY-1, 357 (5.6%) PGY-2, 946 (14.8%) PGY-3, 2075 (32.4%) PGY-4, and 2923 (45.6%) PGY-5 residents. 5988 (93.4%) reported general surgery or a general surgery sub-specialty, while 345 (5.4%) reported a non-general surgery specialty (Plastic surgery, Urology, OB/GYN). On univariate logistic regression, male gender ($OR = 1.7$, $p < 0.001$), increasing PGY level (OR(PGY 5 vs 1) = 5.9, $p < 0.001$), and general surgery specialty ($OR = 5.6$, $p < 0.001$) were predictive of FLS pass rates. However, on multivariate logistic regression, only PGY level and specialty remained significant.

Conclusion: Gender, despite its known association with VSA, does not influence FLS pass rates, which supports the validity of this exam. The initially identified gender difference likely relates to residents from specialties outside of general surgery who were not required to take the exam for board eligibility during the study period.

P332

Development of deep learning model for safety direct optical trocar insertion in minimally invasive surgery: an innovative method for preventing trocar injuries

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Introduction: Direct optical trocar insertion technique was well utilized to establish pneumoperitoneum in almost all patients undergoing bariatric surgery and served as a good method for obese patients undergoing minimally invasive surgery. However, this procedure has the possibility of resulting in serious complications, such as the rupturing of hollow viscus organs or a catastrophic rupture of the aorta, Using a deep learning system coupled with a laparoscopic suite with an alarming system, the surgeon is able to recognize safety landmarks in real time, leading to a safer procedure. Therefore, this study aims to propose a deep learning approach and alarming system to assist the surgeon during trocar insertion process.
Methods: We collected the dataset from laparoscopic videos and captured the still images for training the model. The surgeon labeled the bounding box on the images and defined the classes of abdominal wall layers that consist of subcutaneous, anterior rectus sheath, rectus muscle, posterior rectus sheath, peritoneum, and abdominal cavity. In this study, the YOLOv7 model, the state-of-the-art deep learning detector, was used to train and detect the abdominal wall layers. We trained the model on still images and also deployed the trained model to laparoscopic videos. The alert sound from alarming system will be activated when the peritoneum layer and abdominal cavity layer are detected. To evaluate this model, mean average precision (mAP), precision, and recall were calculated.
Results: A total of 1,127 still images were captured from 39 laparoscopic video cases. The proposed model was trained with 790 images, validated with 112 images, and tested with 225 images. The model was trained for 200 epochs and fine-tuned until the mAP value reached a plateau. The proposed model achieved the overall mAP of 80.0%, the precision and the recall were 82.1% and 78.2%, respectively. Figure 1 depicts the example of the detected bounding box on images from our proposed model. The alarming system has been validated and accepted by experienced surgeons at our institute.
Conclusion: In this study, we discovered that the potential of deep learning could be utilized to aid surgeons in the direct optical trocar insertion process. During the insertion of a trocar, the proposed model identifies and provides accurate landmark references in real time, accompanied by an alarming system could prevent direct optical trocar complication.

P333

Colonic stenting as a bridge to surgery for patients with left-sided intestinal obstruction: a single Asian institution experience with cost analysis

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Introduction: In patients presenting with acute left-sided colonic obstruction, the European Society for Gastrointestinal Endoscopy in 2020 recommends stenting as a valid alternative to emergency surgery. Endoscopic colonic stenting aims to convert an emergency operation to a semi-elective one to mitigate surgical and anaesthetic risks of emergency surgery. In our institution, we reviewed outcomes prospectively and performed a cost analysis on colonic stenting for acute colonic obstruction.
Methods: Endoscopic, surgical, and financial details in all patients presenting with benign or malignant acute colonic obstruction who had stenting performed over a 4-year period (2019–2022) were prospectively collected. Outcomes were defined as technical and clinical success and successful surgical resection. Financial cost of stenting was compared with expected cost if stenting were not performed to evaluate its cost-effectiveness. We excluded patients who eventually declined surgery in favor of expectant management in the final analysis.
Results: A total of 36 patients underwent colonic stenting in the study period with 27 eventually undergoing definitive resection. Patients were symptomatic for a median of 3 (IQR: 2–7) days before colonic stenting. Most common pathology causing obstruction was primary colon cancer (n = 26,96%), all of which were cT3 and above.
Median procedure time was 226 (IQR: 197–262) minutes with a high technical (n = 25,93%) and clinical (n = 23,85%) success rates, with low rates of complications, such as perforation (n = 2,7%). One patient (4%) was complicated by delayed perforation 17-day post-colonic stenting requiring emergent resection. Median time from stenting to surgery was 12 (IQR: 9–17) days. As a bridge to surgery, surgical outcomes also showed a low rate of postoperative complications (n = 3.11%), such as anastomotic leakage (0.0%), intraabdominal abscesses (2.7%), and 30-day postoperative mortality (0.0%).

Expected cost of management with colonic stenting from acute management to definitive treatment was US$29,196, while expected cost with emergent surgery, including eventual stoma reversal, was US$45,716 (healthcare cost savings of US$16,519 per person). Cost savings were mainly due to the avoidance of upfront emergent surgery with stoma creation. Overall difference in the duration of hospitalization for management with colonic stenting over upfront emergent surgery was 2 days, favoring stenting.
Conclusion: In an obstructed patient, stenting as a bridge to surgery is safe, clinically effective, and cost-effective means to treat acute colonic obstruction with high success rates and low complication rates. In the future, more data are needed to determine optimal timing from colonic stent insertion till surgery to mitigate the risk of delayed perforation.

P334

Impact of indications and endoscopic findings on conscious sedation requirements in endoscopy and colonoscopy

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Overview: Colonoscopy and upper endoscopy are procedures performed frequently for the diagnosis of disorders of the gastrointestinal tract. Both moderate sedation and monitored anesthesia care are methods used for sedation; however, medication dosages and sedation practices vary widely between institutions. Patients who require higher doses of sedation may have procedures aborted, resulting in additional healthcare costs to reschedule another procedure under deep sedation/anesthesia support.
Objective: The aim of this study is to evaluate the impact between specific indication for endoscopy and the requirement for high dosages of versed and fentanyl in order to identify patients who may require deep sedation, improving patient experience and reducing healthcare costs by preventing repeat procedures.
Design: This study is a single-center, retrospective chart review of patients undergoing upper endoscopy or colonoscopy. A total of 9,490 procedures for patients who underwent either upper endoscopy (2,215

procedures) or colonoscopy (7,275 procedures) were reviewed after meeting exclusion criteria. Patients were analyzed based on procedure performed, indication for procedure, dosages of sedative medications administered, and procedure length.

Setting: Single military medical center.

Participants: Adults greater than 18 years of age who underwent either upper endoscopy or colonoscopy between Jan 1, 2015 and Jul 31, 2020.

Results: Preliminary data analysis demonstrates significant differences in versed and fentanyl doses based on the indication for the procedure for both upper endoscopy and colonoscopy ($p < 0.001$). The rates of high conscious sedation requirement (defined as requiring greater than or equal to 6 mg of versed and/or 150 μg of fentanyl) also differed significantly ($p = 0.003$ for upper endoscopy, $p < 0.001$ for colonoscopy). Post hoc analysis to determine most significant relationships between dosages and indication, as well as rates of high conscious sedation requirements and patient factors to include body mass index and usage of centrally acting medications is in progress.

Conclusion: Procedural doses of both versed and fentanyl, as well as rates of high conscious sedation requirement, differ significantly based on indication for upper endoscopy and colonoscopy.

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The impact of access to upper endoscopy on the diagnosis and management of endemic gastrointestinal diseases of Eastern Uganda

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Introduction: The availability of upper endoscopy is limited in many low- and middle-income countries (LMIC), especially in rural settings. Few studies have evaluated the effectiveness of using elective upper endoscopies to address both benign and malignant esophagogastric diseases in remote Eastern Uganda. This research assesses the impact of upper endoscopy, offered at a free-standing ambulatory care facility, on the diagnosis of upper gastrointestinal diseases endemic within its catchment area.

Methods and Procedures: This was a retrospective, cross-sectional, single-center study evaluating patients who received elective upper endoscopies from Kyabirwa Surgical Center in rural Eastern Uganda, between February 2020 and June 2022. The primary outcome variables were presenting symptoms and endoscopic diagnosis. Other variables included age, sex, and subsequent intervention. All variables were categorical and described using both percentages and proportions.

Results: A total of 350 endoscopies were performed for 333 patients, with a 1:1 male-to-female ratio and an average age of 48. Abnormalities were found on endoscopy in 73% of patients, revealing diagnoses including but not limited to esophageal cancer (16.4%, N = 64), gastritis (16.7%, N = 65), hiatal hernia (8.7%, N = 34), esophagitis (7.4%, N = 29), ulcer (6.1%, N = 24), and candidiasis (5.1%, N = 20). Most patients presented with epigastric pain alone (40%, N = 133) or dysphagia (39%, N = 130) as their sole complaint. Dysphagia was an alarming symptom, as 51% of patients had esophageal cancer on endoscopy. Biopsies were performed in one-third of all endoscopies, 55% of which confirmed malignancy, 26% to test for H. pylori gastritis, and 10% to further characterize an ulcer. For patients diagnosed with esophageal cancer, 28.1% had an interval palliative stent placed. A normal upper endoscopy changed clinical management in 34% of patients, with 28 patients (27%) subsequently sent for ultrasound or CT and 7 patients (7%) referred for subspecialty services.

Conclusion: The introduction of upper endoscopy into a rural community in LMIC can verify baseline prevalence of upper gastrointestinal diseases endemic to its population. Confirmation of diagnosis by endoscopy can subsequently direct medical management and interventional therapy.

					Diagnoses (not mutually exclusive)											
Presenting Problem	N	N %	# Biopsies	Biopies %	Gastric Ca	Eso Ca	Candidiasis	Esophagitis	Gastritis	Ulcer	Duodenitis	Hiatal hernia	Eso varices	Achalasia	Normal	Other**
epigastric pain (alone)	133	40%	28	29%	1	0	6	14	29	11	5	17	0	0	68	7
dysphagia (alone)	58	17%	35	31%	2	30	4	2	8	2	0	5	0	2	7	2
dysphagia + alarm symptom	27	8%	22	19%	0	22	2	2	2	0	0	2	0	1	0	1
odynophasia w/wo epigastric pain/dysphagia	24	7%	6	5%	0	3	2	3	5	0	0	2	0	1	6	1
epigastric pain + dyspepsia	23	7%	4	4%	0	0	4	2	9	1	1	4	0	0	7	0
epigastric pain + dysphagia	17	5%	9	8%	0	5	0	1	3	2	2	1	0	0	6	1
epigastric pain + alarm symptom	15	5%	1	1%	1	0	0	1	2	4	0	0	2	1	4	2
dyspepsia (alone)	8	2%	5	4%	0	0	1	1	5	2	0	1	0	0	3	0
alarm symptom (alone)	7	2%	0	0%	0	0	0	2	0	1	0	0	3	0	1	0
epigastric pain + dysphagia + alarm symptom	4	1%	3	3%	1	2	0	0	0	0	0	0	0	0	0	1
previously known cancer	2	1%	0	0%	0	2	0	0	0	0	0	1	0	0	0	0
other*	15	5%	1	1%	0	0	1	1	2	3	1	1	0	0	3	8
Total	333	100%	114	100%	5	64	20	29	65	24	9	34	5	5	104	26	390
Percentage					1%	16%	5%	7%	17%	6%	2%	9%	1%	1%	27%	7%	100%

The diagnoses in Table 2 were not mutually exclusive (see description in table). Some patients with epigastric pain may have had 2 concurrent diagnoses. Abbreviations: Ca for cancer. Eso for esophagus. Alarm symptoms are defined as weight loss, hematemesis, or melena.
* Other presenting problem: foreign body (6), emesis (4), hiccups (1), Gastric Outlet Obstruction (1), varices (1), nausea (1), other (1)
** Other endoscopic diagnoses: organo-axial volvulus who went onto receive a barium swallow for further characterization (4), foreign object (4), duodenal mass/obstruction (3), laryngeal tumor (2), enlarged adenoid (2), helminth (1), GOO (1), gastric varices (1), bleeding duo papilla (1), PEG placement (1), Schatzki's ring (1), Mallory Weiss tear (1), incomplete scope (1), missing repots (3)

				Post Procedural Treatment (not mutually exclusive)									
Diagnoses (not mutually exclusive)	N	%N	PPI/antacid	lifestyle modifcaiton	analgesic	antibiotic	antifungal	triple therapy	palliative stent	US/CT	subspecialty referral	close outpatient follow-up	other***
normal endoscopy + persistent symptoms	104	27%	34	14	8	4	0	3	0	28	7	17	0
gastritis	65	17%	52	11	1	4	4	6	0	4	0	11	0
esophageal cancer	64	16%	2	2	15	9	2	0	18	0	0	29	0
hiatal hernia	34	9%	23	14	3	0	1	0	0	1	0	5	2
esophagitis	29	7%	23	2	1	1	4	1	0	2	0	2	0
ulcer	24	6%	18	5	0	0	1	5	0	0	0	5	0
candidiasis	20	5%	1	1	1	0	18	1	0	0	0	2	0
duodenitis	9	2%	4	1	0	0	0	1	0	2	0	3	0
esophageal varices	5	1%	1	0	0	1	0	0	0	0	0	0	3
achalasia	5	1%	0	0	0	0	0	0	0	0	0	5	0
gastric cancer	5	1%	1	0	0	0	0	0	2	0	0	3	0
other**	26	7%	6	2	4	2	2	1	0	4	4	7	0
Total	390	100%											

Abbreviations: US for ultrasound. CT for computed tomography.
** other endoscopic diagnoses: organo-axial volvulus (4), foreign object (4), duodenal mass/obstruction (2), laryngeal tumor (2), enlarged adenoid (2), helminth (1), Gastric Outlet Obstruction (1), gastric varices (1), bleeding duodenal papilla (1), pancreatic mass (1), PEG placement (1), Schatzki's ring (1), Mallory Weiss tear (1), incomplete scope (1), missing repots (3)
***other treatments: additional medications: propranolol (3), fundoplication (2)

P336

Age and BMI do not predict peroral endoscopic myotomy (POEM) failure

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Table 1. Post-operative outcomes after POEM amongst patients with different age groups.

		< 30	30 - 50	50 - 70	age > 70	p-value
		N=5	N=24	N=73	N=30	
Post POEM Eckart		.2	1.45	.86	.5	0.083
Post POEM dysphagia	None	5 (100%)	16 (67%)	53 (74%)	25 (83%)	0.18
	Occasional	0 (0%)	2 (8%)	14 (19%)	4 (13%)	
	Daily	0 (0%)	6 (25%)	4 (6%)	1 (3%)	
	With every meal	0 (0%)	0 (0%)	1 (1%)	0 (0%)	
Basal LES pressure		8	28.4	23.16	2.66	0.12
Residual LES pressure		4	7.75	14	7	0.56
Median IRP		4	17.6	19.33	9.66	0.2
Post POEM BRAVO	No	3 (60%)	14 (58%)	52 (73%)	22 (79%)	0.33
	Yes	2 (40%)	10 (42%)	19 (27%)	6 (21%)	
Fraction of time pH <4		4.3	6.63	6.03	9.48	0.78
Worst DeMeester Score		18.25	24.27	22.93	42.77	0.44
Delay of contrast on UGI	No	3 (60%)	22 (92%)	60 (82%)	27 (90%)	0.22
	Yes	2 (40%)	2 (8%)	13 (18%)	3 (10%)	
Immediate Complication	No	5 (100%)	24 (100%)	68 (93%)	25 (86%)	0.3
	Yes	0 (0%)	0 (0%)	5 (7%)	4 (14%)	
Symptom Recurrence	No	4 (80%)	20 (83%)	62 (85%)	27 (90%)	0.82
	Yes	1 (20%)	4 (17%)	11 (15%)	3 (10%)	
Repeat Endoscopic Intervention	No	3 (60%)	9 (38%)	38 (52%)	17 (57%)	0.51
	Yes	2 (40%)	15 (62%)	35 (48%)	13 (43%)	
Repeat POEM	No	5 (100%)	23 (96%)	71 (97%)	30 (100%)	0.79
	Yes	0 (0%)	1 (4%)	2 (3%)	0 (0%)	
Years until symptom recurrence		2	1.5	2.36	2	0.9
Readmission	No	5 (100%)	22 (92%)	65 (89%)	29 (97%)	0.66
	Yes	0 (0%)	2 (8%)	8 (11%)	1 (3%)	

Introduction: It is well established that advanced age and BMI are associated with worse reflux; however, little is known about the effects of age and BMI on the success of peroral endoscopic myotomy (POEM). We hypothesize that increased age and BMI predict POEM failure.

Methods: We performed a retrospective analysis of patients with achalasia who received a POEM at a single tertiary care academic institution from 2012 to 2022. Patients were included if they had a documented diagnosis of achalasia and underwent a POEM at our institution. Patients were excluded if they were missing data on diagnosis of achalasia, age, BMI, or pre- and post-operative Eckart scores. Patients were grouped into cohorts based on age: < 30 years old, 30–50 years old, 50–70 years old, and > 70 years old. POEM failure was defined as the need for repeat intervention, symptom recurrence, or a high post-operative Eckart score. Demographic, preoperative, and post-operative outcomes were compared using Pearson's chi-squared test, Fisher's exact test, and ANOVA test. Multivariate logistic regression analyzed the association between age and BMI with failure of POEM.

Results: During the study period, 132 patients met inclusion criteria. Five patients were under 30 years old, 24 patients were between 30 and 50 years old, 73 patients were between 50 and 70 years old, 30 patients were > 70 years old. Older patients had significantly increased BMI ($p < 0.001$), Charlson–Deyo Comorbidity index (< 0.001),and increased incidence of diabetes with end organ complications (< 0.001). Pre-POEM Eckart score, dysphasia, regurgitation, and total number of symptoms pre-op did not significantly differ across groups. Post-procedure mean Eckart scores ranged from 0.2 to 1.4 for all cohorts with no significant differences (p 0.083). Patients in all cohorts experienced similar number of symptoms post-POEM. Manometric measurements did not vary across cohorts after POEM. Symptom recurrence, need for repeat endoscopic intervention, repeat surgical intervention, or repeat POEM also did not significantly vary across cohorts (Table 1). Having symptoms of achalasia age > 70 or high BMI did not increase the odds of having a higher post-operative Eckart score, worse dysphagia, regurgitation, or weight loss on multivariate logistical regression.

Conclusion: Our study suggests similar outcomes for patients with advanced age and BMI undergoing POEM. POEM is a safe and effective treatment of achalasia for patients with advanced age. Achalasia recurrence is not associated with high BMI.

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Predictors of pneumoperitoneum during peroral endoscopic myotomy

Saher-Zahra Khan, MD; Christina Boutros, DO; Jamie Benson, MD; Joshua Lyons, MD; Daniel Hashimoto, MD, MS; Jeffrey M Marks, MD, FACS, FASGE; University Hospitals Cleveland Medical Center, Department of Surgery

Possible consequences of insufflation during POEM procedure include subcutaneous emphysema, pneumothorax, and pneumoperitoneum. Pneumoperitoneum can lead to difficulty ventilating and may require decompression which can easily be accomplished with angiocatheter placement. The purpose of this study was to assess predictors of pneumoperitoneum occurrence in patients undergoing POEM.

A retrospective chart review of all patients that underwent POEM for achalasia at a single institution by a single surgeon between 2011 and 2022 was conducted. Patients were excluded from further analysis if they underwent simultaneous laparoscopy during POEM. Continuous variables were compared using t tests and categorical variables were compared using chi-squared or Fisher's exact test. Patient factors including demographics, comorbidities, symptoms, prior interventions or myotomy, presence of hiatal hernia, PPI therapy, location of myotomy, and unintentional mucosal injury during procedure were compared between patients that experienced pneumoperitoneum and those that did not. A logistic regression was conducted to predict the odds of developing pneumoperitoneum using the previously specified patient factors and manometric measurements (variables included if number of observations was ≥ 10).

Out of 131 included patients, 37 experienced intraoperative pneumoperitoneum requiring decompression. There were no significant differences in patient demographics or preoperative factors. The factors of age, sex, BMI, diabetes mellitus, preoperative reflux, preoperative emesis, weight loss, preoperative Eckardt score, prior endoscopic intervention, basal LES pressure, residual LES pressure, median IRP, and use of PPI preoperatively were used in logistic analysis. No resulting odds ratios were statistically significant.

None of the assessed patient factors were predictors of pneumoperitoneum during POEM. Given the challenge in predicting its occurrence, it is best for the providers and operating room to be prepared with abdomen exposed and angiocatheter or other decompressive instrument readily available for use.

Table 1 Odds ratios from logistic regression to predict occurrence of pneumoperitoneum

	Odds Ratio (95% CI)	P-Value
Age > 60 years	1.17 (0.23, 5.94)	0.847
Sex	0.83 (0.18, 3.89)	0.814
BMI > 30	0.24 (0.03, 1.62)	0.142
Diabetes	1.70 (0.28, 10.51)	0.568
Preoperative GERD	6.59 (0.93, 46.63)	0.059
Preoperative Emesis	2.41 (0.55, 10.68)	0.246
Preoperative Weight Loss	0.38 (0.07, 2.06)	0.263
Preoperative Eckardt Score	0.99 (0.66, 1.48)	0.954
Prior Endoscopic Intervention	0.53 (0.06, 4.27)	0.547
Prior Pneumatic Dilatation	1.42 (0.15, 13.79)	0.76
Basal LES Pressure	1.01 (0.98, 1.05)	0.393
Residual LES Pressure	1.07 (0.99, 1.15)	0.105
Median IRP	0.92 (0.85, 1.01)	0.066
Preoperative PPI Use	0.31 (0.07, 1.36)	0.119

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Surgeon-performed ERCP experience at academic center: 10 year data

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Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) is a complex endoscopic procedure that traditionally has been performed by gastroenterologists. However, there has been increased interest in the performance of ERCP by surgeons. While the outcomes of procedures performed by gastroenterologists have been well documented, there are a paucity of literature on the safety and efficacy of ERCP performed by fellowship-trained surgical endoscopists.
Methods: Retrospective review of adult and pediatric cases performed by a fellowship-trained surgical endoscopist at an academic center between Aug 1, 2012 and Aug 1, 2022. Demographic data, indications, procedure data and outcomes during admission were reviewed.
Results: 837 cases were performed during the study period. Mean age was 47 years (SD 20.3). The population included 86% adults and 13.6% pediatric patients. 61% had no prior history of ERCP. The most common indications for ERCP were choledocholithiasis (36%) and liver transplant-related complications (32.4%). 81% of cases were performed under general anesthesia and average procedure time was 34.8 min (SD 16.7). Double-wire cannulation was attempted in 184 cases (22%) and it was successful 95% of the time. The ampulla could not be cannulated in 27 (3.2%) cases and a biliary stricture could not be traversed in 7 (0.8%) cases. Therapeutic interventions included sphincterotomy (59%), stone/sludge removal (45%), stricture dilation (18%), stent removal (27%), stent insertion (38%) and choledoschoscopy with Spyglass (1.1%). There were 21 complications (2.5%), with post-ERCP pancreatitis (1.3%) being the most common one and the most severe a duodenal perforation (0.1%) that required surgical repair.
Conclusion: This study demonstrates that ERCP performed by a fellowship-trained surgical endoscopist at an academic center is safe, with high cannulation rates and low complication rates.

P339

5-Year Experience of Intramural Surgery in the Middle East: A Safety and Feasibility Analysis

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Introduction: New endoscopic techniques have emerged during the last decade with the potential to improve clinical outcomes in gastrointestinal motility disorders (GMD), such as achalasia and gastroparesis. Intramural Surgery (IMS) have been developed to perform muscular division, submucosal dissection, and tumor removal. For the management of GMD, IMS include per-oral esophagomyotomy (POEM) and per-oral pyloromyotomy (POP). Several studies have previously reported outcomes for POEM and POP in North America and East Asia; however, evidence reporting outcomes in the Middle East and North Africa (MENA) population remain limited. As such, the objective of this study was to evaluate the feasibility and safety of POEM and POP for the management of GMD in the MENA region.
Methods and procedures: This retrospective cohort study was conducted with IRB approval. All patients who underwent POEM or POP for the treatment of achalasia and gastroparesis from January 2016 through September 2022 were included. Demographics and surgical outcomes were retrospectively reviewed and analyzed.
Results: Ninety-seven patients underwent IMS procedures. 71 (73.2%) were POEM and 26 (26.8%) were POP. The cohort was 50.5% female with a mean overall age of 40.7 years. The mean overall body mass index (BMI) was 25.7 kg/m2. The most common comorbidities included: GERD (n = 32, 32.9%), hypertension (n = 19, 20.0%), hyperlipidemia (n = 14, 14.3%), diabetes mellitus (n = 14, 14.3%) an,d constipation (n = 11, 11.3%). Among POEM patients, types of achalasia were Type 1 (n = 12, 17%), Type 2 (n = 44, 62%), Type 3 (n = 5, 7.0%) an,d unspecified (n = 10, 14.0%). Etiology of gastroparesis were idiopathic (n = 19, 73.0%), diabetes (n = 4, 15.4%) ,and postsurgical (n = 3, 11.6%). Previous interventions in the POEM group included endoscopic balloon dilation (n = 22, 30.9%), botulinum toxin injections (n = 10, 14.0%) ,and Heller–Dor operations (n = 7, 9.8%). Previous interventions in the POP group included intrapyloric botulinum toxin injections (n = 1, 3.8%). All cases were successfully completed endoscopically. The median operative times were 74 ± 27.9 min for POEM and 38 ± 22.1 min for POP. Complications within 30 days in the POEM group included nausea/vomiting requiring readmission (n = 2, 2.8%), pneumomediastinum (n = 2, 2.8%), and leak (n = 1, 1.4%). In the POP group included nausea/vomiting requiring readmission (n = 2, 7.6%). The median overall hospital stay was 1 ± 2.7 days. At a median follow-up 7 months, there was one mortality, unrelated to the procedure.
Conclusion: POEM and POP procedures are safe and technically feasible with low complication rates, although with longer operative times for POEM. Our study suggests that clinical success in the MENA population is comparable to larger international published series.

P340

Previous Esophageal Dilation May Not Affect Esophageal Diameter and Distensibility Index After Submucosal Tunnel Creation During Per-Oral Endoscopic Myotomy

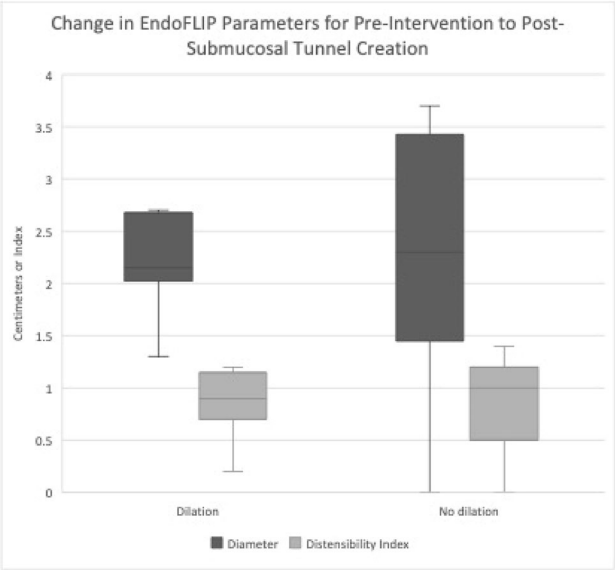
Matthew F Mikulski, MD, MSHCT; Timothy J Morley, MD; Alicja Zalewski, MD; David J Desilets, MD, PhD; John R Romanelli, MD; UMass Chan Medical School—Baystate

Introduction: Endoscopic interventions such as Botox injection and esophageal dilation are hypothesized to induce fibrosis of the esophageal submucosa, potentially affecting the operative approach in per-oral endoscopic myotomy (POEM) or Heller myotomy. EndoFLIP can help guide management by measuring diameter and distensibility index (DI) before and during POEM. We hypothesized that patients with previous dilation were more likely to have submucosal fibrosis and therefore a more pronounced effect on the luminal diameter and DI from creation of the submucosal tunnel (SMT) alone.
Methods: This is a retrospective review of consecutive POEM procedures from a single surgeon–endoscopist team at a high-volume tertiary referral hospital. Patients undergoing POEM with diagnoses of achalasia or esophagogastric junction outflow obstruction (EGJOO) were included if they had full EndoFLIP data: diameter and DI before POEM, after creation of SMT, and after myotomy. Patients were grouped by whether they had a previous endoscopic dilation or not. Demographics,

POEM outcomes, and EndoFLIP data were analyzed using descriptive statistics and Mann–Whitney U test.

Results: Twenty-five patients met inclusion criteria. Twenty-three (95.8%) had achalasia, 12 (48%) were female, median pre-POEM Eckardt was 8 [IQR:7–9], and 10 (41.7%) had esophageal dilation prior to POEM. There were no differences between pre-POEM, post-POEM, or pre/post-change in Eckardt score between those with or without previous dilation, or differences in myotomy length or peri-operative length of stay. EndoFLIP revealed no differences in diameter (median 2.15[IQR:2.03–2.68] cm vs median 2.3[IQR:1.45–3.43] cm, p = 0.792) or DI (median 0.9 [0.7–1.15] vs 1[I QR: 0.5–1.2], p > 0.999) after creation of SMT between those with and without previous dilation (Figure) or after myotomy (median diameter: 4.95 [IQR: 4.15–6.08] vs 5.95 [IQR: 5.35–6.28] cm, p = 0.446, and median DI: 2.9 [2.13–4.4] vs 3.4 [2.45–3.8], p = 0.747).

Conclusion: Esophageal dilation may cause fibrosis of the submucosal tunnel, but previous dilation did not impact diameter or DI after submucosal tunnel creation or myotomy in this exploratory analysis of a small series. Further studies, and perhaps greater numbers, are needed to corroborate these findings and investigate the role of pre-operative esophageal dilation on physiologic parameters measured during POEM procedures.



P341

Widespread provider acceptance and training in peroral endoscopic myotomy evidenced by enhanced procedural patient access

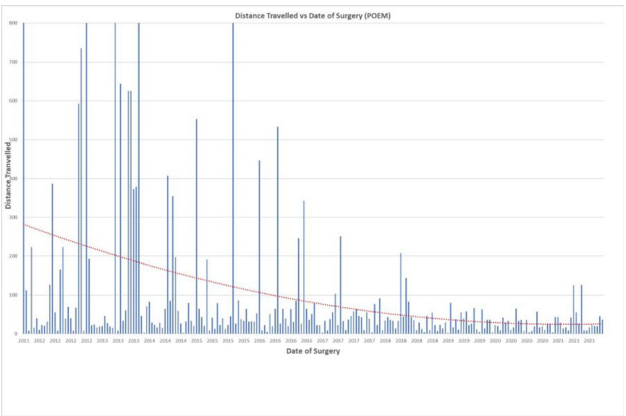
Joshua Lyons, MD; Christina Boutros, MD; Saher-Zahra Khan, MD; Jamie Benson, MD; Daniel Hashimoto, MD; Jeffrey Marks, MD; University Hospitals

Background: The first peroral endoscopic myotomy (POEM) was performed in 2008 and the first POEM performed in the USA was in 2010. While its efficacy has been shown to be better or at the least equivalent to laparoscopic Heller myotomy, it has taken some time for both provider acceptance and provider training in this novel endoscopic therapy for an orphan disease, such as achalasia. This institution has performed POEM since 2010 and this study was designed to evaluate patient access to POEM over the following 11 years.

Methods: This was a retrospective study of all patients who underwent a POEM at a single institution by a single surgeon over a 11-year period (2011–2022). The patients zip code and the hospitals zip code were used to calculate the distance driven by the patient in order to undergo a POEM. This was done using a Google Maps API to enable automated calculations. The distances traveled were then graphed vs year of surgery. A polynomial regression was then calculated for the dataset as well as a linear regression to test for a non-zero slope.

Results: The resulting graph is shown below. The average distance travelled over the first 5.5 years was 176 miles, while the average distance travelled over the following 5.5 years was 37 miles. The polynomial regression had a significant negative coefficient and the linear regression showed a non-zero (negative) slope with a p-value of < 0.0001.

Conclusion: In the early development of POEM, patients procedural access was poor with patients traveling significant distances to undergo surgery. With time, however, patients were able to access the procedure closer to home as evidence by the significantly less miles driven by patients over time. This is a unique measure of provider acceptance, provider training, and national implementation of POEM.



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Evaluation of postoperative esophagram following peroral endoscopic myotomy

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A major complication following peroral endoscopic myotomy (POEM) is esophageal leak. Postoperative esophagrams are often utilized to evaluate the presence of a leak, but is not standard practice. The routine use of post-operative esophogram has come under scrutiny for multiple upper gastrointestinal surgeries, such as bariatric surgery and other gastric resections. The objective of this study was to evaluate the necessity of the postoperative esophagram following POEM.

We retrospectively reviewed charts of patients diagnosed with achalasia who underwent POEM by a single surgeon at a single institution from 2011 to 2022. Patients were stratified into those who completed postoperative esophagram and those who did not. Primary outcomes included complication rates (including leak and aspiration), length of stay, and readmission rates. Data were evaluated using chi-square test for categorical variables and ANOVA for continuous variables.

Out of the 173 patients that were included, 116 had a postoperative esophagram. Patient demographics were not significantly different.

There were no significant difference between the non-esophagram and esophagram groups in leak rate (2.6% vs 0%, p = 0.55), aspiration rate (1.7% vs 3.5%, p = 0.60), or complication rates (7.9% vs 5.5%, p = 0.75). Readmission rate was 10.7% in non-esophagram versus 8.7% in esophagram group (p = 0.67). Length of stay was 1.48 days in the non-esophagram group vs 1.76 days in the esophagram group (p = 0.37).

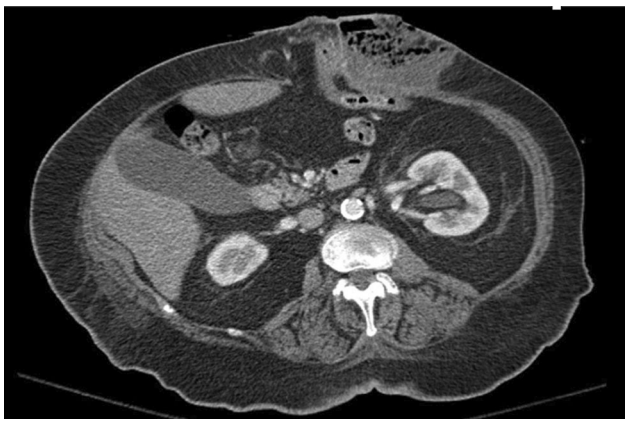
Our study showed no difference in outcomes between POEM patients who received postoperative esophagram verses those who did not. This suggests that postoperative esophagram following POEM should not be used routinely. Esophagrams should be performed depending on the clinical signs/symptoms postoperatively that would warrant imaging and intervention.

		No Postoperative Esophogram (N=57)	Postoperative Esophogram (N=116)	P-Value
Leak		0	3 (2.6%)	0.55
Complication		3 (5.5%)	9 (7.9%)	0.75
Length of Stay (Days)		1.48	1.76	0.37
Presentation to ER		3 (5.4%)	10 (8.8%)	0.55
Readmission		6 (10.7%)	10 (8.7%)	0.67
Postoperative Eckardt Score		1	0.781	0.39
Dysphagia	Score 0	37 (80%)	69 (72%)	0.059
	1	3 (7%)	20 (21%)	
	2	6 (13%)	6 (6%)	
	3	0	1 (1%)	
Chest Pain	Score 0	37 (80%)	79 (84%)	0.72
	1	8 (17%)	13 (14%)	
	2	1 (2%)	1 (1%)	
	3	0	1 (1%)	
Regurgitation	Score 0	36 (78%)	80 (83%)	0.62
	1	8 (17%)	14 (15%)	
	2	2 (4%)	2 (2%)	
	3	0	0	
Weight Loss	Score 0	0	0	0.68
	1	1 (20%)	2 (67%)	
	2	2 (40%)	1 (33%)	
	3	2 (40%)	0	

P343

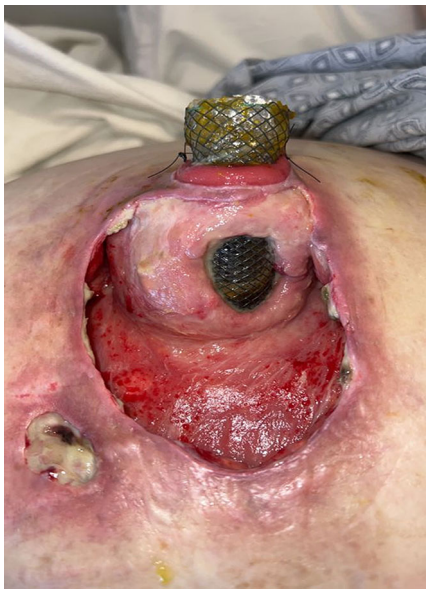
Novel Use of a Covered Metal Stent: A Case of Suprafacial Diverticular End-Colostomy Perforation Causing NSTI

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A 76-year-old female with a history of rectal cancer status post-abdominal perineal resection with end colostomy 10 years ago presented in septic shock with an abdominal wall fluid collection and subcutaneous gas. The source of the infection was identified as a lateral perforation of the suprafascial colon, with a 4-cm defect in diameter. Abdominal debridement for infection control resulted in a large 10-cm-diameter suprafascial wound, which was continually contaminated by the colostomy fistula impairing wound healing. Large complex wounds that involve fistulization to the enteric tract are notoriously difficult to manage and usually result in long-term burden on the health system and frequent returns to the hospital. Traditional management involves surgical fecal diversion to allow wound healing. Over the past decades, endoscopic stents have been used in an increasing variety of scenarios allowing non-surgical management of many disease processes. In this critically ill elderly patient just recovering from septic shock, an operative diversion would have been a high-risk operation. Conversation with interventional gastroenterology, general surgery, and wound care devised this unconventional treatment strategy to allow this tenuous patient to heal this complex wound without intra-abdominal surgery. A 10 cm × 23 mm covered wall flex esophageal stent under fluoroscopic guidance was deployed protruding through the ostomy site bridging the area of perforation well. Patient progressed well after the procedure with successful diversion of fecal material away from the wound bed, development of granulation tissue, and shrinkage of the end-colostomy perforation. This case highlights an unconventional use of covered metal stent placement and a viable treatment option for an enterocutaneous fistula on a patient who was not a good surgical candidate.

P344

Temporomandibular subluxation: A rare complication following esophagogastroduodenoscopy

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Introduction: Temporomandibular subluxation has been reported in literature as a rare complication of prolonged dentistry procedures, intubations, bronchoscopies, transesophageal echocardiograms, and otolaryngology procedures. In contrast, temporomandibular subluxation is not a widely reported complication of esophagogastroduodenoscopy, with extremely limited prior case reports highlighting this complication. In this case report, we present a patient with no prior history of mandibular motion who presented with a left-sided temporomandibular subluxation immediately following upper endoscopy.

Methods and Procedures: A 69-year-old female presented to the surgery department with progressively worsening dysphagia. Esophagogastroduodenoscopy with biopsy was performed without any apparent complications. The patient tolerated the procedure well and was subsequently transported to the recovery room in stable condition The post-anesthesia care unit noted a left sided deviation of the patient's mandible after the procedure, where the patient exhibited difficulty closing her jaw with significant left jaw pain noted over the left temporomandibular joint area. Eyes, Ears, and throat (EENT) was consulted and they promptly reduced the patient's mandible without any further complication.

Results: Upon review of available literature, 7 unique cases have been reported within the last 35 years regarding temporomandibular subluxation following esophagogastroduodenoscopies. Sedation performed by anesthesia varied greatly making it difficult to define specific risk factors that may have caused the complication. It is clear that anterior dislocations are prominent among the reported cases, with both unilateral and bilateral dislocations being identified. Particularly in the context of anterior dislocation, it is theorized that past history of TMJ dysfunction is the strongest predisposing risk factor for temporomandibular dislocation during upper endoscopy. However, it has also been defined in the literature that compromised temporomandibular joints via inadequate capsular integrity, excessive dosage of anesthetic agents leading to excessive masticatory hypotonicity, and compromised articular eminence morphology can also lead to the complication. In addition, increased age could be a predisposing factor to temporomandibular subluxation regardless of procedure time, with increased procedure time being its own independent risk factor.

Conclusion: It is important to note that no particular recommendations exist currently regarding prevention of temporomandibular subluxation following esophagogastroduodenoscopy, in part due to the limited number of cases that have been reported. Consultation or referral to an oral and maxillofacial surgeon is recommended if the provider is uncomfortable with the complexity of the clinical presentation and/or if previous attempts at reduction have failed. Furthermore, consultation is highly recommended if a concomitant fracture is noted.

P345

Safety and feasibility of Operating in the 3rd space on patients with connective tissue disorders—preliminary experience

Hila Shmilovich, MD; UHN

Introduction: In recent years, endoscopic submucosal operative techniques including per-oral endoscopic myotomy (POEM) for the treatment of achalasia and per-oral pyloromyotomy (POP or G-POEM) for the treatment of gastroparesis have gained in acceptance. However, the feasibility and safety of these techniques in patients with connective tissue diseases such as Ehlers–Danlos Syndrome (EDS) have not been described. Many surgeons refrain from operating on patients with EDS due to poor wound healing and other co-morbidities in these patients, and it is unknown to what extant do these concerns extend to in these types of complex endoscopic techniques. To our knowledge this is the first published experience of POEM and POP cases to be performed in EDS patients.
Methods: Two patients with EDS, one with achalasia and DGE and one with DGE, were operated between June and December 2020 for a total of 3 procedures (1 POEM, 2 POP). For the patient with both achalasia and DGE we had separated the 2 procedures and started with POEM as they were more symptomatic from that perspective.
Results: All three procedures performed were uneventful with no immediate or delayed complications. We had made the sub-mucosal tunnel longer than usual. The length of stay was longer in these patients. Both patients were discharged after a normal swallow study and pain management. Follow-up endoscopy demonstrated complete healing of the mucosal incision. Subjectively, operative difficulty was not different in these patients. All procedures resulted in clinical improvement of symptoms.
Conclusion: Our very preliminary experience suggests that endoscopic submucosal procedures may be a safe and feasible option in patient with EDS. These techniques could potentially offer an endoscopic minimally invasive option for this complex group of patients. Further studies are required to establish guidelines.

P346

Conscious sedation vs. general anesthesia during surgeon-performed ERCP: 10-year review

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Introduction: Sedation for endoscopic procedures aims to optimize patient comfort and safety. Historically, endoscopic retrograde cholangiopancreatography (ERCP) was performed under conscious sedation. While there is no standard of care for method of anesthesia, ERCP is a complex endoscopic procedure that usually requires more time to perform safely. Inadequate sedation during ERCP may lead to longer procedure times, decreased technical success, and increased adverse events. General anesthesia for ERCP became consistently available at our institution in 2015 and since then, there was a transition to general anesthesia in all cases to prevent delays in patient care and allow the fellows to have more hands-on experience.
Methods: Retrospective review of pediatric and adult patients who underwent ERCP between August 1, 2012 and August 1, 2022, at an academic center by a fellowship-trained surgeon. Demographic data, indications, procedure data, and outcomes during admission were reviewed and analyzed. The Chi-squared test was used to compare categorical variables.
Results: 837 cases were performed during the study period and overall procedure-related complication rate was 2.5%. The most common indication was choledocholithiasis (36%). 685 (81%) ERCP were completed under general anesthesia and the remaining ones under conscious sedation. Up to early 2015, the majority of cases were done under conscious sedation, but there was a transition to all cases under general anesthesia since then. There were 18 complications in the general anesthesia group and 3 in the sedation one. Additionally, there was no difference in the performance of therapeutic interventions between the different types of anesthesia, except for Spyglass ($p = 0.019$).
Conclusion: Conscious sedation and general anesthesia provide similar procedural success and ERCP-related complications. The transition to general anesthesia at our institution has allowed increased hand-on experience for the fellows, without a significant impact on outcomes.

P347

Postpolypectomy Syndrome Presenting With Small Bowel Obstruction

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Introduction: Postpolypectomy syndrome (PPS) is a rare complication of colonoscopies with an incidence ranging from 0 to 2%. The pathophysiology behind the syndrome occurs when electrical current applied during a polypectomy extends past the mucosa into the muscularis propria and serosa. This results in a transmural burn and peritoneal inflammation, but no colonic perforation. The majority of the people develop symptoms within 12 h of the procedure, but may occur up to 7 days. Symptoms typically include abdominal pain, fever, leukocytosis, and peritoneal inflammation without perforation. The majority of cases can be managed with conservative treatment. In this case report, we present a postpolypectomy syndrome at the ileocecal valve resulting in a high-grade small bowel obstruction.
Methods and Procedures: A 71-year-old male presented to the emergency department with abdominal pain, worsening distention, nausea, and emesis. Denies any bowel movements for 9 days and reports 1 day history of obstipation. Of note, patient had a colonoscopy 9 days prior where a large sessile polyp was removed adjacent to the ileocecal valve. Patient was admitted for management of small bowel obstruction. He subsequently failed conservative management requiring surgical intervention. Intraoperatively, the terminal ileum was densely adhered to the ileocecal valve with friable, fibrinous, and exudative tissue surrounding the valve. An ileocecectomy was performed with primary ileocolic anastomosis.
Results: Given the findings on colonoscopy, the patient was a high risk for developing PPS. First, he had a large polyp > 1 cm which increased his risk. Furthermore, the polyp was a sessile polyp. Lastly, the polyp was located in the cecum where the bowel thickness is less than other portions of the bowel. The most important aspect of this case was the location of the polyp on the upper lip of the ileocecal valve. The majority of PPS cases can be managed conservatively with intravenous fluids and antibiotics given that there is no bowel perforation. However, the localized peritoneal inflammation in this case resulted in a high grade small bowel obstruction requiring surgical intervention.
Conclusion: This case highlights the importance of obtaining accurate and specific records when making clinic decisions after a recent procedure. PPS has not been reported to cause small bowel

obstruction. However, this case reports demonstrate that if PPS occurs at the ileocecal valve, the subsequent transmural and peritoneal inflammation can result in a high-grade small bowel obstruction.

P349

Intraoperative enteroscopy for lower gastrointestinal bleeding of obscure origin: Importance of endoscopic training of surgeons

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Introduction: Small intestinal tumors are an uncommon cause of gastrointestinal bleeding and can be difficult to localize. The sensitivity of CT angiograms is diminished in cases of low-volume bleeding, and nuclear medicine scans do not permit precise localization. Intraoperative enteroscopy via small bowel enterotomy remains an indispensable procedure, allowing for real-time localization and definitive surgical treatment. An advanced endoscopic skillset and availability of emergency endoscopy support are prerequisites but are not widely available.
Methods: A 58-year-old male presented to emergency room with worsening exertional dyspnea and congestive heart failure. Laboratory work-up revealed severe anemia (hemoglobin/hematocrit of 2.2/10.3) and fecal occult blood test was positive. Patient underwent blood transfusions but developed cardiorespiratory failure requiring ventilatory support. He developed intermittent melena requiring daily blood transfusions. Colonoscopy revealed a terminal ileum polypoid mass prolapsing into the cecum, and esophagogastroduodenoscopy showed a clean base pyloric channel ulcer. CT angiogram and nuclear medicine scan did not reveal any active bleeding. She was taken to the operating room and underwent intraoperative enteroscopy (using pediatric colonoscope) through an enterotomy in the small bowel approximately 30-cm proximal to the ileocecal valve. Enteroscopy examined approximately 2 m of small bowel proximally with no evidence of blood or any suspicious lesion. Distal examination confirmed the presence of small bowel polypoid mass and dark blood-filled terminal ileum and cecum. Laparoscopic hand-assisted ileocolic resection was carried out. Patient ceased bleeding after the procedure and was discharged after prolonged recovery from multiorgan failure.
Methods and Procedures: Diagnostic laparoscopy carried out, revealing melanotic contents in terminal ileum.
A small hand-assisted port placed via Pfannenstiel incision (6 cm) and small bowel extracorporealized. Fresh drapes are placed around bowel.

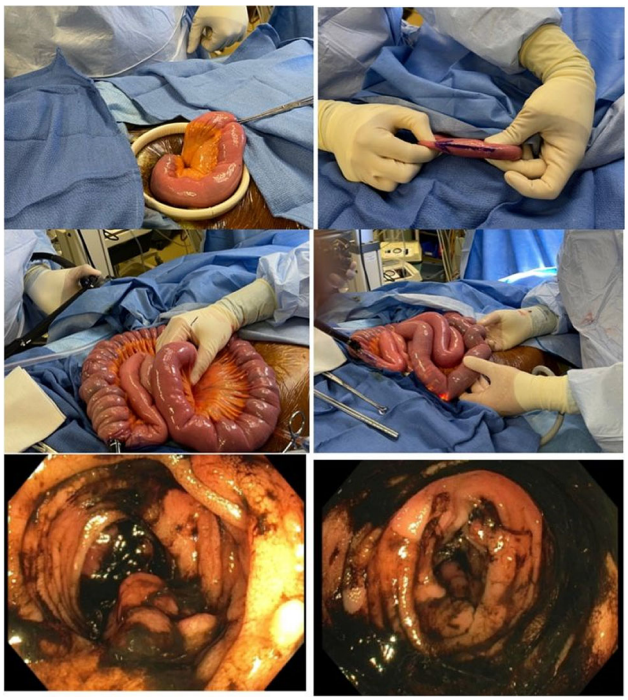
Insertion site is chosen in small bowel proximal to melanotic contents and small bowel direction marked with an arrow.

An enterotomy is made and bowel contents are suctioned.

The colonoscope is inserted into proximal small bowel without insufflation.

Scope stabilized by assistant and small bowel is advanced onto it.

During withdrawal, assistant centers scope and withdraws while insufflating with CO2.



Conclusions: This case illustrates successful management of gastrointestinal bleeding of obscure origin using minimally invasive and endoscopic techniques. Performance of intraoperative enteroscopy by a surgeon with endoscopic skills allowed for detection of small bowel bleeding source and ruled out any upper gastrointestinal source due to absence of blood in the proximal small bowel. This case also underscores the importance of endoscopic training of general surgeons.

P350

An analysis of the learning curve for peroral endoscopic myotomy (POEM)

Jamie Benson, MD; Saher-Zahra Khan, MD; Christina Boutros, DO; Joshua Lyons, MD; Daniel Hashimoto, MD, MS; Jeffrey M Marks, MD, FACS, FASGE; University Hospitals Cleveland Medical Center, Department of Surgery

Peroral endoscopic myotomy (POEM) was first performed in 2008 in Japan and was initiated in the USA afterward. Over the last two decades, POEMs have been performed more frequently and they are now being seen as an equal alternative to the Heller myotomy. The less invasive approach of POEM compared to Heller myotomy provides improved postoperative pain control and decreased morbidity with faster recovery. Two limitations for POEM as a treatment option are the availability of surgeons trained in the procedure and the time to proficiency. We aim to assess time to proficiency by evaluating the learning curve for a single surgeon. Improving our understanding of the time to proficiency will help facilitate further surgical adoption of POEM.

We retrospectively reviewed all POEMs in patients with diagnosed achalasia performed by a single surgeon at a single tertiary care center from 2011 to 2022. Patients were split into quartiles which were evaluated for outcomes of esophageal leak, persistence of symptoms, and need for additional treatments. Data were evaluated

using chi-squared test for categorical variables and Analysis of Variance for continuous variables.

The 160 patients that qualified were split into quartiles of 40 based on date of POEM. For quartiles 1 through 4, the length of stay in days was 1.9, 1.6, 1.6, and 1.6, respectively (p = 0.85). The leak rates were 5% for quartile 1, 0 for quartiles 2 and 3, and 3% for quartile 4 (p = 0.618). Post-operative reflux rate was 18%, 3%, 13%, and 15% for quartiles 1 through 4 (p = 0.14). Readmission was 5%, 5%, 18%, and 8% (p-value = 0.19).

Our data suggest that the learning curve for POEM was achieved by 40 cases. After performing 40 cases we found no significant difference between the quartiles regarding leak rate, post-operative persistence of symptoms, readmissions, or need for additional treatment options.

Table 1 Outcomes of POEM patients based on quartile

	Quartile 1 (N=40)	Quartile 2 (N=40)	Quartile 3 (N=40)	Quartile 4 (N=40)	P-value
Length of Stay (Days)	1.9	1.6	1.6	1.6	0.853
Leak	2 (5%)	0	0	1 (3%)	0.618
Pneumoperitoneum	8 (20%)	10 (25%)	8 (20%)	9 (23%)	0.940
Reflux	7 (18%)	1 (3%)	5 (13%)	6 (15%)	0.140
Dysphagia	4 (10%)	5 (13%)	3 (8%)	3 (8%)	0.933
Readmission	2 (5%)	2 (5%)	7 (18%)	3 (8%)	0.189
Mortality	0	0	0	2 (5%)	0.245

P351

Saving patient from relaparotomy: endoscopic management of duodenal repair leak

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Overview: Duodenal perforations are surgical challenging to treat entity. Leakage in a surgically repaired d1 duodenal perforation in a ailing patient recovering from explorative laparotomy for delayed diagnosis of gall bladder perforation and bilio-enteric fistula is a surgical disaster. With poor general health, week into post-op, subjecting patient to another laparotomy is always a double-edge sword. In the era of minimal access surgery, a trial via endoscopy (by OTSC -over the scope clipping) to treat duodenal perforation and saving the patient from dreadful complications of relaparotomy seems to be a novel approach.

Case Presentation: A 34-year-old lady presented to surgery emergency with chief complaints of severe pain abdomen since last 1 week exacerbated since last 2 days associated with multiple episodes of vomiting containing gastric content. On examination patient was conscious, oriented, frail look with BP-90/55mmhg, PR—120 bpm, spo2—95%on room air, ABG—s/o metabolic acidosis, per abdomen—localized tenderness and guarding in right hypochondrium, epigastrium and umbilical region, and respiratory system—right basal air entry decreased with no added sounds. Patient was resuscitated, with blood investigation suggestive of moderate anaemia, sepsis, mild derangement of LFT, and hypoproteinaemia, with usg whole abdomen—s/o perforated gall bladder with enteric (duodenal fistula). Patient underwent emergency laparotomy with cholecystectomy with primary repair of duodenal perforation with subhepatic drain placement. 2-week post-op patient again started having pain in upper abdomen with vomiting episodes, on usg w/a—multiple large heterogeneous thick-walled loculated collection in epigastric region and pelvis. CECT abd—s/o leak from duodenal repair site. In view of poor general health, 2-week post-op (possibility of post-op adhesions) a trial of endoscopic approach was taken. Patient underwent upper gi endoscopy suggestive of duodenal D1 segment perforation for which over the scope clipping was done. Patient recovered well in post-op period.

Conclusion: A promising minimal access approach to treat duodenal perforation (D1 segment) and avoiding subjecting the patient to complications of another general anaesthesia and re-exploratory laparotomy in immediate post-op period.

P352

Micro-endoscope-integrated holographic, through scattering media imager, realized by tunable projection of 2D spots array

Shimon Elkabetz; Oran Herman; Amihai Meiri; Asaf Shahmoon; Zeev Zalevsky; Z Square Medical

Objective of the Technology: The objective of this research includes integration of high-resolution imaging through scattering medium, such as blood, into a disposable micro-endoscope. A fiber laser integrated into the micro-endoscope as part of its illumination channel, allows to project a tunable array of spots of light onto an object that is located behind the scattering medium. If the distance between the projected spots is larger than the imaging resolution and then by applying localization microscopy algorithms together with scanning of the position of the spots in the array, will yield a high-resolution reconstruction of the inspected object.

Description of the Technology: We have a laser fiber as part of the illumination channel of a disposable micro-endoscope. Using proper optics, we convert the temporal modulation of the laser into spatial distribution. Thus, the result is generation of spatial spots when using a pulsed laser. The detection channel is a holographic recording of the collected back-scattered light that allows extraction of the electrical field. By time integrating the field we obtain the realization of the spatial array of illumination spots formed on top of the inspected object and behind the scattering medium. By changing the temporal modulation of the illumination laser (changing its temporal photonic signals), we can tune the positions of the spots in the illumination array. Since the distance of the spots in the array is larger than the imaging resolution, by applying localization algorithms and scanning with the array of spots, high 2D resolution reconstruction of the inspected object is obtained.

Preliminary Results: We will present experimental lab demonstration for our novel design and demonstrate the generation of the projected array of spots being formed on top of the object and behind the scattering medium. We will also show how such tunable formation can be associated with super-resolved imaging through scattering medium.

Conclusion: We present a time multiplexing super-resolving novel holography related imaging concept that is integrated into a disposable micro-endoscope allowing to obtain a high-resolution imaging of objects though scattering medium, such as blood. We theoretically and experimentally demonstrate the discussed operation principle and show its potential as a modality in medical endoscopic procedures. Imaging resolution improvement equivalent to even an order to magnitude enhancement is demonstrated and discussed.

P353

Symptomatic outcomes after peroral endoscopic myotomy in patients with previous intervention

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Studies show that peroral endoscopic myotomy (POEM) is safe after prior treatment failure with varying results on effectiveness of symptom amelioration compared to that in treatment-naïve patients. We hypothesized that treatment-naïve patients (TN) would have improved symptomatic outcomes compared to patients that had previous endoscopic intervention including botulinum injection or pneumatic dilation (PEI) or prior endoscopic or surgical myotomy (PM).

A retrospective chart review of patients that underwent POEM from 2011 to 2022 by a single surgeon at a single institution was completed. Patients missing pertinent data were excluded. TN patients were compared to patients that had PEI or PM. Primary outcomes included postoperative Eckardt score and occurrence of postoperative symptoms at first postoperative visit. Secondary outcomes included need for endoscopic testing and manometric or pH study findings. Categorical variables were compared using chi-squared or Fisher's exact test. Continuous variables compared using Analysis of Variance testing.

A total of 175 patients were included in the analysis, including 90 treatment-naïve patients, 74 PEI patients, and 11 PM patients. There was no difference in average postoperative Eckardt score (0.75 TN, 1.02 PEI, 1.29 PM, p = 0.45) or average number of symptoms experienced at first follow -p visit (0.47 TN, 0.66 PEI, 0.55 PM, p = 0.35). There were no differences in need for manometry (p = 0.33) or pH study (p = 0.91) or in manometric findings or pH study findings.

Our study showed that there was no difference in experience of symptoms postoperatively between patients that were treatment-naïve prior to POEM versus in those whom previously had endoscopic intervention or myotomy. Thus, POEM can be considered a reasonable option for patients that experienced prior treatment failure. Studies assessing symptoms at longer follow-up are needed to compare long-term symptomatic outcomes.

Table 1 Postoperative symptoms and endoscopic measurements

	TN (N = 90)	PEI (N = 74)	PM (N = 11)	p-value
Eckardt Score	0.75 (1.18)	1.02 (1.72)	1.29 (1.98)	0.45
Number of Symptoms	0.47 (0.75)	0.66 (0.95)	0.55 (1.04)	0.35
Underwent Manometry	9 (11%)	7 (11%)	2 (29%)	0.33
Median IRP	17 (6.06)	15.5 (10.82)	11 (9.90)	0.66
Basal LES Pressure	23 (16.02)	16.17 (16.17)	13 (7.07)	0.60
Residual LES Pressure	9.67 (2.16)	12 (11.47)	4 (0)	0.64
Underwent pH Study	23 (28%)	16 (25%)	2 (29%)	0.91
% Time of pH < 4	6.39 (7.73)	8.43 (8.71)	3.95 (5.16)	0.65
Worst DeMeester Score	23.65 (23.79)	32.23 (27.33)	17.2 (21.64)	0.53

P354

A novel smart phone application for patients undergoing COLOnoscopic bowel PREParation: A Randomized Controlled Trial (COLOPREP Trial)

Sunil V Patel; Lawrence Hookey; David Yu; Jackie McKay; Connie Taylor; Queen's University

Background: Adequate visualization of the lumen is essential during colonoscopies and requires individuals to adhere to bowel preparation instructions. The objective of this study was to compare the performance of a novel smart phone application developed for this purpose vs. traditional paper instructions.

Methods: This RCT compared the "COLOPREP" app with paper instructions, in those undergoing colonoscopy. Bowel preparation included Pico-Salax or Polyethylene Glycol ("PEG") based on endoscopists preference. The primary outcome was the quality of the bowel prep as measured by the Boston Bowel Preparation Score (BBPS). Secondary outcomes included cecal intubation and polyp detection. Patient satisfaction was assessed using a previously developed questionnaire. (Trial Registration NCT03225560).

Results: 664 individuals were approached (350 declined; 76 did not meet inclusion criteria), with 238 individuals randomized (n = 119 in each group). 23 individuals (17 in the app group) did not undergo the intervention, while 11 individuals (5 in the app group) were loss to follow-up. Thus, 202 individuals were included in the intention to treat analysis (N = 97 in the app group and 105 in the paper group). The groups had similar demographics, including mean age (57.2 vs. 56.0, P = 0.44) and gender (Male 54.6% vs. 52.6%, P = 0.75). Indications for colonoscopy and type of bowel preparation were also similar between groups. The primary outcome (BBPS) demonstrated no difference between groups (app mean 7.26 [STD 1.79] vs. paper mean 7.28 [STD 1.55], P = 0.91). There was no difference in cecal intubation rate (95.9% vs. 98.1%, P = 0.37), proportion of individuals with at least one polyp detected (59.3% vs. 53.9%), or mean number of polyps removed (1.7 vs. 1.3, P = 0.11). A higher proportion strongly agreed or agreed that they would use the same type of instructions again in the app group (89.4% vs. 70.1%, P = 0.001).

Discussion: This randomized controlled trial did not demonstrate superiority of the smart phone application in the delivery bowel preparation instructions. Unexpectedly, a large proportion of individuals approached for inclusion refused due to an unwillingness to use a smart phone for instructions. This observation contradicts previous publications assessing the use this technology for the delivery of medical instructions.

Conclusion: Smart phone applications performed similar to traditional paper instructions in those willing to use the application. Local patient preferences need to be considered prior to making changes in the method of delivery of medical instructions.

P355

Gastric Per-Oral Endoscopic Myotomy versus pyloric injection of botulinum toxin for the treatment of gastroparesis: our institutional experience and a review of the literature

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Introduction: A treatment option for patients with medically refractory gastroparesis includes pyloric injection of botulinum toxin. However, this has been shown to have high rates of symptom recurrence, and the most recent American College of Gastroenterology guidelines recommend against the use of botulinum toxin for the treatment of gastroparesis. In the last decade, Gastric Per-Oral Endoscopic Myotomy (GPOEM) has been developed as an effective treatment alternative. The purpose of the study was to evaluate the effect of GPOEM on gastric motility and gastroparesis-related symptoms and to compare it to the botulinum toxin injection results reported in the literature.

Methods: Patients who underwent a GPOEM procedure for the treatment of gastroparesis between September 2018 and June 2022

were included in this study. Paired t test was used to compare changes in Gastric Emptying Scintigraphy (GES) studies and Gastroparesis Cardinal Symptom (GCSI) scores from the preoperative to postoperative period. A Pubmed literature review was then conducted to identify all publications reporting the outcomes of botulinum toxin injections for the treatment of gastroparesis.

Results: A total of 65 patients (51 female, 14 male) with a mean age of 50.7 years underwent a GPOEM during the study period. Twenty-eight patients (22 male, 6 female) with a mean age of 49.2 years had both preoperative and postoperative GES studies in addition to GCSI scores. The etiologies of gastroparesis were diabetic (n = 4), idiopathic (n = 18), and postsurgical (n = 6). Fifty percent of these patients had undergone previous failed interventions including endoscopic botulinum toxin injections (n = 6), gastric stimulator placement (n = 2), and endoscopic pyloric dilation (n = 6). There was a significant decrease in GES percentages (mean difference = 23.5%, p = < 0.001) and GCSI scores (mean difference = 9.6, p = 0.02) postoperatively (Table 1). There were no major complications. In a review of the literature, mean postoperative improvement in GES percentages and GCSI scores were reported at 12.1% and 6, respectively. However, this improvement is known to be transient as botulinum toxin injections last approximately 3 months.

Conclusion: GPOEM leads to significant improvement in GES percentages and GCSI scores postoperatively and is superior to the botulinum toxin results reported in the literature.

Table 1. Comparison of preop and postop/repeat outcomes

	Overall (N=28)	P-value
Preop GES (%)	39.7 ± 22.1	-
Repeat GES (%)	16.2 ± 18.3	-
Difference GES	-23.5 ± 24.1	<0.001
Preop GCSI	27.0 ± 6.5	-
Postop GCSI	13.9 ± 10.3	-
Difference GCSI	-9.6 ± 8.0	0.02

Reported statistics is Mean ± SD

P356

The value and safety of remotely taught endoscopic palliative stenting for esophageal cancer in rural East Africa

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Introduction: Esophageal cancer is the eighth most common cancer worldwide, with a high prevalence of esophageal squamous cell carcinoma (ESCC) in East Africa. Patients in these countries often present with advanced disease, as access to diagnostic and therapeutic endoscopies is limited. One significant barrier to care is the lack of endoscopists trained in advanced interventional techniques. This study examines the novel concept of remotely training surgeons to endoscopically place self-expanding metal stents (SEMS), addressing an endemic need for palliative stenting for patients with obstructive esophageal cancer.

Methods and Procedures: This is a retrospective case series of patients with obstructive esophageal cancer who underwent endoscopic SEMS placement at Kyabirwa Surgical Center in rural Eastern Uganda between February 2020 and June 2022. Two endoscopically naïve surgeon were oriented to endoscopy via a one week in-person demonstration from an expert US gastroenterologist, followed by continued Zoom tele-proctoring of diagnostic and therapeutic endoscopies. Patients' clinical history, post-procedural complications, and symptom resolution were obtained from the center's electronic medical records or in discussion with their families. Variables were described using percentages and proportions.

Results: A total of 333 patients underwent elective upper endoscopies and 64 patients (19%) were diagnosed with esophageal cancer (> 75% ESCC). All esophageal cancer patients presented with dysphagia and 80% (N = 51) had high-grade obstructions where the endoscope could not traverse the tumor. Palliative stenting was performed in 35% of patients (N = 18) at a median of 17 days after index endoscopy. The remaining patients were either too nervous, lost to follow-up, or financially and/or logistically objected to stenting. One patient was re-stented for tumor growth. There were no perforations or procedural complications. Ten patients (55%) died of esophageal cancer an average of 114 days after stenting. At time of death, 8 patients (80%) tolerated liquid and solid food. Of those still alive and accounted for, 80% (N = 4) denied any dysphagia an average of 88 days post-stenting.

Conclusion: Prior to establishing remote training for endoscopic stenting, few patients with advanced esophageal cancer in rural Uganda had available treatments. Patients died of dehydration from poor oral intake and/or aspiration from increased secretions. This study demonstrates that endoscopic therapeutic procedures, such as SEMS placement, can be taught remotely to improve access to certain interventions. Although barriers to care such as fear and financial restraint exist, and ultimate mortality is high, stenting safely relieved most patients' dysphagia up until death while preventing malnutrition.

P357

Evaluation of the indications and satisfaction of patients undergoing colonoscopy at the HCSAE during a year of the pandemic: A prospective study

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Introduction: Colonoscopy is considered the gold standard modality for colorectal cancer screening and evaluation of lower gastrointestinal symptoms so it is important to understand and assess both the indications and satisfaction of colonoscopy. When the indication is appropriate, more clinically relevant diagnoses are obtained. Patient satisfaction has become one of the cornerstones of progressive quality improvement systems in hospitals, the adoption of quality satisfaction indicators can contribute to a progressive improvement of the same.

Methods: A satisfaction questionnaire and data collection sheet to all beneficiaries submitted to Colonoscopy.

Results: A total of 154 questionnaires were evaluated; 84 (54%) women and 70 (46%) men. The mean age was 62.7 years. When analyzing the time between the request and the completion of the study, there was an average of 108 days with a range of 1–436 days; the time in the waiting room (from the arrival of the patient to the unit and the completion of the study had an average of 26 min with a range of 5–180 min). There was an average fasting time of 26 h with a range of 12–48 h. As for the main reference services, they were Gastroenterology 64 (42%), General Surgery 34 (22%), Oncology 24 (15%), Internal Medicine 18 (12%), Coloproctology 8 (5%), and Another 3%.The main indications for referral to perform a colonoscopy are personal history of colorectal cancer 32 (21%), digestive tract bleeding 25 (16%), constipation 17 (11%), anemia under study 14 (9%), and diverticular disease 13(8%) among the main ones. When asking about the overall assessment of their experience, 61% considered it to be excellent, 28% very good, 10% good and bad, or 11% regular. When asked if it was necessary to perform a new endoscopic study, they would do it in the same institution or with the same doctor, 100% answered yes. Time from referral, waiting time, and verbal and written instructions to obtain adequate patient satisfaction in univariate analysis, while waiting time and verbal-written instructions

were significant in multivariate analysis. Obtaining an area under the curve of 0.7737.
Conclusion: Currently there are various guidelines and recommendations to comply with and perform quality endoscopic studies, same that during the colonoscopy must be fulfilled in order to obtain a greater diagnostic yield and take into account that satisfaction during the procedure influences the choice that this patient, or others close to him, will make in the future when they present a new health problem or in compliance with prescribed therapeutic measures.

P358

Foregut stent migration resulting in bowel obstruction and perforation. A report of two cases and review of the literature

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Background: Covered endoluminal stents are increasingly popular mode of treatment of anastomotic leaks in bariatric and foregut surgery. However, their propensity for migration is well reported and multiple fixation mechanisms have been suggested. Overall benefits of their utilization need to be balanced against their potential for migration and other related complications. We present two rare cases of stent migration requiring small bowel resection.
Case #1. A 61-year-old male who failed vertical banding gastroplasty underwent laparoscopic revision to Roux-en-Y complicated by anastomotic leak. Upper endoscopy with 18mmx12cm Niti-S fully covered esophageal stent placement and fixation with an over-the-scope clip (Ovesco Stentfix) was performed. This was followed by repositioning the next day with placement of a second overlapping 20mmx12cm Niti-S fully covered stent with suture fixation with the OverStitch device and injection of fibrin glue. Follow-up imaging showed stent migration to the distal ileum. Prior to elective removal the patient developed peritonitis and pneumoperitoneum and was then taken for emergent diagnostic laparoscopy with small bowel resection and primary anastomosis. The patient tolerated the procedure well and was discharged six day later with full recovery.
Case #2. A 58-year-old female, heavy smoker with history of hemiparesis and recent traumatic fracture of the patella on nonsteroidal analgesics (NSAIDS) for pain management presented with epigastric pain and peritonitis requiring emergent operative intervention. Laparoscopy with suture of the perforated duodenal ulcer and subsequent worsening sepsis and reoperation with laparotomy, tube duodenostomy, and drainage was performed. Subsequently accidental dislodgement of the duodenostomy tube five days later prompted endoscopic intervention and Niti-S Pyloric/Duodenal Covered Stent 10 cm x 22 mm was deployed in pylorus and duodenum. Following clinical recovery and discharge, patient was readmitted five weeks later with obstructive symptoms requiring laparotomy and segmental resection of mid small bowel and stent extraction. Following uncomplicated recovery, the patient was discharged 6 days later.
Conclusion: Natural propensity of stent migration that is augmented by the intestinal peristalsis remains a considerable limitation of wider application of covered stents. Distal stent migration resulting in perforation or obstruction are possible sequala of this phenomenon. Future applications should involve improved stent design and geometry as well as more durable fixation methods to minimize possibility of this untoward occurrence. More studies are needed to evaluate overall benefit and clinical value of covered intraluminal stents in the management of foregut surgery gastrointestinal leaks. Radiograms and endoscopic images will be presented.

P359

Cervical esophagostomy facilitates endoluminal vacuum closure of large gastric conduit leak

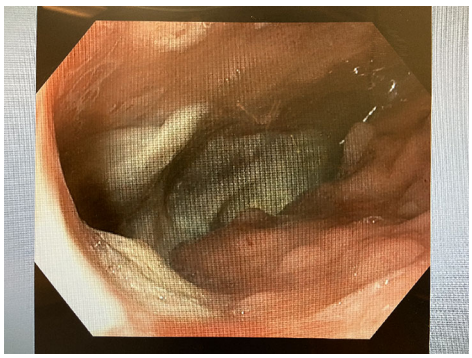
Berna F Buyukozturk, MD[1]; Robin Riley, MD[1]; Serena Murphy, MD[1]; Michael Shelton, MD[1]; Susan Campbell, MD[1]; Lindsey Mucia, NP[1]; Kumar Krishnan, MD[2]; Edward Borrazzo, MD[1]; [1]University of Vermont Medical Center; [2]Massachusetts General Hospital

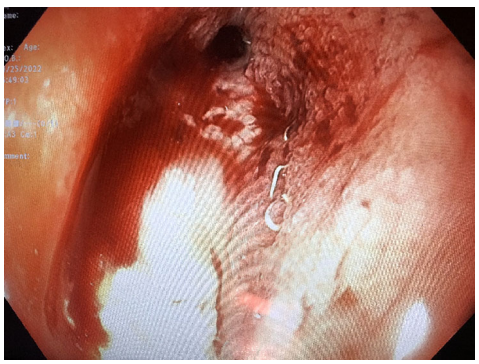
Introduction: Endoluminal vacuum therapy, or EVAC, is an emerging technique to manage anastomotic leaks with promising results.[1] In a PubMed review, there are 36 published case reports utilizing EVAC. This therapy is most commonly applied to esophageal and gastric defects.[2–3] We present a case of a gentleman with a gastric conduit leak treated with EVAC through a novel approach.
Methods/Procedures: A 70-year-old male presented 1-month s/p Ivor lewis esophagectomy for esophageal adenocarcinoma and was found to have a 4 cm defect of the gastric conduit, unamenable to stenting. Despite imaging-guided mediastinal drainage, antibiotics, nil per os, and observation, his defect failed to close. He was unable to tolerate his nasogastric tube and requested it be removed during his admission. EVAC therapy was discussed; however, the patient refused indefinite placement of a nasogastric tube. He was amenable to esophagostomy for the application of EVAC. A left-sided cervical esophagostomy was performed through a lateral neck incision. An endosponge was created, threaded through the esophagostomy, and positioned into the wound cavity under endoscopic and fluoroscopic visualization (Figs. 1–3). The endosponge was exchanged 2–3 times a week over the course of 3 months. The defect minimized to a small fistulous tract (Figs. 4–5) and successful closure was noted on week 23 from initiation of EVAC (Figs. 6–7).
Discussion: We performed cervical esophagostomy for a similar application of EVAC to treat an esophageal perforation in 2020, with successful closure of the defect on hospital day 31.[4] EVAC has demonstrated better rates of successful defect closure when compared to stenting in some studies, ranging from 60 to 100% in one systematic review.[5] In a retrospective analysis of 71 patients, EVAC was superior to stenting for successful defect closure in patients with esophageal defects with no difference in length of stay or mortality.[6] Cervical esophagostomy may enable application of EVAC in clinical situations in which prolonged nasopharyngeal instrumentation is not preferred. While most of the data for EVAC is limited, the existing literature points to favorable outcomes for patients with leaks that are not amenable to stenting and that are high-risk candidates for surgery.
Conclusion: We demonstrate successful application of EVAC through a cervical esophagostomy in a patient not amenable to nasopharyngeal instrumentation. No case reports have been published describing concomitant esophagostomy with EVAC at any other US institution.















P360

Experience in diagnosis and management of anastomotic leaks following esophagectomy: a single-center descriptive study

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Background: Esophageal anastomotic leak (AL) after esophagectomy is a common complication with multifactorial etiology that increases morbidity, mortality, and length of stay. The incidence, diagnostic approach, and management has changed over the years. We sought to describe and characterize the diagnosis and management of patients who developed an esophageal AL at our institution.
Methods: After institutional review board (IRB) approval, we queried our prospectively maintained, institutional, Society of Thoracic Surgeons based database to identify patients who developed an esophageal AL after esophagectomy. Data pertaining to demographics, comorbidities, surgical and oncological characteristics, clinical course, endoscopy, imaging findings, and discharge status were extracted and analyzed.
Results: A total of 173 patients underwent esophagectomy during the study period: 13 transhiatal, 11 three-hole McKeown, 4 colonic and small bowel interposition, and 145 Ivor Lewis. Of 173 patients, 14 (8%) developed an AL; the median time to detection was 7.5 days after surgery. The AL was diagnosed by detection of enteric contents from wound drains in 3 cases (21%), endoscopy in 6 (43%), computed tomography in 3 (21%), and barium esophagography in 2 (14%). Twelve of 14 (86%) patients presented with an increasing white blood cell count and 11 (79%) showed additional signs of sepsis. Three patients did not present AL-related clinical features; 2 were identified by barium esophagography and 1 by endoscopy. All patients received enteral nutritional support, intravenous antibiotics, and antifungals; the median length of antimicrobial therapy was 8 days. Primary treatment of the AL included: endoscopic placement of a self-expanding metal stent (SEMS; n = 7); surgery (n = 3); SEMS with endoluminal vacuum therapy (n = 2); endoscopic drain repositioning (n = 1), and no additional treatment (n = 1). One patient required surgery after initial SEMS placement. Surgery as the primary treatment was related to early detection of ALs; however, no increase in length of stay or mortality was observed. The median intensive care unit stay and hospital stay were 10 and 21.5 days, respectively; no 30-day mortality was documented.
Conclusion: The incidence of esophageal ALs at our center is similar to other high-volume centers. Most ALs can be managed without re-operative intervention. Although AL remains a significant source of postoperative morbidity, advancements in management alternatives have improved the associated mortality. The intervention must be individualized; early ALs are more likely to require surgical intervention.

P361

Esophageal stricture mimicking as achalsia cardia

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Introduction: Achalasia cardia and esophageal stricture are two different spectrum of foregut diseases which have different treatment modalities. Here we discuss an unique case of esophageal stricture which presented as achalasia cardia.
Case Summary: A young lady presented with non-progressive dysphagia (grade 4, taking sometimes liquids) over a period of 3 years and tube gastrostomy (operated at a local centre) in situ since 6 months. She underwent UGIE which showed lower end GE junction narrowing and even pediatric scope could not be negotiable. Hence, manometry could not be done. Barium Swallow was suggestive of achalasia cardia with smooth mucosa and tapering at the lower end. CT scan showed lower end esophageal wall thickening suggestive of sticture. She underwent 1st Surgery: Explorative laparotomy with Hellers cardiomyotomy, anterior fundoplication, and feeding jejunostomy along with intraop endoscopy where the scope could be negotiated with minimal resistance. But there was postoperatively no improvement of dysphagia. Oral barium swallow showed same lower end gastroesophageal junction obstruction with contrast hold up for 30 min. She underwent 2nd surgery (after 1 week): laparotomy, adhesiolysis, resection of strictured GE junction, and fundus of stomach plus esophago-gastric anastomosis. She was maintained on FJ diet during her hospital stay. Gastrograffin swallow done after 6 days of 2nd surgery showed no contrast leak and good passage of contrast into stomach with no hold up. She was started on oral diet postoperatively after 1 week. FJ tube was removed after 2 weeks of discharge and follow-up barium study was normal after 1 month. Post-operative biopsy showed inflammatory fibrosis suggestive of stricture.

Conclusion: Esophageal stricture may mimick as achalasia cardia in rare cases and one should be careful about the preoperative diagnosis for deciding future intervention.

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Robotic versus laparoscopic hiatal hernia repair and Heller myotomy: A systematic review and meta-analysis

Sabrina Awshah; Meagan Read; Emily Coughlin; Adham Saad; Rahul Mhaskar; Joseph Sujka; Christopher DuCoin; USF Morsani College of Medicine

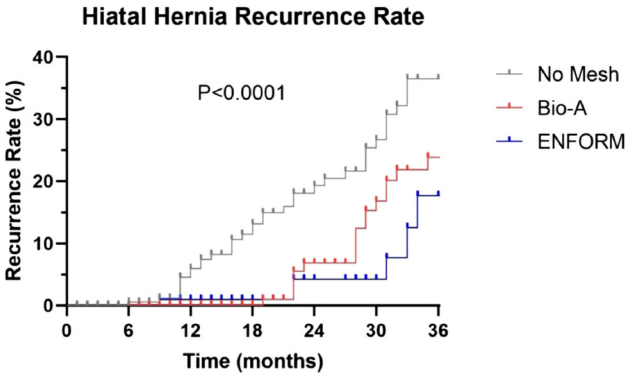
Introduction: Laparoscopic surgery remains the mainstay of treating Hiatal hernias and achalasia. Robotic surgery affords surgeons enhanced visualization and dexterity in the foregut, with recent studies showing improved patient outcomes compared to conventional laparoscopy. We conducted a systematic review and meta-analysis to compare operative and patient outcomes between robotic and laparoscopic hiatal hernia repairs and Heller myotomy.
Methods: We searched PubMed, Embase, and Scopus databases to identify studies published between January 2010 and May 2021. The risk of bias was assessed using the ROBINS-I tool by Cochrane. Assessed outcomes included intraoperative and short-term postoperative patient outcomes for both procedures. We pooled the dichotomous data using the Mantel–Haenszel random effects model to report odds ratio (OR) and 95% confidence intervals (95% CIs) and continuous data to report mean difference (MD) and 95% CIs.
Results: We included 15 comparative studies enrolling 181,388 patients. Ten (robotic n = 11,993, laparoscopic n = 166,864) studies assessed outcomes of hiatal hernia repair, while five (robotic n = 302, laparoscopic n = 2229) assessed the outcomes of Heller myotomy. Robotic hiatal hernia repair had a significantly shorter length of hospital stay [MD − 0.59, (95% CI − 1.04, − 0.13), p = 0.01] compared with laparoscopic procedure. Robotic hiatal hernia repair also had a non-significant longer operative duration [MD 21.58 (95% CI − 0.30, 43.46), p = 0.05] and a nonsignificant reduction in conversions to open [OR 0.19, (95% CI 0.02, 1.73), (p = 0.14)] compared with laparoscopic procedures. In robotic Heller myotomy, the incidence of esophageal perforations [OR 0.13, (95% CI 0.03, 0.52), p = 0.04] was statistically significantly lower compared with laparoscopic procedures. Robotic Heller myotomy also had statistically nonsignificant reductions in conversions to open [OR 0.15 (95% CI 0.02, 1.25) p = 0.08], shorter length of stay [MD − 0.61 (95% CI − 1.42, 0.20) p = 0.14], and longer operative time [MD 7.48 (95% CI − 1.34, 16.30) p = 0.10] compared with laparoscopic procedures.
Conclusion: Laparoscopic and robotic hiatal hernia repair and Heller myotomy have similar safety profiles and perioperative outcomes. The robotic hiatal hernia repair led to a shorter hospital length of stay and the robotic Heller myotomy resulted in fewer esophageal perforations compared with laparoscopic procedures. Limitations include low- to moderate-quality studies. High-quality randomized controlled trials are warranted to compare the two surgical methods.

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Use of Biosynthetic Mesh for Robotic-Assisted Cruroplasty in Hiatal Hernia Repairs

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Background: Recurrence rates after hiatal hernia repair remains high, providing a unique challenge for foregut surgeons. Due to the heterogeneity of studies, the use of mesh during hiatal hernia repair remains controversial. The goal of this study was to compare recurrence rates after robotic-assisted primary cruroplasty to biosynthetic mesh reinforcement in patients undergoing hiatal hernia repair.
Methods: Using a prospective database, we retrospectively reviewed 516 patients undergoing hiatal hernia repair at a single center from January 2016 to June 2022. All cases were robotic assisted and were performed by one of two surgeons. Utilization of mesh was at the discretion of the surgeon and the surgeons transitioned from Bio-A (W.L GORE) to ENFORM (W.L. GORE) mesh upon the release of ENFORM mesh. Mesh was fixated in a "U" or reverse "C" configuration based on surgeon preference. Recurrences were identified radiographically or endoscopically and were investigated based on patients' symptoms at any point during follow-up. Emergency surgery cases, cases involving relaxing incisions, and oncology cases were excluded. Patients with preoperative dysphagia or those undergoing primary antireflux procedures were investigated preoperatively with high-resolution esophageal manometry or video esophagram.
Results: A total of 516 patients were included. Mesh was utilized in 59% of cases, with 35% Bio-A mesh, and 24% ENFORM mesh. Primary cruroplasty was performed in the remaining cases. There were no significant differences in age, sex, BMI, or smoking status between cohorts ($p > 0.05$). Patients who underwent mesh repair were significantly more likely to have pre-operative esophagitis ($p = 0.006$), previous foregut surgery ($p < 0.001$), and a larger hernia defect ($p < 0.001$). There were no significant differences in operative time, intraoperative complications, length of stay, or 90-day morbidity ($p > 0.05$). Average follow-up was 18 months (range 1 month–5 years). Hiatal hernia recurrence rates were significantly higher for patients who underwent primary cruroplasty (28.1% vs. Bio-A mesh 14.9% vs. ENFORM mesh 4.8%; $p < 0.001$). Dysphagia at 30 days was not significantly different between cohorts (2.9% primary repair vs. 4.4% Bio-A mesh vs. 4.0% ENFORM mesh; p = 0.7).
Conclusion: The use of biosynthetic mesh for robotic-assisted cruroplasty is both safe and effective in reducing the recurrence rate. Intermediate-term outcomes suggest a recurrence-free benefit with the use of biosynthetic mesh compared to a non-mesh repair. Longer follow-up is needed to assess the five-year benefit of mesh placement.



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Ultrarapid Development of Ruptured Esophageal Varices in a Patient With a History of Heller Myotomy

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Background: Esophageal varices are enlarged veins within the esophagus, connecting the portal and systemic circulation. In cirrhotic patients, resistance within the portal circulation can often lead to pooling of blood within these esophageal portosystemic collateral vessels, which can eventually lead to rupture and a deadly upper GI bleed. Therefore, all cirrhotic patients without a history of varices are recommended to undergo a screening EGD every 2 to 3 years. We present an unusual case of variceal hemorrhage in a patient who was seen to have no varices on EGD only a month earlier.

Case: A 62-year- old male with a history of alcoholic cirrhosis and achalasia s/p Heller myotomy in 2019 presented following 4 episodes of large-volume hematemesis. The patient was hypotensive and tachycardic on admission and lab work was significant for anemia. Of note, the patient underwent an EGD only a month earlier, which showed no evidence of varices.. The patient required IV fluids as well as 3 units of blood and was started on an octreotide drip as well as pantoprazole and ceftriaxone. The patient then underwent an EGD, which showed three columns of small esophageal varices. Although there were no red wale signs, there was a white nipple sign in the lower esophagus, indicating recent bleeding. Two bands were placed on the white nipple area. Following his EGD, the patient experienced no recurrent bleeding and was hemodynamically stable.

Discussion: Esophageal varices are present in approximately 50–60% of patients with cirrhosis. In cirrhotic patients without varices, current guidelines recommend a screening EGD every 2–3 years. The expected incidence of patients without varices developing bleeding varices within 3 years is less than 10%. In our patient, however, an EGD done in August 2022 showed no varices, and so he would not be due for another screening for 2–3 years. Yet, within a month, the patient developed three columns of varices that ruptured, requiring fluid resuscitation and blood transfusions. Interestingly, the patient had a history of a Heller myotomy in 2019, which may have impacted the pathogenesis of his varices. There are no studies within the literature focusing on the development of varices in patients with a history of myotomy, and further investigation is most definitely warranted. This case is unique as it is extremely rare to develop variceal hemorrhage in an esophagus only a month after it was visualized to have no varices.

P365

Intestinal occlusion secondary to non-syndromic intestinal arteriovenous malformation in a young patient, case report

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The incidence of syndromic pathology and genetic defects in patients with digestive malformations is much higher than that of the general population. Intestinal occlusion and incidental detection of arteriovenous malformations in adult patients are a rare condition that should be approached thoroughly to obtain an accurate diagnosis and find the best therapeutic conduct.

Colonic stricture is typically asymptomatic but can cause symptoms of chronic obstruction. Common etiologies, clinical presentation, and treatment must be individualized. Surgical treatment is reserved for patients with complicated intestinal obstruction and who are not candidates for endoscopy.

18-year-old male whith abdominal pain of 5 days of evolution, generalized, colic type, intensity 8/10, accompanied by nausea and emesis, liquid evacuations at that time, chills. Blood test: Cl 108, k 3.3, Na 138, cr 0.96, glucose 135, BUN 14, Urea 30, TGO 24, TGP 33, Amylase 38, Ca 9.3, DHL 196, Lipase 31, Leukocytes, 11,230, Hgb 16.4, platelets 268,000, and Neutrophils 77.8%. Patient with data of acute abdomen so surgical exploration is decided, finding hypotrophic abdominal wall, at the opening exit of 100 cc of citrine fluid, loops of small intestine dilated in its entirety, as well as cecum, ascending colon, transverse, and descending with significant dilatation. Lesions in rice grains distributed in the loops and mesentery as well as in the omentum. Abundant adenopathies in the mesocolon and mesentery. An area of stenosis of 100% of the sigmoid lumen is identified. Pathology report: Sigmoid segment of 18.5*5.5 cm (perforated chronic colitis secondary to combined vascular malformation, artery, veins and lymphocytes, in the serosa. A new surgical intervention is performed due to torpid evolution with the following findings output of fecal content 1400 cc, necrosis of intestinal loops, necrosis of small intestine to 110 cm of fixed loop, multiple perforations in the jejunum at 130, 150 and 200 cm of fixed loop. Intestinal resection was performed at 110 cm from the fixed loop, and the loop of jejunum and terminal ileum was exteriorized at 40 cm from the ileocecal valve. The patient presented surgical site infection and malnutrition and after 45 hospitalizations, he was discharged.

The most probable cause of arteriovenous colonic diseases develops in normal spasms of the intestine that cause a dilation of the blood vessels, this causes bleeding in the areas of the affected colon and can cause data of ischemia and necrosis, in the majority of cases is associated with congenital disorders and its incidence is low.

P366

Resolution of Roemheld Syndrome After Hiatal Hernia Repair and LINX Placement: Case Review

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Introduction: Roemheld syndrome, also known as gastrocardiac syndrome, was first studied as a relationship between gastrointestinal and cardiovascular symptoms through the vagus nerve. Several hypotheses have attempted to explain the pathophysiology of Roemheld syndrome, but the underlying process remains unclear. The most prominent explanations include autonomic imbalance or local

inflammation triggered by esophageal reflux due to the close anatomical association between the left atrium and esophagus. We present a clinically diagnosed case of Roemheld syndrome in a patient with a hiatal hernia whose gastrointestinal and cardiac symptoms were successfully treated with robotic assisted hernia repair, EGD, and LINX magnetic sphincter augmentation.

Case: A 60-year-old male with a history of esophageal stricture and hiatal hernia presented with complaints of GERD and related arrhythmias for five years. Cardiac work-up with CT angiography revealed normal cardiac chamber morphology, an ejection fraction of 61% and moderate plaque burden in the right coronary artery. Arrhythmias were characterized as supraventricular tachycardia with intermittent pre-ventricular contractions. High-resolution manometry (Fig. 1) showed low pressure in the lower esophageal sphincter with normal esophageal motility. Further evaluation included a 96-h Bravo test (Table 1) that was to be performed two weeks after the stoppage of omeprazole. A DeMeester score of 31 was recorded, confirming mild GERD; however, esophagastroduodenoscopy (EGD) was unremarkable. Surgeons elected to perform a robotic assisted hiatal hernia repair, EGD, and magnetic sphincter augmentation. Four months following surgery, the patient denied symptoms of GERD or episodes of palpitation and subsequently weaned off proton pump inhibitors with continual lack of symptoms.

Discussion: Gastroesophageal Reflux Disease is a common complaint among primary care settings, with a prevalence of approximately 10–15% of the Western population. However, ventricular dysrhythmias among this population and a clinical diagnosis of Roemheld syndrome is unique. This poses the question of what differs among these patients that cause the gastro-cardiac symptoms. One hypothesis may be that the cause of the periesophageal inflammation needed to stimulate the vagus nerve is a two-step process involving a decreased pressure in the lower esophageal sphincter, as well as the presence of a hiatal hernia. Protrusion of the stomach into the chest cavity may exacerbate current reflux, and the anatomical relationship between a herniated fundus and anterior vagal nerve may cause direct physical stimulation that is a more potent risk factor for the development of arrythmias. However, Roemheld Syndrome is a unique diagnosis, and the pathophysiology is still yet to be understood.

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Recurrent Hiatal Hernia Repair Using a Robotic Platform

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Introduction: The failure rate of primary hiatal hernia repair surgery is cited as 24% and symptomatic patients often require reoperation. Currently, minimally invasive laparoscopic surgery has been established as a safe and effective approach to repairing recurrent hiatal hernia. However, the efficacy of robotic-assisted laparoscopic approach has yet to be evaluated. Here, we report our experience with repair of recurrent hiatal hernia using a robotic platform.

Method: We conducted a retrospective chart review of all patients who underwent robotic assisted laparoscopic hiatal hernia repair surgeries in a multicentered health system from 4/2016 to 9/2022. Only those who underwent reoperation for hiatal hernia recurrence after a previous repair were included in the final analysis. Inpatient, operative, and outpatient data were collected.

Results: 30 patients were included in the final analysis. 63% (n = 19) were women, the average age was 61 (± 9.6) years old, and the average BMI was 30 (± 3.8) kg/m2 at reoperation. The majority presented with symptoms of reflux and dysphagia (83% n = 25 and 53% n = 16, respectively). The most common intraoperative finding for hernia reoccurrence was the breakdown of cural repair causing reopening of the esophageal hiatus (73% n = 22). The most common fundoplications performed in the reoperation were Toupet (37% n = 11), Nissen (30% n = 9), and keeping the previous fundoplication without additional wrap (23% n = 7). In all patients, the hiatus was closed with sutures without the use of additional mesh. There were no intraoperative complications requiring conversion to open. The average operative time was 217 (± 59.0) min. 7% (n = 2) of the patients required return to OR on the same admission: one was a transabdominal surgery aborted with plan for open transthoracic approach and the other was due to reherniation due to broken cural stitch. The average length of hospital stay was 3.0(± 2.7) days. In subsequent follow-ups, 80% (n = 24) had improvement of symptoms, with 27% (n = 8) reporting complete resolution. The average length of follow-up was 8.99 (± 12.1) months. In total, 13% (n = 4) had another hernia recurrence after the redo repair requiring additional operations.

Conclusion: Robotic-assisted laparoscopic surgery is an excellent method for the repair of recurrent hiatal hernia. Although operative time was increased with this approach, there were no intraoperative complications, zero conversions to open rate, and similar post-operative results when compared to laparoscopic redo hiatal hernia repair.

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Resolution of Anemia Following Paraesophageal Hernia Repair

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Introduction: The association between paraesophageal hernias and anemia is well known and discussed in the literature[1–3]. It is debated, however, whether this anemia results from an underlying pathologic lesion, malnutrition, or from an alternative cause. There are mixed findings in the literature with regard to whether paraesophageal hernia repair resolves preoperative anemia and the timing for which this occurs[4]. This study aims to assess the improvement and resolution of preoperative anemia in patients undergoing paraesophageal hernia repair in our high-volume center.

Methods: We conducted a retrospective review of all patients > 18 years old who underwent laparoscopic paraesophageal hernia repairs performed at a single institution between 2010 and 2020. Patients with preoperative anemia (< 14 g/dL in men, < 13 g/dL in women) were included in the study. Data abstracted included patient demographics, preoperative lab work, endoscopic discoveries, intraoperative findings, hospital course, complications, and post-operative lab work for up to 6 months following surgery.

Results: There were 108 patients found to be anemic within 30 days of surgery who also had postoperative lab draws. There were 31 female patients and 77 males. 43 patients were found to have evidence of Cameron's ulcerations or gastritis/esophagitis on preoperative endoscopic evaluation. On average, there was a significant increase in hemoglobin across all 108 patients. 27 patients (25%) completely resolved their anemia ($p < 0.0001$), while the other 81 had a significant improvement from their starting hemoglobin ($p = 0.0156$; average 11.0 g/dL to 11.3 g/dL). There was no difference regarding anemia resolution to the type of fundoplication

performed. There was no difference in anemia resolution to the presence of esophagitis, gastritis, or Cameron's ulcerations ($p = 0.5089$).

Conclusion: We found that anemic patients had statistically significant improvement in their hemoglobin levels after undergoing paraesophageal hernia repair, regardless of preoperative endoscopic findings of esophagitis, gastritis, or Cameron's ulcerations. Operative repair may completely resolve anemia following, as was seen for 25% of our patients within 12 months. Paraesophageal hernia repair should be expanded to those patients with asymptomatic paraesophageal hernias in the setting of ongoing anemia.

P370

Gastric Fibrolipoma Presenting as GI Bleed

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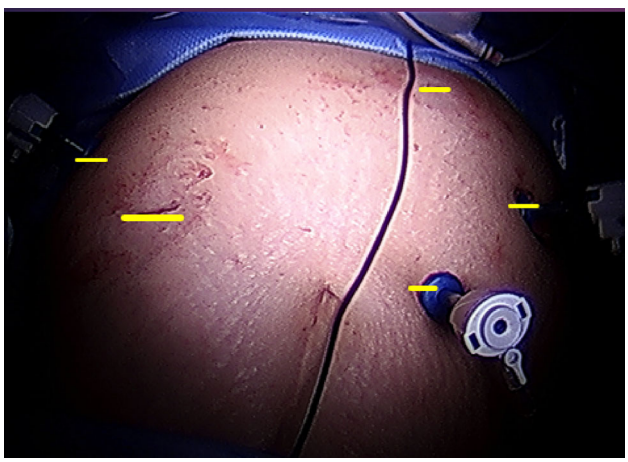
Introduction: Gastric lipomas are very rare, benign tumors, usually occur in the 5th or 6th decade of life. The majority of gastric lipomas are located in the antral region of the stomach, in the submucosa or serosa layers. [1] The majority of gastric lipomas are asymptomatic, but can present as abdominal pain, nausea, vomiting, gastric outlet obstructions, or GI bleeding. The most common symptom, seen in 50% of cases is ulceration with bleeding. [2] We present a case of a 76-year-old female who presented with weakness and severe anemia. EGD revealed a large submucosal mass at the incisura angularis of the stomach. Patient had a laparoscopic wedge resection of the gastric mass. Pathology turned out to be a gastric lipoma.

Case: A 76-year-old female presented with weakness and 1 episode of coffee-ground emesis and dark stools 2 weeks prior. Past medical history includes hypertension and CAD status post-7 cardiac stent placements. On presentation, vitals were stable with no significant physical exam findings. She was transfused 3 units PRBC (currently, Hb 10.2) and underwent EGD which demonstrated a large submucosal mass at the incisura angularis with biopsies taken. Pathology from EGD showed no evidence of the mass as biopsies did not reach the submucosa. No evidence of intestinal metaplasia or malignancy was observed. She was then taken to OR for a laparoscopic wedge gastrectomy (Fig. 1–4). Intraoperatively, ink was seen on the distal stomach near the lesser curvature. An intragastric port was placed and a mass was seen in the distal stomach near the lesser curvature, which determined resection margins. Findings included a submucosal tumor with an overlying ulcer in the distal stomach near the lesser curvature. There was no evidence of peritoneal or omental surface metastasis. Final pathology from the partial gastrectomy showed a 5.5-cm gastric fibrolipoma with no evidence of malignancy.





CT: Large heterogeneous fatty mass filling gastric body and antrum.



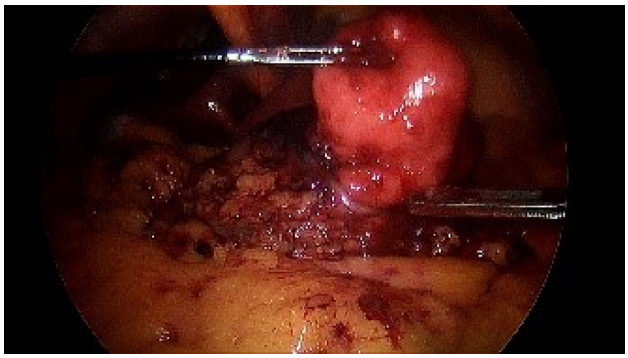


Fig. 1 Laparoscopic port placement for partial gastrectomy and gastric fibrolipoma located at the incisura angularis

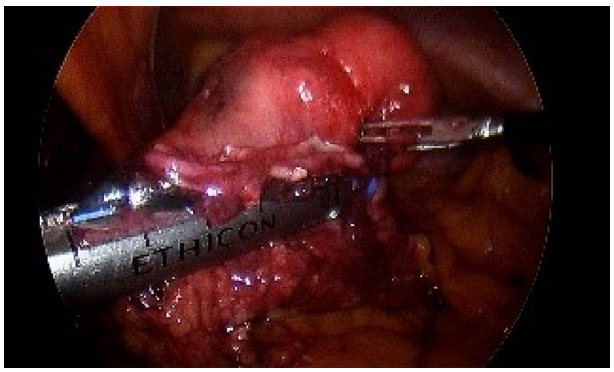




Fig. 2 Blue staple load to staple off 5.5-cm gastric fibrolipoma and staple line after gastric fibrolipoma was removed

Conclusion: This case demonstrates that a potential cause of major upper GI bleed can be due to a gastric fibrolipoma. Therefore, the differential of gastric fibrolipoma should be considered in patients with upper GI bleed.

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Laparoscopic anterior gastropexy for giant hiatal hernia.

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Purpose: Recent studies have pointed the need to reduce the recurrence rates due to the weakness of supporting tissue and lumbar kyphosis in elderly patients with large hiatal. Some studies have also reported the mesh placement for laparoscopic large hiatal hernia with mesh repair improved symptomatic outcomes compared with suture repair, and other studies have reported increased mesh-related complications. Thus, we consider that mesh-related complications may be avoided. The study aimed to evaluate the effectiveness of anterior gastropexy for large hiatal hernia.
Materials and Methods: We retrospectively evaluated patient characteristics, surgical, and postoperative outcomes, etc. in 123 patients with type III /IV hiatal hernia who underwent reinforced hiatoplasty.
Result: Laparoscopic hernioplasty was attempted in 105 patients with type III and in 18 patients with type IV hiatal hernia. 43 patients had hiatal hernia with upside-down stomach. Fundoplication was performed in all cases (Toupet, n = 90; Nissen, n = 1; Lateral Patch, n = 31; others, n = 1). Mesh reinforcement was performed in 23 (18.7%) patients and anterior gastropexy was performed in 95 (77.2%) patients. However, the total recurrence rate was 8.9%. The recurrence rate before gastropexy decreased from 18.2% to 6.8% after gastropexy (p = 0.006). No significant difference was found in the recurrence rate between gastropexy and mesh repair (p = 0.36).
Conclusion: Long anterior gastropexy using non-absorbable barbed suture can reduce postoperative recurrence same as mesh reinforcement.

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Does surgical technique influence recurrence after paraesophageal hernia repair?

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Introduction: Paraesophageal hernia repair (PEHR) carries a higher rate of recurrence compared to most hernia operations. In an effort to decrease recurrence rates, multiple technical variations have been proposed, such as mesh reinforcement, pledget use, and others. However, there are little data on the effect of such technique variations on recurrence risk. This study aimed to assess the impact of surgical techniques on hernia recurrence.
Methods: Outcomes of patients after paraesophageal hernia repair across multiple hospitals at a high-volume academic institution were examined between June 2019 and June 2020. Demographic and procedure details were collected from electronic health records along with post-operative clinical encounter data for up to 24 months. Patients less than 18 years of age, having a reoperation, or other type diaphragmatic hernia repairs were excluded. Recurrence was identified as any evidence of stomach above the diaphragm radiographically, endoscopically, or intraoperatively based on patient symptoms or incidentally during the follow-up period. The association of 20 technical and other factors with hernia recurrence was evaluated using univariate logistic regression analysis.

Results: 468 patients underwent paraesophageal hernia repair during our study period, of which 335 patients were eligible for inclusion in our analysis. 251 (75%) of the patients were female, while 84 (25%) were male. Their mean age was 62.4 ± 12.7 years, and mean BMI was 31 ± 6.7. The mean size of the hernia was 4.9 ± 2.78 cm. The operations were performed by 25 surgeons. Among all 335 procedures, 268 were performed via laparoscopic approach, 38 robotic, and 19 open. 58 out of 335 (17.3%) patients were identified to have recurrence at an average of 10.4 ± 8.17 months after surgery; 12 of those 58 patients (20.7%) required reoperation. On univariate logistic regression, no statistically significant predictors of recurrence were identified, including patient characteristics (Age, gender, and comorbidities), surgeon, hernia size, mesh use, suture type, technique, and fundoplication type.
Conclusion: While 1 in 6 paraesophageal hernia repairs failed during the study period, only 1/5 required reoperation. Notably, none of the examined technical and other factors were predictive of recurrence. Longer-term follow-up may help further clarify the importance of various techniques used during PEHR.

P375

Magnetic Sphincter Augmentation vs Fundoplication: An ACS-NSQIP Review of 30-Day Outcomes and Complications

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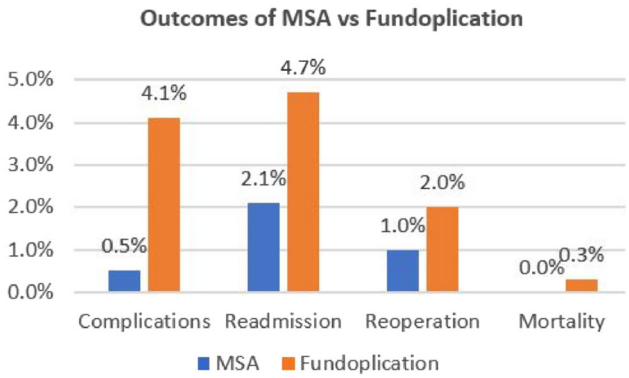
Purpose: Magnetic Sphincter Augmentation (MSA) is an FDA-approved anti-reflux procedure with comparable outcomes to fundoplication. However, most data regarding its use are limited to single or small multi-center studies which may limit the generalizability of its efficacy. The purpose of this study is to evaluate the outcomes of patients undergoing MSA vs fundoplication in a national database.
Materials and Methods: The 2017–2020 American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) Registry was utilized to evaluate patients undergoing MSA or fundoplication. Emergency cases were excluded. Patient outcomes included overall complication rates, readmissions, reoperations, and mortality.
Results: A total of 8,040 patients underwent MSA (n = 623) or fundoplication(n = 7467). MSA patients were younger, more often male, and had fewer comorbidities (Table 1). While patients undergoing MSA experienced similar rates of reoperation (1.0% vs 2.0%, p = 0.07), they experienced fewer readmissions (2.1% vs 4.7%, p = 0.003), complications (0.5% vs 4.1%, p < 0.001), and shorter mean (SD) hospital length of stay (0.41 ± 4.23 vs 1.78 ± 4.59, p < 0.001). Mortality was similar between groups (0% vs 0.3%, p = 0.18). On multivariable analysis, MSA was independently associated with reduced postoperative complications (OR 0.21, CI 0.07–0.56, p = 0.002) and readmissions (OR 0.51, CI 0.29–0.89, p = 0.02).

	Fundoplication (n = 7467)	MSA (n = 623)	p
Median Age	57	51	< 0.001
Sex(Female)	65.8%	50.4%	< 0.001
Median BMI	29.7	29.5	0.018
HTN	40.0%	32.3%	< 0.001
Smoking	11.8%	7.9%	0.003

Table continued

		Fundoplication (n = 7467)	MSA (n = 623)	p
Dyspnea	Moderate	8.9%	3.0%	< 0.001
	At Rest	0.5%	0.2%	
COPD		5.3%	1.4%	< 0.001
Steroid Use		5.1%	1.4%	0.005
> 10% Wt Loss		1.0%	0.2%	0.033

BMI body mass index (kg/m^2), *HTN* hypertension, *COPD* Severe chronic obstructive pulmonary disease, > 10% *Wt loss* more than 10% weight loss in 6 months



Conclusion: In this national database study, compared to fundoplication, MSA was associated with reduced postoperative complications, fewer readmissions, and shorter hospital length of stay. While randomized trials are lacking between MSA and fundoplication, both institutional and national database studies continue to support the use of MSA as a safe and effective anti-reflux operation.

P376

Paraesophageal Hernia Repair: Assessment of Factors Impacting Recurrence

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Introduction: Type II–IV hiatal hernias, commonly called paraesophageal hernias (PEH), are estimated to represent 5–10% of all diagnosed hiatal hernias and can be associated with decreased quality of life and potentially life-threatening complications. While paraesophageal hernia repairs (PEHR) are commonly performed, there are many technical variations and it is unclear what contributes to recurrence or lack of postoperative improvement. The primary outcomes assessed were postoperative symptom improvement and radiographic recurrence.
Methods: In an IRB-approved retrospective study, the electronic medical record at a tertiary care center was queried for PEHRs

performed from 01/01/2018 to 12/31/2022. Patient characteristics, preoperative imaging, operative findings, and postoperative outcomes including complications within 30 days, ED visits or admissions within 30 days, complications or symptoms noted until last day of follow-up, and repeat operations were recorded. STATA v17 was used for descriptive analysis.

Results: A total of 244 patients underwent PEHR (78.7% female, mean age 65.4 ± 12.3 years). Baseline patient characteristics included mean BMI 29.8 ± 4.9 kg/m2 and median ASA score of 3 (IQR 2–3). The majority of PEH were type III (54.2%), followed by type II (22.9%) and type IV (6.3%). Most common preoperative symptoms included: heartburn (49.0%), abdominal pain (36.7%), dysphagia (35.9%), nausea/vomiting (28.6%), and chest pain (24.9%). Only 11.8% had evidence of volvulus on preoperative imaging and 1.5% of surgeries were done emergently. In this cohort, 50 (20.5%) patients were reoperative PEHR. Almost all PEHR were performed minimally invasively (92.7%) with a mean operative time of 118.6 ± 57.6 min. Most repairs were done with crural closure using sutures (81.4%) and some form of fundoplication (71.7%), only 14.2% of repairs utilized mesh. Postoperatively, 76.5% of patients had subjective improving compared to their preoperative symptoms and of the 157 patients with postoperative imaging, 52.9% had evidence of radiographic recurrence at an mean follow-up of 10.4 ± 15.3 months. Only 4.9% of patients required a redo PEHR. There was an overall 30-day complication rate of 8.5%, with few patients requiring 30-day readmission (2%) or a 30-day emergency department visit (3%), and 30-day mortality rate of 1%. Hernia type, crural closure, fundoplication, and mesh usage were not predictors of post-operative radiographic recurrence or post-operative symptom improvement ($P > 0.05$).

Conclusion: The majority of patients undergoing PEHR have symptomatic improvement with minimal complications and reoperations despite radiographic recurrence. Hernia type, crural closure, fundoplication, and mesh usage were not significantly associated with post-operative radiographic recurrence or symptom improvement.

P377

Congenital Diaphragmatic Hernia Repairs: A Case Series of Outcomes

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Background: Congenital Diaphragmatic Hernia is a birth defect characterized by a hole in the diaphragm, consequently resulting in abdominal organs and other contents migrating into the chest cavity. The most common types are Morgagni (anterior) and Bochdelak hernias (posterior). These hernias typically are diagnosed in childhood, but in asymptomatic cases patients are diagnosed as adults. There are limited case series or studies regarding congenital diaphragmatic hernia repairs in adult patients.

Methods: In an IRB-approved retrospective study, the electronic medical record at the tertiary care health system was queried for diaphragmatic hernia repairs performed from 1/1/2018 to 12/31/2022. Eight patients underwent repair during this time period and their baseline characteristics, preoperative symptoms, imaging, operative data, and postoperative surgical outcomes were assessed. Descriptive statistics was used to describe the data and STATA v17 was used to perform the analysis.

Results: Eight patients were diagnosed with a diaphragmatic hernia (62.50% female; average age 58.5 ± 10.4 years). Baseline patient characteristics included average BMI 31.2 ± 6.9 kg/m2 and median ASA score (2.5, IQR 2–3) with 62.5% of patients had a prior abdominal surgery. Preoperative symptoms were all subjective and most commonly included shortness of breath (75.0%), abdominal pain (50.0%), and nausea/vomiting (37.5%). Preoperative imaging demonstrated 3 (37.5%) Bochdalek and 5 (62.5%) Morgagni hernias. Average size of the defect recorded on CT imaging was 5.3 ± 1.3 cm. The majority of patients underwent minimally invasive repair (87.5%) and all patients had a suture repair, with one patient requiring mesh. Average procedure length was 106.5 ± 41.7 min with average length of stay of 2.0 ± 1.1 days. At an average follow-up of 13.0 ± 12.8 months, most patients felt subjective improvement in preoperative symptoms, although some patients did still have shortness of breath (12.5%), abdominal pain (25.0%), and nausea/vomiting (12.5%). There was one readmission within 30 days of surgery for a distal small bowel obstruction managed conservatively, but no other short-term complications and no mortalities occurred. There was one patient who underwent thoracic repair for a recurrent hernia 14 months after initial suture repair only.

Conclusion: Congenital diaphragmatic hernia repair was successful in the majority of patients undergoing repair with minimal complications. Suture repair was sufficient for most patients, but occasionally mesh may be required. Recurrence rates overall are low at one-year follow-up.

P378

Acetaminophen and methocarbomol use are associated with successful extubation after transhiatal esophagectomy

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Introduction: The aim of this study is to identify non-opiate analgesic medications that may be associated with successful extubation immediately following esophagectomy in an attempt further clarify clinical decision making as it relates to which analgesic medications should be administered intraoperatively.

Methods and Procedures: This is a retrospective, IRB-approved comparative study of 43 patients who underwent esophagectomy at Methodist Richardson Medical Center from January 2019 to January 2022. 42 of 43 patient met study criteria. Data were collected on patient demographics and whether immediate extubation was achievable. Student's t tests were used for analysis of medications on extubation.

Results

Table 1 shows the various intra-operative medications administered during surgery

Patients receiving adjunct medication	N	Percent
Ketamine	23	54.8
Magnesium	33	78.6
Acetaminophen	10	23.8
Methocarbamol	13	31
Adjunct medications dosing	Mean dose	
Ketamine (mg)	51.1	
Magnesium (mg)	3030.3	
Acetaminophen (mg)	954.4	
Methocarbamol (mg)	646.2	

Table 2 shows the t test results comparing the differences in OR extubation rates when comparing average adjunct medication doses

T test analysis	OR extubation	No OR extubation	p-value
Acetaminophen (mg)	954	0	< 0.001
Methocarbamol (mg)	646	0	< 0.001
Ketamine (mg)	954.5	36	0.553
Magnesium (mg)	2514	1714	0.335

Conclusion: Acetaminophen and methocarbamol delivery were both found to be associated with being able to successfully immediately extubate a patient following esophagectomy, while ketamine and magnesium were not. These findings support the intra-operative use of acetaminophen and methocarbamol during esophagectomy cases as they help facilitate immediate extubation.

P379

Intraoperative endoflip directed treatment: use in paraesophageal hernias

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Introduction: Endoluminal functional lumen imaging probe (EndoFLIP) for real-time esophagogastric junction (EGJ) assessment has been described in primary anti-reflux surgery. Despite this, the data remain unclear on the ideal distensibility index (DI) to minimize postoperative complications. Further, there are few publications regarding intraoperative EndoFLIP use in paraesophageal hernias (PEH). We aim to describe the use of EndoFLIP in fundoplication determination primarily among patients with PEH without preoperative manometry.
Methods: This is a retrospective review of 16 patients at a single institution who underwent hiatal hernia repair with fundoplication utilizing intraoperative EndoFLIP between July 2020 and June 2022. Distensibilities were recorded at 13 mmHg of intraperitoneal pressure and 30-mL balloon fill. Patient-reported preoperative symptoms and post-cruroplasty DI were used to determine the fundoplication type performed. EndoFLIP measurements were confirmed post-fundoplication. A post-fundoplication DI of 1 to 3 mm^2/mmHg was preferred. Patient-reported symptoms were obtained via record review.
Results: There were 12 (75%) PEH, two (12.5%) redo repairs, and 14 (93.3%) moderate to large hernias. Post-fundoplication, the combined median DI decreased to 1.9 (IQR 1.6) from 2.3 (IQR 2.0) mm^2/mmHg post-cruroplasty. Table 1 displays the available distensibilities. Post-fundoplication distensibilities were equivalent across all fundoplication types (p = 0.904). The median follow-up was 110 (IQR 184) days. Four patients developed minimally limiting dysphagia. One late-developing dysphagia event was likely related to hernia recurrence. Two patients developed mild reflux; one required anti-reflux medication.
Conclusion: This is the first description of EndoFLIP directing fundoplication selection among PEH patients. These results demonstrate that EndoFLIP can be used to choose the appropriate fundoplication type to generate consistent post-fundoplication EGJ distensibilities. A post-fundoplication DI of 1 to 3 mm^2/mmHg resulted in few complications.

Table 1 EndoFLIP Distensibilities

Distensibility Measurements		Fundoplication Type				
		Hill	Dor	Toupet	Nissen	
						Post-cruroplasty: No. 1072
		Median DI (mm^2/mmHg)	1.09		2.40[a]	Post-cruroplasty: 3.15
		IQR			1.80	
Post-fundoplication	No.	0	3	9	3	
	Median DI (mm^2/mmHg)		1.20	1.90[a]	2.00	
	IQR			0.67		
[a]Significant difference (p = 0.026)						

P380

Laparoscopic Thal fundoplication for the management of complex gastroesophageal reflux in children

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Background: The objective of this study is to describe the technique and outcomes of laparoscopic Thal fundoplication for complex pediatric reflux disease. An anterior partial fundoplication for the treatment of gastroesophageal reflux and hiatal hernia was first described by Thal and subsequently popularized in pediatric surgery by Ashcraft. Advantages of this procedure include short operative time, infrequent wrap migration, no division of the short gastric vessels, and infrequent postoperative gas-bloat syndrome. With the advent of minimally invasive surgery, the Thal is a less commonly performed operation. Here we discuss a laparoscopic approach to Thal fundoplication and review outcomes of a 10-year cohort of patients who have undergone the procedure at our institution.
Methods and Procedures: This is a review of our current technique for Thal Fundoplication. Records of all patients who underwent laparoscopic or open Thal fundoplication from 2013 to 2022 at our institution were retrospectively reviewed. Results are expressed as percentages.
Results
Technical approach: Using a minimally invasive approach, we perform an anterior 240 degree fundoplication, similar in construction to that described by Ashcraft. The hiatus is tightened with one or more interrupted retroesophageal sutures, and the fundus is approximated to the anterior esophageal wall and crura with two rows of horizontal mattress sutures.
Outcomes: A total of 132 patients underwent Thal fundoplication during the study period. Patients undergoing the procedure had a broad range of prior medical and surgical conditions, from isolated severe reflux disease to history of esophageal atresia repair, microgastria, repaired diaphragmatic hernia, and tubular stomach secondary to chronic tube feeds. Fifty-one percent of patients had a hiatal hernia. Of these procedures, 87.3% were performed laparoscopically and 29.5% were revision fundoplasties. Among revision fundoplasties, 87.1% were performed laparoscopically. The index fundoplication was a Nissen (82.1%) or Toupet (15.4%) in most cases. One Thal fundoplication (2.5%) was revised during a subsequent Heller

myotomy for achalasia. Four patients in the cohort (3%) required reoperation following Thal fundoplication (adhesive small bowel obstruction, leaking gastrostomy, abdominal compartment syndrome, pyloroplasty complication). No patients required reoperation for recurrent reflux, hiatal hernia, or wrap disruption.

Conclusions: The Thal fundoplication is technically feasible from a minimally invasive approach and is a versatile operation that can be successfully applied in children with complex foregut anatomy or history of prior fundoplication. Patients in our cohort have had excellent results, with none requiring reoperation for recurrent reflux, hiatal hernia, or wrap disruption during the follow-up period.

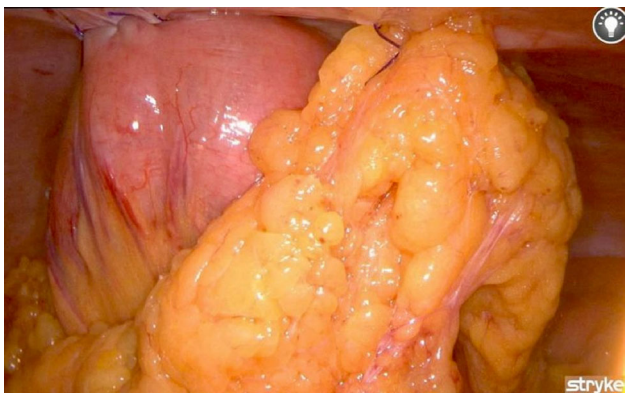
P381

Omentopexy reduces the incidence of Symptomatic Post-Esophagectomy Diaphragmatic Herniation Following Laparoscopically Assisted Oesophagectomy: 15 years of experience from a UK Specialist Center

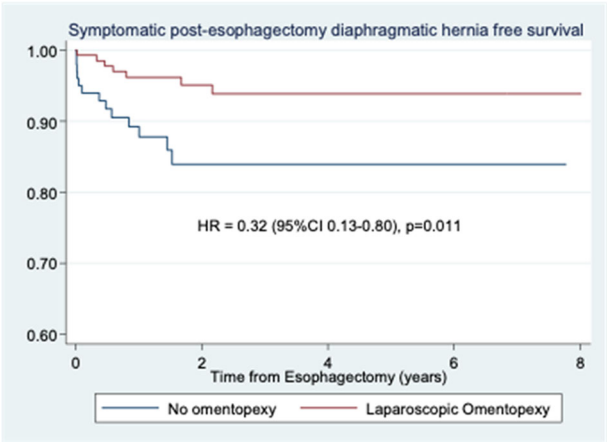
Matthew Doe[1]; Oliver D Brown[1]; Michael Jones[2]; Simon Dwerryhouse[3]; Simon M Miggs[3]; Steve Hornby[3]; David Messenger[1]; Martin Wadley[3]; [1]University Hospitals Bristol NHS Foundation Trust; [2]Royal United Hospitals NHS Trust; [3]Gloucestershire Hospitals NHS Foundation Trust

Objectives: Post-esophagectomy diaphragmatic herniation (PEDH) is a recognized complication of laparoscopically assisted esophagectomy (LAE) and occurs in up to 26% of cases. Several preventative measures have been reported but no formal efficacy data are available. LAE has been undertaken since 2005 in our tertiary specialist oesophagogastric unit with a PEDH of 13.2% in our initial published experience. Subsequently, a novel technique of laparoscopic omentopexy was introduced to reduce the incidence of PEDH. Therefore, the objective of this study was to determine the effectiveness of omentopexy in reducing symptomatic PEDH requiring operative intervention.

Methods and Procedures: Details on consecutive patients undergoing LAE in our unit were extracted from a prospectively maintained, institution-approved, esophageal resection database since 2005. Data were collected on patient demographics, neoadjuvant treatment, operative technique, morbidity, and survival. Patient records were also reviewed from referring centers to maximise data capture on the development and timing of symptomatic PEDH. Laparoscopic Omentopexy involved suturing the left-side of the greater omentum to the abdominal wall of the left upper quadrant, either by splitting the omentum into two pedicles and affixing around the site of feeding jejunostomy (Fig. 1) or by simple fixation alone, with minimal omental redundancy between the colon and fixation site.



Results: A total of 243 patients underwent LAE (9 underwent thoracoscopic second stage) with a median follow-up of 23.8 months. 7/142 patients undergoing omentopexy (4.9%) developed symptomatic PEDH necessitating repair, compared to 13/101 patients (12.9%) in the non-omentopexy group [Hazard Ratio = 0.32 (95% Confidence Interval(CI): 0.12–0.80), p = 0.011]. This translated to a 1-year PEDH-free survival of 96.2% (95%CI: 91.1%-98.4%) in the omentopexy cohort and 87.8% (95%CI: 78.9%-93.1%) in the non-omentopexy cohort (Fig. 2). Of the 7 PEDHs in the omentopexy cohort, only one PEDH (14.2%) developed within 30 days of surgery, compared to 6/13 PEDHs (46.2%) in the non-omentopexy cohort (p = 0.329). No demographic or treatment factors contributed to the risk of PEDH. No complications could be attributed to omentopexy.



Conclusion: Omentopexy is safe and effective at reducing the incidence of symptomatic PEDH and may be of greatest benefit in the early post-operative period. This simple and low-risk technique should be considered in all patients undergoing the laparoscopic abdominal phase of esophagectomy and merits further study in the randomized controlled trial setting.

P383

Procedure volume impacts complications and length of stay (LOS) following emergent paraesophageal hernia repair

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Introduction: Higher procedure volume has been associated with improved outcomes for a variety of procedures. This relationship has not been studied for most emergent procedures, including PEHR. Our goal was to utilize national data to evaluate the outcomes between high (HVC)- and low-volume centers (LVC) following emergent PEHR.

Methods and Procedures: The Nationwide Readmissions Database was queried for patients undergoing emergent PEHR from 2016 to 2018. Patients excluded were < 18 years old, diagnosed with gastrointestinal malignancy, or had a concurrent bariatric procedure. Centers were stratified into percentiles based on emergent procedure volume per year. HVCs were defined as the top 5th percentile (≥ 12 emergent procedures/year), and LVCs were defined as 50th percentile or less (≤ 2 emergent procedures/year). Standard statistical methods were applied.

Results: From 2016 to 2018, 9,966 patients were identified. Of these, 2,985(30.0%) underwent emergent PEHR at a HVC and

1,915(19.2%) at an LVC. Patients at HVCs were younger (67 [56, 76] vs 72 [61, 81] years, $p < 0.001$) and had a lower Charlson Comorbidity Index (0 [0, 1] vs 1 [0, 2], $p < 0.001$). HVC patients were more concentrated in metropolitan teaching (94.8% vs 51.2%, $p < 0.001$) and large(88.7% vs 35.9%, $p < 0.001$) hospitals and were more often transferred from another facility (3.4% vs 1.6%, $p < 0.001$). Hospital charges were less at HVCs ($75,372 [40,835, 129,838] vs $85,852 [51,803, 148,270], $p < 0.001$). HVCs performed a higher proportion of laparoscopic (66.5% vs 57.5%, $p < 0.001$) and robotic(18.4% vs 9.5%,$p < 0.001$) instead of open (14.5% vs 32.2%, $p < 0.001$) procedures. Rates of cardiac complications (13.6% vs 18.4%, $p < 0.001$), VTE(1.7% vs 2.5%, $p = 0.040$), pneumonia (3.0% vs 6.1%, $p < 0.001$), respiratory failure (7.3% vs 13.9%, $p < 0.001$), acute renal failure (8.4% vs 17.3%, $p < 0.001$), and sepsis(3.7% vs 9.0%, $p < 0.001$) were lower at HVCs. HVCs had lower LOS (4[2, 8] vs 7[4, 11] days, $p < 0.001$), 30-day(10.2% vs 12.7%, $p = 0.008$), 90-day (14.7% vs 17.5%, $p = 0.011$), and 180-day (17.4% vs 20.7%, $p = 0.005$) readmission rates and perioperative mortality (1.6% vs 2.5%, $p = 0.033$). However, in regression, procedure volume was not independently associated with 30-day ($p = 0.987$), 90-day ($p = 0.693$), or 180-day ($p = 0.537$) readmissions or perioperative mortality ($p = 0.727$). Comorbidities ($p < 0.001$), payer type ($p < 0.001$), hospital bed size ($p = 0.002$), and LOS ($p < 0.001$) were independently associated with readmissions. Age, open procedure, and LOS (all $p < 0.001$) were independently associated with mortality. Procedure volume was independently associated with less overall complications($p = 0.046$) and shorter LOS ($p < 0.001$).

Conclusion: After controlling for confounding variables, emergent PEHR procedure volume was not independently associated with readmissions or mortality, although it was independently associated with less complications and shorter LOS. Factors independently associated with readmissions included comorbidity burden, payer type, hospital bedsize, and LOS. Age, open procedure, and LOS were independently associated with mortality.

P384

What do you do when the HRM shows Esophagogastric Junction Outlet Obstruction (EGJOO) and it is not achalasia?

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Introduction: Esophagogastric junction outflow obstruction (EGJOO) is a manometric diagnosis described with high-resolution manometry (HRM), elevated median integrated relaxation pressure (IRP), and elevated intrabolus pressure (IBP). Unless clearly achalasia, management strategies are challenging. The aim of the study is to identify trends in the presentation and management of EGJOO that resulted in the best outcomes.

Methods: A retrospective chart review was performed for 267 patients (single hospital system) with HRM from an IRB-approved database between 1/1/2017 and 12/31/2020. Data were collected for those with EGJOO on demographics, symptoms, manometric, endoscopic findings, management, and outcomes. Success is defined as symptom improvement from preintervention baseline or complete resolution at final follow-up (mean 4 months).

Results: Of 267 patients with HRM, 41 had EGJOO. Of these, 13 (36.6%) had isolated EGJOO, while 26 (64%) had other esophageal pathologies. 13 patients (31.7%) with no follow-up in EMR were excluded from data analysis. 28 patients (7 male/21 female) were included in the analysis. (mean age 64.6 years). Preintervention symptoms included dysphagia (64.3%), regurgitation (35.7%), heartburn (71.4%), pain (50.0%), and cough (21.4%). 9 (32.1%) of patients had isolated EGJOO, 10 (35.7%) had both EGJOO and hiatal hernia and 5 (17.9%) with possible achalasia variant, 3 (10.7) had EGJOO and Jackhammer esophagus, and 1 (3.6%) had a combination of EGJOO, hiatal hernia, and pseudoachalasia. 5 (21.4%) had a history of prior foregut surgery (sleeve gastrectomy, gastric bypass, hiatal hernia repair (HHR), and fundoplication).

In surgical group, 8/13 patients presented with heartburn and 87.5% improved/resolved, while 7/13 had dysphagia, 6/13 had regurgitation, 2/13 had cough, and 4/13 had pain which all resolved/improved at follow-up. In non-surgical group, 13/15 patients presented with heartburn, 11/15 dysphagia, 4/15 regurgitation, 4/15 cough, and 10/15 pain. At final follow-up, resolved/improved symptoms were reported in 46.2% heartburn, 63.6% dysphagia, 75% regurgitation, 50% cough, and 70% pain.

Conclusion: There is no definite trend in preintervention symptoms related to EGJOO; however, heartburn was most common (71.4%), followed by dysphagia (64.3%), pain (50.0%), regurgitation (35.7%), and cough (21.4%). This review demonstrates better symptom management with surgical intervention (almost complete resolution or improvement) when compared to non-surgical approach.

P385

Esophageal Anastomotic Stricture Association With Barbed Suture

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Introduction: Anastomotic techniques in esophageal and gastric reconstruction have been widely described in the context of evolving surgical tools. While rates of strictures have decreased overall, our experience has highlighted a surprising etiology of stricture not previously described. We hypothesize that barbed suture used in esophageal to jejunal anastomosis can be etiologic in stricture formation, with a high rate of revision.

Methods: A three-year single-surgeon experience was reviewed retrospectively, selecting foregut reconstructions inherent to resections for proximal and distal gastric lesions. We assessed details of anastomotic construction, surgical revision, and postoperative endoscopy, including pathology. Outcomes included length of stay, leaks, endoscopically identified strictures, length of stay, and mortality.

Results: Fifty-two foregut reconstructive cases were identified. Cancer of the esophagus, proximal, or distal stomach represented 38/52 (73%) followed by ulcer disease in 7 and anastomotic stricture in 7. Types of anastomoses constructed included 28 gastrojejunostomies (GJ), 15 esophagojejunostomies(EJ), 8 esophagogastric(EG), and one esophagoileal(EI) anastomosis. Eleven cases required endoscopic intervention for obstructive symptoms. Of these, 7 cases occurred in EJ anastomoses and 4 cases required surgical revision. In 3 of 4 cases requiring revision, barbed suture was used in the anastomotic construction and a 25-mm EEA stapler was used in the other. A staple line defect was repaired in the EEA case during the index procedure. Postoperative leak or tumor recurrence was absent in these 7 EJ anastomoses. One additional EJ stricture, in which barbed suture was used, fully resolved after a single endoscopic dilation with excision of a visible bridging barbed suture. A total of 4/8 EJ anastomoses with barbed suture strictured, with 3/4 (75%) of these strictures requiring surgical revision for an overall 37.5% (3/8) surgical revision rate. The remaining 7 strictures occurred in 3 GJs, 1 EEA EJ, 2 EJ, and 1 EG due to tumor recurrence, food impaction, and inflammation. Six of seven resolved with endoscopic intervention. Chi-square analysis revealed that EJ vs non-EJ anastomoses were significantly more likely to result in stricture and revision. This study

did not show significance in stricture or surgical revision rates with respect to barbed suture use alone; however, a trend toward significance for revision in barbed EJ anastomoses was noted.
Conclusion: The individual cases suggest an association (barbed suture + EJ) that the authors believe warrant avoidance of barbed suture; however, further study with a larger series may help answer this question definitively.

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Gastro-Esophageal Reflux Test to Determine Surgical Indication for GERD Patients and Results of Laparoscopic NISSEN Fundoplication

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Introduction: The indication of laparoscopic anti-reflux surgery for GERD patients is difficult to be determined fairly. We have established "Reflux Test" as a useful tool to determine surgical treatment for GERD patients.
Surgical Indication
Reflux Test

At the standing position a patient swallows 300-ml barium solution. After total solution goes into stomach, a patient lies down at the flat position. Then a patient changes the position to left lateral decubitus position, flat position, right lateral decubitus position, and flat position again every 10 s in the order. During this procedure, gastro-esophageal reflux was evaluated and assigned to severe, moderate, and slight category. If the reflux was observed slightly up to cervical esophagus, the case was assigned to moderate category. The anti-reflux surgery was considered in the moderate and severe categories.
Results: We have performed laparoscopic Nissen procedure in 130 cases. Median follow-up period of this study was 84 months (3–151 months). In 19 cases (14.6%), PPI was restarted before 6 months after the anti-reflux surgery. In 33 cases (26.2%), PPI was restarted after the anti-reflux surgery during the whole follow-up period of this study. The results of the study have shown that the reflux esophagitis was improved obviously after the anti-reflux surgery even in the PPI restarted group which was analyzed by our endoscopic esophagitis grading score ($p < 0.001$).
Conclusion: The anti-reflux surgery is most effective for the patients who really have the obvious reflux confirmed by Reflux Test. The results of the laparoscopic Nissen fundoplication were good and satisfied by the patients mostly.

P390

Delayed Presentation of a Bochdalek Hernia in an Adult Female

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Bochdalek hernias are congenital defects commonly observed at birth and rarely remain asymptomatic into adulthood. They result from a failed fusion of the posterolateral diaphragmatic foramina and thus can lead to protrusion of abdominal organs into the thoracic cavity. We present a case of a 56-year-old female who presented with a recurrent history of nausea, vomiting, and abdominal pain. A computed tomography (CT) scan of the abdomen revealed a mesenteroaxial gastric volvulus with one-third of the gastric fundus herniating through a 3-cm defect in the diaphragm. Surgical treatment aims to reduce the herniated contents and close the defect. Intraoperatively, the viscera should be examined thoroughly for necrosis and ischemia. Open transthoracic or transabdominal approaches are recommended for surgical repair in symptomatic patients with known prolapse and adhesions. Our case report strives to demonstrate the importance of a thorough evaluation of all patients, leading to early diagnosis and prompt surgical intervention in the treatment of delayed presentation of Bochdalek hernia.

P391

Gastric Diverticulum Causing Regurgitation in a 35-Year-Old Female

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Introduction: Gastric diverticula are the least common gastrointestinal diverticula and a rare cause of upper gastrointestinal symptoms. Due to this, most of the published research is in the form of case studies which tend to involve men in their sixties with epigastric pain and associated Gastroesophageal Reflux Disease (GERD) or Peptic Ulcer Disease (PUD). This case study adds to the understanding of symptom manifestation and patient representation as the patient was a healthy 35-year-old female with the main complaint of regurgitation.
Case Report: A 35-year-old female without significant medical history presented with belching of undigested food and generalized epigastric discomfort. She did not have any prior GI complaints. She completed a trial of proton pump inhibitors (PPIs) without improvement prior to any imaging. Esophagogastroduodenoscopy (EGD) revealed a single gastric diverticulum located in the fundus, confirmed on upper gastrointestinal contrast study. A five-port robotic-assisted partial gastrectomy was performed to remove the diverticulum. The specimen was negative for Helicobacter pylori, as well as for active or chronic inflammation. Afterward, the patient reported vast improvement in symptoms.
Discussion: Gastric diverticula are a rare cause of regurgitation and epigastric discomfort, with a reported incidence of 0.1 to 2.6% in the literature. These can be congenital or acquired; acquired diverticula are caused by inflammation found in PUD, GERD, or malignancy. Symptoms can include nausea, vomiting, abdominal pain, postprandial fullness, anorexia, and dyspepsia. Narrower diverticular necks can cause food retention and obstruction leading to diverticulitis, hemorrhage, and perforation. Gastric diverticula are often incidentally diagnosed on upper endoscopy or misdiagnosed as paraesophageal hernias, hiatal hernias, and in some cases, left adrenal masses. Diagnosis of gastric diverticula can be established by EGD, upper gastrointestinal contrast study, or Computerized Tomographic (CT scan). Initial treatment includes symptomatic medical management with PPIs; however, patients who fail medical treatment or those with large and complicated diverticula (> 4 cm) are candidates for surgical resection. Reasonable options for surgical management include minimally invasive diverticulectomy and partial gastrectomy.
Conclusion: Diagnosis of gastric diverticula can be challenging due to the sheer number and vagueness of potential symptoms. This case study emphasizes how younger women without prior GI history can also be affected by gastric diverticula and contributes to the understanding of the various ways in which it can present, including regurgitation. Once this diagnosis is reached and if medical

management fails, diverticulectomy and partial gastrectomy are the standard surgical treatments.

P392

Standardization and short-term results of robot-assisted thoracoscopic esophagectomy

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Introduction: Surgical cases of robot-assisted thoracoscopic esophagectomy (RAMIE) is increasing because of the advantages of robotic system. We introduced RAMIE in 2019 and standardized the surgical procedure. The usefulness of RAMIE was examined by classifying surgical cases into early and late periods and comparing the surgical results.
Methods: Fifty-four patients who underwent RAMIE were enrolled in the study. All patients underwent D2 or higher lymph node (LN) dissection, gastric tube reconstruction, and R0 surgery. The patients were divided into two groups, 26 cases in the first half up to December 2020 and 28 cases in the second half after January 2021. The patient background, surgical technique, and short-term results were compared. The tumor staging was based on the UICC 8th version.
Results: Thoracic surgery time was 274 min, the chest bleeding volume was 30 mL, and the postoperative hospital stay was 19 days (median). In the late stage, patients with clinical thoracic LN metastasis ($p = 0.01$) and advanced stage ($p = 0.006$) were higher than those in the early period. There were significantly more cases of thoracic duct resection and D3 dissection in the late period ($p = 0.02$, $p = 0.009$). No differences in postoperative complications and intra-hospital death was observed; however, the postoperative hospital stay was significantly shortened in the late period ($p = 0.001$).
Conclusion: Thorough mediastinal LN dissection by RAMIE could be safely performed by standardizing and improving the surgical procedures. RAMIE has several issues, such as higher cost associated with equipment and longer operative time, but it is possible to perform precise procedures with solo surgery, and it is expected that cost reduction effects will be expected in terms of the number of participants in surgery and the length of hospital stay after surgery.

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Recurrent Paraesophageal Hernias: Making the Case for Reoperative Surgery in a Propensity-Matched Cohort

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Introduction: Paraesophageal hernia repairs (PEHR) can have radiographic recurrence rates as high as 50% in two years, with a certain subset of patients requiring repeat operation. There are poor preoperative and intraoperative predictors of surgical failure, recurrence, and need for reoperation. Our main objective was to use propensity matching to compare patients undergoing initial PEHR vs redo PEHR to identify factors associated with failure to improve and reoperations.
Methods: In an IRB-approved retrospective study, the electronic medical record was queried for patients $\geq$ 18 years old undergoing PEHR at a tertiary care center from 1/1/2018 to 12/31/2022. Data from baseline demographics, preoperative imaging and endoscopy, operative reports, post-operative course, and all available follow-up were collected. A computational generalization of inverse propensity score weight was used to create populations with similar covariate distribution between patients undergoing initial PEHR vs a redo PEHR. Primary Outcomes assessed were differences in improvement in postoperative symptoms. Secondary outcomes assessed were 30-day morbidity, readmissions, reoperations, long-term complications, and incidence of radiographic recurrence. Data were analyzed with Stata Version 17.0 using descriptive and univariate analyses.
Results: Of 386 patients who underwent formal repair, 50 (13.0%) patients were identified as undergoing reoperations. After weight propensity score analysis, initial vs redo PEHR patients had no statistically significant difference between average age, BMI, ASA, race, or gender ($p > 0.05$). Reoperations had a longer average hospital length of stay compared to initial operations (3.9 ± 3.2 vs. 2.3 ± 3.7, $p < 0.05$) and were more frequently open operations (20% vs 2%, $p < 0.05$). There were no differences in subjective postoperative symptom improvement between the two groups. Patients who had a fundoplication ($p = 0.004$) and crural repair ($p = 0.004$) had less postoperative radiographic recurrence at an average follow-up of 11.2 ± 15.5 months in both groups. There was also no difference in rates of needing another PEHR (13% vs 15%, $p = 0.75$) for recurrence between initial and redo PEHRs. There was no significant difference in 30-day complication rates, delayed complications, ED visits, readmissions, or mortality.
Conclusion: Compared to initial PEHR, reoperative PEHRs were more likely to be performed open, had longer hospital lengths of stay, and with no significant difference in postoperative symptom improvement, recurrence, complications, readmissions, and reoperations. Crural closure and fundoplication at the time of PEHR decreased radiographic recurrence on short-term follow-up.

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Laparoscopic versus open splenectomy for splenic peliosis: report of three cases and literature review

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Introduction: Splenic peliosis is a rare condition. We highlight the surgical urgency of this condition and describe the potential for laparoscopic management in stable patients.
Methods and Procedures: We performed a systematic literature review and report three additional patients with splenic peliosis and splenic rupture.
Results: Review of the English literature identified forty patients with splenic peliosis in whom clinical details were available. Splenic peliosis is associated with hematologic disorders, including myelofibrosis, acute leukemia, multiple myeloma, and Hodgkin disease. Eight of the forty reported patients presented with concurrent malignancy. Splenic peliosis was identified in three patients only at autopsy. Of the thirty-seven cases reported in living patients, twenty-four (65%) presented with spontaneous splenic rupture, one of whom was successfully managed nonoperatively. Thirty-four of the thirty-six patients (94%)

underwent open splenectomy. Attempted laparoscopic splenectomy was converted to open surgery in the remaining two patients.

We report three additional patients who presented with splenic peliosis and splenic rupture (Table 1). One patient developed acute myelogenous leukemia four years following splenectomy and one patient had existing diffuse large B-cell lymphoma prior to splenectomy. These two patients underwent emergent open splenectomy due to splenic rupture and hemorrhagic shock. Our third patient presented with isolated spontaneous splenic rupture. However, given his hematologic stability, he underwent a successful laparoscopic splenectomy. The patient developed a small intra-abdominal fluid collection that was managed by percutaneous drainage. No other complications were noted in our three patients.

Table 1 Patient summaries

	Age	Sex	Management	Blood products	Spleen weight (g)	Medical history	Spontaneous splenic rupture	Associated malignancy
1	31	M	Open splenectomy	4 U shed blood	280	Essential thrombocytopenia; Antiphospholipid syndrome	Yes	Acute myelogenous leukemia
2	78	M	Open splenectomy	6 U RBC, 5 U FP, 6 U Platelets	1403	Atrial fibrillation; Chronic anemia	Yes	Diffuse large B-Cell lymphoma
3	44	M	Laparoscopic splenectomy	None	227.8	None	Yes	No

Conclusion: To the best of our knowledge, we report the first successful laparoscopic splenectomy for splenic peliosis in the English literature. Given that spontaneous splenic rupture may result in life-threatening hemorrhage, recognition of this condition and urgent surgical management is essential.

P395

Paraesophageal hernia repair in patients with a BMI > 35 is a combined Roux-en-Y gastric bypass and paraesophageam hernia repair a better option

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Introduction: Obesity is a risk factor for paraesophageal hernias, with reported higher prevalence in obese patients. Similarly, higher Body Mass Index (BMI) levels adversely affect paraesophageal hernia repair (PEHR) outcomes, with well-documented hernia recurrence rates in the obese. We hypothesize that in patients with a BMI > 35, combined laparoscopic PEHR with Roux-en-Y gastric bypass (LPEHR/ LRYGB) has a lower overall hernia recurrence rate, than LPEHR alone.

Methods: A retrospective review of a prospectively maintained database from a single institute was reviewed from 1/1/2010 to 1/1/2020. All patients referred for paraesophageal hernia with a BMI > 35 were included. Patients with previous foregut surgery or concurrent weight loss surgery other than LRYGB were excluded. The primary outcome measured was overall recurrence rate. Secondary outcome measured was need for recurrent operative paraesophageal hernia repair. The time until recurrence and need for re-intervention was compared between matched groups using Kaplan–Meier estimates and a Log Rank test.

Results: A total of 307 patients underwent index LPEHR/ LRYGB (n = 183) or LPEHR (n = 124). Patients who underwent concurrent LPEHR/ LRYGB were significantly younger (51.6 compared to 64.3 years old, $p < 0.0001$) and with a higher preoperative BMI (42.5 compared to 38.7, $p < 0.0001$). Median follow-up after concurrent LPEHR/ LRYGB was 34 months compared to 49 months following LPEHR. There was no statistically significant difference in perioperative overall recurrence or recurrence requiring re-intervention between propensity-matched groups.

Conclusion: Combined LPEHR/ LRYGB can be performed with equivalent recurrent rates as compared to LPEHR. Given the metabolic benefit of LRYGB, further long-term studies are needed to investigate the clinical significance of combined LPEHR/LRYGB surgery in patients with a BMI > 35.

Table 1: Propensity matched population, Kaplan-Meier estimates for time until recurrence and re-intervention comparing the bariatric group (n=80) and foregut groups (n=80). Log-rank p-value=0.875 for recurrence and Log-rank p-value=0.427 for re-intervention.

		Month of follow-up				
		12	24	36	48	60
Bariatric group	Recurrence rate, %	8.9	10.8	15.0	23.7	23.7
	95% CI	2.1-15.8	3.2-18.3	5.8-24.2	11.2-36.1	11.2-36.1
	N in follow-up	55	46	34	26	17
Foregut group	Recurrence rate, %	8.5	13.0	18.1	20.1	22.5
	95% CI	2.0-15.0	5.1-21.0	8.8-27.4	10.2-29.9	11.8-33.2
	N in follow-up	63	54	44	35	25
Bariatric group	Intervention rate, %	0.0	0.0	0.0	3.3	3.3
	95% CI	-	-	-	0.0-9.7	0.0-9.7
	N in follow-up	59	48	37	29	22
Foregut group	Intervention rate, %	1.4	1.4	2.2	2.2	2.2
	95% CI	0.0-4.3	0.0-4.3	0.0-7.6	0.0-7.6	0.0-7.6
	N in follow-up	67	60	48	38	28

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Outcome of gastric conduit reconstruction after esophagectomy—a comparison between hand-assisted laparoscopic surgery and laparoscopic surgery

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Background: In recent years, laparoscopic surgery has been widely used in gastric conduit reconstruction during esophagectomy. In our institute, we have introduced the use of hand-assisted laparoscopic surgery (HALS) since 2010 and laparoscopic surgery (LAP) since 2018. While HALS allows for patently grasping the stomach, we have experienced that the operative field is limited due to the inserted left hand and that it is difficult to confirm fine anatomy. LAP is now actively used considering the advantage of developing visual field during dissection of the suprapancreatic lymph nodes (LNs) and the LNs near the right diaphragmatic crus.

Methods: We included 611 patients who underwent thoracic esophagectomy and gastric conduit reconstruction and neck anastomosis for esophageal cancer at our hospital between April 2010 and November 2021. Of these patients, we performed propensity-score matching using age, sex, BMI, histological type, and cStage to compare surgical outcomes between HALS and LAP reconstruction.

Results: HALS was performed on 243 cases and LAP on 75 cases. After propensity score matching, 75 HALS and 75 LAP cases were compared. The mean number of abdominal LNs dissected was higher in LAP (12.0 vs. 14.0), especially the No. 3 LN station (lesser curvature LNs along the branches of the left gastric artery) was

significantly higher in LAP (3.0 vs. 4.0, p = 0.03). Blood loss during reconstructive manipulation tended to be lower in LAP, but abdominal operation time was significantly longer in LAP (93.0 min vs. 110.0 min, p = 0.001). No intraoperative complications such as injury of gastric wall or right gastroepiploic artery were observed in either group. There was no difference in the incidence of postoperative complications.

Conclusion: There was no difference in safety of LAP compared to HALS in gastric conduit reconstruction. LAP may be more effective in lymph node dissection due to its superior surgical field.

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Personalized anti-reflux surgery: connecting GERD phenotypes in 690 patients to outcomes

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Introduction: Anti-reflux operations are effective treatments for GERD. Despite standardized surgical techniques, variability in post-operative outcomes persists. Most patients with GERD possess one or more characteristics that augment their disease and may affect post-operative outcomes—a GERD "phenotype." We sought to define these phenotypes and to compare their post-operative outcomes.

Methods: We performed a retrospective review of a prospective gastroesophageal database at our institution, selecting all patients who underwent an anti-reflux procedure for GERD. Patients were grouped into different phenotypes based on the presence of four characteristics known to play a role in GERD: hiatal or paraesophageal hernia (PEH), hypotensive LES, esophageal dysmotility, delayed gastric emptying (DGE), and obesity. Patient-reported outcomes (GERD-HRQL, dysphagia, and reflux symptom index (RSI) scores) were compared across phenotypes using the Wilcoxon rank-sum test.

Results: 690 patients underwent an anti-reflux procedure between 2008 and 2022. Most patients underwent a Nissen fundoplication (302 (54%)), followed by a Toupet or Dor fundoplication (205 (37%)). Twelve distinct phenotypes emerged (Table 1). Non-obese patients with normal esophageal motility, normotensive LES, no DGE, with a PEH represented the most common phenotype (134 (24%)). The phenotype with the lowest ("best") post-operative GERD-HRQL scores at one year was defined by obesity, a hypotensive LES, and a PEH, while the phenotype with the highest ("worst") scores was defined by obesity, ineffective motility, and a PEH (1.5 ± 2.4 vs 9.8 ± 11.4, p = 0.010). There was no statistically significant difference in GERD-HRQL, dysphagia, or RSI scores between phenotypes after five years.

Conclusion: We have identified distinct phenotypes based on common GERD-associated patient characteristics. With further study these phenotypes may aid surgeons in prognosticating outcomes to individual patients considering an anti-reflux procedure.

Table 1. Description of GERD Phenotypes

Phenotype #	Hernia Type	Hypotensive LES	Esophageal Motility	DGE	Obesity	n (%)
1	Type II-IV	No	Normal	No	No	134 (24)
2	Type II-IV	No	Normal	No	Yes	105 (19)
3	Type I	No	Normal	No	No	56 (10)
4	Type II-IV	Yes	Normal	No	No	46 (8)
5	Type I	Yes	Normal	No	No	39 (7)
6	Type I	No	Normal	No	Yes	36 (6)
7	Type II-IV	Yes	Normal	No	Yes	33 (6)
8	Type II-IV	No	Ineffective	No	No	27 (5)
9	No Hernia	No	Normal	No	No	22 (4)
10	Type II-IV	No	Ineffective	No	Yes	21 (4)
11	Type I	Yes	Ineffective	No	No	20 (4)
All DGE	-	-	-	Yes	-	20 (4)

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Endoscopic pyloromyotomy and pyloroplasty for medically refractory gastroparesis: a safe and effective means of palliation

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Introduction: Gastroparesis is a chronic debilitating gastrointestinal disease with a paucity of medical options. We evaluated the palliative efficacy and safety of major pyloric interventions for medically refractory gastroparesis.

Methods: A retrospective review of patients undergoing laparoscopic pyloroplasty (LP) and per-oral endoscopic pyloromyotomy (POP) for gastroparesis from 1/2015 to 2/2022 was performed. Pre- and post-operative symptom severity scores were reviewed in the categories of nausea, vomiting, fullness, early satiety, bloating, distension, heartburn, and regurgitation. Symptoms were then subdivided into mild (0–1), moderate (2–3), and severe (4–5) to evaluate the degree of symptom change preoperatively to postoperatively. Nonparametric tests were performed and p-values < 0.05 were considered significant.

Results: Patients who underwent either LP (89) or POP (145) showed a significant improvement in symptom scores. Vomiting showed the greatest degree of improvement ($p < 0.01$) with significant improvement across all symptom categories. There were significant decreases in the percentage of patients reporting severe symptoms (Table 1) with 58% of patients with severe vomiting showing improvement. Two patients returned to the operating room for leak after LP and recovered without any major morbidity. There was no major morbidity in the POP group.

Conclusion: LP and POP results in significant symptom improvement in gastroparesis, with vomiting, nausea and fullness showing the greatest improvement. Pyloric surgery is safe and effective in the palliation of medically refractory gastroparesis.

Table 1

		Pre-Op	Post-Op	p-value
Nausea	Mild	10 (8.40%)	39 (31.71%)	0.01
	Moderate	30 (25.21%)	41 (33.33%)	
	Severe	79 (66.39%)	43 (34.96%)	
Vomiting	Mild	42 (35.29%)	74 (60.66%)	< 0.01
	Moderate	27 (22.69%)	27 (22.13%)	
	Severe	50 (42.02%)	21 (17.21%)	
Fullness	Mild	5 (4.42%)	24 (19.67%)	0.04
	Moderate	27 (23.89%)	41 (33.61%)	
	Severe	81 (71.68%)	57 (46.72%)	

Table 1 continued

		Pre-Op	Post-Op	p-value
Composite score	Mild	8 (6.72%)	42 (34.15%)	< 0.01
	Moderate	58 (48.74%)	61 (49.59%)	
	Severe	53 (44.54%)	20 (16.26%)	

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Impact of Operative Time on Outcome in Laparoscopic Antireflux Surgery Outcomes: Is Faster Surgery Better?

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Introduction: Operative time has been shown to be a marker for quality in bariatric surgery and can be used as a surrogate for operative experience and efficiency. Prolonged operative time in bariatric surgery has been shown to be associated with increasing odds of mortality and serious complications. However, this association of prolonged OT and adverse outcome have not been examined in other commonly performed foregut operations. The aim of this study was to evaluate the effect of prolonged OT on adverse outcome in laparoscopic antireflux surgery.
Methods and Procedures: The National Surgical Quality Improvement Program files (2016–2020) were used to evaluate clinical data of patients who underwent laparoscopic antireflux surgery, including Nissen fundoplication and paraoesophageal hernia repair. Emergent cases were excluded. Patient's operative time were stratified into quartiles (Q1 to Q4) based on the median OT. Cohort of patients in Q4 was defined as having prolonged OT. Multivariate logistic regression model was used to assess the association between OT and outcomes after adjustment for preoperative demographic and clinical characteristics. Outcome measures examined include 30-day mortality and overall morbidity.
Results: A total of 33,635 antireflux operation were examined. The median OT was 119 min for entire cohort. The median OT for Q1, Q2, Q3, and Q4 was 63, 98, 140, and 206 min, respectively. Patient demographics were similar between cohorts. Patients in Q4 cohort had significantly higher 30-day mortality compared to patients in Q1 (0.7% vs. 0.2%, AOR 3.31, CI 1.83–6.10, $P < 0.01$). Compared to Q1 cohort, the odds of overall morbidity significantly increased with each quartile (AOR: 1.45 for Q2, 2.04 for Q3, 3.65 for Q4; $P < 0.01$, respectively).
Conclusion(s): Prolonged operative time is associated with a significant increase in the odds of mortality and overall morbidity in laparoscopic antireflux surgery. Operative time may be a useful marker for quality in laparoscopic antireflux surgery.

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Not all gastric tumors are GISTs: case report of a gastric schwannoma

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Fig. 1 Endoscopic view of gastric schwanomma



Introduction: Mesenchymal tumors of the GI tract include gastrointestinal stromal tumors (GISTs), leimyomas, lipomas, leiomyosacromas, and schwannomas. Some are benign, whereas others have significant malignant potential. The most common of these tumors are GISTs but these tumors can be difficult to distinguish without histopathological or immunohistochemical analysis. Gastric schwannomas are rare and account for 0.2% of all gastrointestinal tumors and 4% of benign stomach tumors. We present a case of an incidentally found gastric tumor, with pathology returning as a gastric schwanomma.
Case Report: A 60-year-old female was referred for an abnormal 4.5-cm tumor found in the gastric fundus during diagnostic esophagogastroduodenoscopy for symptoms of reflux. Fine needle aspiration returned negative for carcinoma or CD117, while scant spindle cell and stromal fragments were noted. Diagnosis was uncertain but the decision was made to resect the mass based on abnormal appearance and concern for GIST. CT chest, abdomen, and pelvis were obtained and were negative for metastatic disease. The patient had a moderate-sized hiatal hernia along with uncontrolled reflux on maximum medical therapy. The mass was located about 5 cm from the GE junction along the greater curvature of the stomach. The patient underwent a robot-assisted laparoscopic gastric wedge resection. Using endoscopic guidance, the mass was identified (see Fig. 1). The short gastric vessels were taken with the vessel sealer from the level of the lower pole of the spleen. The hiatal hernia was then dissected circumferentially until 4 cm of intra-abdominal esophageal length was obtained. A wedge resection was then performed with a 56-french bougie in place, similar to how a Collis gastroplasty may be accomplished. The surgery was completed with a hiatal hernia repair and modified Dor fundoplication. Esophagogastroduodenoscopy was used to confirm complete removal of tumor as well as Hill grade 1 valve. The patient was discharged post-operative day 2 in stable condition.
The pathology returned with findings of a peripheral nerve sheath tumor, positive for S100, consistent with a gastric schwanomma.
Discussion: Gastric schwannomas are a rare gastric pathology, arising from the nerve plexus of the gastric mucosa. Surgical resection may be both diagnostic and therapeutic. Currently there are no surveillance

guidelines for this diagnosis; however, gastric schwannomas are considered benign tumors with excellent prognosis.

	All	Heavyweight Synthetic Bioabsorbable	Lightweight Synthetic Bioabsorbable	Biologic	p-value
Months to recurrence [Median(Q1-Q3)]	32(17–54)	32(18–50)	10(6–13)	42(17–72)	0.016[a,c]
Recurrence [N(%)]	79(16.7)	46(17.6)	5(4.5)	20(24.1)	< 0.001[a,c]
Within 6 months [N(%)]	4(0.8)	2(0.8)	1(0.9)	1(1.2)	0.933
Within 1 year [N(%)]	11(2.3)	4(1.5)	3(2.7)	4(4.8)	0.322
Within 2 years [N(%)]	27(5.7)	12(4.6)	5(4.5)	8(9.6)	0.187
Within 5 years [N(%)]	62(13.1)	40(15.3)	5(4.5)	13(15.7)	0.011[a,c]
Follow-up, months [Median(Q1–Q3)]	60(28–92)	62(42–80)	10(4–19)	116(100–128)	< 0.001[a,b,c]

P401

A 13-year experience with biologic and biosynthetic absorbable mesh-reinforced paraesophageal hernia repair

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Table 1 Recurrence rates

Background: This study aims to determine outcomes and rates of recurrence following paraesophageal hernia repair with three different meshes.
Methods: A retrospective review of all patients who underwent paraesophageal hernia repair with mesh at a single institution was performed. Medical records were reviewed for patient-reported, radiographic, or endoscopic recurrence, defined as > 2 cm of vertical intrathoracic stomach. If no studies were available, patients were considered to have no recurrence. Group comparisons were made using chi-square or Fisher's exact tests with Bonferroni correction for multiple comparisons, statistical significance of $p < 0.05$.
Results: Between 10/2008 and 9/2021, 473 patients underwent paraesophageal hernia repair with mesh; 1.3% type 2 hernias, 86.0% type 3 hernias, and 12.7% type 4 hernias. Three types of mesh were used: initially biologic (n = 83), then heavyweight synthetic bioabsorbable (n = 261), and finally lightweight synthetic bioabsorbable (n = 111). There were no significant differences in age, ASA, BMI, gender, smoking status, diabetes, chronic steroid use, preoperative acid suppression, hernia type, or recurrent hernia between groups. There were no significant differences in 30-day postoperative complications. Reflux symptom index, GERD-HRQL, and dysphagia scores at 1- and 2-year postoperative timepoints were not significantly different. The overall recurrence rate was 16.7%, with significantly less recurrence (4.5%, $p < 0.001$) and a shorter median time to recurrence (10 months, $p = 0.016$) in the lightweight group (Table 1).
Conclusion: Paraesophageal hernia recurrence rates were the lowest in the lightweight synthetic bioabsorbable mesh cohort overall, although follow-up was significantly shorter. No significant differences in recurrence rates between biologic, heavyweight, or lightweight synthetic bioabsorbable mesh at 6-month, 1-year, or 2-year postoperative time points were seen.

P402

Multicenter Pan-Canadian Experience of Per-Oral Endoscopic Myotomy (POEM) for the Treatment of Achalasia: a Retrospective Study

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Background: Per-oral endoscopic myotomy (POEM) has emerged as a modality for the surgical treatment of achalasia using a minimally invasive approach with similar clinical efficacy to laparoscopic Heller myotomy. Japanese, European, American, and International clinical practice guidelines now cite POEM as a first-line treatment for achalasia. In Canada, single-center experiences with POEM have shown promising results. This study aims to capture the pan-Canadian national experience with POEM for the treatment of achalasia across multiple institutions.
Methods: This is a retrospective study of patients who underwent POEM for achalasia across five Canadian institutions (St. Joseph's Healthcare Hamilton, Kingston Health Sciences Centre, University Health Network Toronto, the Surrey Memorial Hospital and the Montreal Sacred Heart Hospital) between 2012 and 2022. Pre-operative, procedural, and post-operative data were collected. Our primary outcome was response rate as defined as the proportion of patients with normal Eckardt score (≤ 3) at 4 weeks. Secondary outcomes included procedure-related adverse events, length of stay in hospital, post-procedure lower esophageal sphincter pressures, post-procedure gastroesophageal reflux disease, and response rate at last follow-up. Outcomes are reported as either proportions (%) or means $\pm$ STD.
Results: Preliminary results from 67 patients who underwent POEM at one institution are described. Previous interventions for achalasia included balloon dilation (40%), botulism injection (12%), Heller myotomy (6%), and previous POEM (1%). The mean pre-operative Eckardt score was 7.32 ± 2.45. The mean pre-operative lower esophageal sphincter resting and relaxation pressures were 41.7 ± 17.3 mmHg and 27.7 ± 14.6 mmHg, respectively. The mean duration of surgery was 79.5 ± 28.4 min and the mean length of stay for elective POEM was 0.2 ± 0.4 days. Peri-operative complications occurred in 7% of patients, all of which were Clavien–Dindo Grade $\leq$ III. No major complications occurred. The post-operative response rate (Eckardt score ≤ 3) was 84% at 1 month, 89% at 6 months ,and 89% at 12 months. Mean post-operative lower esophageal sphincter resting and relaxation pressures were 16.8 ± 8.6 mmHg and 10.0 ± 6.6 mmHg, respectively. Additional interventions for achalasia following POEM were required in 10% of patients (7% balloon dilations and 7% repeat POEM). 38% of patients had abnormally high DeMeester scores on post-operative 24-h pH monitoring studies.
Conclusions/Further Directions: POEM is safe and feasible in Canadian institutions with efficacy in keeping with current international literature. Data from the remaining institutions will be included for conference presentation.

P403

Roux-En-Y Gastric Bypass in Non-Bariatric Patients with Refractory GERD

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Introduction: For most patients with intractable gastroesophageal reflux (GERD), fundoplication is the treatment of choice. However, fundoplication procedures may provide suboptimal results for patients with previous foregut surgery or with poor motility at baseline. For such select patients, limited research suggests that Roux-en-y gastric bypass (RYGB) may provide an effective alternative. The aim of this study was to report the postoperative outcomes for a cohort of patients who underwent RYGB for GERD and who were deemed higher risk for fundoplication.
Methods: This was a retrospective review of patients undergoing RYGB for GERD between 2015 and 2020 at a single-academic hospital with IRB approval.
Results: 9 patients with mean BMI 30.4 kg/m2 [22.7–36.9] underwent RYGB for refractory GERD. Seven of 9 had at least one previous fundoplication. Mean GI Quality of Life (GIQLI) improvement at 30-day post-op was + 33 [95% CI 19–47], representing a mean increase of 53% ($p < 0.001$). All patients reported improvement in the GERD-specific questions on the GIQLI survey. Six of 9 patients had complete resolution of GERD, with the remaining patients symptomatically well controlled on prn PPI. Each reported an increase in GIQLI. Complications requiring hospital admission included internal hernia [PAD1] (1/9, 11%) and marginal ulceration (1/9, 11%). Four of nine patients identified had comorbid diabetes, all four patients had HBA1C < 6.5% at one-year follow-up and two of four no longer required diabetic medications. One of nine patients identified had biopsy-proven Barrett's esophagus; this patient's post-operative DeMeester score was 2.6 and surveillance endoscopy has shown gross improvement in his esophageal mucosa however without reversal of metaplasia.
Conclusion: We affirm that RYGB is a viable option for refractory GERD in non-bariatric patients who have undergone previous fundoplication or are clinically unfavorable for fundoplication. A prospective randomized study is needed to further determine efficacy and favorability of RYGB for refractory reflux vs. high-risk fundoplication.

P404

A case of retroperitoneal abscess secondary to duodenal perforation

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The development of a retroperitoneal abscess in the setting of duodenal perforation is a rare occurrence. There are various causes of duodenal perforation, such as trauma, iatrogenic injury, and most commonly, peptic ulcer disease. Urgent surgical intervention is required when a patient presents with a perforated duodenal ulcer and signs of peritonitis. Most commonly, closure is performed with an omental pedicle or Graham patch. In cases of large perforations, surgical resection, gastric partition with diverting gastrojejunostomy, or T-drain placement may be required. In this case, we present a patient with duodenal ulcer perforation complicated by retroperitoneal abscess formation. Treatment involved IR drainage of the abscess, followed by laparotomy after persistence of fluid. Surgery was composed of a right-side hemicolectomy, Braun jejunojejunostomy, pyloric exclusion, intraoperative abscess drainage, and duodenal repair using an omental pedicle flap.

P405

Characterizing Comorbidities that Influence Hiatal Hernia Development Post-Bariatric Surgery

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Introduction: Hiatal hernia (HH) is routinely reported in 40% of bariatric surgery patients. HH pathogenesis is not well understood, currently described in literature as multifactorial in nature. It is commonly reported that patients who suffer from causes of increased intrabdominal pressure, such as obesity, pregnancy, or chronic constipation, are at a higher risk of developing HH. We sought to characterize significant factors that are believed to increase HH rates. We hypothesized that patients with increased weight loss post-bariatric surgery would develop HHs at a lower rate.
Methods: A retrospective cohort study was conducted, with 559 patients who underwent esophagogastroduodenoscopy (EGD) in preparation for bariatric surgery meeting the inclusion criteria. Prevalence of HH was derived based on EGD findings. Descriptive analyses of categorical data were conducted to report frequencies, median, and range for continuous data. Chi-squared or Fisher's exact test investigated the association between patient, disease, operative-related attributes, and HH status. The differences in distribution of continuous data across patients with and without HH were investigated utilizing the Mann–Whitney U test. P-values less than 0.05 indicated statistical significance. Univariate and multivariate regression analyses investigated the association between HH status and patient attributes.
Results: The mean age was 44.30 and mean BMI was 48.76. The groups consisted of Roux-en-Y gastric bypass (RYGB) (N = 291), sleeve gastrectomy (SG) (N = 260), and band revision (N = 8). EGD identified HH in 317 patients. Esophagitis (N = 29, + HH = 23, -HH = 6, $p = 0.012$) and gastric polyps (N = 47, + HH = 34, -HH = 13, $p = 0.024$) significantly increased HH rates, while increased weight loss after one year of follow-up decreased HH rates (N = 79 lbs without HH, N = 87 lbs with HH, $p < 0.05$). Gender, gastroesophageal reflux disease, obstructive sleep apnea, hypertension, number of hypertension medications, hyperlipidemia, insulin-dependent diabetes mellitus, osteoarthritis, six-month and two-year percent excess body weight loss, body mass index, and previous bariatric surgical history did not significantly impact HH status.
Conclusion: HH is common in the bariatric population, yet the exact etiology of HH is still under speculation. This study supports that post-bariatric surgery, HH status tends to be largely unrelated to many known comorbidities. Interestingly, type of bariatric surgery did not impact post-surgical HH rates, although it is commonly reported that SG patients have higher HH rates. Furthermore, an increased weight loss at one year was indicated as a protective factor for decreasing HH incidence, further supporting patient weight loss encouragement postoperatively as a method of potentially decreasing reflux symptoms.

P406

Totally Minilaparoscopic complete fixed non-deformable fundoplication (Gea fundoplication) is a safe and feasible procedure to treat Gastroesophageal reflux

Ignacio Del Rio-Suarez, MD; Gabriel Rangel-Olvera, MD, MSc; Bianca Alanis-Rivera, MD; Mario Alberto Gallardo-Ramirez, MD; Jose de Jesus Herrera-Esquivel, MD; Mucio Moreno-Portillo, MD; Hospital General "Dr. Manuel Gea Gonzalez

Introduction: The complete fixed non-deformable fundoplication or Gea fundoplication was created for the treatment of gastroesophageal disorders, with the aim of ensuring that the anatomical modifications around the LES remain undeformable (fixing the stomach, the GEU, and performing a complete fundoplication to the diaphragmatic aponeurosis and crura using approximately 13–16 knots), with comparable perioperative results to other fundoplications, but with less dysphagia. The development of minilaparoscopic devices made it possible to perform procedures with less postoperative pain, abdominal wall trauma, better cosmetic results, and ergonomics for the surgeon. The aim of this study is to prove the safety and feasibility of the complete fixed non-deformable fundoplication using a complete minilaparoscopic approach for the treatment of GERD.
Methods: A retrospective study was performed, evaluating the minilaparoscopic Gea fundoplications performed between May 2018 and September 2022. Demographic, endoscopic, physiologic, and surgical variables were evaluated. Surgery was performed using a 10-mm trocar for the telescope, two 3-mm trocars, and a liver retractor of 2.5 mm, with the procedure performed as the original technique, using extracorporeal Gea knots.
Results: 40 patients were included, 33 were primary fundoplication with a mean operative time (OT) of 120.77 (60–220) min and estimated blood loss (EBL) of 25.22 (5–100) cc; 7 were re-fundoplication with a mean OT of 195.5 (180–360) min and an EBL of 35.4 cc (20–140). All patients presented typical symptoms and 18 atypical, with a length of 92.6 (19–380) months and a positive association to symptoms index. The mean hiatal hernia length was 3.9 (3–9 cm). Intraoperative endoscopy was performed in all patients to evaluate the fundoplication configuration. All the primary patients were discharged the same day (ambulatory), and the redo patients were discharged after 24 h. Patients required only 3–5 days of mild oral analgesics.
Conclusion: The totally Minilaparoscopic complete fixed non-deformable fundoplication is a safe and feasible procedure to treat Gastroesophageal reflux (as a primary or redo procedure), with the possibility of lower use of analgesics, smaller incisions, less abdominal trauma, and length of stay, but with a higher operative time.

P407

Strangulated recurrent hiatal hernia after Roux-en-Y gastric bypass

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Introduction: Roux-en-Y gastric bypass (RYGB) is a common surgical procedure for the management of obesity. Hiatal hernia complications occur in up to 40% of patients that undergo weight loss surgery[1]. Here, we report a strangulated hiatal hernia with necrosis of the entire roux limb 3-month post-successful RYGB.

Case Presentation: A 67-year-old female presented to the ED with acute abdominal pain, shortness of breath, and right chest pain. Three months prior to presentation, she underwent a robotic RYGB with concurrent posterior crural repair for a known large hiatal hernia. The patient was seen for follow-up 3 days prior to presentation and reported no complications.
Upon presentation to ED, a CT scan of abdomen and thorax demonstrated a recurrent hiatal hernia with small bowel in the right chest.

Operation to repair the hernia began laparoscopically, however, was transitioned to a laparotomy, but both methods were unsuccessful in reducing the incarcerated bowel. Cardiothoracic surgery was consulted intraoperatively and a right-sided thoracotomy was performed. A necrotic-appearing small bowel was noted in the right chest. The diaphragm was opened sufficiently to facilitate reduction. However, once reduced, the entire roux limb was found to be non-viable and was resected.

The patient was left in discontinuity and a follow-up operation was performed two days later for reversal of her gastric bypass and feeding jejunostomy. The gastric pouch and remnant were found to be viable, as well as the remaining small bowel. An esophagogastroduodenoscopy (EGD) was performed to confirm the viability of the mucosa lining. We created a gastrogastric anastomosis with the gastric pouch and remnant. The gastrotomy was then closed and a repeat EGD was performed resulting in a negative leak test. The small healthy roux limb was brought to the abdominal wall as a feeding jejunostomy with use of a foley catheter as the jejunostomy tube.
Discussion/Conclusion: The American Society for Metabolic and Bariatric Surgery reported that 252,000 operations were performed for obesity in 2018, with 17% being RYGB[2]. Although hiatal hernias occur in 40% of patients undergoing weight loss surgery1, those containing the Roux limb leading to obstruction are extremely rare, with only five cases reported [3–7]. With such complications, necrosis of the Roux limb has not been previously reported to our knowledge. Strangulated hiatal hernia after Roux-en-Y can be a devastating complication following gastric bypass. We believe a multidisciplinary approach is important to the successful management of such a complication.

P408

Hiatal hernia reporting—time to remove subjectivity?

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Introduction: The size of a hiatal hernia (HH) is a key determinant of the approach for surgical repair, including whether patients qualify for transoral incisionless fundoplication or mesh. Although some guidelines recommend including a measurement when identifying HHs, endoscopists will often utilize subjective terms, such as "small," "medium," and "large," without any standardized objective correlations. The aim of this study was to compare the subjective sizing of HHs to manometry and barium swallow with the hypothesis that there will be significant variability of the subjective findings.
Methods and Procedures: A retrospective chart review was conducted on patients diagnosed endoscopically with HHs and referred for surgical management between 2017 and 2021 at Newton Wellesley Hospital (N = 93). Patient medical records were reviewed, and information collected regarding their HH subjective size assessment, axial length measurement (cm), manometry results, and barium swallow readings. Linear regression models were used to analyze the correlation between the objective endoscopic axial length

measurements and manometry measurements with the endoscopic and barium swallow subjective size allocations. The HH subjective size labels and their corresponding manometry measurements were compared using ANOVA.

Results: Of the 93 endoscopies reporting HHs, 42 of the reports gave a subjective size estimate, 38 gave an axial length measurement, and 12 gave both. 48 patients had manometry in addition to endoscopy, 9 had a barium swallow, and 25 patients underwent endoscopy, manometry, and barium swallow. Of the 34 barium swallow reads, only one gave an objective HH size measurement; the remainder gave subjective size estimates. Axial length measurements were significantly correlated with the manometry measurements ($R2 = 0.697$, $p = 0.011$); however, the endoscopic subjective size estimates were not closely related to the manometry measurements ($R2 = 0.0014$, $p = 0.7255$). Similarly, the subjective size estimates from barium swallow reads were not significantly correlated with the endoscopic axial length measurements ($R2 = 0.0003$, $p = 0.86$), endoscopic subjective size estimates ($R2 = 0.0097$, $p = 0.3446$), or the manometry measurements ($R2 = 0.0160$, $p = 0.2268$). When the endoscopic subjective sizes were compared to their corresponding manometry measurements, there was no significant difference between "small" and "medium" ($p = 0.748$), "medium" and "large" ($p = 0.239$), or "small" and "large" ($p = 0.185$).

Conclusion: Subjective size measurements assigned to HHs via endoscopy and barium swallow lack a consistent definition, leading to considerable variability and poor correlation to objective manometry findings. These results suggest that size measurements should be documented when describing HHs endoscopically and radiographically to better guide clinical decision-making.

P409

Feasibility and safety of the use of Totally Minilaparoscopic complete fixed non-deformable fundoplication (Gea fundoplication) with Heller myotomy to treat achalasia

Ignacio Del Rio-Suarez, MD; Gabriel Rangel-Olvera, MD, MSc; Bianca Alanis-Rivera, MD; Mario Alberto Gallardo-Ramirez; Jose de Jesus Herrera-Esquivel, MD; Mucio Moreno-Portillo; Hospital General "Dr. Manuel Gea Gonzalez"

Introduction: The complete fixed non-deformable fundoplication or Gea fundoplication was created for the treatment of gastroesophageal disorders (including GERD and Achalasia), with the aim of ensuring that the anatomical modifications around the LES remain undeformable (fixing the stomach, the GEU, and performing a complete fundoplication to the diaphragmatic aponeurosis and crura using approximately 13–16 knots), with comparable perioperative results to other fundoplications, but with less dysphagia. The development of minilaparoscopic devices made it possible to perform procedures with less postoperative pain, abdominal wall trauma, better cosmetic results, and ergonomics for the surgeon. The aim of this study is to prove the safety and feasibility of the complete fixed non-deformable fundoplication using a complete minilaparoscopic approach for the treatment of Achalasia.

Methods: A retrospective study evaluated the minilaparoscopic Gea fundoplications done between May 2018 and September 2022. Demographic, endoscopic, physiologic, and surgical variables were evaluated. Total minilaparoscopic surgery was performed using a 10-mm trocar for the telescope, two 3-mm trocars, and a liver retractor of 2.5 mm, with the change of one minilaparoscopic trocar to a conventional 5-mm trocar for the use of advanced energy devices for the minilaparoscopic-assisted surgeries. The fundoplication was performed as described using extracorporeal Gea knots. The primary Heller myotomy was done as described in primary cases, with complementary myotomy depending based on the manometric results on the redo cases.

Results: 12 patients were treated for achalasia, being 7 primary surgeries and 5 redo (3 mini-assisted and 2 totally minilaparoscopic); the mean operative time for the primary surgery was 170.2 (90–240) with an EBL of 32.4 cc (5–110) and a mean time of 230.3 (190–330) min and 40.2 cc (10–140) for the redo group. 3 patients (all Achalasia redo) presented esophageal perforation due to the dissection; all of them were managed with primary closure, Gea fundoplication, and drain collocation. Intraoperative endoscopy was performed in all patients to evaluate the fundoplication configuration. All the primary patients were discharged the same day (ambulatory), the redo patients were discharged after 24 h, while the patients with esophageal perforation were discharged after 3–5 days. Patients required only 3–5 days of mild oral analgesics.

Conclusion: The complete fixed non-deformable fundoplication with heller myotomy has proven effective in threatening achalasia; our results show that the minilaparoscopic approach is feasible and safe for primary and redo patients, with all the benefits of this approach, even when complications like esophageal perforation due to the dissection is presented.

P410

Type IV Hiatal Hernia Causing Severe Restrictive Pulmonary Function

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Hiatal hernias are classified based on location of the GE junction and by severity of abdominal contents protruding into the thoracic cavity. A type IV hiatal hernia indicates a large defect in which both the stomach and another visceral organ has herniated into the mediastinum. These are rare, accounting for $< 5\%$ of all hiatal hernias; however, there is potential for them to cause severe cardiopulmonary compromise.

Our patient is a 76-year-old female with a history of HTN, HLD, and hypothyroidism who presented to her PCP with several months of worsening shortness of breath. She was referred to Pulmonology and Cardiology and was ultimately found to have a large type IV hiatal hernia defect that contained the entirety of her stomach as well as portions of her colon, pancreas, and small intestine. She underwent PFTs which showed severe restrictive disease. She was evaluated by Cardiothoracic surgery and ultimately scheduled for a hiatal hernia repair via left thoracotomy.

At the time of operation, the pleural cavity was accessed via thoracotomy at the 8th intercostal space. The broadly splayed out inferior pulmonary ligament was taken down in addition to adhesions between the hernia sac and LLL and lingula. The right and left crus were also dissected free and then reapproximated using interrupted anterior and posterior sutures around a 48F bougie, ensuring 2 cm of intraabdominal esophagus. Hemoclips were placed at the GE junction for postoperative identification. The chest was then filled with saline and an air leak was identified at the LLL where it had been freed from the inferior pulmonary ligament. This area was oversewn and Tisseel was applied. At the conclusion of the case, an end expiratory air leak was noted from the two 28-F chest tubes placed in the left pleural cavity and posterior mediastinum. The patient was subsequently admitted to the ICU and had a fairly uneventful hospital course. Chest tubes were later removed and the patient was discharged to home on a soft diet. At one-month follow-up, patient has complete resolution of SOB and reflux symptoms.

This case highlights the seemingly innocuous clinical manifestations of a large type IV hiatal hernia and brings to our attention the importance of further investigation in these scenarios. Patients can

have debilitating respiratory compromise that can be undertreated without surgical management. Although operative intervention is not without risk, often the benefits of pursuing surgery can greatly improve quality of life.



P412

Novel Use of Esophagogastroduodenoscopy Postoperatively, with Minimal Insufflation, for Evaluation of Operative Repair for an Acute Gastric Bleed

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Introduction: Acute gastrointestinal (GI) bleeding can be a life-threatening condition. This is usually diagnosed and managed by an upper GI tract endoscopy. When treating actively bleeding duodenal ulcers, surgical intervention or arterial embolization by Interventional Radiology (IR) is warranted in the event of failed initial management. We present a patient with a significant GI bleed and failure of management through endoscopy, necessitating emergent surgical intervention.
Methods: An 87-year-old female presented to the emergency department after a fall. Her hemoglobin level dropped significantly and an esophagogastroduodenoscopy (EGD) revealed a large pool of blood in the stomach but had a limited view of an active bleed. The patient was taken emergently to the operating room (OR) where she underwent an exploratory laparotomy, gastroduodenostomy, suture ligation, and pyloroplasty. The following day, she had increased sanguineous output from her nasogastric (NG) tube. Re-evaluation was done with an EGD in the OR. The patient tolerated all procedures well and was transferred to a facility with IR capabilities for further management.
Discussion: An EGD hours after gastroduodenostomy runs a high risk for perforation and is not the typical course of action. Given the lack of IR availability and concern for rebleeding, this procedure was performed in the OR to minimize risk.
Conclusion: A favorable outcome was achieved with this patient and hemostasis was confirmed with the post-operative EGD. Further studies will determine whether this approach is a viable option for facilities without IR until the patient can be transferred.

P413

A comparison between gastric peroral endoscopic myotomy (GPOEM) and pyloroplasty in postoperative symptom improvement among gastroparesis patients

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Introduction: Compare clinical outcomes of laparoscopic pyloroplasty (LP) and per-oral endoscopic pyloromyotomy (POP) for medically refractory gastroparesis.
Methods: Retrospective review of 234 patients who underwent LP or POP from January 2015 to February 2022 by two fellowship-trained foregut surgeons. Pre- and postoperative symptom scores were compared for nausea, vomiting, fullness, early satiety, bloating, distension, heartburn, and regurgitation. P-values < 0.05 were considered significant.
Results: Age, gender, and etiology of gastroparesis were comparable between the groups. All symptom categories showed a decrease in symptom severity postoperatively in both the pyloroplasty and POP groups. No difference was encountered when comparing outcomes in the two groups ($p = 0.99$) (Table 1). Two patients returned to the operating room for leak after LP and recovered without any major morbidity. There was no major morbidity in the POP group. Median length of stay was higher in LP (2 days) than POP (0 days).
Conclusion: LP and POP offer equivalent palliation for medically refractory gastroparesis. POP could be preferable due to its minimally invasive nature.

Table 1

Pre/post-difference	POP median (IQR) (N = 145)	Pyloroplasty median (IQR) (N = 89)	Total median (IQR) (N = 234)	p-value
Nausea	− 1 (− 2 to 0)	− 1 (− 3 to 0)	− 1 (− 2 to 0)	0.99
Vomiting	0 (− 2 to 0)	0 (− 2 to 0)	0 (− 2 to 0)	0.99
Fullness	− 1 (− 1 to 0)	− 1 (− 1 to 0)	− 1 (− 1 to 0)	0.99
Early Satiety	0 (− 2 to 0)	− 1 (− 3 to 0)	− 1 (− 2 to 0)	0.99
Bloating	− 1 (− 2 to 0)	0 (− 2 to 0)	− 1 (− 2 to 0)	0.99
Distension	− 1 (− 1 to 0)	− 1 (− 3 to 0)	− 1 (− 2 to 0)	0.99
Heartburn	− 1 (− 2 to 0)	− 1 (− 2 to 0)	− 1 (− 2 to 0)	0.99
Regurgitation	− 1 (− 2 to 1)	− 1 (− 3 to 0)	− 1 (− 2 to 0)	0.99
Composite Score	− 1 (− 2 to 0)	?− 1 (− 2 to 0)	?− 1 (− 2 to 0)	0.99

P414

EndoFLIP-driven paraesophageal hernia repair without fundoplication: heresy or good practice?

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Introduction: It is generally recommended to perform esophagogastric junction augmentation to prevent postoperative gastroesophageal reflux disease (GERD) after hiatal hernia repair (HHR). Augmentation is not without consequence, with a serious complication rate of 18.1% and a long-term dysphagia rate 22.9% after fundoplication. The aim of this study is to assess the outcomes of cruroplasty alone to fundoplication after HHR when the final distensibility index (DI), as assessed by endoluminal functional lumen imaging probe (EndoFLIP), is similar.
Methods: This is a retrospective analysis of 42 patients at a single center who underwent HHR with intraoperative EndoFLIP between July 2020 and June 2022. The final DI of patients who underwent a fundoplication were used to identify all cruroplasty-alone patients with a DI within 0.5 mm2/mmHg. Only patients with at least one comparative patient were included. All comparisons were made at equivalent pneumoperitoneum and balloon volumes. Postoperative symptoms were patient-reported and obtained via record review.
Results: Overall, 28 (67%) hernias were PEH and 33 (79%) were moderate to large. There were no differences in the distribution of hiatal hernia type (p = 0.128), hernia size (p = 0.245), redo procedures (p = 0.454), or final DI values (p = 0.435) between study groups. Table 1 compares the outcomes between study groups. Half as many postoperative dysphagia events occurred among the cruroplasty alone cohort compared to the fundoplication cohort, although this was not significant (p = 0.451). There was no difference in the postoperative GERD event rate (p = 0.228). There were three radiographic recurrences with two occurring in the fundoplication cohort.
Conclusion: This study demonstrates that outcomes are equivalent between cruroplasty alone and fundoplication after HHR when the cruroplasty is directed by EndoFLIP. Arguably, fundoplication should only be used when appropriate final DI values cannot be achieved with cruroplasty alone.

Table 1 Hiatal hernia repair with fundoplication vs. cruroplasty alone

Outcome measures		Fundoplication (n = 21)	Cruroplasty (n = 21)
Final DI, mm^2/mmHg	Median (IQR)	2.10 (1.39)	1.90 (0.95)
Days of Follow-up		132 (175)	100 (206)
Dysphagia	Count	6	3
GERD		4	7
Days to Dysphagia	Median (IQR)	44 (207)	80
Days to GERD		249 (391)	127 (152)

P415

Hill Modified: A Novel Approach Technique

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Background: Laparoscopic sleeve gastrectomy (LSG) has become a popular and valid option for obesity treatment, even though the literature is ambivalent regarding the increase or decrease in GERD after this surgery. Thus, it is necessary to propose new surgical techniques as a solution to GERD in patients with a concomitant LSG. Therefore, we aimed to describe and propose a surgical procedure for GERD management based on the Hill technique that can be applied in all patients who undergo an LSG or with a history of it.
Methods: Retrospective observational study with a prospective database in which we described, Hill-modified technique in a group of 16 patients with GERD who underwent this procedure concomitantly with an LSG or who presented with GERD after LSG with a 3-year follow-up. The surgical technique is based on an intra-abdominal esophageal length of a minimum of 3 cm and posterior fixation of the gastroesophageal junction to the crus.
Results: Mean age was 48.1 (± 14.7) years with a mean BMI of 32.3 (± 5.9) kg/m2. All patients had a history of GERD and GERD-Q score mean 10.5 (± 1.3). 94.5% of patients had a hiatal hernia, one of them concurrent with a Schatzki ring, and 57.1% of patients had a supracarinal reflux in the upper gastrointestinal radiography, while 42.8% had infracarinal reflux. "Hill modified technique" was completed in all of them. Concomitant hiatal hernia closure was performed in 81% of patients, 68.75% of patients underwent sleeve gastrectomy with Hill-modified technique in the same surgical event, and 18.75% had other associated procedures. Laparoscopic approach was performed in 15 patients and robotic-assisted laparoscopic surgery in 1 of the cases. Early complications were presented only in two patients. Fifteen patients received PPI treatment after surgery for a period of 30 to 90 days. One patient was symptomatic in the 3rd month after surgery follow-up; symptoms resolved in the next control.
Conclusion: Hill-modified technique can be used and presented as an option for GERD control in patients with LSG.

P417

Comparison of Outcomes of Paraesophageal Hernia Repair Between General Surgeons and Thoracic Surgeons

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Background: Historically, paraesophageal hernia repairs have been performed by both general surgeons and thoracic surgeons, with variability between institutions and practitioners. With the advent of minimally invasive transabdominal surgery, these repairs can typically be performed with low morbidity and shorter recovery. Thoracic surgeons may argue that greater familiarity with mediastinal anatomy confers better outcomes, while general surgeons argue greater facility with laparoscopy and transabdominal surgery is key. To date, there have been no studies comparing outcomes between the fields.
Methods: The NSQIP public use database was queried for all primary paraesophageal hernia repairs from 2015 to 2020. The data were

stratified by surgeon subspecialty and postsurgical outcomes were analyzed by year.
Results: 30,425 paraesophageal hernia repairs were captured between 2015 and 2020. General surgeons performed 28,777 repairs and thoracic surgeons performed 1648 repairs. Patient demographic factors were consistent between both groups. Rates of emergency surgery, mortality, surgical site infection, bleeding, MI, and readmission were equivalent between the groups. Between general and thoracic surgeons, the rate of return to OR trended toward significance (2.8 vs. 3.6, $p = 0.063$), as did unplanned intubation (0.9 vs. 1.3, $p = 0.071$). Cases performed by thoracic surgeons also showed a slightly higher rate of prolonged intubation (1.6 vs. 0.9, $p = 0.003$).
Discussion: Overall, the outcomes of paraesophageal hernia repairs are equivalent between general and thoracic surgeons. It is possible that thoracic surgery has a higher incidence of larger hernias; however, this is not clear from the NSQIP database. Also important to note is that the vast majority of repairs by thoracic surgeons are performed transabdominally. Among both groups of surgeons, the complication rate after paraesophageal hernia repairs is quite low.

P418

Does fixation of the gastric conduit reduces the incidence of gastric volvulus after esophagectomy?

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Introduction: Gastric conduit volvulus is a rare complication after esophagectomy that warrants additional surgical reintervention and is associated with increased morbidity and mortality. Yet, the role of fixation of the gastric conduit to the paraspinal fascia during esophagectomy and the association with postoperative volvulus is unknown. The aim of the study is to evaluate whether fixation of the gastric conduit would reduce the incidence of postoperative volvulus following esophagectomy.
Methods: This single-center retrospective analysis of patients who underwent esophagectomy was conducted to determine the rate of postoperative volvulus following a change in practice. All patients who underwent an esophagectomy from January 2013 to August 2022 were included. In July 2018, our center began fixing the conduit to the paraspinal fascia in an effort to reduce the incidence of postoperative gastric conduit volvulus. We compared postoperative outcomes of gastric conduit volvulus, reoperations, morbidity, and mortality among those who had fixation versus non-fixation of the conduit to the paraspinal fascia. Differences among the fixation and non-fixation groups were analyzed using descriptive statistics.
Results: Two hundred and thirty-three consecutive patients underwent minimally invasive esophagectomy from 2013 to 2022 (81% male, median age 67 years old). Non-fixation of the conduit was observed in the first 121 (52%)patients, while the conduit was fixed to the paraspinal fascia in the subsequent 112 (48%) patients. Comparing both groups, there were no significant differences in major complications, anastomotic leak, and 30-day and 90-day all-cause mortality. Notably, the fixation group was less likely to experience any 30-day reoperations following their index esophagectomy ($p = 0.001$). Mechanical conduit obstruction caused by volvulus or external compression occurred less frequently in the fixation group ($n = 3$) versus the non-fixation group ($n = 6$). Before implementation of practice change with fixation, four (3%) patients developed gastric conduit volvulus in the non-fixation group, which required reoperative intervention. Following implementation of fixation, no patient experienced gastric volvulus.
Conclusion: Acute gastric conduit volvulus is a major complication after esophagectomies and early diagnosis and intervention are crucial and lifesaving. In this study, although not statistically significant using traditional definitions, fixation of the gastric conduit did reduce the number of patients who experienced postoperative volvulus. Additional future studies are needed to validate this technique and the prevention of postoperative acute gastric conduit volvulus among a diverse patient population.

P419

Impedance planimetry (EndoFLIP) after Hill compared to Toupet

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Introduction: Endoluminal functional lumen imaging probe (EndoFLIP) has been used to provide objective measurements of the gastroesophageal junction during anti-reflux Nissen and Toupet fundoplication. However, there are limited data on EndoFLIP measurements during Hill fundoplication. We aim to describe our institutional experience in performing EndoFLIP during Hill fundoplication and to compare these measurements to those obtained during Toupet fundoplication.
Methods: A retrospective chart review of a prospectively maintained database was performed. Patients who underwent an index Hill or Toupet fundoplication and intraoperative EndoFLIP between October 2017 and August 2022 were included. Intra-operative EndoFLIP measurements of the lower gastroesophageal junction (GEJ) included cross-sectional surface area (CSA), intra-balloon pressure, high-pressure zone length (HPZ), and distensibility index (DI). These were obtained at 10 mmHg of pneumoperitoneum and 30-ml balloon fill volume of a 325 Endoflip balloon at three distinct time points: pre-procedure, post-hiatal hernia repair, and post-fundoplication.
Results: Out of a total of 214 patients that had robotic anti-reflux surgery, 154 received a Toupet fundoplication (71.9%), while 60 patients underwent a Hill procedure (28%). At baseline, both cohorts were not statistically different in terms of sex, BMI, or the GERD HRQL score. However, patients who underwent Toupet were older (55.15 ± 16.79 vs 46.42 ± 16.45 years, $p = 0.0007$).
The gastroesophageal junction's distensibility index was significantly lower after Hill (0.8 [IQR: 0.6–1.1]mm2/mmHg) compared to Toupet (1.2 [IQR: 0.8–1.6]mm2/mmHg, $p = 0.001$). While there was no difference in post-fundoplication HPZ between procedures [Hill: 3 (IQR 2.5–3) cm; Toupet: 3 (IQR 2.5–3.5) cm, $p = 0.19$], after Hill both the CSA (24 [IQR:19–32.2]mm2) and pressure (29 [IQR:24.7–33.6] mmHg) were lower than Toupet (41 [IQR: 28-54.5]mm2, 33.8 [IQR:27.2–39.1] mmHg, respectively) ($p < 0.0001$, $p = 0.0005$, respectively). Patients who underwent Hill had a greater decrease in both DI (23% vs 4.3%) and CSA (36.6% vs 9%) from baseline measurements, but a lower increase in pressure (18.7% vs 48.5%) compared to Toupet.
Conclusion: The Hill procedure significantly lowers the GEJ's CSA and DI when compared to Toupet. Further studies evaluating the clinical correlation with outcomes is warranted and may dictate intraoperative targets.

P420

Prevalence of neoplastic lesions in small gastric subepithelial lesions undergoing surgical resection according to the risk features

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Introduction: Endoscopic surveillance are recommended for small-sized subepithelial lesions (SELs) by the guidelines. However, differentiation of potentially malignant lesions is extremely difficult by image study for small SELs. We aimed to analyzing the prevalence of neoplastic lesions in small gastric SELs undergoing surgical resection.
Methods: A total of 222 surgically resected small ($\leq$ 3 cm) gastric SELs between April,2014 and March 2022 were analyzed. All patients were evaluated by computed tomography and endoscopic ultrasonography (EUS). We classified the patients into three risk groups according to the tumor size, growing, and high-risk features as follows: Group 1, $<$ 2 cm with no risk; Group 2, $<$ 2 cm with any risk; and Group 3, $\geq$ 2 cm. The patients were 37 (16.7%), 45 (20.3%), and 140 (63.1%) in each group, respectively.
Results: Pathologic examination showed that 55.0% and 3.2% of tumors were gastrointestinal stromal tumors (GISTs) and neuroendocrine tumors (NETs). Regarding GIST, 33 (14.9%) were very-low risk, 67 (30.2%) were low risk, 14 (6.3%) were intermediate risk, and 8 (3.6%) were high risk. Prevalence of neoplastic lesions was significantly differed between risk groups (43.2%, 57.8% and 62.1% in Group 1, 2 and 3, respectively; $p < 0.001$). The proportion of potentially progressive lesions (GISTs of low/intermediate/high risk and NETs) also increased with risk groups to 18.9%, 33.3%, and 52.8%. Age (Odds ratio (OR), 1.057), tumor size (OR, 3.433), endoscopic risk features (OR, 3.831), and tumor location (OR, 4.585) were found to be independent predictive factors for potentially progressive lesions, but risk features on EUS was not significant. All patients underwent laparoscopic surgery and mean operation time and blood loss were 87 min and 26 ml, respectively. Overall morbidity was 2.7% and median hospital stay was 4 days.
Conclusion: The incidence of neoplastic and potentially progressive lesions were 43.2% and 18.9% in the very small ($<$ 2 cm) gastric SELs with no high-risk features. Although it was relatively lower than those in the small SELs with risk, the absolute values are a matter for consideration. Therefore, even in small SELs, resection for definitive diagnosis and treatment needs to be considered.

P421

Our Standard Right-Side Approach in Laparoscopic Nissen Fundoplication for GERD Patients

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Introduction: Laparoscopic techniques in anti-reflux surgery for GERD patients are still considered slightly complicated. We have established a simple anti-reflux surgery procedure with right-side approach contributing to less bleeding and less operative time.
Surgical Procedure
Setting

Our 5-mm trocar setting with patients in the reverse Trendelenburg's position is as follows: 12-mm trocar just below the navel (A), 5-mm trocar at the upper right abdomen for pulling up the liver, 5-mm trocar at upper right, 12-mm trocar at upper left (B), and 5-mm trocar at middle left (C).

Step 1: Right-Side Approach

Left part of the lesser omentum was cut by preserving the hepatic branch of vagus nerve. The right crus of the diaphragma has been dissected free from the soft tissue around the stomach and abdominal esophagus. In this step, the fascia of the right crus should be preserved and the soft tissue should not be damaged to avoid unnecessary bleeding. After cutting the peritoneum just inside the right crus, the soft tissue was dissected bluntly to left side. Then, the inside and outside margins of the left crus of the diaphragma were recognized from the right side. The laparoscope uses trocar (A), the assistant uses trocar (B) to pull the stomach, and the operator's right hand uses trocar (C).

Step 2: Flap Preparation

The branches of left gastroepiploic vessels and the short gastric vessels were divided. The left crus of the diaphragma was exposed and the window at the posterior side of the abdominal esophagus was shown and widely opened. The laparoscope uses trocar (A) at the beginning of dividing left gastroepiploic vessels and trocar (B) when dividing short gastric vessels.

Step 3: Suturing

The right and left crus are sutured with interrupted stitches to reduce the hiatus. From the right side, the fundus of the stomach is grasped through the window behind the abdominal esophagus. Then, the fundus of the stomach is pulled to obtain a 360 -egree "stomach-wrap" around the abdominal esophagus. Stitches are placed between both gastric flaps.
Results: We have performed this procedure in 130 cases. The mean operation time in recent 20 cases is about 70 min. The patients are mostly satisfied with the postoperative results because of stable food passage and no reflux.

P423

Re-operative intervention after non-traditional anti-reflux surgery

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Background: Laparoscopic fundoplication is the gold standard for definitive treatment of pathological gastroesophageal reflux disease (GERD). Several alternate procedures have been developed with the goal of better outcomes. The aim of this study was to review a single-center experience of re-operative intervention after prior non-traditional anti-reflux surgery (NTARS).
Methods: With IRB approval, our database was queried to identify patients who underwent reoperation after a primary NTARS, such as transoral incisionless fundoplication (TIF and c-TIF), magnetic sphincter augmentation (MSA) with the LINX device, electrical stimulation therapy (EST) with Endostim implantation, or Angelchik prosthesis. Patients who underwent Endostim removal due to an end-of-study closure were excluded from analysis. The presenting symptoms, procedure, operative findings, and perioperative outcomes were extracted and analyzed.
Results: A total of 21 patients (mean age 53.62 $\pm$ 4.43 years) met the study criteria for re-operative intervention during the study period (May 2017–August 2022); 4 of these with end-of-study Endostim

removal were excluded. Primary NTARS included MSA with LINX (n = 8), TIF/c-TIF (n = 5), Angelchik prosthesis (n = 2), and Endostim implant (n = 2). The most common indications for re-operative surgery were reflux (n = 6), dysphagia (n = 3), and abdominal pain (n = 4) after LINX; reflux (n = 4), dysphagia (n = 2), and abdominal pain (n = 3) after TIF; reflux (n = 2), nocturnal regurgitation (n = 2), and dysphagia (n = 2) after Angelchik; and reflux (n = 2) after Endostim. Nine patients had a recurrent hiatal hernia. All re-operations were minimally invasive with 1 conversion to laparotomy (s/p TIF). The most common procedure was redo-partial fundoplication with need for Roux-en-Y (RNY) conversion in 4 patients (3 gastro-jejunostomy and 1 esophago-jejunostomy; 3 TIF and 1 Angelchik). Operative findings included dense fibrosis (n = 15), vagal injury (n = 9), device migration (n = 5), visceral injury (n = 1), and splenic bleed (n = 1). The median length of hospital stay was 1 day. The patient with esophago-jejunostomy had an anastomotic leak and a prolonged, complicated recovery. There was no perioperative mortality.
Conclusion: With the introduction of NTARS, some patients will inevitably require re-operative intervention. In this study, a high proportion of patients required conversion to RNY reconstruction. The high rate of observed vagal injury is concerning and likely due to postoperative scarring, especially in TIF procedures. Re-operative surgery after NTARS procedures is technically difficult even in the hands of experienced foregut surgeons.

P424

Successful Surgical Management of a Perforated Duodenal Ulcer Within an Incarcerated Paraesophageal Hernia

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Introduction: A type IV paraesophageal hernia is a rare category of hiatal hernia characterized by herniation of the stomach and other intra-abdominal organs into the chest. Incarceration can lead to obstruction, bowel ischemia, or rarely perforation. As with any other perforated viscus, a perforated ulcer associated with a paraesophageal hernia is a surgical emergency and is associated with a high mortality rate. We present a case report of an incarcerated paraesophageal hernia containing a duodenal perforation managed with surgery.
Case Presentation: The patient is a 65-year-old female with super morbid obesity (BMI 67) and severe malnutrition (albumin 2.9). She initially presented to the emergency department complaining of shortness of breath and nausea for five days and was found to be in septic shock. A computed tomography scan of the chest and abdomen revealed a large paraesophageal hernia containing the stomach and proximal duodenum with free air and fluid in the chest and abdomen. The patient was taken emergently to the operating room for exploratory laparotomy. Operative findings included a paraesophageal hernia with incarcerated greater omentum, stomach, and proximal duodenum with foul smelling bilious fluid throughout the chest and abdomen. After adequate mobilization, a 3-cm perforation in the posterior wall of the first portion of the duodenum was identified immediately distal to the pylorus. A distal gastrectomy with Billroth II reconstruction and gastropexy was performed. The patient remained in critical condition throughout the procedure, necessitating vasopressor support. Postoperatively, she recovered well. A water-soluble swallow study was performed on postoperative day 7 which showed no evidence of leak or obstruction. The patient was started on an oral liquid diet and eventually advanced to a soft diet on postoperative day 10. On postoperative day 50, the patient was readmitted to the hospital with a superficial surgical site infection and abscess which was managed with incision and drainage. Subsequently, she was seen in three-month follow-up and was doing well.
Conclusion: We report a positive outcome in a rare and dangerous case of an incarcerated paraesophageal hernia associated with duodenal perforation and septic shock.

P425

Efficacy and safeness of polyglycolic acid-felt sealant with fibrin glue at the liver cut surface for prevention of postoperative bile leakage in laparoscopic liver resection

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Introduction: Bile duct injury and bile leakage often occurred in extensive liver resection. However, repair of bile duct injury is a complicated technique especially in laparoscopic liver resection (LLR). TachoSil® is widely used for prevention of bile leakage on liver cut surface. We previously investigated the safety and effectiveness of polyglycolic acid-felt sealant with fibrin glue (PGA methods) at the liver cut surface for prevention of postoperative bile leakage in liver resection. This time, we aimed to determine the efficacy of PGA sealant for prevention of bile leakage after LLR compared with conventional method.
Methods: The target is 580 patients who performed LLR between January 2008 and December 2021 at our facility. We started PGA sealant in January 2019. In the PGA group, 1-cc fibrin fluid and 1-cc thrombin fluid were dropped on cutting surface and PGA sheet soaked with 1-cc fibrin fluid was sticked on cutting surface. The PGA was incubated with 1-cc thrombin fluid. Finally, mixed fluid of fibrin and thrombin was sprinkled over the PGA sheet. From January 2019 to December 2021, 16 patients have been performed PGA methods on LLR undergoing cutting depth over 5 cm. We compared the PGA group with control group 28 patients whose background matched undergoing LLR cutting depth over 5 cm without conventional procedure from January 2016.
Result: No significant difference was observed between PGA group and control group in terms of background. In PGA group, 3 cases were found in intraoperative bile leakage without suturing repair. Postoperative bile leakage (greater than Clavien–Dindo classification III) occurred in 2 patients in the control group and in no patients in the PGA group. In PGA group, postoperative hospital stay was 7.5 (5–21) days shorter than in control group. However, no significant difference was observed in complication rate and postoperative hospital stay between both groups.
Conclusion: Polyglycolic acid-felt sealant with fibrin glue at the liver cut surface in LLR is easy to handle and safe. This technique may suppress postoperative bile leakage which requires invasive treatment.

P429

Validation of the Japanese Difficulty Score for Laparoscopic Hepatectomy in Robotic Liver Resection

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Background: Laparoscopic hepatectomy is associated with a steep learning curve, leading to the development of robotic approaches to reduce technical limitations of these complex procedures. The Japanese Laparoscopic Difficulty Scoring (LDS), first published by Ban et al., was developed to standardize the stratification of laparoscopic hepatectomy into low, intermediate, and high complexity procedures. The LDS has been shown to correlate with perioperative outcomes in laparoscopic resections but has not been validated for robotic resections. This study assesses whether this correlation also applies to the robotic approach.
Methods: After Institution Review Board approval, a retrospectively maintained registry of hepatectomies performed at a single high-volume tertiary care center was queried for all minimally invasive resections performed between 2008 and 2019. Patient charts were retrospectively reviewed, and data including patient demographics, preoperative characteristics, intraoperative details, and postoperative outcomes were collected. Patients were grouped based on LDS: "low" (< 4), "intermediate" (4–6), and "high" (7+) difficulty. Statistical comparisons were made using ANOVA or Chi-square test.
Results: There were 882 hepatectomies performed during the study period. Of these, 413 patients underwent minimally invasive hepatectomy. Of those, 276 underwent laparoscopic resection and 137 underwent robotic resection. In the robotic cohort, patients were grouped for difficulty of resection by LDS: 25 "low," 58 "intermediate," and 54 "high." There were no significant differences in patient demographics. "High" LDS was associated with more major resections (≥ 4 contiguous segments) versus minor resections (median LDS 8 vs 5, $p < 0.0001$). Intraoperatively, "high" LDS was associated with significantly longer operative times, increased blood loss, and increased blood transfusion. Conversion rates were similar among all three groups. Postoperatively, "high" LDS was associated with higher rates of post-hepatectomy liver failure (PHLF) at 16.7%, compared to 5.2% "intermediate" LDS and 0.0% "low" LDS ($p = 0.018$). Median length of stay (LOS) was longer in patients in the "high" group at 4 days, compared to 3 days in the "intermediate" group and 2 days in the "low" group ($p = 0.0005$). 30-day readmissions and 90-day mortality were similar among the groups.
Conclusion: Operative complexity is driven by greater extent of resection, manifested by increased operative time, EBL, and blood transfusion and leads to increased PHLF and LOS. LDS successfully predicts the complexity of robotic liver resection as it has previously done for laparoscopic hepatectomies. LDS can be used as a tool to guide beginner surgeons practicing robotic hepatectomies in which cases to perform first while on their learning curve.

P434

An Overview of Preoperative, Intraoperative, and Postoperative Variables of Liver Resection for Hepatic Adenoma.

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Introduction: Hepatic adenomas occur infrequently; therefore, the lack of data are noticeable in surgery practices. We describe outcomes and complications of such liver resections performed in our hepatobiliary center within the past decade.
Methods: Perioperative data of 12 patients undergoing hepatic adenoma resections were collected and analyzed. Major liver resection is defined as resection of ≥ 3 adjacent Couinaud segments. The data are presented as median (mean ± standard deviation).
Results: Patients were 35 (39 ± 17.68) years old, with BMI of 29.47(31.09 ± 9.24)k g/m2 and ASA class of 2.5 (2.33 ± 0.78). 92% of the patients were women and 25% had previous abdominal operations. The MELD score was 8 (8 ± 1.66) indicating normal background liver at baseline. 75% of the liver resections were conducted using robotic approach. According to Iwate, 25% of the patients were in intermediate, 25% were advance, and 50% were expert group. Intraoperatively, 75% of the patients underwent major resections. The operative time was 232 (242 ± 151.85) minutes with an EBL of 75 (193.33 ± 198.10) mL. The size of the tumors resected was 4.45 (7.24 ± 5.94)c m. No intraoperative complications nor conversion to open occurred throughout the series. The length of hospital stay was 4 (4 ± 2.30)d ays. The 30-day readmission rate was 16.7%, and no 30-day mortality was seen. One Clavien–Dindo II complication occurred due to a wound infection. No major complications, defined by the Clavien–Dindo score (≥ III), have occurred.
Conclusion: Hepatic adenomas occur mostly in young women and often require major hepatic resection. Robotic approach is safe and feasible for the treatment of hepatic adenoma.

Preoperative variables	Results
Number of patients(n)	12
Age (years)	35(39 ± 7.68)
Sex (M/W)	(1/11)
BMI (kg/m2)	29.47(31.09 ± 9.24)
Previous abdominal operations	3(25%)
ASA	2.5(2.33 0.78)
MELD score	8(8 ± 1.66)
Cirrhosis (n)	0(0%)

Intraoperative variables	Results
Major resections	9(75%)
Operative duration (min)	232(242 ± 151.85)
EBL (mL)	75(193.33 ± 198.10)
Procedure approach (Robotic/open)	9/3
Conversion to open (n)	0(0%)
Intraoperative complications (n)	0(0%)
Tumor size (cm)	4.45(7.24 5.94)

Postoperative variables	Results
Length of stay (days)	4(4 ± 2.30)
Readmission within 30 days (n)	2(16.7%)

Table continued

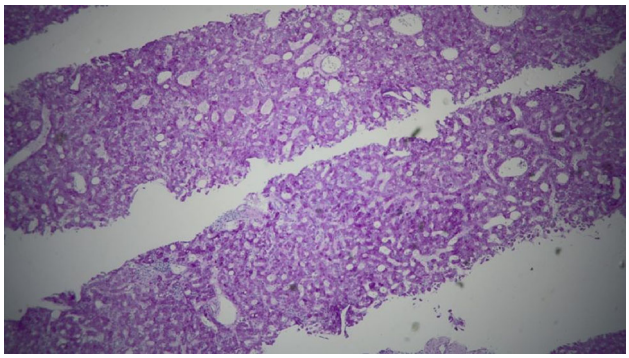
Postoperative variables	Results
30-day mortality (n)	0(0%)
Clavien–Dindo score (≥ II)	1(8.33%)
Clavien–Dindo score (≥ III)	0(0%)

P435

Atypical follicular nodular hyperplasia misdiagnosed as Hepatocellular carcinoma: a case report

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Introduction: Follicular nodular hyperplasia (FNH) is the second most common benign liver tumor, representing 25%. Imaging can help make the final diagnosis, although atypical cases can require a different approach. Biopsy has been the standard tool in patients presenting with inconclusive imaging. When deciding on management false-negative and false-positive results from biopsy must be taken into consideration. We present a patient misdiagnosed with Hepatocellular carcinoma (HCC).
Case presentation: A 40-yr-old patient presented with an elevated Alkaline Phosphatase (693) in his routine check-up. During his work-up a liver mass was found in the US. CT reported a 14.3 × 11.6 × 12.3 cm, irregular, lobulated mass with a central scar with homogeneous enhancement in the arterial phase, predominantly in the portal phase, associated with 3 small calcifications and peripheral isodense necrosis zones. A liver biopsy was taken, seven samples were analyzed, and a hepatocellular carcinoma diagnosis was made. The patient was scheduled for a right-extended hepatectomy. The patient presented pneumonia postoperatively requiring management in the ICU and was finally discharged 10 days after surgery. Definitive pathology of the liver mass reported a FNH.
Discussion: The diagnosis of FNH is based on patient history and imaging, most commonly, asymptomatic with normal liver function tests. Imaging helps differentiate FNH from other hepatic tumors (hepatic adenoma, HCC, fibrolamellar carcinoma), characteristic findings include a central scar, and homogeneous enhancement in the arterial phase with attenuation in the portal phase. Our patient presented with no personal history of cancer and no risk factors for hepatocellular carcinoma and imaging was nonconclusive. A liver biopsy was undertaken to clarify the diagnosis, although it was misdiagnosed as HCC. Several studies have shown that a preoperative biopsy can have up to 94% accuracy when imaging has classic findings but can drop to 58% in atypical cases. Few false negatives where an HCC was found on biopsy have been reported but all have greatly influenced final management.
Conclusion: When deciding between conservative and surgical management in patients with atypical cases, false-negative biopsy for FNH should be considered as a possibility. We recommend a multidisciplinary approach and considering repeating biopsy before major surgical procedures are performed.



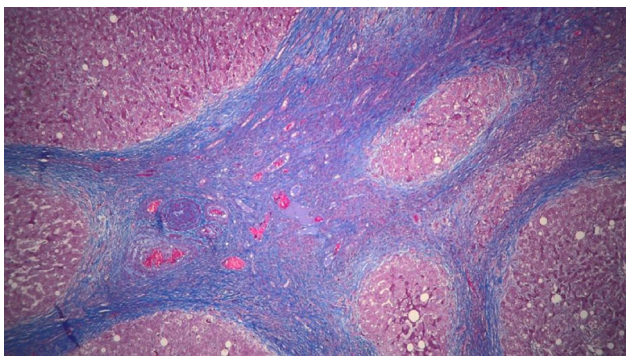


Image 1 Liver biopsy H&E stain: HCC with moderate nuclear atypia, hyperchromatic nuclei, and trabecular pattern
Image 2 Definitive pathology Trichrome stain: highlighting fibrous bands, bland hepatocytes

P436

A case series of liver resection using Senhance digital laparoscopy system

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The Senhance digital laparoscopy system (SDLS) (TransEnterix, Morrisville, NC, USA) was introduced in 2012 as a novel robotic system with a telesurgical concept. This system was approved for use by the Japanese Ministry of Health, Labor, and Welfare in 2019. We believe that the three-dimensional (3D) magnifying view feature and the haptic feedback make this system useful in hepatectomy. We present a detailed procedure of SDLS and compare it with ordinary LLR in terms of its safety and effectiveness.
Materials and Methods: The cases were selected for SDLS hysterectomy if the tumor was < 6 cm in size and located on the surface of the liver. Accordingly, SDLS hepatectomy was performed in 22 patients (SDLS group) with hepatocellular carcinoma (HCC) between December 2020 and August 2022. Out of 22 patients, 18 underwent partial resection and 4 underwent lateral segmentectomy. Comparative cases (the LLR group) included 28 background-matched patients who underwent ordinary LLR for HCC, between July 2019 and December 2020. Operations were performed using two robot arms and two assistant devices. The resection line was determined with an

intraoperative echogram and marked using monopolar scalpels. Liver transection was performed with monopolar scissors or ultrasonic devices after clashing and healing with bipolar devices.
Results: There were no significant between-group differences in terms of patient characteristics. None of the patients in the SDLS group required conversion to ordinary LLR or laparotomy.
The surgical duration was significantly different between the SDLS 139 (114–221) min) in the SDLS group and 106 (68–242) min in the LLR group. Blood loss and hospital stay were 35 ml (range, 0–160 ml) vs. 50 ml (range, 0–300 ml) and 5 days (range, 4–6 days) vs. 6 days (range, 3–18 days), respectively, in the SDLS and LLR groups (no significant difference). No postoperative complications over Clavien–Dindo classification III were observed in either group. There were no case of the positive surgical margins in the SDLS group and 4 cases in the LLR group.
Conclusion: The 3d magnifying view and the haptic feedback system make SDLS useful and safe for use in liver transection, which requires high visibility of tumor depth and confirmation of small vessels.

P441

Intracorporeal Surgical Approach Following Failed Endoscopic and Angiographic Management of Dieulafoy Lesions: A Case Series

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Introduction: Dieulafoy lesions (DL) are rare vascular malformations that account for approximately 1–2% of gastrointestinal bleeds. Although advancements in endoscopic and angiographic techniques can successfully manage up to 95% of DL, the remaining cases require surgical interventions with associated increased risk of morbidity. This case series describes an effective, minimally invasive, approach using laparoscopy after endoscopic and angiographic attempts and detection and treatment failed.
Case Presentation: We describe two separate cases involving healthy 25- and 32-year-old males presenting with presyncope, hematochezia, and melena. After numerous blood transfusions, multiple EGDs & colonoscopies, and negative CT angiographies, the bleeding sources were unable to be localized. Tagged RBC nuclear scan eventually revealed LUQ bleeds and were subsequently managed using percutaneous angiography with embolization and microcoiling of jejunal branches of the superior mesenteric artery (Fig. 1A, B, 2A, B). Both patients were initially stable following embolization, but eventually developed rebleeding several days later necessitating surgical intervention. Diagnostic laparoscopy was performed in both cases; the bowel was run laparoscopically and previously placed radio-opaque endovascular coils were localized using intraoperative fluoroscopy. The mesentery was ligated proximal and distal to the coils and the associated jejunal was segmentally resected. Intraoperative angiography demonstrated no active extravasation, and enteral continuity was achieved via primary stapled anastomosis. The resected jejunal segments were removed through the umbilical port and the fascia was closed. Their postoperative recovery was uneventful and both were discharged on POD3. The pathology reports later confirmed DL of the small intestines.
Discussion: Historically, severe DL that were unsuccessfully managed by endoscopic and angiographic techniques would require conventional explorative laparotomy, of which resulted in high morbidity and risk of complication. This laparoscopic approach utilizing fluoroscopy reduces the risk of morbidity and mortality that is associated with open surgery. Data have shown that length of stay and pain are reduced in laparoscopy when compared to laparotomy. This technique, albeit not entirely novel, exemplifies the importance of understanding the fundamentals of laparoscopic surgery and applying this knowledge to problem solve complex and unique challenges so that our patients benefit from the advantages of minimally invasive surgery.

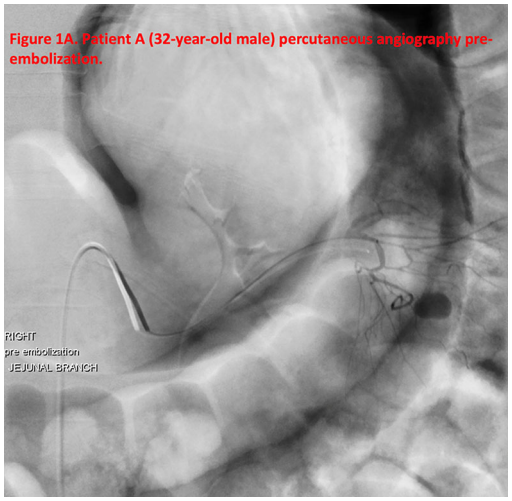


Figure 1A. Patient A (32-year-old male) percutaneous angiography pre-embolization.



Figure 1B. Patient A (32-year-old male) percutaneous angiography post-embolization with radiopaque coil placement.

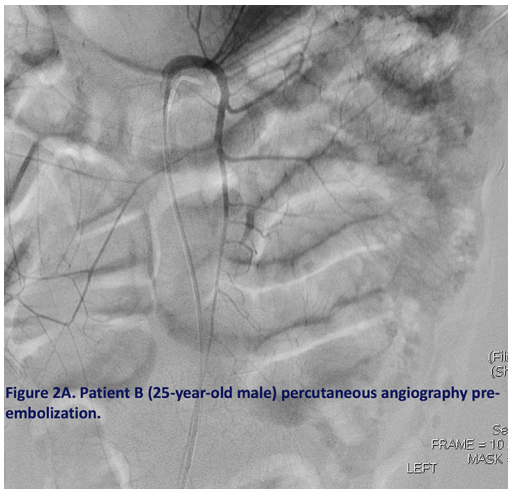


Figure 2A. Patient B (25-year-old male) percutaneous angiography pre-embolization.

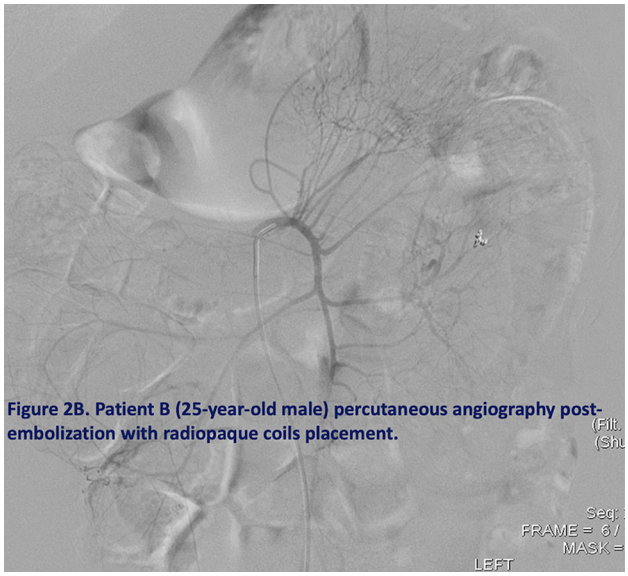


Figure 2B. Patient B (25-year-old male) percutaneous angiography post-embolization with radiopaque coils placement.

P445

Specimen retrieval bag use and the rate of surgical site infection in laparoscopic appendectomy

Daniel G Chen, MD, MPHTM; Dylan Russel, MD; Keaton Altom, MD; Christopher Yheulon, MD; Tripler Army Medical Center

Introduction: Laparoscopic appendectomy represents one of the most performed procedures for the general surgeon. SSI remains the most encountered post-operative complication with a high associated medical cost. This study investigates whether the use of a specimen retrieval bag (SRB) reduces the incidence of post-operative SSI and associated costs in emergent laparoscopic appendectomies performed for acute appendicitis.
Methods: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)-targeted appendectomy database was queried from 2005 to 2020 for patients undergoing an emergent laparoscopic appendectomy (CPT code 44,970) without other or concurrent procedures performed. Participants were divided into two groups: those in which an SRB was used and those where one was not. Patients were matched based on their pre-operative demographics, comorbidities, and peri-operative factors. Further subgroup analysis compares rates of SSI in complicated vs uncomplicated appendicitis. The primary outcome was SSI within 30 days of surgery with secondary analysis of overall cost per patient.
Results: On initial query, over 300,000 patients were identified within the ACS-NSQIP appendectomy database. Of those, 18,635 patients met inclusion criteria and were included in matching. An SRB was used in 17,436 patients and was not used in 1,199 patients. For all covariates assessed, a standardized mean difference (SMD) of less than 0.1 was achieved. A total of 506 patients developed an SSI within the study period (2.7%) with similar rates between groups (3.4% vs 2.7%, p = 0.145; OR 0.77, 95% CI 0.56–1.07). Upon further delineation of SSI subtype, there was a significant difference in organ space infection (OSI) when an SRB was used (1.7% vs. 2.6%, p = 0.027; OR 0.64, 95% CI 0.44–0.93).
Conclusion: The use of an SRB significantly reduces the risk of postoperative OSI. Given the significant healthcare burden and cost of postoperative OSI, surgeons should strongly consider the routine use of SRB for laparoscopic appendectomy as a best practice.

P446

Association between clinical and surgical variables with postoperative outcomes in intestinal obstruction

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Introduction: Intestinal obstruction (IO) is a common surgical pathology that is associated to previous surgical procedures, that if not solved, can lead to ischemia and death. Therefore, we aimed to describe the factors that are related to morbidity and mortality regarding the management of IO.
Methods: Retrospective observational study with a prospective database, in which we described patients from a single-center experience who underwent surgical management due to IO between 2004 and 2015. Demographics, perioperative data, surgical outcomes, morbidity, and mortality were described.
Results: 366 patients were included. Female were 54.6%. Mean age was 61.26 years. Laparoscopic approach was done in 21.8% with a conversion rate of 17.2%. Intestinal resection was performed in 37.9% of the cases. Postoperative complications were observed in 18.85%. Reintervention rate was and mortality rate was 4.1%. Laparoscopic approach showed lesser time of intestinal transit (mean 28.67 vs mean 41.95 h) and restart of oral intake after surgery (mean 96.06 vs mean 119.65) compared with open approach. Increased heart rate (p 0.01) was related to mortality, same as intensive care unit (ICU) and length of stay (p 0.000). For morbidity, laparotomy, and need and duration of ICU stay were related with any complication statistically significant (p 0.02, 0.008, 0.000, respectively).
Conclusion: Patients with increased heart rate, decreased intravenous fluids, need and higher length of stay in the ICU, and delay in resuming oral intake after surgery appear to have poor outcomes. The laparoscopic approach seems to be a safe and feasible approach for intestinal obstruction.

P447

Large retroperitoneal lymphangioma in a young, healthy male: a case report

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Background: Lymphangiomas are rare benign tumors typically found in children and occur most often in the head and neck. In fact, lymphangiomas in adults are exceedingly rare, with only 5% occurring intraabdominally and 1% retroperitoneally. Because these tumors present with nonspecific findings, such as dull pain or swelling, they are difficult to accurately diagnose and are usually identified after behaving as a lead point or mass effect, if growing with development of volvulus or obstruction. Ultrasound and MRI have proven to be the most useful diagnostic imaging modalities. As shown in the following case and discussion, retroperitoneal lymphangiomas should be excised early to prevent serious complications.
Case Presentation: This is a 24-year-old male who presented to the office after identifying a mass in the right lower quadrant that had been increasing in size and becoming progressively more tender. He found the mass incidentally 8 months ago. Curiously, he described the sensation of fluid dripping in his abdomen. Abdominal ultrasound revealed an 11.9-cm simple intraperitoneal cyst. Follow-up CT abdomen and pelvis with IV contrast demonstrated an 11.2-cm round cystic mass in the right retroperitoneum partially displacing surrounding organs, including the IVC, aorta, and second and third portions of the duodenum. In the operating room, a retroperitoneal mass was found and its capsule was circumferentially dissected free from surrounding tissue. The mass was then excised with the entire capsule intact. Given that the mass was densely adherent to the duodenum, a single small serosal tear was primarily repaired without any complications. Surgical pathology was consistent with lymphangioma (Figs. 1, 2). The patient recovered well without clinically evident signs of recurrence.
Discussion: While lymphangiomas often present with subtle symptoms, the diagnosis should be suspected if imaging reveals a cystic mass. Surgical resection is the current standard of treatment for lymphangiomas. Laparoscopic and open techniques have both been successful approaches with the principal goal of complete resection to reduce the chance of recurrence. Although the tumors themselves do not have malignant potential, their mass effect has the capability of compromising other structures.



Figure 1: Gross specimen of retroperitoneal lymphangioma

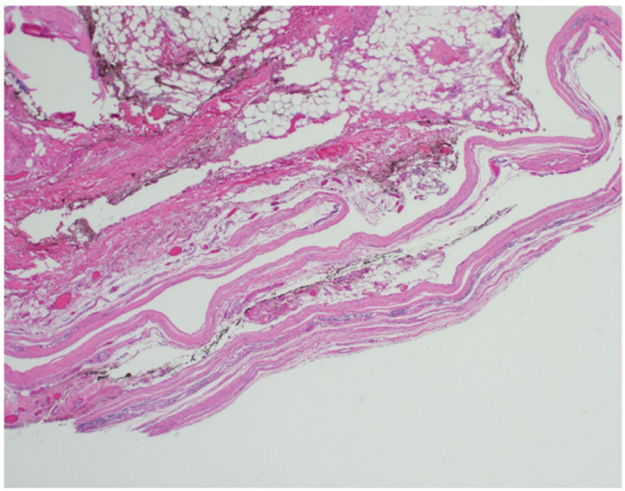


Figure 2. H&E stain of retroperitoneal lymphangioma

P448

The super simple splenectomy

Núria Lluís, MD; Montse Adell Trapé, MD; Domenech Asbun, MD; Horacio J Asbun, MD; Miami Cancer Institute

Introduction: Laparoscopic splenectomy (LS) has become a standard treatment approach for various surgical diseases of the spleen. We describe a simplified, standardized method of performing laparoscopic splenectomy and review outcomes.
Materials and Methods: We performed a retrospective review of LS cases performed at our institution (3/2020–3/2022). Steps of the surgical technique include spleen exposure, limited spleen mobilization, stapled hilar transection, and final extraction. 1) Exposure of the spleen involves liberating the splenic flexure and taking down the splenocolic and phrenocolic ligaments as needed to expose the undersurface of the spleen. 2) Limited mobilization requires ligation of the short gastric vessels within the gastrosplenic ligament from

caudad to cephalad and dissecting the posterolateral peritoneal attachments to the spleen. The gastric fundus is mobilized while preserving the gastroepiploic arcade. Sometimes, there is a natural plane posterolateral to the spleen that requires minimal or no dissection. 3) A stapler is placed across the hilum and all vessels transected together, with care to spare the pancreatic tail. Individual identification and ligation of splenic artery and vein is not necessary. 4) Any remaining superior peritoneal attachments are divided to completely free the spleen. The specimen is placed in a retrieval bag and, if appropriate for the diagnosis, fractured at the hilum to assist with extraction.

Results: Thirteen patients underwent a laparoscopic splenectomy, median (IQR) age was 56 (44–68) years, and 62% were female. The most common indication for splenectomy was idiopathic thrombocytopenic purpura (38%), followed by other autoimmune and malignant hematologic diseases. Median BMI and splenic volume was 26.8 (25.7—31.4) kg/m2 and 573 (463—2464) cc. Procedures lasted a median of 116 (90—170) minutes and intraoperative blood loss was minimal. Indocyanine green was used in four patients (30.8%) to correctly distinguish and preserve distal pancreatic parenchyma from the splenic hilum. No conversions were noted. Clavien–Dindo grade $\geq$ III complications at 30 days occurred in two patients (15%): one patient presented idiopathic pleural effusion requiring thoracocentesis; one patient died on postoperative day 18 due to COVID-19 pneumonia. Four patients (30%) experienced postoperative thromboembolic events, including splenic and/or portal vein thrombosis, deep vein thrombosis, and subsegmental pulmonary embolism. These were likely related to the prothrombotic nature of their disease or COVID related. No postoperative pancreatic fistulas were noted. Patients were discharged at a median of 2 (2—3) days.

Conclusion: We believe our simplified laparoscopic splenectomy technique is safe and feasible. This stepwise approach allows for reproducible and satisfactory outcomes.

P450

Is accrual higher for patients randomized to pragmatic versus exploratory randomized clinical trials? A systematic review and meta-analysis

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Background: Recruiting and retaining patients are particularly challenging in surgical randomized controlled trials (RCT) such that approximately half fail to reach target recruitment and/or have high attrition. All RCTs fall within a spectrum of pragmatic or explanatory design. Pragmatic studies represent real-world settings, such as wider inclusion criteria, less stringent follow-up, and flexibility in adherence to an intervention. Explanatory studies represent ideal settings with more specific patient populations and strict protocols. We sought to compare the effect of pragmatic versus explanatory trial designs on accrual (percentage of eligible patients enrolled) and retention rates (enrolled patients present at follow-up).

Methods: Electronic databases were searched from January 2016 to 2019, to avoid the Coronavirus-19 pandemic impact on trial accrual and retention. RCTs involving $>$ 150 patients undergoing surgical interventions for gastrointestinal or hepatobiliary pathologies were included. The Pragmatic Explanatory Continuum Indicator Summary 2 (PRECIS-2) was used to assess study design. The PRECIS-2 scores of all included studies were averaged, defining pragmatic and explanatory trials as studies with scores one standard deviation above and below the mean, respectively. Independent samples t test were used to determine the effect of explanatory or pragmatic studies on accrual and retention rates. Multiple linear regression was used to assess the effect of each PRECIS-2 scoring domain on accrual and retention rates.

Results: 129 RCTs were included for PRECIS-2 scoring. A score of 27 was considered as explanatory and 34 as pragmatic. There were no significant impact of pragmatic or explanatory study type on retention ($t(24) = 0.001$, $p = 0.99$) or accrual rates ($t(20) = -0.318$, $p = 0.75$). Pragmatic primary outcomes, which are research endpoints that are more relevant to patients (weight loss, quality of life), trended toward higher accrual rates ($B = 0.08$, $t = 1.82$, $p = 0.09$). More pragmatic follow-up, that is, no more than usual follow-up appointments in frequency and intensity ($B = 0.039$, $t = 3.34$, $p = 0.003$) as well as explanatory settings, where the studies involve a single center or only specialized centres ($B = -0.037$, $t = -4.244$, $p = 0.0003$), were associated with higher retention rates.

Conclusion: There is no difference in accrual or retention rates between pragmatic and explanatory trial designs. Primary research outcomes more relevant to patients can help with trial accrual. Less stringent follow-up appointments in explanatory settings can help with trial retention. This can inform design decisions for surgical trial lists.

P451

Adrenalectomy in adrenal hematoma and atypical presentation of incidentaloma: Case report and literature review

Juan Pablo González Serrano; Nubia Andrea Ramirez Buensuceso Conde; Karen Alejandra Rodriguez Ambriz; Rubén Alejandro Sandoval Barba; Petróleos Mexicanos

A 65-year-old male with a history of arterial hypertension of 4 years of evolution presented to the emergency department with abdominal pain and hypertensive uncontrolled, with loss of 8 kg in 2 months. A CT scan was requested and found a right adrenal tumor of 63 $\times$ 70x44 mm of heterogeneous characteristics, solid with fat striation, and 59 HU in simple phase with contrast enhancement to 63 HU in venous phase and 70 HU in arterial phase, as well as an hematic collection in perirenal space.

Endocrinology evaluation was requested, where no hormonal dysfunction was identified and malignancy was suspected, so 24-h ULC was requested, urine metanephrines (total 152, metanephrines 27, normometanephrines 125). Oncology evaluation was requested due to high suspicion of malignancy, indicating biopsy of the lesion, which was not performed due to risk of complications.

It was programmed as open adrenalectomy due to the risk of malignancy and during hospitalization, a new CT scan was requested, where a decrease of 27 $\times$ 22x21 mm and a volume of 6.5 cc with 19 HU in simple phase was observed, increasing to 22 HU after contrast. Lipid-poor adenoma was considered as a diagnosis and laparoscopic adrenalectomy was performed.

Laparoscopic procedure was performed, findings in cavity with multiple adhesions and a subcapsular hematoma in the right adrenal with a tumor of 2 $\times$ 3 cm, vascular control of the adrenal vein was performed with hem-o-lok and dissection with bipolar energy, and drainage was placed in the surgical bed.

The patient evolved adequately and was discharged on the second postoperative day. The anatomopathological result was adrenal adenoma with hemorrhage, ischemic necrosis, and hemosiderin deposits together with abundant adipose tissue with vascular congestion and calcifications.

PEMEX ®
POR EL RESCATE DE LA SOBERANÍA

P453

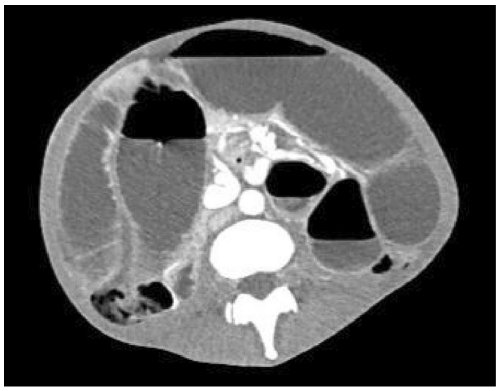
Kaposi Sarcoma presenting as Small Bowel Obstruction

Jane Tian; Shubham Bhatia; Maryam Hassanesfahani; Martine A Louis; Noman Khan; Flushing Hospital Medical Center

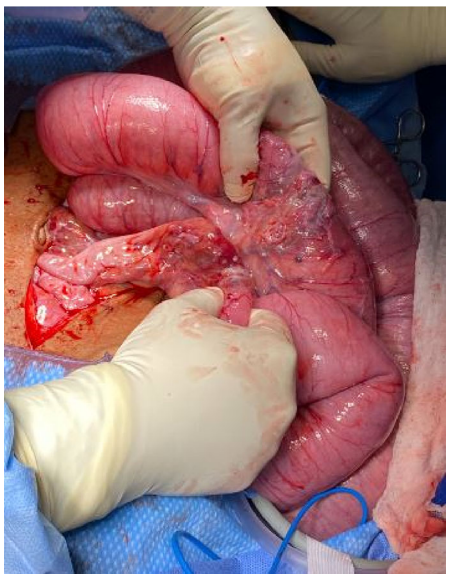
Introduction: Kaposi's sarcoma of the small bowel is an uncommon entity seen mostly affecting HIV-positive patients. It has been described to occur mostly in young homosexual males and differ from its classical form in virulence and preponderance of systemic manifestations. Kaposi's sarcoma is clinically silent and occurs concurrently with or after cutaneous disease. Usually, Kaposi Sarcoma of the bowel is diagnosed as an incidental finding seen on imaging. We present a case of Kaposi Sarcoma presenting with obstruction and concern for bowel ischemia.

Case Presentation: Patient is a frail 28-year old transgender male to female with HIV/AIDs who presented to the ED with one day of abdominal pain. History was limited as patient was uncooperative. Physical exam significant for cachexia, skin changes compatible with skin-type Kaposi's Sarcoma, abdominal distention, and peritonitis. CT abdomen and pelvis showed multiple small bowel loops with questionable transition zone and swirling of mesentery (Figs. 1, 2).





Patient was emergently taken to the operating room for diagnostic laparoscopy and converted to exploratory laparotomy due to multiple dilated bowel loops. Intraop findings consisted of 3 small bowel tumors starting 45 cm proximal to cecum with significant lymphadenopathy (Figs. 3, 4).





A palliative procedure was done with approximately 40 cm of bowel encompassing all 3 tumors resected, an end ileostomy, and mucous fistula created. Patient had an uncomplicated post-op course and was eventually discharged to rehabilitation. Final pathology showed malignant vascular tumor with extensive ulceration involving all layers of bowel wall, positive staining for CD-34 & HHV-8 consistent with Kaposi Sarcoma.

Discussion: Kaposi sarcoma is the most common tumor seen in AIDS with typical findings of cutaneous lesions. Previous reports have shown that 10–66% of those patients with skin lesions also had systemic disease. The gastrointestinal tract (mainly small bowel and stomach) is the third most common site of Kaposi's sarcoma after skin and lymph nodes. Unfortunately, GI manifestations are often clinically silent with symptoms appearing typically in advanced lesions. These symptoms can range from being vague abdominal pain/discomfort anorexia or weight loss to intussusception, perforation or in our case obstruction. Therefore, a high index of suspicion is needed when encountering these subset of immunodeficient patients. The prognosis for visceral Kaposi is low with mean survival of < 2 years after diagnosis. Current treatment options include chemotherapy, immunomodulatory agents, radiation, or palliative surgery.

P455

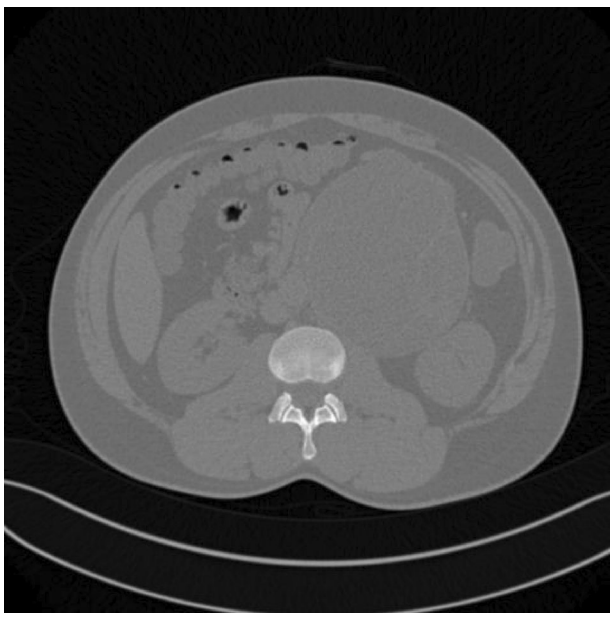
Giant Retroperitoneal Mature Teratoma in young Male, An Atypical Variant: A case report

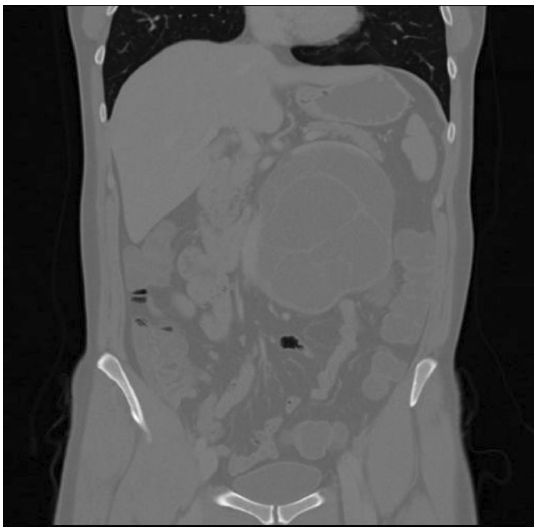
Humaira Alam, General Surgeon; Prof Humad Naeem Rana, Professor of Surgery; Dawood Morad, Resident General Surgery; Maham Tahira, Resident General Surgery; Shalamar Medical and Dental College

Introduction: Teratoma are congenital tumors, consisting of derivatives from ectoderm, mesoderm, endoderm, and germ cell layers[i]. While majority of teratoma present congenitally in midline in sacrococcygeal region, usually in ovaries of females and in testis of young adult males [ii]. Primary retroperitoneal mature teratoma are exceedingly uncommon after 50 years of age and only 7 cases has been presented in literature so far.

Case Report: A 35-year-old male presented to us with history of pain inly. From last 6 months patient was feeling dull pain in left loin non-radiating, continuous, and progressive. Physical examination revealed huge palpable mass of left kidney. CT scan abdomen showed huge 14 cm non-enhancing multiseptated cystic mass arising from left kidney, displacing left pelviureteric junction. Radiologist suggested it seems to be Lt renal tumor. Pt was referred to urologist for further management, but urologist was not convinced with the diagnosis of renal tumor; moreover, due to poor quality of CT scan, repeat CT scan was performed that revealed 14 $\times$ 10x13 cm mass present anterior to left psaos muscle displacing left kidney, most likely diagnosis of lymphangioma was made. But primary surgical team was still ambiguous about radiological diagnosis and second opinion from another radiologist was sorted out. This time radiologist pointed toward hydatid cyst. All hematological and serum assays were all normal with normal LDH and tumor markers for gonadal tumours. So patient counseled and explored, intraoperatively mass was located behind left kidney and encroaching left side of pelvis. So, mass excised in toto from adjacent structures. Histological slides of cystic mass stratified squamous epithelium with underlying sebaceous tissue with skin adnexal structure. In addition to this cartilage, neural tissue and respiratory epithelium were also identified, so finally the diagnosis of mature retroperitoneal teratoma was established. Patient is doing well at the time of reporting and following up in our surgical clinic.

Conclusion: Retroperitoneal mature cystic teratoma are extremely rare entity. Primary gonadal tumors with retroperitoneal metastasis should be excluded. Complete surgical resection of tumor is necessary to evaluate whether they are immature and solid elements with long-term follow-up due to increased risk of malignancy.







P456

Incidence and predictors of hypophosphatemia after Ferric Carboxymaltose use—a 3-year experience from a single institution in Singapore

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Background: Ferric Carboxymaltose (FCM) administration helps reduce transfusion requirements in the perioperative situation which improves patient outcomes and reduces healthcare costs. However, there is increasing evidence of hypophosphatemia after FCM use. We aim to determine the incidence of hypophosphatemia after FCM administration and elucidate potential biochemical factors associated with the development of subsequent hypophosphatemia.
Methods: A retrospective review of anonymised data of all FCM administrations in a single institution was conducted from August 2018 to August 2021. Each unique FCM dose administered was examined to assess its effect on Hb and serum phosphate levels within the subsequent 28 days from each FCM administration. Patients' serum phosphate levels within 28 days of FCM administration were benchmarked against their serum phosphate level within 2 weeks before FCM administration. The odds ratios of various pre-FCM serum markers were calculated to elucidate potential biochemical predictors of post-FCM hypophosphatemia.
Results: In 3 years, a total of 1296 doses of FCM were administered to 1069 patients. The mean improvement in Hb was 2.45 g/dL (SD = 1.94) within 28 days of FCM administration, with the mean time taken to peak Hb levels being 6.3 days (SD = 8.63). The incidence of hypophosphatemia < 0.8 mmol/L was 22.7% (n = 186), and < 0.4 mmol/L was 1.6% (n = 9). The odds of developing hypophosphatemia (< 0.8 mmol/L) were 27.7 (CI: 17.3–44.2, $p < 0.0001$) if baseline serum phosphate was less than 1 mmol/L. The odds of developing hypophosphatemia (< 0.8 mmol/L) were 1.3 (CI: 1.08–1.59, $p < 0.01$) if change in Hb levels observed after FCM administration were more than 4 g/dL.
Conclusion: Hypophosphatemia after FCM administration is significant and should be used by clinicians with caution.
Keywords: Ferric Carboxymaltose, Intravenous Iron, Hypophosphatemia, Anemia, Iron Deficiency.

P457

Importance of pre-operative suspicion in obstruction secondary to jejunal adenocarcinoma

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Introduction: In the U.S.A., small bowel obstruction (SBO) is primarily due to adhesions from prior laparotomy. In patients without previous abdominal surgery (virgin abdomen), SBO is commonly caused by an incarcerated hernia and rarely from jejunal adenocarcinoma.
Case presentation: A 57-year-old African American woman presented with a 3-month history of abdominal pain, vomiting, early satiety, 27-pound weight loss, and intermittent constipation. Computed tomography (CT) scans of the abdomen demonstrated concern for SBO. Upper endoscopy was attempted but unsuccessful due to 400 cc-retained bilious fluid in the stomach. Fluid was aspirated and emergency laparotomy revealed a 2.5 × 2.0 × 1.0-cm tumor in the proximal jejunum. Resection of the mass with 5-cm proximal and distal margins, small bowel mesenteric lymph node sampling, and primary anastomosis was completed. Histopathology confirmed stage IIIB (T3N2M0) jejunal adenocarcinoma extending into subserosa and 4/5 regional lymph nodes. The patient achieved remission with 6 months of FOLFOX chemotherapy. However, 9 months later, she presented to the ED with jaundice and was found to have metastases. After a series of metastasis-related health complications, including stroke and deep vein thrombosis, palliative care was initiated and the patient later expired.
Discussion: Initial evaluation consists of a focused history and physical exam, contrast computed tomography (CT), nasogastric decompression, gastrografin, or surgery if needed. However, when evaluating SBO in the virgin abdomen (SBO-VA) without evidence of hernia on physical exam, an index of suspicion for small bowel adenocarcinoma (SBA) should be considered. Due to SBA presenting with vague symptoms initially, patient's usually present during later stages of diagnosis and have a poor prognosis. The tendency of SBA to be diagnosed intraoperatively in the setting of obstruction can leave the emergency surgeon uncertain about the extent of resection. As a result, many patients have few lymph nodes resected and risk of

recurrence. With high suspicion of malignancy in SBO, a goal is to retrieve at least 8–10 regional lymph nodes for evaluation. Additionally, double-balloon enteroscopy (DBE) and wireless capsule endoscopy should be considered when a mass is suspected beyond the proximal duodenum to aid in an earlier diagnosis.
Conclusion: When evaluating SBO-VA, pre-operative suspicion for SBA may improve prognosis by ensuring adequate resection of lymph nodes and mesentery.

P458

Enteroenteric intussusception secondary to metastatic cardiac pleomorphic sarcoma

Breanna Connett, DO; Aja Harding, DO; Nathan LaFayette, MD; Beaumont Hospital

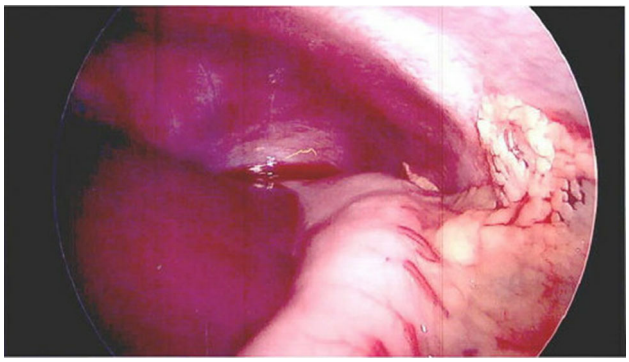
Primary cardiac pleomorphic sarcomas are a rare neoplasm with overall poor prognosis given the patient's late presentation. Average survival rate ranges 12 to 15 months if the tumor is resectable versus 5 months if unresectable. Here, we report a case of a 67-year-old female presenting with a week-long history of intermittent abdominal pain, with outpatient CT image findings consistent with enteroenteric intussusception and a filling defect of the cardiac left atrium. After laparoscopic small bowel resection, subsequent histology revealed high-grade pleomorphic sarcoma with cardiac origin. There have been few case reports of primary cardiac pleomorphic sarcoma with metastasis to the small bowel in the literature. Primary management currently includes surgical resection and chemotherapy. Our case report outlines an uncommon presentation of cardiac pleomorphic sarcoma as a metastatic small bowel intussusception, as well as the challenges faced with diagnosing and treating this rare and aggressive malignancy.

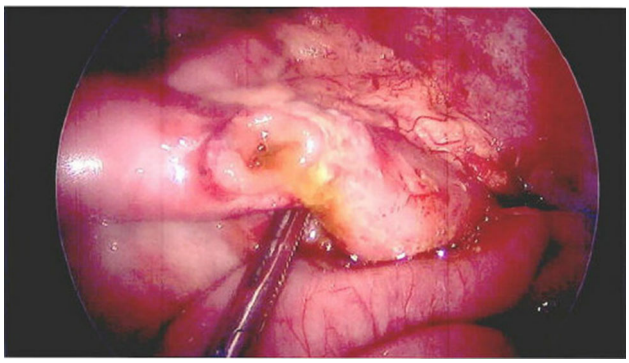
P459

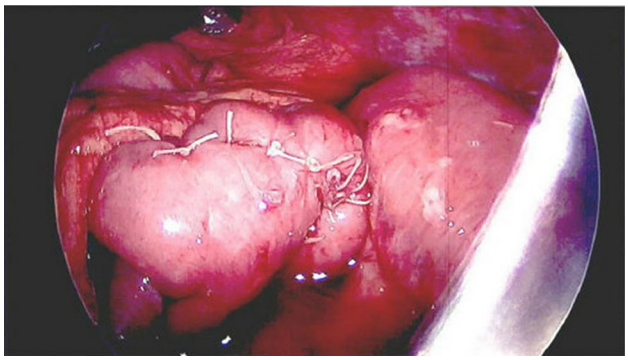
Laparoscopic Repair of a Small Bowel Injury in a Pediatric Male Following Blunt Abdominal Trauma

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Introduction: In recent years, there has been a trend to pursue laparoscopy for both diagnostic and therapeutic purposes in pediatric trauma. While exploratory laparotomy in the setting of hemodynamic instability is standard, minimally invasive surgery has proven its role in hemodynamically stable pediatric patients who sustain blunt abdominal injury. This case highlights a 7-year-old male who was found to have a full-thickness jejunal perforation following motor vehicle accident. He underwent diagnostic laparoscopy with primary repair of his small bowel injury and was discharged on postoperative day five.
Case Description: A 7-year-old male presented to our facility following a motor vehicle accident where he was restrained in the front passenger seat. He did not experience loss of consciousness and airbags deployed. His main complaints upon arrival were nausea, non-bloody emesis, and abdominal pain. Physical exam was significant for tachycardia just above normal limits and mild generalized abdominal tenderness. His initial labs were unremarkable, but computed tomography showed fluid in the pelvis.
He was observed for approximately 6 h, while serial abdominal exams were performed. The following morning his abdominal pain persisted and his leukocytosis rose to 19,500 from 6,400 upon arrival. Diagnostic laparoscopy was performed and a full-thickness jejunal perforation was identified. Laparoscopic primary repair was performed in two layers and the total operative time was just under three hours. His postoperative course was unremarkable and bowel function returned by postoperative day four. He was discharged the following day. Full recovery was noted at two-week follow-up.
Discussion: Motor vehicle collisions remain the most common causes of death in children and adolescence in the USA. Blunt abdominal trauma is the third most common cause of death in pediatric patients, but the most common unrecognized fatal trauma. Over the last decade, laparoscopy has become an acceptable alternative to laparotomy in the management of traumatic intra-abdominal injuries in pediatrics. When compared to laparotomy, laparoscopy was associated with decreased morbidity, intensive care days, and overall hospital length of stay. Earlier discharge is thought to be secondary to decreased postoperative pain, earlier ambulation, and earlier return of bowel function. In the patient we present, bowel function was obtained by postoperative day four and he was discharged on day five.
Conclusion: Laparoscopy can be used as a safe alternative to laparotomy in hemodynamically stable pediatric patients with suspected small bowel injury secondary to blunt abdominal trauma.







P461

Robotic-assisted repair of diaphragmatic eventration for small bowel volvulus in an adult: a unique case report

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Introduction: Eventration is a diaphragmatic defect often sustained from blunt force injury that thins muscle fibers without rupture. Eventration can allow abdominal viscera to protrude into the thoracic cavity similar to a hiatal hernia. While there are well-documented reports of eventration causing gastric and colonic volvulus, there are no reports linking diaphragmatic eventration with small bowel volvulus in adults. In this report, we describe diaphragmatic eventration allowing intermittent small bowel volvuli and its surgical management.
Case Description: A 37-year-old male presented to our clinic for evaluation of intermittent severe abdominal pain. He described 30 months of recurrent, self-resolving acute epigastric, and right-upper quadrant pain with dry heaves. He had suffered a motor vehicle collision 13 years prior that did not involve any surgeries and was an otherwise healthy, active duty military member. Review of records and imaging obtained prior to our clinic evaluation revealed a left-sided diaphragmatic eventration with intermittent small bowel volvulus, evidenced by resolution between sequential CT scans. We conducted surgical repair via robotic-assisted laparoscopy using an abdominal approach. Notable intraoperative findings and steps included as follows: 1) no radiographic or intraoperative evidence of intestinal malrotation or non-rotation, 2) large eventration of the left hemidiaphragm, 3) fenestration of the elevated diaphragm allowing for surgical manipulation, 4) inspection of the thoracic cavity with the laparoscope that revealed no adhesions within the left chest, 5) placement of a thoracostomy tube, 6) plication and resection of the redundant diaphragm using an endoscopic stapler, 7) imbrication and reinforcement of the staple line using pledgeted sutures, and 8) inspection of the small bowel, which confirmed an elongated mesentery with eventration as putative causes for his symptoms. Our patient tolerated the surgery and postoperative course without complication. He followed up postoperatively without any recurrent abdominal symptoms, with subjectively improved breathing, and with an even diaphragm on chest X-ray, without pneumothorax. At 6-month follow-up, he remained symptom free and was appropriately released to full, unrestricted activity. He continues to be free of bowel obstruction symptoms or recurrent volvulus based on 2 years of active duty medical records.
Discussion: Visceral organ volvulus can cause gastrointestinal tract obstruction and risks life-threatening tissue ischemia. In the active duty population, the potential for operating in austere settings remote from advanced surgical capabilities amplifies these risks. Our unique case presents the only one of its kind—an adult with diaphragmatic eventration leading to intermittently resolving small bowel volvuli with clear indications for repair.

P462

The metabolic outcomes of laparoscopic cholecystectomy—a preliminary report of a phase 1 prospective cohort study

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Background: Laparoscopic cholecystectomy is well known as a gold standard of treatment for gallstone disease. Gallbladder removal is one of the most common procedures in the USA, with more than 1.2 million cholecystectomies per year, and 92% of the procedures are performed laparoscopically. In 2011, Amigo et al. reported increased triglyceride levels in mice after cholecystectomy. According to Ruhl et al. (2013), cholecystectomy is associated with an increased risk of non-alcoholic fatty liver disease that is considered a liver manifestation of metabolic syndrome. In 2014, Shen et al. published a retrospective study enrolling 5672 participants that demonstrated an increased risk of metabolic syndrome after cholecystectomy compared with gallstone disease alone. Metabolic syndrome (MS) is a disease of civilization. It is a group of disorders containing impaired glucose intolerance, hypertension, abdominal obesity, and dyslipidemia. According to meta-analysis, individuals reaching the criteria of metabolic syndrome have a twice higher risk of myocardial infarction or stroke and a 1.5-time higher risk of death for any reason.
Objective: The study aims to assess the risk of metabolic syndrome after laparoscopic cholecystectomy prospectively.
Methods: The first phase assumed evaluating the change in serum lipid levels associated with the gallbladder removal. The study included all individuals undergoing laparoscopic cholecystectomy due to gallstones. The exclusion criteria covered all previous metabolic disorders, like obesity, diabetes, thyroid disease, and influencing drugs. The changes in all metabolic syndrome criteria were evaluated before and three months after the laparoscopic cholecystectomy. The blood evaluation contained serum glucose, total serum cholesterol (TC), low-density (LDL) and high-density lipoprotein cholesterol (HDL), and triglyceride levels (TG). The medical examination evaluated weight, blood pressure, heart rate, and waist circumference. The study was approved by the local ethics committee and was registered on Clinicaltrails.gov.
Results: 85 participants were enrolled in the first phase of the trial. All individuals underwent laparoscopic cholecystectomy with no complications. There were no statistically significant differences in metabolic syndrome factors before and after laparoscopic cholecystectomy.
Conclusions: In contrast to retrospective studies, the prospective evaluation so far indicated that there is no evidence of increased risk of metabolic syndrome after laparoscopic cholecystectomy. However, further investigation regarding the metabolic consequences of this procedure is required.

P463

T4a Low-grade Appendiceal Mucinous Neoplasm: Case Report and Review of the Literature

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Introduction: Appendiceal mucinous lesions are rare representing between 0.2 and 0.3% of all appendectomy specimens. Patients with appendiceal mucinous lesions or mucoceles are often asymptomatic or have non-specific symptoms. Therefore, preoperative diagnosis is difficult and can be challenging to differentiate from adnexal masses. This report describes a case of a low-grade appendiceal neoplasm.
Case Presentation: A 34-year-old female presented with a 6-month history of intermittent right lower quadrant abdominal pain. Ultrasound revealed a complex cystic mass in the right adnexa. The patient was assessed by Gynecology and General Surgery as radiology was unable to determine the origin of the mass following MRI. CT imaging favored an appendiceal mucocele and a laparoscopic appendectomy was performed. Intraoperatively, the mass was found to have a dual-blood supply arising from the appendiceal artery and a vessel adjacent to the right fallopian tube. A stapler was used to divide the base of the appendix and the specimen was retrieved with the aid of a sterile bag to prevent rupture. The patient was discharged on the day of surgery without complication. The histopathological results revealed a low-grade appendiceal neoplasm with negative margins and acellular mucin noted on the serosal margin, classifying this specimen as a T4a lesion. The specimen measured 8.4 × 6.4 × 4.9 cm. The patient recovered without issue. Given that the rate of recurrent disease is between 3 and 7%, no further surgery is warranted. A colonoscopy is pending and surveillance using tumor markers and an abdominal CT scan is planned.

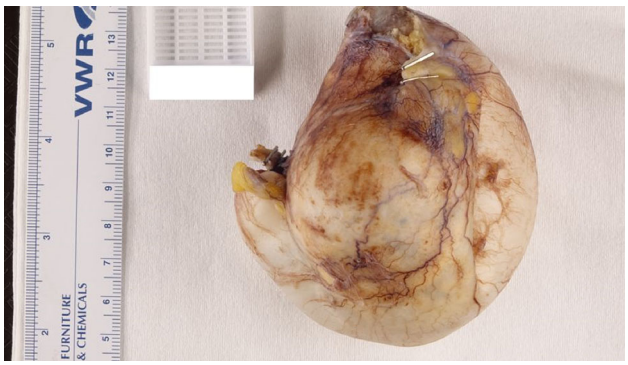


Fig. 1 Macroscopic appearance of the resected specimen. The appendiceal specimen is dilated, has an intact serosal surface, and demonstrates an edematous area measuring 1.5 × 0.9 cm

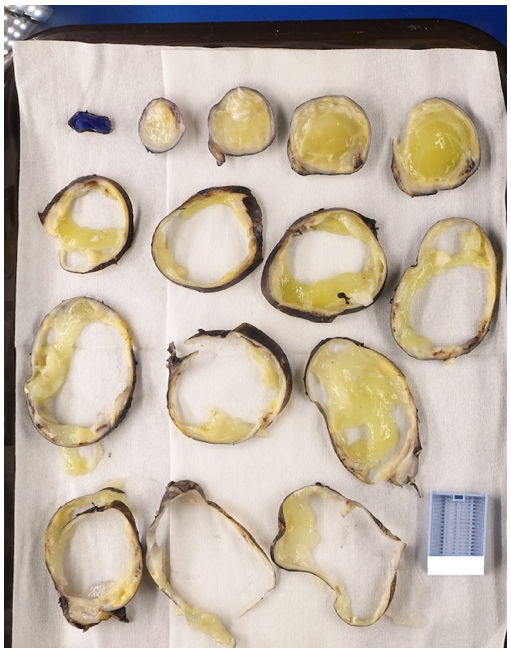


Fig. 2 Macroscopic appearance of the resected specimen. The edematous mass contains yellow mucin which is present at the serosal margin

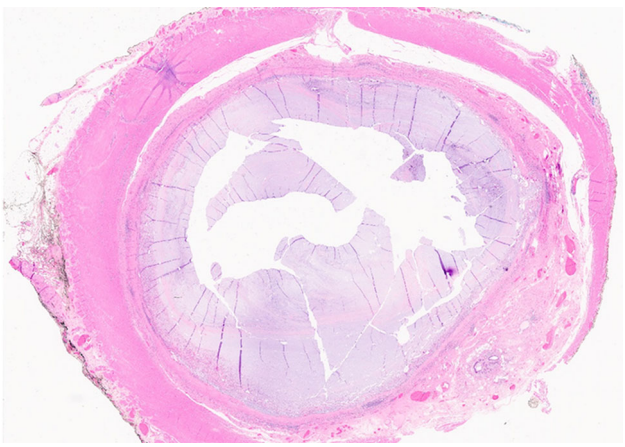


Fig. 3 Histological findings. Hematoxylin and eosin staining shows a cystically dilated appendiceal lumen filled with acellular mucin (0.4x)

Conclusion: In conclusion, this case outlines a rare case of low-grade appendiceal neoplasm with acellular mucin deposit on the serosal margin highlighting the imaging modalities utilized in the diagnosis, pathology classification and grading system, treatment, and subsequent follow-up approach.

P465

A Case of Benign Multicystic Peritoneal Mesothelioma

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Introduction: Multicystic peritoneal mesothelioma (MCPN) is a rare neoplasm originating from the peritoneum most commonly in premenopausal females. It accounts for 3–5% of peritoneal mesotheliomas. The objective is to describe the work-up and management of MCPN.

Case Summary: A 47-year-old female with no significant past medical history presents with right lower quadrant pain radiating to the back for 3 days and also reports 6 pounds weight loss over one year. A CT abdomen pelvis revealed a multilobulated, multiseptated, well-circumscribed cystic mass 8.0 × 4.7 × 7.9 cm in size abutting the inferior aspect of the gallbladder extending anteriorly to the right kidney into the paracolic gutter. A right upper quadrant ultrasound was obtained to further characterize the cystic mass. US revealed a 4.4 × 7.7 × 9.3-cm multiseptated cystic mass, suspicious for exophytic complex hepatic cyst. No mural nodularity or abnormal mural hypervascularity was seen. Tumor markers LDH, CA 125, and CEA were negative. The decision was made to resect the cyst via laparoscopic approach.

Upon entry into the LUQ, the cyst was noted to be extraperitoneal with adhesions to the peritoneum of the gallbladder, hepatic flexure of the colon, right colon, and small bowel. The adhesions to the peritoneum were dissected with ligasure and blunt dissection until the specimen was dissected free. Pathology revealed benign multicystic mesothelioma expressing pankeratin Cam 5.2 and mesothelial cell markers, calretinin and WT-1. It was negative for pax 8, ER, CD34, and CD31.





Fig. 1 CT showing cystic structure abutting the right kidney, liver, and gallbladder

Discussion: Unlike malignant mesothelioma, there is no consensus on the cause of MCPN. Chronic inflammation caused by previous surgeries, endometriosis, or peritoneal dialysis may be associated with MCPM. MRI is considered the best imaging technique as it best differentiates MCPM from other cysts. High Ca 19–9 serum concentrations are also found to be associated with MCPM. Laparoscopy is the best way to obtain definitive diagnosis and to evaluate the extent of disease. Complete resection of the tumor is the most common treatment; however, due to a recurrence rate of almost 50% within 2 years and risk of malignant transformation, alternatives with HIPEC and CRS have been suggested with recurrence rates of ∼ 20%.

Conclusion: MCPM is a rare neoplasm which closely resembles other cystic lesions. There is no definitive diagnosis or treatment recommendation, although complete resection is most favored.

P466

Factors associated with conversion in laparoscopic surgery: a single-center prospective study

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Introduction: Laparoscopy has a clear patient benefit related to postoperative morbidity but may not be as commonly performed in low-resource countries. The decision to convert to laparotomy can be complex and involve factors related to the surgeon, patient, and

procedure. A study of these factors would allow better preparation and preoperative planning to reduce the risk of complications. The objective of this work is to analyze the factors associated with conversion to laparoscopic surgery in a low-resource setting.

Patients and Methods: This is a descriptive and analytical prospective study over the period from May 1, 2018 to October 31, 2021. We have included patients operated on laparoscopically at a tertiary care institution in West Africa. The parameters studied were age, sex, overweight/obesity (BMI $\geq$ 25), existence of an operating difficulty (e.g., accidental opening of the viscera, hemorrhage), existence of a problem related to the equipment (e.g., failure of the equipment, rupture of CO2), operating time, and conversion rate. Bivariate and multivariate analyses (logistic regression) were performed to determine the factors associated with conversion during laparoscopic surgery.

Results: Over the study period, 123 laparoscopic surgeries were performed. The average age of patients was 31.2 years (range 11–75). There were 66 women (53.6%) and 57 men (46.4%). Obesity or overweight was found in 22.7% (n = 28). The intervention was urgent in 68 cases (55.2%). Laparoscopy was diagnostic means in 19% of cases, therapeutic in 76.5% of patients, and both in 4.8%. The average operating time was 80.5 min with extremes of 20 and 210 min. The pathologies found were dominated by appendicular pathologies (48%), followed by gynecological (18.7%), biliary (14.6%), digestive (10.56%), and parietal (4%). The average length of hospitalization was 3 days (range 1–16). Equipment malfunction was encountered in 9.8% (n = 12) cases. Surgical difficulties were noted in 11 cases (8.9%). In 11 cases (8.9%), laparoscopy was converted to laparotomy. Logistic regression found as a factor related to conversion: obesity or overweight (OR = 4.6; p = 0.034), the existence of an operating difficulty (OR = 12.6; p = 0.028), and the existence of a problem related to equipment (OR = 9.4; p = 0.002).

Conclusion: Conversion is necessary when the proposed laparoscopic approach can no longer be pursued without significant risk. Understanding the factors associated with conversion, shown by this study to include overweight/obesity, operating difficulty, and equipment malfunction, may facilitate better procedural planning to reduce postoperative morbidity in low-resource settings.

P468

Evaluating the Potential vs. the Current Performance

Katherine McCollum; Faiz Tuma, MD, MME, MDE, EdS, FACS, FRCSC; Central Michigan University Medical School

Introduction: Social psychologists have repeatedly referred to the notion that humans are what they could be, not what they are now. Professional evaluations are only based on what students have learned in the past, not their ability to learn in the future. Using an evaluation technique that measures not only how well they have mastered previously taught material, but also their ability to learn will allow better evaluation of candidates. There are many factors that affect a person when they are evaluated at a single point in time. A single evaluation may reflect more than just their performance that day. Individuals with high potential with or without current good performance will be able to keep up with the evolving field and research required.

Methods: Tests used to determine the ability of a person to learn in real-life situations include focus on tasks that are not obligatory to assess willingness to learn and improve on new skills, focus on principles and concepts rather than small details, measuring difference/improvement of performance on the same tasks over a time period, and to test candidates with tasks under less than ideal/unusual circumstances. The overall goal is to test a student's ability to efficiently learn new skills within a set amount of time or with a certain amount of instruction and not just test the skills they have previously been taught.

Results: Focusing on evaluating potentials and applying some or all of the strategies may be very challenging, and results may not be highly predictive at the beginning. However, refining these evaluation tools over time to a level where the results can be implemented safely and effectively in practice will only improve the ability to evaluate how future professionals will perform in their field. It is true that potential may not always be fulfilled since ideal learning and/or life conditions rarely occur; therefore, these tests are not absolute, a condition which should be considered. Students may also find that the results help them to learn about themselves and call a focus to this type of personal development.

Conclusion: Potential performance is important indicator of long-term performance and can be used synergistically with current academic performance evaluations. In professions where the landscape of knowledge is constantly evolving and adapting with new techniques, research, and best practices, the ability of incoming professionals to evolve with these changes is crucial.

P469

Thromboelastography with Platelet Mapping Identifies that High Platelet Reactivity is Associated with Obesity, Diabetes, and Thrombotic Events

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Introduction: Perioperative prevention of venous thromboembolic events (VTEs) in the bariatric population is of paramount clinical importance. While there is agreement on the use of preoperative thrombophylaxis (typically with heparin or enoxaparin), there are a paucity of objective, subject-specific metrics to determine which patients may be at highest risk for perioperative thrombotic events, which pharmacologic targets may mitigate that risk, and the optimal dose and duration of prophylactic therapy. Thromboelastography with Platelet Mapping (TEG-PM) is an emerging point-of-care modality that provides a comprehensive profile of coagulation and platelet function and may offer insight into clot dysregulation for this high-risk group. This study of patients undergoing lower extremity revascularization aimed to analyze the impact that metabolic risk factors, such as obesity and diabetes, have on coagulation profiles, and to correlate these data with the real-world clinical endpoint of postoperative thrombosis.

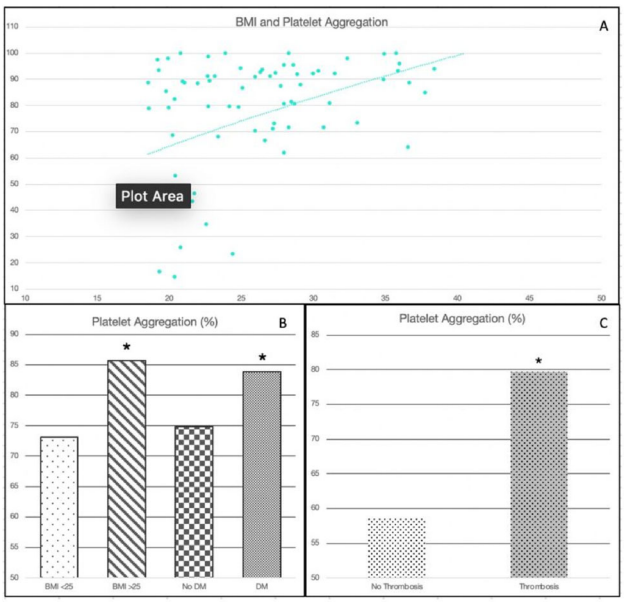
Methods: We conducted a prospective observational study of patients undergoing lower extremity revascularization with serial TEG-PM analysis (preoperatively and at 1, 3 and 6 months). Pre-operative TEG-PM coagulation profiles of patients who were overweight or obese (BMI > 25) were compared to those with a normal BMI. The relationship of TEG-PM metrics to graft/stent thrombosis within the first postoperative year was also evaluated.

Results: 155 TEG-PM samples from 122 patients were analyzed. The high BMI cohort (average BMI 31.1) had a significantly greater incidence of DM [61% vs 38%, p = 0.02]. Compared to normal weight patients (average BMI 21.7), TEG-PM revealed that those with a high BMI had significantly greater % platelet aggregation [85.7% vs. 73.1%, p < 0.01]. The presence of DM was also associated with greater % platelet aggregation compared to those patients without DM [83.5% vs. 74.9%, p = 0.008], regardless of BMI (Fig. 1B). Thirty patients (19.4%) experienced graft/stent thrombosis. Compared to those without events, patients with thrombosis

demonstrated significantly higher % platelet aggregation at the timepoint prior to the diagnosis of their event [79.9 ± 26.4 vs. 58.5 ± 26.4, p < 0.001] (Fig. 1C).

Conclusion(s): In this study of perioperative TEG-PM coagulation profiles, obesity and diabetes were associated with a preoperative hypercoagulability profile with increased % platelet aggregation, which in turn was associated with thrombotic events. While this study was conducted in a vascular disease patient cohort, obesity and diabetes were independently associated with hypercoagulable profiles predictive of thrombosis. Further research in a bariatric patient cohort specifically is necessary; however, this study suggests that using TEG-PM may allow for personalized, targeted thrombophylaxis for bariatric patients.

Figure 1. The association between BMI (A,B), DM (B) and platelet aggregation, and the association between platelet aggregation and thrombosis (C).



P470

Real-time Intraoperative Comparison of Mucosal and Serosal Perfusion of Rectosigmoid Anastomosis using Laser Speckle Contrast Imaging (LSCI) and Indocyanine Green Fluorescence Angiography (ICG-FA) in a Porcine Model

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Introduction: We report a novel application of Laser Speckle Contrast Imaging (LSCI) to detect and quantify at mucosal and serosal tissue perfusion in a clinically relevant porcine rectosigmoid anastomosis model. Serosal inspection of intestine is routinely used as a surrogate assessment of transmural blood flow and tissue perfusion. Accurate intraoperative assessment of both mucosal and serosal tissue perfusion at anastomoses may critically influence technical decisions and lead to reduced complications, including strictures and anastomotic leaks.

Methods: ActivSight™ is an FDA-cleared device in laparoscopic form factor that can be used to visualize and evaluate both LSCI and indocyanine fluorescence angiography (ICG-FA) intraoperatively. LSCI measures blood flow and displays a real-time colormap of tissue microvascular perfusion. Relative Perfusion Unit (RPU) mode allows quantification of LSCI perfusion for observed tissue as a percentage from 0% (no perfusion) to 100% (maximal perfusion), based on reference values from the current visual field. Using LSCI and ICG-FA, mucosal (trans-anal) and serosal (transperitoneal) perfusion of a stapled end-to-end porcine rectosigmoid anastomosis were assessed under the following conditions: (1) control, e.g., physiological blood flow, and (2) induced ischemia via superior rectal artery occlusion (Figs. 1A–D, 2A–D). Microvascular perfusion quantified using LSCI-derived RPU percentages. ICG-FA was assessed by visual inspection. Statistical analysis was performed using Student's t tests.

Results: Higher perfusion was measured on the mucosal surface of the anastomosis (74% ± 29) as compared to the serosal surface (61 ± 12%, p = 0.09) (Fig. 3C) using LSCI RPU. Arterial occlusion induced a significant decrease in anastomotic perfusion on both the mucosal (32 ± 10%) and the serosal surfaces (22 ± 2%) (p < 0.00001) (Fig. 3A/3B). Visual inspection of ICG-FA did not detect any apparent differences in mucosal and serosal anastomotic perfusion under these two conditions (Fig. 1D/2D).

Conclusion: LSCI can detect and display real-time variation in tissue perfusion at both mucosal and serosal surfaces of a porcine rectosigmoid anastomosis, while such differentiation is difficult to achieve with ICG-FA. The difference in the mechanism of action between the imaging modalities may account for this. LSCI detects microvascular perfusion by active red blood cell movements near tissue surfaces in real time, whereas ICG-FA detects the presence of ICG in blood volume but cannot differentiate between current perfusion and prior perfusion. Real-time assessment of mucosal and serosal perfusion using LSCI may provide a potential tool for more accurate intraoperative clinical decision-making and reduced complication rates.

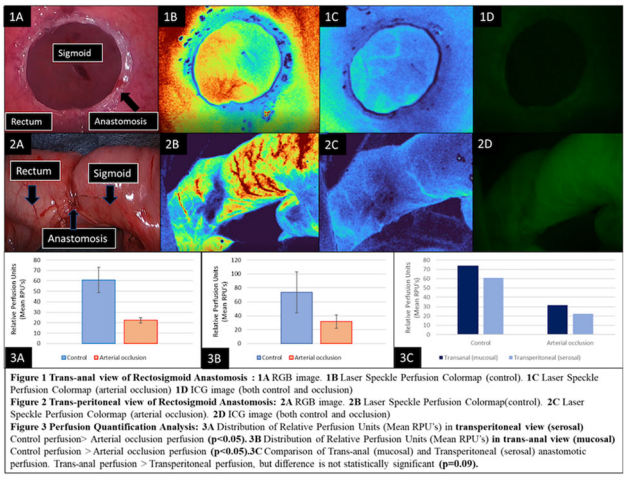


Figure 1 Trans-anal view of Rectosigmoid Anastomosis : **1A** RGB image. **1B** Laser Speckle Perfusion Colormap (control). **1C** Laser Speckle Perfusion Colormap (arterial occlusion) **1D** ICG image (both control and occlusion)

Figure 2 Trans-peritoneal view of Rectosigmoid Anastomosis: **2A** RGB image. **2B** Laser Speckle Perfusion Colormap(control). **2C** Laser Speckle Perfusion Colormap (arterial occlusion). **2D** ICG image (both control and occlusion)

Figure 3 Perfusion Quantification Analysis: **3A** Distribution of Relative Perfusion Units (Mean RPU's) in **transperitoneal view (serosal)** Control perfusion> Arterial occlusion perfusion **(p<0.05). 3B** Distribution of Relative Perfusion Units (Mean RPU's) **in trans-anal view (mucosal)** Control perfusion > Arterial occlusion perfusion **(p<0.05).3C** Comparison of Trans-anal (mucosal) and Transperitoneal (serosal) anastomotic perfusion. Trans-anal perfusion > Transperitoneal perfusion, but difference is not statistically significant **(p=0.09).**

P471

Mediastinal parathyroidectomy by VATS for persistent, sporadic primary hyperparathyroidism in an adolescent: a case report

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Background: We report a case of a non-syndromic adolescent with persistent PHPT who was cured after undergoing mediastinal

parathyroidectomy via VATS approach while utilizing intraoperative parathyroid hormone guidance and frozen-section pathologic analysis.

Clinical Case: A 13-year-old female presented with recurrent renal stones and worsening fatigue that was affecting school performance. Laboratory assessments revealed a serum calcium level of 11.7 mg/dL (reference range: 8.4–10.2 mg/dL), serum intact PTH level of 172 pg/ml (reference range: 15–65 pg/ml), vitamin D level of 17 ng/ml (reference range: 30–100 ng/ml), 1,25-dihydroxyvitamin D level of 142 pg/ml (reference range: 20–79 pg/ml), and normal kidney function. A sestamibi parathyroid scan revealed abnormal sestamibi uptake within the right superior mediastinum, adjacent to the proximal aortic arch, suggestive of an ectopic parathyroid adenoma (Fig. 1). Thoracic CT scan with contrast revealed a hyperenhancing nodule that was consistent with the nuclear medicine scan (Fig. 2). The operative plan was to perform a thoracic resection of the mediastinal nodule using a right-sided VATS approach with intraoperative serum PTH-level monitoring. Three ports were placed in the interspaces' medial to the anterior axillary line and CO2 insufflation was instituted with careful hemodynamic monitoring. The mediastinum was visualized and inspected in its entirety. Resection of pericardial fat and the right thymus gland overlying the aortic arch based on preoperative localization was then performed. A 0.7 × 0.5 × 0.3-cm pink-tan nodule was isolated from the resected specimen and was confirmed to be parathyroid tissue by pathology. Serum PTH levels decreased from a pre-excision level of 210 pg/ml to a post-excision level of 24.2 pg/ml. At two-week follow-up, her labs showed a normal PTH level of 47 pg/ml and total serum calcium of 7.8 mg/dL. Serial laboratory evaluation demonstrated normalization of her total serum calcium level, with maintenance of a hormonal state such that she was able to wean off of any supplemental calcitriol and calcium.

Conclusion: The recent rise in minimally invasive techniques have been shown to reduce morbidity and improve postoperative recovery[1]. The VATS surgical approach should be considered for removal of mediastinal parathyroid adenomas in adolescents.

Keywords: pediatrics; primary hyperparathyroidism; VATS; ectopic parathyroid

Figure 1

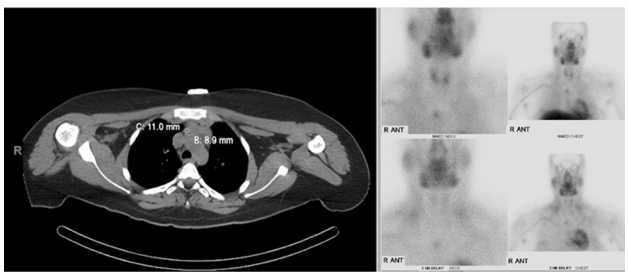
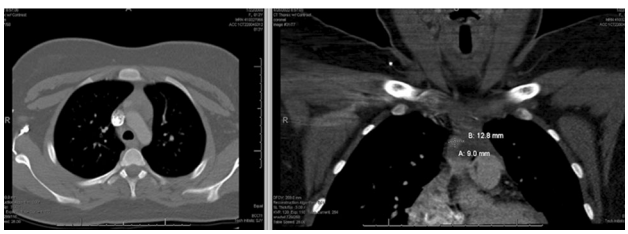


Figure 2



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P472

Transumbilical laparoscopic-assisted appendectomy as a safe procedure for pediatric uncomplicated appendicitis: A comparison with laparoscopic and open appendectomy in a randomized clinical trial

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Background: Deemed as a safe and easily performed procedure in children, transumbilicus laparoscopic-assisted appendectomy (TULA) also offers several other advantages: reduced costs, a lower wound infection rate, fewer postoperative complications, and better cosmetic outcomes. The present investigation compares the results of three methods of appendectomies: conventional, laparoscopic, and transumbilicus laparoscopic assisted.

Methods: After considering inclusion criteria for uncomplicated acute appendicitis in children under 14 years, the current study enrolled 210 patients and divided them into three groups of 70 each. Patients with the following conditions were excluded (26 patients): gangrenous appendicitis (9 patients), appendicular abscess 7 patients), and perforation and peritonitis (10 patients). Each group underwent one of the three methods of appendectomy. In TULA, a 5-mm laparoscopic port was inserted inside the umbilicus. After grasping the appendix, the surgeon exteriorized it from the umbilicus and then performed an extra-corporeal appendectomy. The surgical approaches for the other two patient groups were standard techniques normally utilized in laparoscopic (LA) and open appendectomy (OA).

Results: In TULA [1], the mean operation length was significantly shorter than that in LA. However, in a comparison between the TULA and OA groups, there was no statistically significant difference in the operation length. However, TULA's operation length was significantly shorter than that of LA. Regarding scar size, the smallest were from the TULA group, with a significant difference in surgical wound size when compared with those of the other two groups. The length of the hospital stay was significantly shorter for TULA and LA patients than for OA patients. In addition, there was a lower wound infection rate associated with TULA than with LA and OA.

Conclusion: TULA is an alternative method of appendectomy in uncomplicated pediatric acute appendicitis. Compared to other approaches, TULA is technically easier, has a shorter operation time, offers better surgical outcomes, involves less surgical site infections, and results in excellent cosmetic results.

P473

The Initial US Experience Using the Senhance Robot In Pediatric Surgery

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Introduction: The 3 modular arm, Senhance Robotics system with 3-mm instruments should be ideal for minimally invasive procedures in infants and children. To verify this premise, we embarked on the

first US trial using this instrumentation to prove safety, efficacy, and the utility in this smaller patient population.

Materials and Methods: With IRB approval, pediatric patients from ages 0 to18 years, who were scheduled for minimally invasive procedures were enrolled in this prospective clinical trial. We tabulated age, weight, diagnosis, procedure performed, operative times, need for accessory ports and instrumentation, conversions, complications, perioperative analgesic use, and patient satisfaction.

Results: The most common procedures performed were inguinal hernia repairs and cholecystectomy. All procedures were able to be performed as outpatient surgery. There were no complications, readmissions, or need for additional surgery and patients were treated without post-operative narcotics. The operative times were comparable to conventional laparoscopic or robotic surgery reported in the literature and the cosmetic appearance of the 3-mm trocar wounds was favorably accepted by all subjects and their families.

Conclusion: The Senhance Robotic platform appears to be ideal for use in Pediatric patients and because of the ability to use 3-mm instruments holds great promise for extended applications in this patient population.

P475

H-type tracheoesophageal fistula cannulation for rapid intraoperative localization

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Introduction: The most common location of an H-type tracheoesophageal fistula (TEF) is at or above the level of T2. Preoperatively, fistula localization aids in determining surgical approach. Intraoperatively, fistula localization aids to decrease operative time and avoids unnecessary dissection. This is the first report that describes an easy and reproducible technique for fistula cannulation with a rapid and simplified intraoperative localization.

Method: A 16-day-old baby boy was taken to the Operating Room for H-type TEF repair. Suspension laryngoscopy and tracheoscopy were used to directly visualize the fistula. A catheter was successfully passed through the fistula and into the esophagus. We proceeded with rigid esophagoscopy and the catheter was retrieved and withdrawn to form a loop. By applying gentle traction on the catheter loop, rapid intraoperative localization of H-type TEF was achieved.

Results: After confirmation of an H-type TEF diagnosis via fluoroscopy, a new approach for intraoperative cannulation of the fistula was performed. This novel technique permits rapid intraoperative localization of the fistula. The fistula was repaired without complications. Contrast esophagogram on postoperative day 7 revealed no leak or fistula recurrence.

Conclusion: Multiple techniques have been reported for tracheoesophageal fistula cannulation; however, up to this date, creating a loop with our technique when cannulating the fistula has not been reported. This approach enables creation of traction by tugging the looped catheter, while neck dissection is performed leading to a rapid localization of the fistula intraoperatively, reducing operative time, and diminishing unnecessary dissection that could potentially lead to surrounding tissue injury.

Keywords: isolated tracheoesophageal fistula, H-type TEF, suspension laryngoscopy, tracheoscopy, rigid esophagoscopy, urethral catheter

P476

Quantifying force in robotic surgical systems: the first step toward haptics

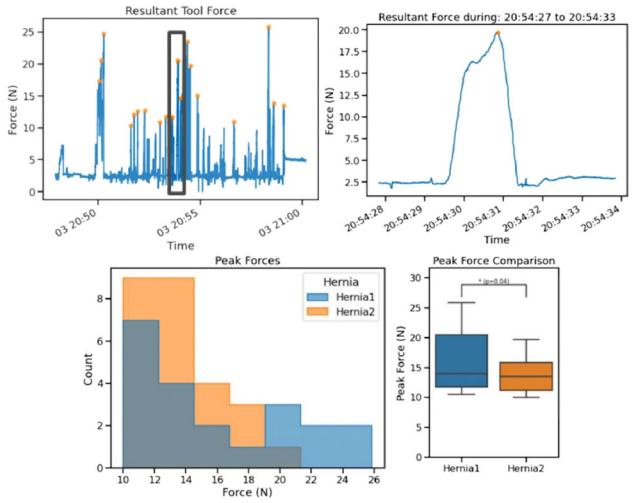
Olivia Fukui, MD[1]; Scotty Chung[2]; Kristina Fioretti, MD[1]; Mulham Soudan[2]; Emma Coltoff[2]; Maggie Bosley, MD[1]; Carl Westcott, MD[1]; Philip Brown, PhD[2]; [1]Atrium Health Wake Forest Baptist; [2]Wake Forest University School of Biomedical Engineering and Sciences

Introduction: Surgical robotic systems currently have no force feedback or haptic interface with the user. This is seen as a major detractor to robotic surgery as well as an area for research and improvement. The first hurdle to haptics is measuring force on the robotic arms and instrument tips. Quantifying these forces could lead to optical or physical force feedback to the operator. Ventral hernias are a unique challenge and good experimental model due to complex loading of the abdominal muscles with primary closure. We sought to understand how application of forces during ventral hernia repair could improve the handling of suture and tissue leading to improved accuracy and outcomes.

Methods and Procedures: WFU biomedical engineering acquired a first generation Da Vinci robotic system and utilized the Da Vinci Research kit (dVRK) framework for research. A custom Mega Needle Driver tool was slotted and fitted with optical fiber strain gauge to enable force estimate occurring at the tip and along the instrument shaft. A cadaver without prior abdominal surgery was used. An elliptical hernia defect was created in the anterior abdominal wall musculature and the skin closed over it. The fascial defect was closed primarily using a 2-0 Stratafix. A second hernia was created by excising an additional 1 cm around the previous defect. The same ports were utilized for the second repair. A peak detection model was utilized to determine when forces above 10 N were applied. The peak force values and number of occurrences were compared between the two hernias.

Results: The max and average peak forces applied per hernia are shown in Figure 2 along with the measured defect size. In Figure 2 we show the force versus time graph for the hernia procedure and a small interval centered around a detected peak. This also shows a comparison of the peak forces between the two hernias. A t test comparing the peak forces between the two repairs found a significant difference ($p<0.04$).

Conclusions We have demonstrated a system to capture force readings during robotic surgery. Despite the second hernia being larger, a lower peak force was applied during the repair. However, there were more occurrences of high force loads. A significant difference between the two hernias is not surprising due to the hernia size and a different surgeon performing the closure. While several improvements to technical issues of this system are required, the concept of force measurement is demonstrated and proven feasible.



P477

Evaluation of a cordless energy device in general, metabolic, & bariatric surgery

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Background: Ultrasonic energy devices utilized for laparoscopic dissection and transection of tissue are typically constrained by cords. Energy devices are often used in conjunction with surgical clips to maintain hemostasis in cases requiring transection of vascular structures. There is currently only one cordless ultrasonic dissector on the market. We hypothesized that a cordless energy device would improve freedom of movement and mobility during common minimally invasive laparoscopic procedures and eliminate the need to use surgical clips to achieve and maintain hemostasis during ligation of vessels encountered in common general surgical procedures.
Methods: A total of 23 consecutive laparoscopic surgical procedures were performed over a 4-week period. Procedures included laparoscopic appendectomy, laparoscopic cholecystectomy, and laparoscopic sleeve gastrectomy. Ligations of the cystic artery, short gastric arteries, and appendiceal artery were performed using a cordless ultrasonic energy device. Data points examined included whether or not vascular clips needed to be deployed, following ultrasonic ligation. Intra-operative and post-operative complications were evaluated as well as pre-operative and post-operative hemoglobin obtained on post-operative day 0 (POD0) and post-operative day 1 (POD1). Patients were followed throughout their hospital stay and evaluated for bleeding complications related to utilization of the ultrasonic vessel sealing capability of the cordless energy device.
Results: Bivariate analyses reveal no significant difference among average pre-operative (12.3; sd3.3) and post-operative (11.9; sd2.7) hemoglobin on POD0 and POD1 ($p = 0.43$). Of the 23 cases recorded, 48% ligated cystic artery, 48% short gastric arteries, and 4% appendiceal arteries. There were no intra-operative or post-operative complications observed. None of the operative procedures required utilization of vascular clips to maintain hemostasis. None of the 23 laparoscopic surgical procedures used vascular clips for control of bleeding during vessel coagulation. There were no re-admissions in the 30 days following surgery and there were no reoperations or intra-abdominal complications related to the use of the ultrasonic device. There were no device failures.
Conclusion: Utilization of a cordless ultrasonic energy device was effective for vessel coagulation in the 23 patient during which it was deployed. In all 23 cases significant vascular structures were transected in order to complete the operative procedure. Supplemental vascular clips were not needed in order to maintain hemostasis and the procedures were completed without surgical complications related to bleeding or other abdominal complication.

P478

Estimated Cost Savings due to the Early Prediction of Anastomotic Leaks in Gastrointestinal Surgery

Nour Helwa, BS; Manaswi Sharma, BS; FluidAI Medical

Background: Anastomotic leakage (AL) is considered the bane of gastrointestinal surgery and is one of the most feared complications. An AL results in a higher total cost of care due to prolonged hospitalization, need for further diagnostic workup, and re-intervention. Early detection and timely therapeutic action are necessary to diminish the postoperative mortality, morbidity, cost, and high complication rates associated with AL. Various research articles have demonstrated the value of consecutive postoperative pH and electrical conductivity (EC) measurements of abdominal drainage for the early prediction of AL. pH and EC can allow for the detection of AL five days prior to the standard of care on average, with high sensitivity and specificity. In response to this need, *FluidAI* (a medical device company formerly known as *NERv Technology Inc.*) focused on developing a solution (Origin^{TM}) that harnesses the power of these biomarkers. Origin^{TM} allows for the non-invasive, continuous, bedside monitoring of pH and EC of drain fluid for the early detection of AL. Our study aims to estimate the potential economic savings associated with the early detection of AL using Origin^{TM} in gastrointestinal surgery.
Methods: Through a survey of the literature, we estimated the average cost of clinically relevant postoperative anastomotic leaks. Studies reporting on the economic burden of clinical anastomotic leaks in upper gastrointestinal (GI), hepatobiliary (HPB), and colorectal surgery by Agzarian et al., Topal et al., and Hammond et al. were included. The average inpatient cost of hospitalization for AL patients was analyzed by department. The costs were recalculated using an adjusted length of stay (LOS) to determine the average savings accrued by early detection of AL.
Results: The estimated reduction in cost associated with the early prediction of postoperative AL in upper GI, HPB, and colorectal surgery is approximated at 19.0%, 16.0%, and 19.0% respectively. The main cost savings can be attributed to reduce LOS due to early detection. The percentage of the cost savings due to reduced hospitalization was equivalent to 57%, 32%, and 54% for upper GI, HBP, and colorectal surgery, respectively.

Table 1: Approximate Cost Savings per Patient with Early Detection of AL

Type of AL	Average Cost/Patient of AL	Average Savings/Patient Due to Early Detection	Department	Approximate Percent Saving by Department
Esophageal Anastomotic Leak	$119,822	$13,797.21	Hospitalization	57%
			Pharmacy	10%
			Laboratory	3%
			Radiology	2%
			Other	28%
Clinically Relevant Postoperative Pancreatic Fistula	€15,225	€2,432.5	Hospitalization	38%
			Pharmacy	25%
			Laboratory	9%
			Radiology	1%
			Other	27%
Colorectal Anastomotic Leak	$72,905	$13,860.27	Hospitalization	54%
			Pharmacy	15%
			Laboratory	7%
			Radiology	3%
			Other	21%

Conclusion: Early diagnosis of AL can reduce hospital costs. Since Origin^{TM} can be used to identify postoperative AL at onset; it carries

the potential to decrease the economic burden associated with this complication.

P479

Hybrid Laparoscopic Devascularization of Upper Stomach and Splenectomy (Hassab's Operation) for Severe Cirrhosis with Porto-Systemic Shunt.

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In modern times, endoscopic & IVR approaches have become mainstream treatments of esophagogastric varices associated with portal hypertension by cirrhosis rather than surgical approaches. This is because surgical approaches, such as esophageal transection or selective shunt surgery, had high-risk postoperative mortality.

However, it is reported that surgical approach can not only be effective in patients with severe esophagogastric varices refractory to non-invasive treatments but also improve liver function and nutrition level by increasing blood inflow of the liver.

We performed hybrid laparoscopic Hassab operation for 4 patients with severe cirrhosis associated with portal systemic shunt and splenomegaly. Postoperative courses are uncomplicated. Not only refractory ascites has significantly improved but also Child–Pugh score and nutrition level have improved in all patients.

Considering high risk of postoperative hemorrhage due to severe cirrhosis, HALS Hassab operation is less complicated & safer procedure rather than other selective shunt procedures. Especially for patients with portal HTN & hypersplenomegaly, the Hassab operation is useful not only in treating varices, but in improving liver function in cirrhotic patients leads to improvement in patients' quality of life.

Especially in Japan, the number of available deceased and living donors are very small, and shunt surgery such as Hassab operation is an alternative treatment for patients with severe cirrhosis associated with esophagogastric varices and refractory ascites. HALS approach is less invasive than an open surgery, with better postoperative cosmesis, suitable for pts with severe cirrhosis & high ASA-PS score.

P480

Performance Evaluation of pH Measurements Made Using Origin for Integration with Chest Tube Drainage Systems

Nour Helwa[1]; Diana Khater[2]; Manaswi Sharma[1]; [1]FluidAI Medical; [2]University of Waterloo

Background: Chest tubes are routinely used following cardiothoracic surgeries to drain excess fluid, blood, and air from the mediastinum and pleural cavities. To date, there is no standardized method for chest tube management, particularly when considering criteria for their removal. Prolonged chest tube use increases the risk of iatrogenic infection, length of stay (LOS), and pain and reduces mobility. Conversely, premature removal of drains can cause fluid build-up, which hinders pulmonary function. Continuous pH and impedance monitoring of chest drainage can facilitate informed and prudent decision-making when determining the optimal time for tube removal. Impedance sensors can be used to objectively monitor and track postoperative air leaks. pH sensors can be used to infer the inflammatory processes associated with empyema and other postoperative cardiopulmonary complications. *FluidAI* (a medical device company formerly known as *NERv Technology Inc.*) developed a non-invasive, sensor-based platform (*Origin*^{TM}) that can be modified to connect in-line to traditional/analog chest drainage systems for 24-h monitoring of drained effluent. This will allow for early and safe chest tube removal reducing patients' LOS and the cost of hospitalization. This study assesses the ability of *Origin*^{TM} to accurately measure the pH of pleural fluid compared with the widely used Radiometer ABL800 Flex blood gas analyzer (BGA).

Methods: A thoracotomy was performed on 9 Yorkshire pigs (mean age: 4 months, mean weight: 31 kg). Pleural fluid was collected from the left and right pleural spaces. The pH of each sample was analyzed using *Origin*^{TM} and BGA. Pearson's correlation, linear regression analysis, and Bland–Altman (BA) analysis were used to compute inter-technique agreement.

Results: The Pearson coefficient ($r = 0.965$, $p < 0.05$) and the coefficient of determination ($r^2 = 0.931$, $p < 0.05$) indicated a strong linear correlation between pH data collected using the two systems within a measuring range of 6.000–8.200. The linear regression model had a slope of 0.820 and an intercept of 1.037. BA analysis revealed that the mean estimated bias ± standard deviation between pH measurements obtained using *Origin*^{TM} and BGA was 0.382 ± 0.084, (95% CI: 0.293–0.470). The reported upper and lower limits of agreement were 0.547 (95% CI: 0.386–0.708) and 0.216 (95% CI: 0.055–0.377), respectively.

Conclusion: pH measurements made using *Origin*^{TM} strongly correlate with BGA measurements. Continuous pH and impedance analysis of pleural effluent using *Origin*^{TM} can help improve the management of traditional chest tube drainage systems.

P481

Laparoscopic versus open loop ileostomy reversal: a systematic review and meta-analysis

Tyler McKechnie, MD; Léa Tessier, BSc; Tharani Anpalagan, BMSc; Megan Chu, MD; Yung Lee, MD; Kathleen Logie, MD; Aristithes Doumouras, MD, MPH; Nalin Amin, MD; Dennis Hong, MD, MSc; Cagla Eskicioglu, MD, MSc; McMaster University

Introduction: Loop ileostomies (LIs) are used for temporary fecal diversion to protect downstream colorectal anastomoses. Standard operative approach for LI reversal has been through an open technique. Recently, however, laparoscopic LI reversal has been employed and studied. The aim of this systematic review and meta-analysis is to compare laparoscopic and open LI reversal.

Methods and Procedures: Medline, Embase, and CENTRAL were systematically searched. Articles were included if they compared rate of postoperative morbidity and/or length of stay (LOS) in patients undergoing laparoscopic and open LI reversal. The primary outcome was postoperative LOS in days. Pairwise meta-analyses using inverse variance random effects were performed. The Grading of Recommendations, Assessment, Development, and Evidence (GRADE) approach was conducted to assess overall quality of evidence.

Results: From 410 citations, four observational studies with 213 patients undergoing laparoscopic LI reversal (40.8% female, mean age: 50.1) and 176 patients undergoing open LI reversal (43.8% female, mean age: 52.1) met inclusion. Patients in the laparoscopic group reversal had significantly shorter LOS (MD − 0.39, 95%CI − 0.73 to − 0.04, p = 0.03). Laparoscopic and open LI reversal were comparable in postoperative morbidity (OR 0.62, 95%CI 0.32 to 1.22, p = 0.17), aside from a significant decrease in rate of superficial surgical site infection (sSSI) with the use of laparoscopy (OR 0.22, 95%CI 0.07 to 0.71, p = 0.01). Operative time was not significantly different between groups (MD 11.91, 95%CI − 1.87 to 25.70, p = 0.09). The GRADE quality of evidence was low to very low.

Conclusion: This review presents low-quality evidence that laparoscopic LI reversal is a feasible approach that may significantly reduce postoperative LOS and sSSI compared to open LI reversal without

significantly increasing operative time. Future prospective comparative study is required to confirm the findings of the present review.

P482

Indocyanine Green Fluorescence Quantification using a Novel Flexible Endoscopic Near-Infrared Imaging Device

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Introduction: Current commercial Near-Infrared (NIR) imaging systems provide excellent fluorescence visualization but, however, are limited by their anatomical reach, particularly intraluminally. Using Artificial Intelligence Methods (AIM), dynamic fluorescence quantification of Indocyanine Green (ICG) has demonstrated promise in the classification of colonic tissue [1] [2], but further development has been restricted by the available NIR imaging technologies. This research aims to meet the identified need by developing a flexible endoscopic NIR imaging device capable of capturing the desired AIM input signal, whilst extending the intraluminal reach.
Methods and Procedures: The developed device design consists of a set of isolated and flexible fibre optic bundles for respective target (distal) illumination (dye excitation) and NIR/white light collection, encased in an outer sheath across a 1.85 m length. Its 2.4 mm outer diameter facilitates use in tandem with conventional colonoscopies via the mother–daughter technique. The collection fibre bundle is coupled to a single-colour CMOS (complementary metal–oxide–semiconductor) sensor, first passing the collected electromagnetic radiation (EMR) through a series of multi-bandpass wavelength filters, which isolate ICG fluorescence along with visible light, allowing for simultaneous multispectral imaging. The generated fluorescent image is processed for use with a prior developed fluorescence tracking software application. A modular perfusion model was developed to test the ability of the flexible NIR imaging system to capture dynamic fluorescence signals. Tracked and quantified perfusion from preselected regions of interest were compared against a commercial NIR fluorescence imaging system (Pinpoint, Stryker, USA).
Results: The developed flexible NIR imaging device was successful in extracorporeally visualizing real-time imaging of ICG fluorescence, whilst also demonstrating effective qualitative performance in ICG fluorescence quantification when compared to the commercial laparoscopic system.
Conclusion: Although in vivo testing remains a necessity to validate the developed device, initial results have shown its capabilities for perfusion quantification via ICG fluorescence. This flexible endoscopic NIR imaging device has the potential to extend NIR visualization to more torturous areas of the gastrointestinal tract and as a result in the further development of AIM for the real-time classification of tissue.
Keywords: Indocyanine Green (ICG), Colonoscopy, Near-Infrared, Flexible Fibre Optics

P483

The Senhance Surgical System in colorectal surgery: a systematic review

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Introduction: For the last two decades, Intuitive Surgical Inc. held a monopoly on robotic devices; however, recently other companies have introduced their own platforms which are intended to tackle the existing challenges and contribute to lower costs. One of the newer technologies is the Senhance Surgical System, which allows for infrared eye tracking, haptic feedback, and an adjustable upright seat allowing for improved ergonomics. This systematic review was designed with the aim of reviewing the current literature pertaining to the use of the Senhance Surgical System in colorectal surgery.
Methods and Procedures: Medline, EMBASE, and CENTRAL were searched. Articles were eligible for inclusion if they evaluated adults undergoing colorectal surgery with the Senhance Surgical System. The primary outcome was intraoperative efficacy, as defined by operative time, estimated blood loss (EBL), and conversion. A DerSimonian and Laird inverse variance random-effects meta-analysis was used to generate overall effect size estimates and narrative review was provided for each outcome.
Results: Six observational studies with 223 patients (mean age: 63.7, 41.2% female, mean BMI: 24.4 kg/m2) were included. The most common indication for surgery was colorectal cancer (n = 180, 80.7%) and the most common operation was anterior resection (n = 72, 32.3%). Meta-analyses demonstrated a pooled total operative time of 229.8 min (95% CI 189.3–270.4), console time of 141.3 min (95% CI 106.5–176.1), and docking time of 10.8 min (95% CI 6.4–15.2). The pooled EBL was 37.0 mL (95% CI 24.7–49.2). Overall, there were nine (4.0%) conversions to laparoscopy/laparotomy. Pooled overall 30-day postoperative morbidity across all six included studies was 17.6% (95% CI 8.8–34.2%).
Conclusions: The Senhance Surgical System has an acceptable safety profile, reasonable docking and console times, low conversion rates, and an affordable case cost across a variety of colorectal surgeries. Further prospective, comparative trials with other robotic surgical platforms are warranted.

P484

Dual-PEG Tube Gastropexy for Gastric Volvulus in the Elderly

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Introduction: Gastric volvulus is an uncommon cause of foregut obstruction, but can be a life-threatening condition requiring prompt diagnosis and treatment. After decompression with a nasogastric tube (NGT) and if a patient is hemodynamically appropriate, some have described surgical gastric tube placement to provide a point of fixation to prevent future volvulus. We describe an elderly woman who underwent placement of two percutaneous endoscopic gastrostomy (PEG) tubes to prevent future mesenteroaxial gastric volvulus.
Case Report: A 95-year-old woman with a past medical history of gastroesophageal reflux disease and hypertension presented to her local emergency department with a 1-day history of epigastric pain, nausea, and vomiting. Her lab work was notable for a leukocytosis of 19.6, acute kidney injury, and lactic acidosis of 4.8. CT imaging was obtained and notable for mesenteroaxial gastric volvulus (Figs. 1, 2). A NGT was placed with evacuation of 2 L of bilious contents and significant relief in the patient's symptoms. She was transferred to our institution and her repeat lab work was much improved. A family meeting was held and the patient and her family did not want major surgery, but were amenable to PEG tube placement. Given her mesenteroaxial volvulus, we felt that single-point fixation would not adequately prevent recurrent volvulus and it was thought that two points of fixation would better prevent future volvulus.
Operative Technique: The EGD scope was introduced. The stomach was markedly dilated consistent with the disease process of gastric

volvulus. There were signs of both esophagitis and gastritis. We examined the entirety of the stomach which encompassed much of the anterior abdominal wall. We chose two locations for PEG tube gastropexy as far left and as far right as possible on the anterior abdominal wall. Two 20-Fr pull PEG tubes were then placed in the usual fashion.

Postoperative Course: The patient recovered well after placement of her PEG tubes. The tubes were kept to gravity drainage overnight and her diet was then rapidly advanced. Discharge was delayed by need for further physical therapy, but she was discharged on postoperative day five on a soft diet.

Conclusion: Mesenteroaxial gastric volvulus is an uncommon cause of bowel obstruction. We describe the placement of dual-PEG tubes as another surgical option for treatment in the elderly and those with significant comorbidities.

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Acceptance of Exoskeletons in Intraoperative Environments: A Qualitative Analysis of Surgical Teams' Perspectives

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Surgical team members often suffer from musculoskeletal (MS) symptoms due to the physical demands of work in the operating room (OR). Previous studies have investigated the implementation of exoskeletons in the OR as a potential intervention to reduce MS of surgeons and OR staff. Passive exoskeletons are worn devices that protect users during strenuous lifting or prolonged static postures. However, the practical use of these wearable devices to support surgical team members during work duties, and their integration to job workflow, are unknown. This study aims to identify surgical teams' perspectives of exoskeletons that provide upper body and back support and their compatibility with their daily duties in the OR. Surgical team members included in this study were seven minimally invasive surgeons, four surgical residents, seven OR nurses, seven surgical technicians, and two central processing technicians. A demonstration of two back- (Back-X, SuitX & Apex, Herowear) and two shoulder (EVO, Ekso & Paexo Shoulder, Ottobock)-support exoskeletons were given, and participants donned the devices. Team member interviews were recorded, transcribed, and reviewed by two raters who cataloged emerging themes. From these interviews and focus groups, five reoccurring themes across all team members emerged: 1) acceptance, 2) workflow, 3) user needs, 4) hindrances, and 5) need for intervention. Surgeons were largely willing to utilize exoskeletons and believed they were compatible with their daily workflow but preferred self-donning of these devices. Nurses, surgical technicians, and central processing technicians believed exoskeletons may assist in reducing physical demands of their daily duties. However, nurses believed the time to put on the devices may be a hindrance. Central processing technicians believed they needed additional exposure to better understand the technology. Surgery residents noted the potential benefits of this device for specific tasks (e.g., retracting), but they did not believe they would personally use the device due to the time it takes to don the exoskeleton. Based on the physical demands of their work, surgeons believed they could benefit from back and shoulder support; nurses believed they could benefit from back support; and surgical technicians, central processing technicians, and surgical residents believed they could benefit from shoulder support exoskeletons. Our preliminary work demonstrates surgical team members' acceptance and perceived benefit of exoskeleton use in their daily tasks. This aids in determining which exoskeleton type to utilize in real-world testing for eventual implementation into OR practice.

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Hybrid laparo-endoscopic approach with fluorescent ICG navigation of sentinel lymph nodes for early gastric cancer: First experience

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Background: Currently, endoscopic submucosal dissection (ESD) is becoming the mainstay of treatment for early gastric cancer. The main problem that causes concern remains an increase in the frequency of metastasis of the sentinel lymph nodes as the depth of tumor invasion into the stomach wall and size of the tumor increases and the degree of tumor differentiation decreases.

Aim of the Study: To demonstrate our first experience of surgical intervention using a hybrid laparo-endoscopic approach and fluorescent ICG navigation of sentinel lymph nodes in early gastric cancer, with evaluation of method in the treatment of early gastric cancer based on literature data.

Materials and Methods: A 66-year-old female patient was admitted to the surgical endoscopic department of A.V. Vishnevsky National Medical Research Center of Surgery with complaints of recurrent epigastric pain. According to the results of the studies, she was diagnosed with early gastric cancer: well-differentiated adenocarcinoma of the antrum (TisN0M0). ESD with assessment of sentinel lymph node with ICG navigation was performed.

The course of the intervention: endoscopy showed an epithelial neoplasm along the anterior wall of the antrum, 12 × 18 mm in size. The saline solution was introduced into the submucosal layer for lifting, followed by the injection of indocyanine green (ICG) dye in a volume of 2.0 ml. Next, the tumor was removed by the standard technique of endoscopic dissection in the submucosal layer. Simultaneously, laparoscopic team using ICG navigation visualized the paragastric lymph nodes, performed lymph node dissection of the sentinel node from group 3a, as well as 3b, 4d, and 6 groups of lymph nodes. Intraoperatively, morphology showed no metastases in the lymph nodes.

Results: The operation time was 130 min. There were no intra- and post-operative complications. The tumor on morphology was presented with highly differentiated adenocarcinoma without involvement of the muscularis propria and submucosal layer pT1apN0(0/10)cM0; Grade 1. The patient was discharged on the 5th day after surgery. Within 3 years, patient was followed up by oncologist and surgeon. The control upper endoscopy and CT scan showed no local and distant tumor recurrence or residual tumor.

Conclusion: The presented successful clinical case and literature data demonstrate that ICG navigation of the sentinel lymph nodes allows to investigate the lymphatic status, therefore perform an organ-preserving surgery in the absence of metastases in the sentinel lymph node, and in case of detection of metastases, expand the surgery according to oncological principles of radical intervention.

P487

Multi-disciplinary Intervention for Intussusception in the Setting of Peutz–Jeghers Syndrome: A Case Report

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Introduction: Peutz–Jeghers syndrome (PJS) is a rare autosomal dominant condition with varying characteristics, among the most common being multiple enteric hamartomas, dark macules of the lips,

and increased risk of cancer, namely gastric. Many patients remain asymptomatic from PJS; however, complications such as obstruction, abdominal pain, rectal bleeding, and rarely intussusception can occur. Intussusception and its treatment options in the setting of PJS are poorly characterized in the literature. Here, we describe the multi-specialty management of a patient with recurrent intussusception secondary to PJS.

Case Presentation: Our patient is a 39-year-old female with a history of PJS who presented with colicky abdominal pain. Her work-up including CT imaging which revealed intussusception secondary to large distal jejunal polyps. Her initial episodes were self-limited. Eventually she progressed requiring endoscopic intervention by gastroenterology (GI) involving the snaring of several extremely large polyps. She later developed worsening abdominal pain secondary jejunal intussusception that was not amenable to endoscopic intervention. She was taken to the OR with colorectal surgery in collaboration with gastroenterology for exploratory laparotomy along with concurrent endoscopy. After reduction, a jejunal enterotomy was made and GI advanced a colonoscopy proximally to remove the large polyp with a snare. An additional polyp with a 3-cm base was identified that was too large for snare polypectomy. An enterotomy was made so that a stapler could be introduced. This was fired across the base of the polyp without any narrowing of the lumen. The enterotomy was closed primarily and no bowel resection was required.

Discussion: Intussusception resulting from PJS occurs in all age groups. Though not well characterized in the literature, the majority require surgical intervention. A combined approach involving exploratory laparotomy and intra-operative endoscopy has been safely described in the literature in only a few case reports. This approach is advantageous because it allows for reduction of intussusception, direct inspection of bowel perfusion, and a minimally invasive, bowel preserving way of removing lead point polyps. Without the aid of enteroscopy, a segmental bowel resection would be required in a patient that will likely require multiple future interventions.

Conclusion: A multi-specialty collaborative intervention involving surgical management with intraoperative endoscopy offers a safe and feasible intervention for PJS patients with intussusception who have polyps that are traditionally endoscopically unresectable without a collaborative approach.

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Effects and Challenges of an 8K Ultra-High-Definition Endoscopy for Laparoscopic Rectal Cancer Surgery

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Introduction: In rectal cancer surgery, where most procedures are performed in the narrow pelvic cavity, advances in endoscopic surgery have enabled a detailed understanding of the anatomy and precise surgical manipulation, leading to dramatic advances in surgical techniques. Meanwhile, innovations in imaging technology have brought endoscopic surgery using 8K ultra-high-definition (UHD) images with four times the number of pixels of 4K, thereby contributing to further development of surgical procedures. 8K clear images obtained without the scope being close to the subject makes it possible to secure the surgical space in narrow pelvic surgery and helps to prevent contamination of the scope tip by mist and reduce the frequency of interference between forceps and scope. This study aimed to clarify effects and challenges of laparoscopic rectal cancer surgery with 8K UHD endoscopy.

Methods: In this multi-center questionnaire survey, data were collected from surgical participants who newly used 8K UHD endoscopy in patients undergoing rectal cancer surgery from February 2020 to November 2020. Survey items included sense of presence, reality, depth perception, visibility of tissue, eyestrain, degree of satisfaction for operators, and weight, operability, focus adjustment, physical fatigue, eyestrain, and satisfaction for camera assistants. Participants rated each 8K UHD endoscopic surgery on a one-to-five scale (definitively inferior, relatively inferior, equivalent, relatively superior, definitively superior) compared to the existing endoscopy system of each facility.

Results: Overall, questionnaire responses from 44 participants assessing 8K UHD endoscopic surgery were collected from rectal cancer surgeries performed in 22 patients. Respective ratings of operators included sense of presence: "superior or relatively superior," 100%; reality: "superior or relatively superior," 86.4%; and visibility of tissue: "superior or relatively superior," 100%. Weight was rated as "inferior or relatively inferior" by 95.5% of camera assistants and focus adjustment as "inferior or relatively inferior" by 72.7% of them.

Discussion: The high visual quality of the ultra-high-definition images and the understanding of fine anatomical structures can lead to precise surgical procedures and improve safety in rectal cancer surgery. While, although scope technology has been developed to reduce the size and weight of the 8K endoscope to 370 g, the weight of 8K endoscope is still twice as heavy as a conventional 2K endoscope, so the extra weight and difficulty of scope operation could increase the burden on camera assistants during long-term operations.

P491

Double Rhomboid flap Surgery for long, recurrent pilonidal sinus

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Pilonidal disease is known to have recurrences, in spite of advanced technology and a clear understanding of pathophysiology. Deep gluteal cleft and longer distance between the sinuses make its management difficult. Such a case was managed successfully by a double rhomboid flap. Vascularity of the flap was judged by Infrared imaging. Rhomboid flap surgery is having less recurrence rate compared to other modalities. In long multiple PNS, where sinuses are placed at wide distances, double rhomboid flap is a good option to manage.

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Current results of Transoral Incisionless Fundoplication in the Management of Chronic Refractory GERD

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Background: Refractory gastroesophageal reflux disease (GERD) to medications and lifestyle modifications remains a major disease burden in the medical community. The standard of care remains fundoplication. Laparoscopic fundoplication has been the standard for many years, but with the introduction of Transoral incisionless fundoplication (TIF) in the late 2000s, treatment outcomes have been closely followed. The TIF procedure has since then undergone many changes with newly evolved equipment and updated guidelines for

optimal patient satisfaction. This novel method of fundoplication has evolved through three eras as classified for this study: pre-TIF 2.0 (Era 1), TIF 2.0 (Era 2), and cTIF for Hill 3 or greater with an axial displacement > 2.0 cm (Era 3). Data showing improvement of GERD outcomes with the evolution of TIF have not yet been analyzed. The aim of this study is to evaluate and compare GERD outcomes with the evolution of TIF through these three Eras.

Methods: EMBASE, PubMed, and Cochrane Library databases (from Feb 2008 to Sept 2021) were used to conduct a systematic review identifying studies investigating the outcomes of TIF and cTIF. The outcomes analyzed for this study include Gastro-Esophageal Reflux Symptom Scale (GERSS), GERD Health-Related Quality of Life Questionnaire (GERD-HRQL), Acid Exposure Time (AET), DeMeester score, Reflux Symptom Index (RSI), and percentage of PPI cessation. Results are expressed as differences in means. Statistical analysis was done using Microsoft Excel (Microsoft, Redmond, WA) to compare the mean averages of the three groups.

Results: In this meta-analysis, fifty-nine studies were quantitatively assessed. A total of 2,905 patients were included; 782 patients who underwent cTIF, 1,695 patients who underwent TIF 2.0, and 428 patients who underwent TIF 1.0. GERD-HRQL (18.92 vs. 6.86 vs. 5.12), % PPI cessation (70% vs. 75% vs. 88%), and DeMeester scores (24.51 vs. 22.28 vs. 10.02) improved significantly from Era 1 to Era 3. RSI (4.97 vs. 6.41) was noted to be better in Era 3 compared to the other eras. GERSS (4.22 vs. 5.44) was slightly better in Era 2, with no significant improvement in AET noted (6.84 vs 6.81).

Conclusion: The evolution of the TIF procedure and criteria has produced improved outcomes in the management of patients with chronic refractory GERD symptoms.

P494

Robotic cricopharyngeal myotomy: a novel approach for treating cricopharyngeal hypertrophy

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Introduction: The cricopharyngeus plays an integral role in the process of swallowing in both relaxation and contraction [1]. Failure of this muscle to relax results in oropharyngeal dysphagia [2]. Over time, this muscle hypertrophies and increases risk for aspiration events [3]. Current management for patients with cricopharyngeal hypertrophy with dysphagia include balloon dilation, botox injection, and surgical myotomy. Open myotomy is considered the definitive treatment; however, there are several drawbacks attributable to the long-neck incision, drain placement, invasiveness of the procedure, and length of stay. We aim to share our experience using the Da Vinci Robot to perform a minimally invasive approach to cricopharyngeal myotomy, which has never been described before in the literature.

Methods and Procedures: We conducted a retrospective review of all robotic cricopharyngeal myotomies in patients over the age of 18 years performed at a single institution by a single surgeon from 2021 and 2022. Data abstracted included patient demographics, length of procedure, hospital length of stay, time to diet resumption, complications, symptom improvement at follow-up, and recurrence. We used ranges and frequencies (percentages) to describe the patient population and outcomes.

Results: Nine robotic cricopharyngeal myotomies were performed. The median age was 65 years old (62–91) and mostly female (n = 5, 56%) with a median BMI of 28.9 kg/m^2 (21.7–39.5). The median procedure length was 113 min (94–141) and there were no intraoperative complications. All patients had a post-procedural esophagram and no leaks were identified. All patients were started on a liquid diet in recovery and all but one were subsequently discharged to home on the same day as procedure. All patients had routine two-week post-operative follow-up in addition to phone follow-up at a later date (6 months–11-month post-operative). All patients reported significant improvement in symptoms. There were no complications or readmissions. No instances of recurrence were reported. On cost analysis, the minimally invasive robotic approach allows for an outpatient procedure with a conservative total cost savings of approximately $1,000 per day.

Conclusion: Our experience with the novel technique of minimally invasive robotic cricopharyngeal myotomy for cervical dysphagia is safe, efficacious, and cost saving, with excellent patient outcomes.

P496

Distal pancreatectomy in a patient with pancreatic cyst suspected of malignancy without preoperative histopathological diagnosis. Is it possible to recommend surgery without biopsy? Case report and literature review

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Introduction: The management of pancreatic cysts depends on their histology, in the cases where endoscopic biopsy is not possible, the therapeutic decision should be based on imaging studies, and clinical judgment. Pancreatic cysts are estimated to be present in 2–45% of the general population. Histologically, they are classified as benign, potentially malignant, and malignant. Imaging studies such as multiphase tomography and magnetic resonance support the etiological diagnosis of cysts, with a success rate of 2.1–2.6% and 13.5–45%, respectively. However, diagnostic accuracy remains relatively low. Endoscopic fine-needle biopsy (FNAB) improves diagnostic accuracy to differentiate mucinous from non-mucinous pancreatic cysts and malignant from benign, in cases where tomography or magnetic resonance imaging is unclear. However, there are cases where an endoscopic biopsy is not possible due to the anatomical location of the lesion. Pancreatic mucinous cysts make up 23% of cysts with malignant potential. It is a rare tumor with a malignant potential of 10% per year.

Method: A 68-year-old male patient who was incidentally diagnosed with a 17.8 mm × 17.3 mm × 15.5 mm tumor in the tail of the pancreas after performing an abdominal CT scan during an episode of acute diverticulitis. In follow-up studies, a solid component and growth of 9 mm are detected for 6 months. An endoscopic BAAF was not possible. Given the growth of the lesion and the presence of a solid component, it was decided to perform a distal pancreatectomy.

Results: A laparoscopic distal pancreatectomy and splenectomy were performed. Pathological analysis showed a simple multilocular mucinous pancreatic cyst with peripancreatic lymph nodes within normal limits.

Conclusion: The diagnostic accuracy of a pancreatic cyst by imaging is low even with the support of a fine-needle biopsy. In addition, in many cases, biopsies are not possible, which lead to a more aggressive behavior. However, there are radiological findings that support the probability of malignancy and are sufficient to justify surgical resection.

P497

Identifying nutritional deficit following enteral feeding access in acute necrotizing pancreatitis

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Introduction: Acute pancreatitis (AP) remains the leading gastrointestinal cause of hospitalization in the U.S.A.1 Approximately 20% of patients diagnosed with AP develop acute necrotizing pancreatitis (ANP), which carries a morbidity and mortality of 27%.2 The high inflammatory and catabolic state of the disease necessitates a high nutritional demand; however, due to varying institutional practices, hospitalized patients with ANP often have nutritional deficits, even after enteral tube placement. Initiation of enteral nutrition (EN), within 24 h of hospital admission, is the current recommendation.3,5,6,7 The aim of this study is to identify nutritional deficiency by comparing prescribed EN volume vs actual volume delivered. Secondary aims included overall hospital length of stay (LOS), ICU LOS, and mortality.
Methods: A retrospective, chart-based review was performed on 325 adult patients with ANP, who were admitted to Atrium Health CMC from January 2017 to July 2020. Inclusion criteria included the 2012 Revised Atlanta Criteria for pathologic inclusion 4, presence of NG or PEG/J tube, and initiation of EN. Prescribed volume of EN versus actual volume delivered after enteral access was recorded on 99 patients; multiple variables were recorded and statistically analyzed for association with EN failure. Failure of EN was defined as inability to reach volume goal within 48 h.
Results: Eighty-six percent of patients with ANP were identified as nutritionally deficient (n = 85). Median EN start date was 1 day after admission among nutritionally competent vs 3 among nutritionally deficient (p = 0.13). Median start date of TPN was 2 days after admission in the nutritionally competent vs. 3 among nutritionally deficient (p = 0.67). Median hospital LOS was 14.5 days among nutritionally competent vs. 19 among nutritionally deficient (p = 0.36). Median ICU LOS was 8 days among nutritionally competent vs. 4 among the nutritionally deficient (p = 0.62). Thirty-day mortality was 14.3% in nutritionally competent and 9.4% among nutritionally deficient (p = 0.63). The study was underpowered (power = 0.12).
Conclusion: The timing of EN initiation remains inconsistent. Reassuring, strong associations can be made from preliminary data. ICU LOS and mortality were greater for the nutritionally competent; however, this supports the high mortality rate associated with ANP, which necessitates a well-equipped medical facility to treat the disease state and its complications. The 86% nutritionally deficient demands immediate practice change to assess nutritional needs and automate a pathway to initiate and escalate EN to meet patients' personalized goals. Limitations included inconsistent documentation in the EMR and insufficient sample size for statistical measurements.

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Laparoscopic distal pancreatectomy after liver transplantation: A single-center experience

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Background: The aim of this study is to report the feasibility and short-term outcomes of laparoscopic distal pancreatectomy (LDP) in patients who have undergone orthotopic liver transplantation (OLT).
Methods: We performed a retrospective review of a prospectively maintained pancreatic surgical database for all patients undergoing LDP after OLT from January 2011 until September 2022. Demographics, indications for pancreatic resection, and time from liver transplant to LDP were reported. Operative mortality and morbidity were recorded within 90 days of surgery. Continuous variables were recorded as mean and range, while categorical variables were summarized using frequency and percentage. Postoperative complications within 90 days from LDP were graded based on Clavien–Dindo classification with major complication recorded as grade IIIa or higher.
Results: A total of 6 patients were identified meeting inclusion criteria. 2 patients were females and 4 males with a mean age of 66 years (range 60–77). Average body mass index (BMI) was 27. 5 days was the average length of stay (LOS) in our cohort. Two patients required conversion to open (one due to hepatic artery injury and one due to dense adhesions). Two patients had major complications. One clinically relevant post-pancreatectomy fistula (POPF) and one post-pancreatectomy hemorrhage (PPH) were observed. No mortality within 90 days from LDP.
Conclusion: LDP after OLT carries increased complications risk compared to no OLT patients. However, it is feasible with acceptable outcomes at high-volume institutions and if performed by experienced surgeons that are familiar with altered anatomy after OLT.

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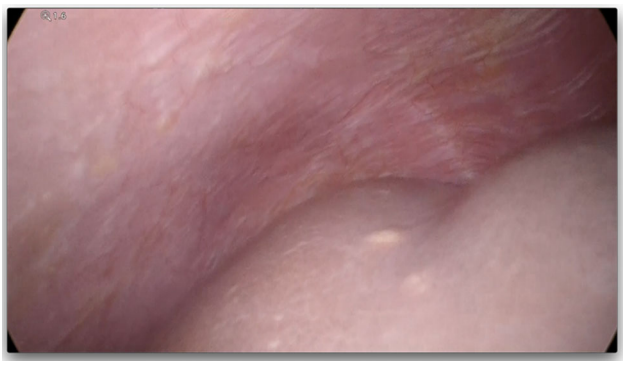
Positive staging laparoscopy in resectable pancreatic cancer: a case report and a review of the literature

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Introduction: Pancreatic cancer staging represents a challenge in modern medicine. Curative treatment is sought in patients with resectable disease. The goal of staging work-up is to delineate the extent of the disease and identify patients who are eligible for resection with curative intent. Multi-phase contrast-enhanced thin-slice CT scan (MDCT) is the preferred method for staging and assessing tumor resectability. Approximately, 20% of patients deemed resectable in MDCT are found non-resectable in staging laparoscopy (SL). Indications for SL are not universally accepted and can miss patients with distant metastasis.
Case presentation: A 40-yr-old male patient presents with a 6-w history of epigastric pain and jaundice. ERCP showed intrapancreatic CBD stenosis and endoscopic US found a 1.75 × 1.3-cm pancreatic head tumor, and FNA was positive for pancreatic adenocarcinoma. An MDCT and PET-CT were performed with no evidence of vascular invasion or distant metastasis and CA 19-9 was 37.28 U/mL. SL found a 0.3-cm liver mass on segment VII and frozen section was positive for metastatic disease.
Discussion: SL is not routinely performed and current guidelines indicate that SL can be considered in patients with a resectable tumor in CT scan plus a high-risk feature (elevated CA 19-9, large primary tumors, large regional lymph nodes, excessive weight loss, extreme pain). Tumor size (> 3 cm) and CA 19-9 (≥ 150 U/mL) cut-off values have been proposed to predict which patients would benefit most from a SL. Our patient met neither criteria and metastasis was found on SL. Although current literature states T1 tumors are unlikely to have metastasis, MDCT can fail to identify occult metastatic

disease (hepatic or peritoneal metastases) and routinely performing SL identifies occult metastasis before a laparotomy incision has been made

Conclusion: SL is a useful tool in pancreatic cancer staging, it can help identify occult metastatic disease in previously resectable tumors and can therefore help avoid futile laparotomy. It should be considered in all patients with resectable tumors in MDCT.



P500

Trends in Preoperative Risk Stratification and Length of Hospital Stay in Patients Undergoing Pancreatic Resection

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Background: Pancreatic resections are complex abdominal operations that have high rates of postoperative complications. Appropriately, resourced rural hospitals can achieve pancreatic surgical outcomes comparable to national standards, but little is known about how patient risk profiles and postoperative complication rates have changed over time.

Methods: A retrospective cohort of patients who underwent pancreatic resection at a tertiary referral center between January 2008 and December 2021 was compiled in the Research Electronic Data Capture (REDCap) database. Utilizing the American College of Surgeons National Surgery Quality Improvement Program (NSQIP) Risk Calculator, the McGill Brisbane Symptom Score (MBSS), patient demographic characteristics, and various postoperative complications, comparisons were made to assess differences in preoperative risk profiles and postoperative outcomes among patients who underwent pancreatic resection in an early cohort (2008–2014) and a late cohort (2015–2021).

Results: Two-hundred and fifteen patients underwent pancreatic resection at our facility from 2008 to 2021. Relative to the early cohort, patients who underwent pancreatic resection in the late cohort had an increased risk profile including a significantly higher prevalence of unintentional preoperative weight loss ($p \leq 0.01$) and diabetes ($p = 0.05$). Based on the NSQIP risk calculator, the late cohort also had significantly greater preoperative predicted risk for any postoperative complication ($p = 0.03$) and for specific postoperative complications, such as pneumonia ($p = 0.04$), hospital readmission ($p = 0.04$), sepsis ($p = 0.02$), discharge to a rehabilitation facility ($p = 0.04$), and death ($p = 0.02$). The MBSS calculator also demonstrated a significantly increased prevalence of high-risk patients in the late cohort as compared to the early cohort ($p < 0.01$). There were no significant differences in actual postoperative complication rates between the two cohorts. The NSQIP risk calculator predicted the median hospital length of stay (LOS) in the late cohort to be significantly increased as compared to the early cohort ($p = 0.02$). The actual hospital LOS was found to be significantly decreased in the late cohort ($p = 0.04$).

Conclusion: The preoperative risk profile of patients who underwent pancreatic resection has significantly increased over time at our tertiary referral center. Despite the greater complexity of such patients, postoperative outcomes have not changed, and hospital LOS has shortened. These findings suggest that postoperative management has improved and that pancreatic resection may be available to a broader range of patients diagnosed with pancreatic cancer.

P502

Laparoscopic pancreaticoduodenectomy for periampullary cancer: Improving outcomes with arterial first approach

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Background: Early controlling relevant arteries can minify bleeding during dissection phage that makes increasing intraoperative blood loss and prolonging operating time and affects the quality of lymphadenectomy in laparoscopic pancreaticoduodenectomy (LPD). This study presents our outcomes in both periods: before and after implementing arterial first approach.

Method: We analyzed the data from 75 patients with periampullary cancer. Sixty-five patients had witnessed traditional LPD in the period from February 2017 to January 2022 (group A). Then, in the next six months, 10 consecutive patients was carried out LPD with arterial first approach (group B).

Results: The mean of operating time was not significant difference as comparing group A with group B (512 ± 98 min vs 554 ± 72 min, $p = 0.19$). The mean of estimated blood loss was also not significant difference, 267 ± 102 ml vs 284 ± 97 ml ($p = 0.63$). On the contrary, the mean of harvested lymph nodes was significantly higher in group B (21.3 ± 12.2 vs 15.8 ± 6.2, $p = 0.03$). There was no pancreatic fistula and major complication (Clavien–Dindo > = III) in group B.

Conclusion: In early stage of the change, we found that arterial first approach was safe and brought higher number of harvested lymph nodes. Longer learning curve will be necessary to improve the outcomes of operating time and blood loss.

Keywords: laparoscopic, pancreaticoduodenectomy, periampullary cancer, arterial first approach

P503

Development and validation of an open pancreatic necrosectomy risk score in acute pancreatitis

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Introduction: There are a paucity of literature describing risk factors for requirement of open pancreatic necrosectomy. This study aims to develop a risk model predictive of progression to open necrosectomy amongst patients with acute pancreatitis in a tertiary center.

Methods: Adult patients admitted with acute pancreatitis from 7/1/2013 to 7/1/2022 were included. Variables of interest were selected using backward stepwise selection with criteria for entry $P = 0.1$ and exit $P = 0.2$. Variables available for selection include patient demographics, cause of pancreatitis, comorbidities, prior 30-day readmission, number of computed tomography (CT) imaging, and serum laboratory values within 72 h of admission. Logistic regression

models and corresponding nomogram were fitted based on selected variables to predict requirement for open pancreatic necrosectomy during the same admission. Performance of the model was assessed by computing the area under the receiver operating characteristic curve (AUROC) after tenfold stratified cross-validation. 95% confidence intervals were calculated with 200 bootstrap replications.

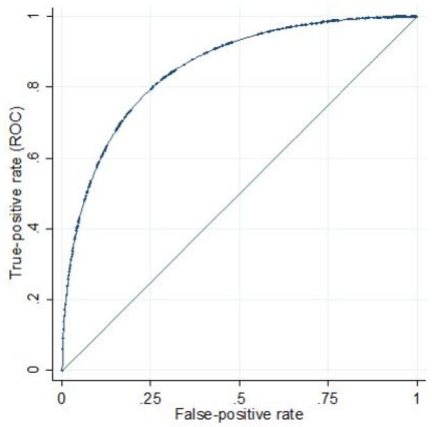
Results: 3493 admissions with 3022 patients admitted for pancreatitis were included. Most common etiologies of pancreatitis included alcohol (61.6%) and gallstones (29.2%). 3% of the cohort progressed to open pancreatic necrosectomy with 1% requiring repeat operative intervention. The model identified 8 clinical factors predictive of progression to open pancreatic necrosectomy during the same admission: male sex, race, etiology, ICU admission, organ failure on admission, number of prior CTs, presence of pancreatic necrosis on CT, and prior 30-day readmission. The model AUROC was 0.855 (95% C.I. = 0.79–0.92).

Conclusion: We demonstrate a risk score using 8 clinical factors that predict progression to open pancreatic necrosectomy during the same admission among patients admitted with acute pancreatitis.

Table Stepwise multivariable logistic regression identifying factors predictive of open pancreatic necrosectomy

Variable	Odds ratio	P	95% CI
Male Sex	2.55	0.04	1.03–6.35
ICU Admission	0.26	0.02	0.08–0.83
Prior 30 day Admission	6.63	< 0.001	2.40–18.27
Number of CT Scans	1.48	< 0.001	1.28–1.71
Organ Failure on Admission	0.37	0.04	0.14–0.99
Pancreatic Necrosis on CT	2.99	< 0.001	1.13–7.88
Race	0.59	0.08	0.33–1.07
Etiology of Pancreatitis	0.59	0.09	0.32–1.09

Figure: Performance of the open pancreatic necrosectomy risk score was assessed in the by computing the area under the receiver operating characteristic curve (AUROC) after 10-fold stratified cross-validation. 95% confidence intervals were calculated 200 bootstrap replications.



Area Under Curve	95% C.I.	
0.8551	0.7889	0.9212

P504

Pre-operative nutritional risk screening identifies patients at increased risk of adverse events after surgery

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Introduction: The act of surgery imposes risk to the patient, including infection, impaired wound healing, prolonged hospitalization, and even death. As surgeons it is imperative that we identify modifiable risk and intervene prior to operating. Despite the estimation that between 24 and 65% of patients undergoing surgery are at nutritional risk, only 20% of hospitals in the USA have a formalized nutrition assessment to screen for increased risk among patients.

Methods: Using single-institution data (2018–2021) extracted from the American College of Surgery National Surgical Quality and Improvement Program (NSQIP), patient data were abstracted for those who had undergone one of five specific procedure types: colectomy, proctectomy, pancreatectomy, hepatectomy, or ventral hernia repair. In addition to standard demographic, comorbidity, and outcomes data, the electronic medical record was reviewed to identify available pre-operative markers of nutritional risk, functional status, and inflammation, including the malnutrition screening tool (MST), a clinical malnutrition evaluation, and albumin levels. Primary outcomes included post-operative complication (infection, sepsis, respiratory or renal failure), return to OR, length of stay, discharge to facility, readmission, and 30-day mortality.

Results: The cohort included 2,823 subjects. Nutritional risk (MST) was assessed in 2,303 and found to be significantly associated with return to OR (OR 1.37), post-op infection (OR 1.26), post-op sepsis (OR 1.63), increased length of stay (OR 1.63), discharge to facility (OR 1.58), admission > 30 days (OR 1.36), and 30-day mortality (OR 1.71). For patients with high nutritional risk (n = 784), a clinical diagnosis of malnutrition was found in 67% of pancreatectomy, 65.9% of colectomy, 59.4% of proctectomy, 40.7% of hepatectomy, and 31.1% of ventral hernia repair patients. Across procedure type, a diagnosis of malnutrition was associated with post-op sepsis (OR 1.61), increased length of stay (> / = 5 days; OR 1.85), hospitalization > 30 days (OR 2.04), and discharge to a facility (OR 1.64). Albumin was available for 2819 cases; albumin less than 3.5 g/dL was significantly associated with return to OR (OR 2.87), post-op infection (OR 2.08), post-op sepsis (OR 5.88), longer length of stay (OR 2.80), hospitalization > 30 days (OR 2.44), discharge to facility (OR 5.44), readmission (OR 1.75), and 30-day mortality (OR 63.6).

Conclusion: Surgical stress is compounded by poor nutritional status. Peri-operative nutrition screening is a feasible way to identify at-risk patients who may have clinical malnutrition or develop malnutrition due to the metabolic demands of surgery. Future studies are needed to evaluate the benefit of peri-operative nutritional interventions in this population.

P505

Impact of Surgical Setting on 30-day Outcomes after Cholecystectomy

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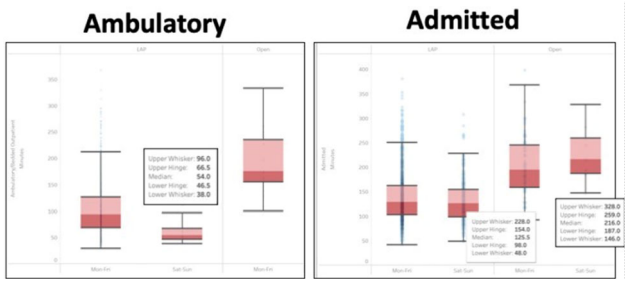
Background: Cholecystectomy is a common procedure performed by surgeons with various subspecialty training. Surgical treatment for benign biliary disease occurs for both the ambulatory and inpatient settings. The focus of this study is to compare the utilization of ambulatory cholecystectomy and inpatient cholecystectomy to improve quality outcomes.
Methods: Patients > 18 years who underwent cholecystectomy at a single-academic health system between July 2018 and April 2022 were included. The Current Procedural Terminology codes 47562 (laparoscopic cholecystectomy-LC), 47563 (laparoscopic cholecystectomy with intraoperative cholangiogram-LCC), and 47600 (open cholecystectomy-OC) were collected. Demographic, intraoperative, and 30-day outcomes were collected to compare patients who underwent ambulatory cholecystectomy to those admitted. The primary outcome was operative time. Secondary outcomes included postoperative length of stay, 30-day emergency department visits, and 30-day readmission rates.
Results: 4010 cholecystectomies were performed by 56 surgeons, 2,101 were ambulatory procedures and 1909 were performed after hospital admission. General and subspeciality surgeons performed 87% of ambulatory cholecystectomies, while acute care surgeons performed 85% of admitted cholecystectomies. The patients who underwent open cholecystectomy had the smallest volume, longest operative time, postoperative length of stay, and most frequent emergency department visits (Table 1). The median operative time was longest for open cholecystectomies performed over the weekend (Fig. 1). The inclusion of a cholangiogram was associated with the lowest rate of postoperative emergency department visits.
Conclusion: The volume of cholecystectomy is shared between ambulatory and inpatient settings. Operative time and outcomes are impacted by type of procedure and occurrence on the weekend. Future analyses should incorporate this data to optimize pathways for patients that improves care to increase quality outcomes.

Table 1 Comparison of effectiveness for cholecystectomy performed in the ambulatory and inpatient settings

Cholecystectomy	Ambulatory (N=2,101)	Admitted (N= 1,909)	Total (N=4,010)
Volume			
LC	1,759	1,637	3,396
LCC	321	184	505
OC	21	88	109
Operative Time (min) *			
LC	60.7	90.3	74.9
LCC	88	114.2	97
OC	142.7	142	142
Length of Stay (days)*			
LC	0.5	1.7	1.1
LCC	0.3	1.7	0.8
OC	3.7	11.2	9.7
Emergency Department visit *			
LC	7.6%	11.5%	9.5%
LCC	5.9%	9.2%	7.1%
OC	19%	21.8%	21.3%

*Means are reported. LC = laparoscopic cholecystectomy, LCC = laparoscopic cholecystectomy with cholangiogram, OC = open cholecystectomy

Fig. 1 The weekend effect on operative times for cholecystectomy



P506

Smartphone-based pharmaceutical database

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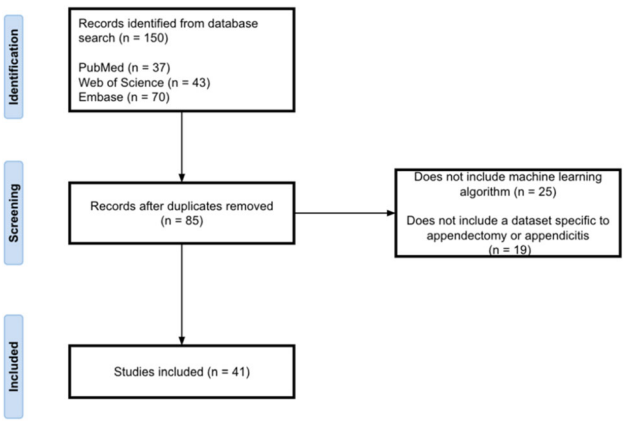
Introduction: Modern medicine is progressively developing by utilizing evidence-based medicine. Clinical pharmacy is a subdivision of pharmacy, allowing clinical pharmacists to deliver direct patient care in collaboration with physicians. This will ultimately optimize medication, health promotion, wellness, and disease prevention. Studies reported that such services decrease adverse drug reactions, hospital readmissions, and medication adherence and improve patient clinical outcomes.
The following study aims to form a nationwide database accessible to healthcare professionals, linking all pharmaceutical, medical, and surgical departments across all hospitals in Kuwait. This will provide the most recent evidence-based protocols and familiarize healthcare professionals with the available medication and guidelines. The final goal of this study is to improve patient care and outcomes.
Methods and Procedures: A collaboration between all departments in Mubarak Al Kabeer Hospital, Kuwait was first initiated. Mubarak Al Kabeer Hospital is one of the largest hospitals in Kuwait, covering approximately 1,000,000 individuals. First, date on the most common conditions and medication used were collected from each department's representative. Next, our local trust established a database with all available medications. Data on the most common organisms patients present with was also collected. Next, both datasets will utilize the development of a smartphone application available to all healthcare workers locally with clinical guidelines, medications, and evidence-based studies. This will unify the use of drugs in the hospital, offering consistency of care throughout the different departments and overall better healthcare outcomes.
Results: This study is in progress. The goal is to complete the primary data collection by the end of 2022. Then, the application development will be initiated and aim to be completed by February 2023, when it will be made available to all healthcare professionals in Mubarak Al Kabeer Hospital. The progress of our application will be audited, and we aim to utilize such an application as a nationwide one.
Conclusion: Our study aims to establish a unified pharmaceutical database easily accessible to healthcare workers in Kuwait. By establishing such an application, we aim to improve healthcare by fewer adverse drug reactions, better medication adherence, consistency of care, and ultimately better patient outcomes.

P507

Emergent applications of machine learning for diagnosing and managing appendicitis: a state-of-the-art review

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Introduction: Clinical diagnosis of appendicitis currently relies on scoring systems like the Alvarado Score to stratify patients by risk of perforation. However, atypical presentations and poor predictive value of laboratory tests complicate diagnoses and decisions for surgical intervention. CT imaging improves sensitivity and specificity of diagnoses, yet this tool bears the drawbacks of high operator dependency and radiation exposure. The aim of this review is to describe reports on the use of novel machine learning algorithms in the context of appendicitis diagnosis and management.
Method(s): A state-of-the-art review was conducted based upon systematic assessment of relevant articles found in PubMed, Web of Science, and Embase published from January 1, 2012 to January 1, 2022. Search terms included the following: "Appendectomy" OR "Appendicitis" and "Machine Learning" OR "Artificial Intelligence." Boolean operators were used to connect related keywords appropriately. Only studies including an application of at least one machine learning algorithm implemented on an appendicitis-specific dataset were considered. Studies with pediatric and/or adult cases were accepted.
Results: 41 relevant studies were identified with an average sample size of 15,997 patients. The most common use case of ML algorithms was for predicting diagnosis (56% of studies). Other common applications included predicting various post-operative outcomes, including length of hospital stay, development of sepsis, and 30-day mortality (29% of studies). On average, the algorithms used in these studies reported accuracy of 89%, a sensitivity of 85%, and a specificity of 77%. The area under the receiver-operating curve (AUROC) metric was only reported in 14 studies. No specific algorithm seemed to be superior to all others; logistic regression was the optimal model in 17% of studies, a neural network in 15%, a random forest in 12%, and a support vector machine in 7%. Remaining studies involved models based in various ensemble or otherwise rare techniques. Each of the three studies that compared their highest performing algorithm to the Alvarado Score reported that their machine learning-based method demonstrated greater accuracy than the Alvarado scoring system.
Conclusion(s): The identified studies suggest that machine learning may augment a clinician's ability to diagnose appendicitis and to prepare for patient-specific post-operative complications. Further studies will be needed to elucidate the relative performance of such approaches to the Alvarado Score and to assess the feasibility and advisability of implementing machine learning-based tools in clinical practice.



P508

Outcomes and re-admissions of hot gallbladders in a high-volume tertiary care hospital

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Introduction: Almost 70,000 cholecystectomies are performed each year in the UK, averaging a cost of over 110 million pounds. 11% of acute surgical admissions are related to gallstone disease with current recommendations in the UK being to perform a laparoscopic cholecystectomy (LC) within 7 days of admission (AUGIS 2016 guidelines; NICE 2021 guidelines) or 72 h of admission (current research). We aimed to assess the efficiency of our service and identify the outcomes of emergency LC during the acute symptomatic phase of a hot gallbladder.
Method: A retrospective, cohort study was conducted at The John Radcliffe Hospital, Oxford University Hospitals to include patients that underwent LC's for hot gallbladders between January 2019 and August 2020 (n = 466). Patients were divided on prognostic variables, such as age, comorbidities, and time to operation. The primary outcome measured was time from admission to operation. Secondary outcomes measured were biliary leak, postoperative morbidity, readmission rate, rate of suboptimal treatment, and length of post-operative stay.
Results: A total of 466 patients were included in the study and the median admission to operation time was 5 days, but a quarter of our patients were operated on after 7 days (24.7% in < 3 days, 50.6% in 3–7 days, and 24.7% in > 7 days). High 30-day re-admission rates (11.8%) and prolonged post-operative stay were directly influenced by a greater admission to operation time ($p = 0.0351$ and $p = 0.0169$, respectively). 62% of the re-admitted patients were linked to surgeries occurring more than 7 days from their date of admission. Retained stones (21.8%) and intra-abdominal collections (14.5%) were the leading causes of re-admission.
Conclusion: The study demonstrated that our institution was failing to meet the AUGIS and NICE guidelines on performing a hot cholecystectomy within 7 days in up to one-quarter of our patients. This resulted in a prolonged in-hospital admission and post-operative stay, higher re-admission rates, and complications. To improve our hot gallbladder service, we recently attained a dedicated hot gallbladder operative list alongside introducing the use of laparoscopic transcystic exploration of the CBD using a choledochoscope combined with laser lithotripsy with the aim to reduce in-hospital stay, complication rates, and time window from admission to operation.

P509

Successful extubation after esophagectomy: do non-opioids make the cut?

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Introduction: Enhanced recovery after surgery (ERAS) protocols are increasingly common, but the role of pain adjuncts remains unclear. Early extubation after esophagectomy is the standard of care to minimize pulmonary complications. This study aims to identify non-opioid adjuncts that are associated with successful immediate extubation following esophagectomy.

Methods: This is a retrospective review of 43 trans-hiatal esophagectomies between January 2019 and 2022 at a single institution. Analysis was completed comparing the use of non-opioid adjuncts in patients who underwent immediate and delayed extubation.
Results: Table 1 compares pain adjuncts between groups. The immediate extubation group received a higher proportion of methocarbamol (37.1%, p = 0.052) and acetaminophen (31.4%, p = 0.084) doses. Methocarbamol had a moderate negative correlation with opioid administration ($r_s = -0.33$, p = 0.034), as did acetaminophen ($r_s = -0.30$, p = 0.051).
Conclusion: Methocarbamol and acetaminophen appear intimately associated with successful immediate extubation after esophagectomy and reduced opioid consumption. These findings support the use of these medications in esophagectomy ERAS pathways to facilitate immediate extubation.

Table 1 Intraoperative adjunct comparisons

Pain Adjunct		Extubation timing			
		Delayed (n = 7)	Immediate		
			POD 0 Pain Score (0–10)		
			0–1 (n = 22)	2–3 (n = 11)	4–5 (n = 2)
Regional block	TAP No. patients receiving	2	5	3	1
	TAP +	5	17	8	1
Magnesium	No. patients receiving	4	20	8	1
Methocarbamol		0	8	4	1
Acetaminophen		0	8	2	1
Ketamine		4	9	10	0
Morphine equivalents		7	22	11	2
Magnesium	Median (IQR), mg	3500 (2500)	3000 (2000)	2000 (750)	2000
Methocarbamol			450 (200)	1000 (300)	1000
Acetaminophen			1000 (0)	1000 (0)	1000
Ketamine		50 (38)	50 (0)	50 (0)	
Morphine equivalents		75 (48)	75 (50)	60 (45)	68

P510

Enteral nutrition (EN) in surgical intensive care unit (SICU) after implementation of peri-procedural fasting protocol

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Introduction: In surgical patients, malnutrition is a risk factor for increased morbidity and mortality. During a Surgical ICU admission, less than half of patients reach their targeted goal energy intake. Delivery of enteral nutrition to ICU patients is commonly interrupted for diagnostic and therapeutic procedures. We hypothesize that standardization of a peri-procedural fasting protocol in the SICU will mitigate interruptions in hourly feeding goals, thereby improving daily caloric intake.
Methods: Data from patients admitted to the SICU requiring enteral feeding at The University of Missouri Hospital (MU) was retrospectively collected. A peri-procedural fasting protocol was implemented by the bedside provider. Daily caloric intake by %Kcal received of daily goal was tracked over eleven months (Oct 2021 – Aug 2022). Patients in the first month were compared to patients in the eleventh month using a 2-sided 2-sample t test.
Results: 139 patients were admitted to the MU SICU between October 2021 and August 2022 who required enteral feeding. After implementation of a peri-procedural fasting protocol, 80.4%Kcals were obtained in comparison to 82.64 pre-procedure. An average of 84.27 mls were obtained post-procedure as compared to 75.09 ml. No statistically significant association was found for %Kcal nor volume of tube feeds between the patients in the first and last months of protocol implementation (p-value 0.8162, 0.1528, respectively); however, there was an overall increasing trend across the eleven months. 69% (std ± 22%) of patients adhered to the protocol and had appropriate tube feeding hold orders placed. However, 20.4% (std ± 14.9%) of patients had an inappropriate NPO at midnight order placed.
Conclusion: Implementation of a peri-procedural fasting protocol does improve overall volume of enteral nutrition. Under current protocol conditions, the MU ICU achieved 2016 ASPEN guideline recommendation of greater than 80% of calculated goal energy intake within 48–72 h. However, additional improvement may have been hindered by inappropriate NPO orders included in standard NPO order sets created by the electronic medical record system. Future study is warranted to address barriers created by the EMR standard order-sets.

P512

Reducing Robotic Hernia Surgery Costs

B Yglesias, MD; A Arif, MD; J Phillips, MD; Western Reserve Health Education

Introduction: Robotic surgery is now a frequently used tool to assist with inguinal and ventral hernia repairs. The utilization of the DaVinci Robot for robotic-assisted laparoscopic hernia repairs has been increasing over the last decade. There are multiple advantages using the Da Vinci Robot system over the conventional laparoscopic tools. Disadvantages include operating room availability, maintenance and specialty staff, bulky size, lack of tactile feedback, 8-mm port sites larger than 5-mm laparoscopic port sites, and cost. The two main factors driving the cost difference is the cost of the medical devices and increased operating times. The purpose of this quality improvement project is to decrease the cost of robotic inguinal and ventral hernia repairs without increasing operative time or difficulty or without decreasing the quality of hernia repairs.
Methods and Procedures: Part of the increased cost of robotic surgery is due to the setup, drapes, instrumentation, and use of the robot. Unfortunately, we cannot change the cost of the instruments or the Da Vinci Robot at this time, but we can change how we drape the robotic arms to decrease the cost of use. We propose that only draping three of the robotic arms with the Da Vinci robotic arm drapes instead of four drapes will decrease the cost of each case. Currently at our community hospital, for robotic inguinal and ventral hernias, all four robotic arms are draped with individual Da Vinci arm drapes. We recommend only using Da Vinci arm drapes for the robotic arms 1–3 and draping the 4th robotic arm with reusable or disposable sterile gowns.

Results: At our local community hospital system, we provided a total of 405 robotic hernia repairs in the last three years. Each DaVinci Robotic arm drape costs $52 per arm drape. If we were to use one less robotic arm drape for each case, this would have saved $21,060 over the last 3 years or an average of $7,020 per year.
Conclusion: Given the results at our community hospital, we recommend changing the draping methods of Da Vinci robotic arms in the robotic-assisted laparoscopic inguinal and ventral hernia repairs. This change does not affect the time or difficulty of surgery, decrease the quality of the repair, or decrease patient outcomes. We believed this method could be applied to other hospitals as well and may even result in more significant savings if they perform more robotic-assisted surgeries.

P513

PEG Tube Dislodgment: A Thorough Analysis of an Unfortunately Common Complication

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Introduction: Percutaneous endoscopic gastrostomy tube (PEG) placement is a common procedure in chronically and critically ill patients. Dislodgement of PEG tubes remains one of the main postinterventional complications and generates significant additional cost. The aim of this study was to evaluate patient-, surgeon-specific, and institutional risk factors for dislodgement.
Methods: This study was conducted as single-institution retrospective review. A total of 150 patients with PEG placement were included. 41% (n = 61) were females. 38% of patients had a BMI of 30 or greater and 4.7% were considered underweight. Patient demographics, BMI, abdominal wall thickness on CT, procedure time, surgeon experience, and dislodgement management were recorded. We analyzed nutritional status of patients based on perioperative albumin levels. Nursing and physician documentation were reviewed for reports of agitation or combativeness. Patients were grouped based on need for immunosuppression and withdrawal prevention treatment. Statistical analysis was performed using SPSS software ver. 25 (IBM, Armonk, NY, USA) by AL.
Results: PEG dislodgement was reported in 21 patients (14%). Dislodgements occurred anywhere from 5 to 322 days postop. One patient had a PEG placed twice over the course of multiple years, both with subsequent dislodgement. 9 cases of dislodgement were managed with endoscopic replacement. 3 dislodgements in the immediate postoperative period (< 10 days postop) required a laparotomy. Only 8.7% of patients had a normal Albumin level. No significant correlation between gender, obesity, BMI, malnutrition, patient location (Critical care unit vs floor), presence of brain injury, withdrawal prevention treatment, and immunosuppression to PEG dislodgement was demonstrated. Patients with documented agitation were much more likely to experience dislodgement (p = 0.01, Phi 0.211). Surgeon experience did not influence risk of dislodgement, but minimally invasive fellowship training was associated with a higher likelihood of endoscopic management of dislodgement (p = 0.005).
Conclusion: Malnutrition, immunosuppression, and obesity have less influence on dislodgement rates at our institution than expected based on other published data. Reported agitation/combativeness had the greatest influence on dislodgement rates.

P514

A Mixed-Methods Study of Surgeon Perspectives on the STITCH Trial

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Background: Incisional hernia prevention strategies related to fascial closure technique during laparotomy are well described yet poorly implemented into practice. The factors hindering the surgeon's adoption of evidence-based techniques for fascial closure are poorly understood and characterized.
Methods: Using a sequential mixed-methods design, we first collected 139 responses to a validated quantitative survey based on the theoretical domains framework. Mean scores from survey responses were tabulated, and the findings were used to develop an interview guide for subsequent qualitative individual semi-structured phone interviews. Fourteen practicing surgeons were convenience sampled from social media outlets and our institution. The interviews were recorded and transcribed verbatim for coding and thematic analysis using NVivo 12 Plus. Data from the surveys and interviews were integrated using joint displays.
Results: While 94% of surgeons were aware of the study findings, many did not employ the techniques. This reflected a disparity in the domain of decision-making in the theoretical domains framework. Surgeons listed the following as barriers: application to a patient population with higher BMI (26%), application to their particular practice (19%), suture size (16%), and application to their patient demographics (16%). Qualitative analyses from surveys and semi-structured interviews revealed additional themes also related to the domain of surgeon decision making. Surgeons cited limitations of study design, external validity of findings, anecdotal experiences, and situation-specific environments that influenced their decision-making. Peer influence, practice models and pressures, and lack of training also affected surgeons' perspectives on integrating small bite technique into practice.
Conclusion: Trial design limitations, peer influence, and patient-specific factors impacted surgeon decision making in their choice of fascial closure technique. Future clinical trials in diverse patient populations may improve surgeons' confidence in implementing technique for fascial closure.

P515

The environmental impact of telemedicine preoperative evaluations for benign foregut clinic

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Introduction: Healthcare accounts for almost 10% of the United States' greenhouse gas emissions. This is estimated to result in a loss of 470,000 disability-adjusted life years due to the impact of environment on health; on par with the number of deaths from medical errors in the USA. Telemedicine holds great potential to decrease healthcare's carbon footprint by reducing emissions associated with travel. At our institution, the majority of benign foregut initial consultations have been conducted through telemedicine during COVID. We aimed to estimate the environmental impact of preoperative telemedicine compared to in-person consultations.

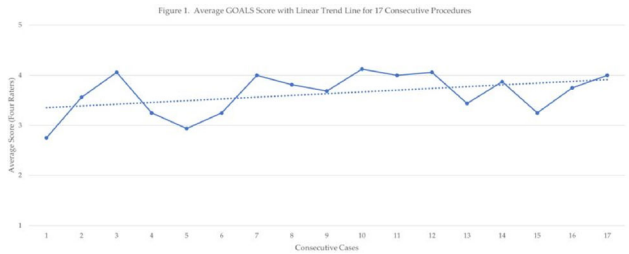
Methods: We performed a retrospective analysis of benign foregut clinic consultations for the third quarter of 2020. In-person visits emissions were calculated using a previously validated formula of 404-g CO2 per car gas mile or 90 g CO2 per plan-passenger kilometer. Telemedicine visits' environmental impact was calculated using a validated 0.031-kg CO2 per hour formula. Environmental impact was quantified by calculating the difference in CO2 emissions between in-person and telemedicine visits. Lastly, we retrospectively assessed in-person visits to determine whether the clinical decision-making was influenced by physical examination to estimate the hypothetical upper limit of telemedicine usage.
Results: There were 143 consultations, 60 of which were in-person. The in-person visits totaled 21,752.4 miles and emitted 7018.4 kg CO2, while the telemedicine visits totaled 41 h of video conferencing and emitted 1.3 kg CO2. Of the 60 in-person visits, 95% of visits were unchanged by the physical exam and could have been conducted via telemedicine with a further 82.3% reduction in carbon emissions. Telemedicine consultation over this period resulted in a total emissions savings of 7017.1 kg CO2; in one year, this would be equivalent to a year of emissions from 3 people in the industrialized world.
Conclusion: Telemedicine visits result in a 99.99% less CO2 emissions compared to in-person. Further, our results suggest that in our patient population, physical exam does not often affect operative decision-making. As such, a widespread shift to a telemedicine evaluation would have a marked positive impact on the environment. However, not all patients have telemedicine capabilities and current restrictive policies limit physicians from offering telemedicine to some, such as out-of-state patients. Moving toward telemedicine evaluations in select surgical populations is a purposeful step toward actively addressing our role in healthcare's large carbon footprint.

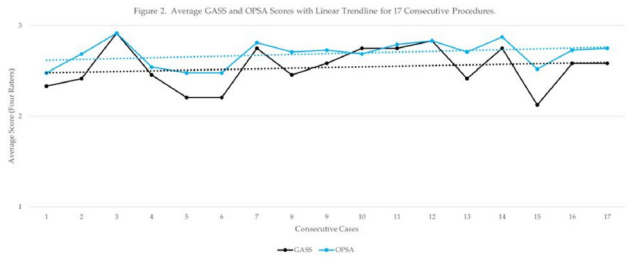
P516

Using video-based assessment (VBA) to document fellow improvement in safely completing the jejunojejunostomy portion of laparoscopic Roux-en-Y gastric bypass surgery

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Introduction: Using video-based assessment (VBA), our goals were to document the technical skills and safety of surgeon performance completing twelve consecutive tasks of the jejunojejunostomy (JJ) portion of Roux-en-Y gastric bypass (RYGB) surgery.
Methods and Procedures: De-identified videos of first 17 consecutive surgeries conducted between August 2021 and January 2022 by a single fellow at an academic teaching hospital were assessed by four board-certified bariatric surgeons. Raters completed the Global Operative Assessment of Laparoscopic Skills (GOALS), the General Assessment of Surgical Skill (GASS), and an objective procedure-specific assessment (OPSA). The GASS and OPSA are instruments developed by board-certified minimally-invasive surgeons (insert from author list?). GASS measures five domains of overall performance (economy of motion, tissue handling, appreciation of operative anatomy, bimanual dexterity, achievement of homeostasis) and the OPSA measures performance on 12 consecutive tasks to complete the JJ portion of RYGB surgery. Both instruments use a 3-point scale (1 = Poor; 2 = Adequate; 3 = Good) for each item. The analysis included average scores among the four raters for each instrument for each of the 17 consecutive procedures.
Results:





Statistically significant improvement in Fellow performance was documented in average GOALS ($p = 0.01$) and OPSA ($p = 0.05$) scores. Though GASS scores improved modestly, the increase was not statistically significant. However, improvement in hemostasis ($p = 0.04$) and bimanual dexterity ($p = 0.04$) scores were significant.
Conclusion: Improved skill acquisition by a Fellow was documented early in their training using multiple assessment types; with further validation, the two new scales may support identifying and evaluating entrustable professional activities during surgical training programs.

P518

Recurrent Intentional Foreign Body Ingestion and its Impact on a Tertiary Healthcare System: An Algorithm for Clinical Management

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Intentional foreign body ingestion (IFBI) is uniquely challenging for healthcare systems to manage. In particular, the global burden of recurrent intentional foreign body ingestion (RIFBI) is large and very difficult to mitigate, severely impacting hospital resources. The overall incidence of foreign body ingestion is increasing, having nearly doubled between 2000 and 2017 from 3/100,000 to 5.3/100,000. IFBI accounts for up to 92% of all adult foreign body ingestions and is most common in individuals with psychiatric illness, substance use disorder, or in incarcerated persons. There are a lack of effective interventions to reduce the number and frequency of recurrences in patients with RIFBI and several attempts at multidisciplinary approaches to tackle the problem have fallen short. With regard to clinical management of a particular ingestion events, actions are dictated by the nature of what was swallowed. Most foreign bodies (80–90%) with pass spontaneously through the gastrointestinal tract without need for further. In the remaining cases (10–20%) endoscopic intervention is required, with surgical exploration require rarely (1%). However, in cases of IFBI the need for endoscopic and

surgical intervention is much higher. The burden on healthcare is significant and grave with respect to the management of IFBI. Such an issue demands more effective, yet safe, systems-based protocols to alleviate the financial burden induced by the recurrency of IFBI patients.

We present here our experience with RIFBI is a single patient spanning 3 years. Using her case as a model example, we attempt to discuss the impact of RIFBI on clinical services and hospital systems. With a total of 51 admissions for RIFBI and a financial burden of just under $500,000 to the institution, our patient epitomizes the detriment that recurrent foreign body swallowers have on finance, staffing, and hospital systems-based systems when ineffective protocols to safely triage these patients are in place. This comes with several negative repercussions, such as physician and staff burnout, interruptions to psychiatric care, poor mitigation of recurrent swallowing, and a detriment to the physician–patient relationship.

RIFBI in psychiatric patients is a significant problem to healthcare institutions around the world. In this study, we provide an evidence-based algorithm and model for the development of experience-based refinements and interventions designed to improve the safety and cost-effectiveness in managing these patients.

P519

Non-pharmacological interventions to manage postoperative pain after abdominal surgery: protocol for a systemic review and meta-analysis

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Introduction: The objective of this study is to estimate the extent to which non-pharmacological interventions impact self-reported pain intensity and opioid consumption following abdominal surgery. Non-pharmacological interventions (i.e., approaches to pain management that do not involve drugs) are not a routine component of pain management following abdominal surgery, despite guidelines recommending their use as a component of multimodal analgesia. In response to the current opioid crisis, various non-pharmacological interventions have been proposed for postoperative pain management, with some studies demonstrating improved pain relief and opioid-sparing effects. Despite these findings, there are a lack of comprehensive knowledge syntheses guiding clinical decision-making regarding the use of non-pharmacological pain interventions after abdominal surgery.

Methods and Procedures: This study is a systematic review and meta-analysis conducted in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P). A comprehensive search of major electronic databases (i.e., MEDLINE, EMBASE, The Cochrane Library, Scopus, Biosis, CINAHL, and PsycINFO) was conducted by an experienced medical librarian. Eligible studies are parallel randomized controlled trials that enrolled adult patients (> 18 years) undergoing abdominal surgery and compared a non-pharmacological pain intervention to a control intervention (placebo, sham, or standard care). Screening of articles, data extraction, and risk of bias assessment (i.e., Cochrane's risk-of-bias tool for randomized trials) will be conducted in duplicate. The two primary outcomes will be self-reported pain intensity on post-operative day 1 (standardized to a 0–10-cm Visual Analogue Scale) and postoperative opioid consumption (morphine milligram equivalents [MME]). Secondary outcomes include pain intensity at further timepoints, pain interference, adverse events, dissatisfaction, patient self-reported postoperative health status, and healthcare reutilization. Meta-analyses will be conducted using random-effects models (conducted separately for each non-pharmacological intervention identified) and certainty of evidence will be appraised using GRADE. Sensitivity analyses will be performed to explore potential sources of heterogeneity (e.g., procedure type, surgical approach, risk of bias).

Results: Databases were searched from 01/01/1990 to 03/21/2022, identifying 2789 potentially relevant articles. After removal of 24 duplicates, titles, and abstracts of the remaining 2765 articles were screened by two separate reviewers. Screening of 591 full-text articles deemed potentially relevant is currently underway.

Conclusion: Managing pain after abdominal surgery remains challenging for clinicians. Non-pharmacological interventions may be a valuable addition to routine multimodal analgesia, but evidence remains uncertain. This meta-analysis will contribute valuable knowledge to inform clinical decision-making regarding the implementation of non-pharmacological interventions to improve pain management and reduce opioid harms after abdominal surgery.

P520

Is ethnicity a factor in the severity of acute appendicitis?—A retrospective comparison between Jews and Arabs in northern Israel

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Background: Acute appendicitis is one of the most common surgical emergencies. It is divided into complicated and simple disease. The two major ethnicities in Israel are Jews and Arabs. The purpose of this study is to determine the effect of social factors and ethnicity on the severity of acute appendicitis in northern Israel.

Methods: This was a retrospective study comparing all patients above the age of 18 who were admitted to our institution with the diagnosis of acute appendicitis between January 1st, 2010 and December 31th, 2020. Patient's demographics, social, pre-operative, and peri-operative factors were collected and analyzed. Univariable and multivariable analyses were used to study the association between ethnicity and disease complexity while adjusting for significant background characteristics.

Results: We identified 2943 patients who were admitted to our institution during the study period with the diagnosis of acute appendicitis. 54.1% were Jews and 22% had complicated disease. There was no difference in settlement size and most patients arrived during morning shift (62.3%). When comparing Jews and Arabs, Jews were significantly older, had more complicated disease, came from larger settlement,s and most patients arrived in the morning shift. Nevertheless, multivariate regression analysis did not find significant association between ethnicity and disease severity once adjusted to age and comorbidities.

Conclusion: Jews had a more complicated disease most probably due to their older age. This difference could imply for possible genetic or cultural differences. Morning arrival to the emergency department (ER) signifies delay in arrival which contributes to disease severity. The lower availability of primary care physicians in smaller settlements shorten the interval between disease onset and ER arrival. Further research is needed.

P521

Diagnostic Performance of CT and MRI compared to Ultrasonography in the Detection of Sarcopenia in an Asian population: A Systematic Review

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Background: This systematic review aimed to compare the diagnostic performance of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) with ultrasonography in the detection of sarcopenia in an Asian population.
Methods: A systematic search of PubMed and Cochrane Library was conducted for studies analyzing the diagnostic performance of CT, MRI, and ultrasonography in detecting sarcopenia in Asians. Quality assessment was performed using the Newcastle–Ottawa scale.
Results: Findings of 4720 patients were pooled across twelve studies and examined. Analysis of ROC results demonstrated that ultrasound had a high diagnostic value (pooled mean AUC = 0.74, mean sensitivities and specificities were 82.84% and 76.54%, respectively) for detecting sarcopenia in Asian populations.
Conclusion: Ultrasonography may potentially be a valuable diagnostic tool for the early and accurate detection of sarcopenia in Asians. Future research should focus on validating cut-off values for the use of ultrasonography in assessing sarcopenia in Asian populations so that it can be implemented in clinical practice.

P522

Patient and Provider Factors that Influence Attitudes toward Chaperone Use for Sensitive Exams

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Introduction: While there are data that suggest the majority of patients do not have a preference regarding chaperone presence during sensitive exams, there are certain patient factors that may influence this preference. Previously reported patient factors include patient gender and patient age. Similarly, while data suggest the majority of providers do not always use a chaperone when performing a sensitive exam, there may be certain provider factors that influence the decision to use a chaperone. The purpose of this study was to survey patients and medical providers on their attitudes toward chaperone use and explore factors that may influence these attitudes.
Methods: A survey was administered at a single tertiary military medical center to providers and patients across multiple specialties, and further sub-analysis of the data was completed. For patients, sub-analysis was done for gender, age, history of sexual abuse, and clinic seen in. For providers, sub-analysis was done for provider gender and training status.
Results: A total of 319 patient surveys were collected. Thirty-three percent of females and $< 1\%$ of males would prefer to have a chaperone present during a sensitive exam. Nine percent of patients younger than age 26 would prefer to have a chaperone present. Thirty-two percent of patients with a history of sexual abuse would prefer to have a chaperone present. On sub-analysis by clinic, the preference of having a chaperone present ranged from 0% to 50%. In the emergency department and urology clinic, 0% of patients preferred having a chaperone present. In the obstetrics and gynecology (OB/GYN) and wellness clinics, 37% and 50% of patients, respectively, would prefer having a chaperone present. A total of 61 provider surveys were collected. Forty-six percent of male providers always use a chaperone and 39% of females always use a chaperone. Fifty-two percent of providers still in training always use a chaperone.
Conclusion: The majority of patients do not have a preference regarding chaperone presence during sensitive exams; however, female gender and history of sexual abuse increase the likelihood of a patient preferring to have a chaperone present. Patients younger than age 26 are less likely to prefer a chaperone present. These factors should be considered when creating a institutional policy regarding chaperone use. Providers are more likely to always use a chaperone if they are male or if they are still in training.

P523

Automated three-dimensional psoas analysis is superior to two-dimensional analysis to predict sarcopenia and can be used to predict discharge disposition in trauma patients

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Background: Sarcopenia is an independent risk factor for morbidity. A ubiquitous and accurate means for identification of sarcopenia is lacking. CT imaging is routinely used to evaluate surgical patients. Classically, sarcopenia is calculated with a single slice of a CT image. This project completed a 3D analysis of the entire psoas muscle to assess for sarcopenia. These measurements were then used to predict discharge disposition following a trauma admission.
Methods: Psoas muscles from 317 patients were segmented in whole-body CT scans by an in-house developed Deep LOGISMOS software. Psoas muscles were analyzed in 2D using a single slice analysis at L3 to produce total psoas area (TPA) and in 3D to generate total psoas volume (TPV). 2D and 3D radiomic features (RF) were extracted for TPA and TPV using PyRadiomics package quantifying sarcopenia severity. Patient information included patient characteristics (PC), injury severity score (SS), time in ICU (TII), and time until discharge (TUD). Random forest classifier was trained to predict clinical outcome of discharge home without assist (181 Y / 136 N) and prediction performance assessed using fivefold cross-validation. Different input feature combination of radiomic features and patient information were tested. Prediction correctness (mean $\pm$ standard deviation) and combined F1-score (1 is best) were calculated to compare performance of different prediction models.
Results: The highest prediction correctness of 74% was achieved with all available patient information combined with 3D radiomic features (Table 1). When comparing the prediction value of 2D vs. 3D RFs in the tested prediction models, which differed in the richness of the input data but always included 2D or 3D radiomic features, 3D psoas muscle analyses and associated 3D radiomic features consistently and statistically significantly outperformed that of 2D analyses and 2D radiomic features ($p < 0.01$ for both correctness and F1 score comparisons).
Conclusion: 3D volumetric and density analysis outperformed the standard 2D measurements utilized in sarcopenia characterization and aided in predicting discharge disposition. Further studies to predict morbidity, identify patients who would benefit from prehabilitation, and improve hospital reimbursement based on value-based care will need to be completed.

	Patient-specific features used in respective prediction models					
Predicting patient home discharge without assist	RF only	RF+PC	RF+SS	RF+PC+SS	RF+PC+SS+TII	RF+PC+SS+TII+TUD
3D prediction correctness [mean±stdev %]	57±2	60±3	64±4	65±3	67±4	74±3
2D prediction correctness [mean±stdev %]	56±6	55±2	59±3	62±5	64±4	72±5
3D F1-score	0.644	0.672	0.702	0.718	0.728	0.772
2D F1-score	0.63	0.624	0.647	0.672	0.697	0.762

P524

In-hospital cardiac arrest following surgery: a single-center, retrospective study of the impact of code location on mortality

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Introduction: More than half of all patients who suffer in-hospital cardiac arrest (IHCA) do not survive to discharge. In-hospital procedures transiently impart increased risk and physiologic stress upon hospitalized patients undergoing such interventions, but the risk of such exposures and the impact of location of their post-procedural care on survival after IHCA is unknown.
Methods: We identified all patients with documented IHCA at our tertiary referral center between Jan 2017 and July 2022. IHCA occurring in the emergency department, operating room, or procedural suite were excluded, as were patients who did not undergo a surgical or minimally invasive procedure prior to IHCA. Patients were categorized by the category of their inpatient room at the time of IHCA: surgical ward, medical ward, surgical intensive care unit (SICU), medical ICU (MICU), or mixed surgical and medical ICU. Outcomes of interest were in-hospital and 30-day mortality. Stepwise multivariate logistic regression analysis was used to evaluate the effect of in-hospital location on outcomes, adjusting for patient demographics, comorbidities, code conditions, and patient Sequential Organ Failure Assessment (SOFA) score prior to event.
Results: 245 post-procedural IHCA events were identified. Most occurred in an ICU (57.6%): 12.2% in SICU, 7.4% in MICU, and 38.0% in mixed ICUs. IHCA on the wards was equally common on medical (56.7%) and surgical (43.6%) floors. Unadjusted in-hospital and 30-day mortality were significantly higher in ICU patients (68.8% vs. 50.0%). After adjustment, in-hospital location did not persist as an independent risk factor for mortality after IHCA, although a trend toward increased mortality was noted for MICU patients (aOR 3.3; 95% CI 0.80, 13.7). Pre-IHCA SOFA score and code duration were associated with increased risk of 30-day mortality (aOR 1.09 [CI 1.00, 1.19] and aOR 1.02 [CI 1.01, 1.04], respectively), independent of hospital location.
Conclusions: In-hospital code location was not an independent predictor of in-hospital or 30-day mortality among post-procedural hospitalized patients with IHCA. Conditions preceding IHCA in this population remain poorly characterized, and more research is needed to identify risk factors for delayed post-procedural IHCA.

P525

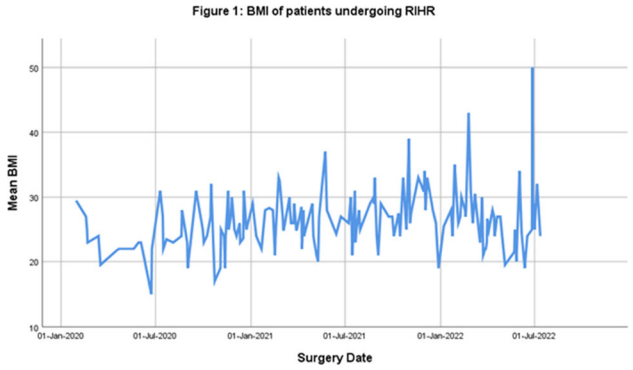
The Impact of Obesity on Robotic Inguinal Hernia Repair: Patient Selection and Outcomes

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Introduction: Obesity confers no greater risk of complications after robotic inguinal hernia repair (RIHR), but brings greater technical difficulty. We recently demonstrated no increase in complications following hernia repair after an academic hernia practice adopted robotic surgery. We hypothesize patient selection played a role in these outcomes and sought to examine the relationship of patient BMI to outcomes after RIHR adoption.
Methods: We conducted a retrospective review of all hernia repairs between July 2018 and July 2022 performed by three surgeons who adopted robotic-assisted laparoscopic hernia surgery over six months in 2020. Data abstracted included patient characteristics, surgical approach, type of hernia, and complications. Univariate analysis was performed using t test and ANOVA for continuous variables and chi-square for count data comparing data from before and after robotic adoption.
Results: There were 68 (42.8%) inguinal hernia repairs before and 252 (49.6%) after robotic adoption (p = 0.30); 205 (64.0%) were RIHR. There was no difference in case mix, patient demographics, including average BMI, or complications between the two groups (Table 1). Mean BMI was lower for RIHR compared to robotic ventral or umbilical hernia repairs (26.2 vs 33.4 vs 30.9, p = < .001). For RIHR patients, mean difference in BMI between Q2 and Q4 was 7.33 (p = 0.03); patients with the highest BMI underwent RIHR in the last 14 months studied (Fig. 1). In RIHR patients with complications, mean BMI was lower compared to those without (25.8 vs 28.6, p = 0.01). The majority of RIHR complications occurred in the first 10 cases performed by each surgeon.
Conclusion: After adopting RIHR, we observed no difference in patient characteristics, including mean patient BMI, but surgeons performed RIHR in patients with a wider range of BMI after completing at least 30 cases. Most of the complications after RIHR occurred early after adoption of the robotic platform in non-obese patients.

Table 1 Inguinal hernia repairs before and after robotic adoption

	Before n = 68	After n = 252	p-value
Age (years ± SE)	59 ± 1.7	57 ± 1.0	.30
Male	60	219	.77
BMI (cm/kg ± SE)	25.9 ± 0.57	26.5 ± 0.29	.41
Recurrent repairs	15	37	.14
Complications	15	35	.10



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Outcomes in Acute Care Surgery Based on Hospital Size: A National Inpatient Sample Analysis

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Introduction: The increasing complexity of the healthcare system has allowed for an increased variety of hospitals for patients to seek care. This can be separated by hospital size as well as the communities they serve. With a recent commitment to strengthen the community healthcare network, our aim is to understand the differences in outcomes in acute care surgery (ACS) between the community hospital setting (CHS) and the non-community, academic hospital setting (AHS).
Methods: The National Inpatient Sample database (NIS) was queried from 2016 to 2019 for patients with diagnoses that needed ACS based on the International Calcification of Disease, tenth edition coding system (ICD-10). These included patients with cholecystitis, appendicitis, gastric and duodenal perforation, diverticulitis, necrotizing soft tissue infection, and small bowel obstruction (SBO). Complications were determined based on their ICD-10 codes. Patients were separated into two groups, CHS and AHS, based on their NIS bed size distinctions. A community hospital was defined as a hospital bed size less than 200 in rural and urban non-teaching hospitals or less than 450 in an urban teaching hospital.
Results: There were a total of 54,510 individuals with a diagnosis needing ACS. The mean length of stay (LOS) for individuals in a CHS was 5.5 days compared to 6.5 days in the AHS. Patients in the AHS had a higher odds of mortality (1.3, 1.25–1.50) compared to CHS (0.73, 0.67–0.80) with appendicitis, pancreatitis, cholecystitis, and SBO contributing most to this disparity. Furthermore, in the AHS we found a higher odds of respiratory complications (1.24, 1.17–1.31), postoperative infection (1.2, 1.00–1.45), postoperative shock (1.58, 1.05–2.38), and ileus (1.11, 1.02–1.22). In comparison, we found that the CHS group had a lower odds of respiratory complications (0.81, 0.77–0.85), postoperative infection (0.83, 0.69–0.99), postoperative shock (0.63, 0.42–0.95), and ileus (0.90, 0.82–0.98). Moreover, we found a significantly increased LOS in the AHS compared to CHS in patients with known heart failure ($p < 0.001$) and pulmonary disease ($p < 0.001$). Furthermore, using the Elixhauser comorbidity index (ECI), we found increased scores in the AHS compared to the CHS. Finally, the AHS group showed to have an increased presenting risk of mortality compared to the CHS group.
Conclusion: There is an increased likelihood of morbidity as well as mortality in patients with a diagnoses that needs ACS in an AHS compared to a CHS. This can likely be explained by the increased ECI as well as increased acuity at time of presentation.

P529

Impact of timing to surgery in gastric cancer survival: An NCDB Analysis

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Introduction: Surgical resection is the first line of treatment for gastric cancer (GC) and it remains unclear whether surgical delay has a meaningful impact on survival outcomes. We aimed to elucidate if a longer time interval between diagnosis and surgery impacts survival outcomes, and if so, determine the optimal timing to perform the procedure with the highest survival outcomes.
Methods: Patients diagnosed with Stage I–IV gastric cancer who underwent surgery between 2004 and 2018 were identified in the NCDB and divided into four groups based on time intervals between diagnosis and surgery. Cox-PH analysis and Kaplan–Meier curves were used to evaluate survival outcomes.
Results: 11,703 GC patients identified through the NCDB were further divided by length of time from diagnosis to surgery into 4 groups: 3 days to 4 weeks [5,880 (50.2%)], 4 to 8 weeks [3,443 (29.4%)], 8 to 12 weeks [949 (8.2%)], and more than 12 weeks [1,431 (12.2%)]. Multivariable survival analysis was used to assess the independent effect of delay to surgery. Patients who had surgery between 4 and 8 weeks had better survival outcomes than those who had surgery before 4 weeks (Reference: > 3 days to 4 weeks, 4 to 8 weeks: HR 0.81, 95%-CI [0.72–0.92]). A delay to surgery of 8 to 12 weeks (HR 0.86, 95%-CI [0.71–1.04]) and > 12 weeks (HR 0.88, 95%-CI [0.72–1.07]) had better survival, but not at a statistically significant level. Other variables associated with worse overall survival were older age, Black or White race compared to Asian, positive surgical margins, higher clinical T stage, tumor locations other than body of the stomach and pylorus, presence of Signet Ring cells, lack of adjuvant therapy, and lympho-vascular invasion. Kaplan–Meier survival curves showed significant difference in survival probability ($p < 0.001$) among the four groups, but without adjustment for confounders.
Conclusion: Our study identifies no association between worse survival and timing to surgery spanning 4 to 12 weeks and beyond. Clinicians and surgeons should be cognizant of this information when balancing timing to surgery with other patient needs in order to optimize patient outcomes.

P530

Objective, procedure-specific assessment (OPSA) videoscopic inguinal hernia repair (IHR): validation of a new instrument to measure procedural safety and granting autonomy

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Introduction: Current video-based assessments (VBA) of surgery, such as the global objective assessment of laparoscopic skills (GOALS), focus on determining a level of skill—as opposed to safety or adequacy—in generic domains, such as instrument handling, efficiency of motion, and respect for tissue. Our goal was to develop and validate a tool to document the safe and/or adequate completion of laparoscopic and robotic inguinal hernia repair (IHR) to support awarding individual autonomy based upon competence, consistent with entrustable professional activities (EPA) goals.
Methods and Procedures: Two board-certified surgeons developed a real-world, experientially driven OPSA for IHR. Items are listed in Table 1, assessed on a three-point scale: 1 = Poor (unsafe/inadequate); 2 = Adequate (safe/adequate); and 3 = Excellent (safe/expert). 20 videos were selected, de-identified, and randomized from a 150 IHR video repository on a proprietary SaaS-based software platform used for automated video capture and video-based assessment (VBA) to improve surgical quality and safety. Selected videos presented varying levels of difficulty, anatomy, and laterality. Six board-certified surgeons experienced in minimally invasive IHR (mean practice duration: 15.3 years), completed the OPSA on each video using the SaaS platform. Data were downloaded to a.cvs file for analysis. The primary analysis was total agreement—the ratio of raters that agreed on case safety—based upon each task being assessed as either safe (score $\geq$ 2) or unsafe (score $<$ 2).
Results: 120 video reviews were analyzed.

Item	Total Agreement
Incision / Port placement	98%
Elevation of Peritoneal Flap (TAPP)	52%
Elevation of Peritoneal Flap (TEP)	62%
Exposure	89%
Reducing the sac	92%
Full dissection of the myopectineal orifice	83%
Mesh insertion	89%
Mesh fixation (If no fixation used, leave blank)	85%
Operation Flow	87%
OVERALL	82%

Table 1 Items and percent agreement on successful completion in the OPSA validation study.

Total agreement between raters in concluding the procedure was safe based upon the IHR OPSA was high, ranging from a low of 52% (Elevation of Peritoneal Flap (TAPP)), a high of 98% (Incision/Port placement), and an average of 82%.
Conclusion: This preliminary study documents that the IHR—OPSA has a high percentage of agreement regarding safety/adequacy among raters, indicating it is a valid measure of a surgeon's safe conduct in IHR and may be used to help determine surgeon competency and granting autonomy in IHR.

P531

Therapy gaps in the community management of gastroesophageal reflux disease: an underserved population

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Introduction: The American Gastroenterological Association (AGA) recommends endoscopic evaluation and ambulatory pH testing in patients with inadequate response to medical therapy. The purpose of this study is to identify and define therapy gaps in the treatment of GERD using a hospital network database.
Methods: Patient data with a primary complaint of GERD from July 2020 to June 2021 in a single-hospital system in Colorado and Kansas were collected. There were 70 facilities (PCP offices, specialty clinics and hospital emergency departments). Patients with GERD as a presenting diagnosis were included. Additional diagnosis such as chest pain, dysphagia, hiatal hernia, stricture, gastroparesis, and Barrett's esophagus were collected. Data on referrals to specialists were collected. The use of acid suppression was also collected.
Results: There were 54,298 patients during the study period. 12,069 patients (22%) had at least an additional abovelisted diagnosis. 1,297 with GERD plus Barrett's esophagus, 1,671 patients with GERD plus stricture, 5,004 with GERD plus hiatal hernia, and 3,313 with GERD plus chest pain. The GERD-only patient group tended to have a higher number of encounters in the year, as compared with the GERD plus another diagnosis group (Table). There were referrals to gastroenterology in 1,701 patients, pulmonology in 345 patients, and ENT in 367 patients. 35,885 patients were on proton pump inhibitors, of which 3,795 patients (10.5%) were on 40 mg/day or greater and 12,990 were on H2 blockers.

Number of visits	All GERD	GERD plus another diagnosis
1	70%	90%
2	21%	6%
3–5	10%	3%
5+	$<$ 1%	$<$ 1%

Conclusion: Medical acid suppression was ubiquitous in the study population. A majority of patients (70%) presenting with a primary diagnosis of GERD visit with their medical provider once suggesting possible symptom control with medical management. 10% of patients present more than twice in a year suggesting inadequate symptom control despite medical management. Only 3% of patients were referred to gastroenterology. This study suggests a significant therapy gap in the community management of GERD and a lack of specialty referral in patients with poor symptom control with medical management.

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Best Practices for Telemedicine Among Surgical Patients: A Summary of Qualitative Findings

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Background: Telemedicine reduces barriers to healthcare access by increasing access to specialists for patients in remote areas and reducing patient travel and wait times that require caregiver involvement and may require days off work that many patients cannot afford. However, appropriate indications for telemedicine in the peri-operative setting are not clear. The goal of this study is to use qualitative analysis to determine best practices for using telemedicine in the peri-operative setting.

Methods: Primary qualitative data were collected from UAB colorectal surgery patients Nov 2020–May 2021. UAB colorectal nurses and physicians were interviewed Jun–Sep 2021. Individual semi-structured interviews were recorded and transcribed using Landmark until thematic saturation was reached using NVivo12 software.
Results: For patients (n = 27), many found it most important to meet their surgeon in person prior to surgery. There were many intangibles, such as confidence, body language, and interaction with staff that patients found were important for pre-operative engagement and lacking in telemedicine. Some patients were happy to be seen via telemedicine pre- and postoperatively for uncomplicated, outpatient surgeries. Postoperatively, patients trusted that the provider would determine the appropriate visit setting, whether via telemedicine or in-person. Most patients were content with phone calls, as there were often technological issues on either the patient's or the provider's end that made video-based visits difficult.
Providers (n = 8) were the main proponents of in-person visits, particularly for meeting patients before surgery, sharing bad news, and seeing patients after complicated surgeries. Providers felt the role of telemedicine would be best for a pre–pre-op visit to ensure that a complete workup (labs, imaging, etc.) was done before meeting in-person. While many preferred video-based visits, providers often relied on phone calls due to technological or scheduling difficulties.
Conclusion: Telemedicine use is variable among providers, who often drive hesitancy. Among colorectal patients, telemedicine would best be used to ensure complete pre-op workup and in the post-operative setting for uncomplicated cases. Importantly, phone-based visits are key to remote communication with patients. Standardizing peri-operative telemedicine use will allow for more equitable reimbursement and patient access of the healthcare system.

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Strategies to reduce bed crunch in surgery units especially during COVID

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Introduction: We created a fast track to surgery workflow for healthy patients with abscesses to reduce wait times for emergency operating theatre and obviate the need for inpatient beds. Hospital crowding is a perennial problem worldwide. For surgical patients, this begins with the wait in the emergency department (ED), inpatient bed, and emergency operating theater slot. The wait time for operating theater can be up to 10 h, while patients remain fasted, increasing patient dissatisfaction. These patients spend 2–3 days in the hospital for what is a simple 10-15-min procedure and occupy beds better used for those requiring requisite inpatient care. This problem adversely affects patient satisfaction and also prevents efficient and timely treatment, affecting patient safety. This problem is transformed into a full-blown crisis during the ongoing COVID-19 pandemic.
Methods and Procedures: We developed a protocol to identify suitable patients. They are discharged from the ED and return the next day to undergo surgery. Postoperatively, they are monitored in the day surgery unit before discharge, eliminating the wait for a hospital bed and operating slot. We conducted a pilot study in November 2019. Straightforward abscesses (superficial, smaller than 5 cm) in those who are healthy (ages 18 to 60, well-controlled co-morbidities) were included. ED physicians identify suitable patients, followed by a review by Surgery team. In this way, patients were attended to expeditiously by a specialist, then slotted into surgery the following day, between 9am to 12 pm where manpower for operating theatre is flush. These patients were discharged after surgery.
Results: 19 patients were recruited into the pilot study in November 2019. Those in the workflow waited only an average of 1 h 48 min to surgery, while others waited 6 h 30 min. They were discharged same day after surgery. They paid S$290 for day surgery, a significant reduction from S$975 for who had to be admitted to the wards. In all 150 patients have been included, with improved patient satisfaction, and significant healthcare cost reduction with annual cost savings coming to S$33 976 per year.
Conclusion: The pilot study was a success. Patient satisfaction was high with the much shorter wait and reduced fasting time. This has been particularly useful during COVID-19 pandemic. Given the safety and efficacy of this pilot study with significant reduction in healthcare costs, we have rapidly extended to other specialties and institutions. Collaboration with ED physicians and anaesthesiologists is integral for the success of this initiative.

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Evaluation of Resource Utilization During the COVID-19 Pandemic Using the Medically Necessary, Time-sensitive (MeNTS) Criteria: A Retrospective Study

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Introduction: During the Coronavirus disease of 2019 (COVID-19) pandemic, healthcare resources were redeployed to meet the needs of patients with coronavirus, making resource allocation exceptionally difficult. During the peak of the pandemic (March 2020), the federal government, each individual state, as well as multiple medical societies made recommendations to halt the performance of elective procedures. On June 1, 2020. Our hospital resumed elective surgery with limited capacity. We followed the "Medically Necessary, Time-Sensitive" (MeNTS) procedure scoring system introduced by Prachand et al. to help with triaging elective procedures.
Objective: To report our institutional experience with using the MeNTS score and to evaluate the MeNTS score as well as its components based on its ability to prioritize elective procedures.
Methods: We retrospectively reviewed records of patients scheduled to have elective procedures from June 1, 2020, to December 31, 2021. During this time, our institution was under limited capacity. The MENTS score was calculated and reported by the most experienced attending surgeon overseeing each patient. All adult (18 > years) patients with MeNTS procedures, regardless of surgery type, were included in the analysis.
Results: In our 229 bed acute care county hospital with 6 operating rooms and 18 intensive care unit beds, 2,997 patients underwent elective surgery. There were more females than males (60.78% vs. 39.22%). The mean age was 44.59 (17.55); the mean number of days to surgery was 76.72 (127); the mean patient score was 10.37 (2.95); the mean procedure score was 13.18 (4.27); mean disease score was 18 (5.36); and mean MeNTs total score was 41.53 (6.79). Bivariate linear regression of MeNTS scores and individual scores compared to race, sex, ethnicity, and intubation status showed no significant difference. The multivariate survival model showed that a total MeNTS score < 30 was most predictive of having surgery. Other variables, such as gender, ethnicity, race, and intubation probability, had overlapping confidence intervals, which implied that they were not statistically different from one another.
Conclusion: We found the MeNTS scoring system to be in concordance with our hospital's decision-making process in terms of prioritizing non-urgent procedures. In our study, the total MeNTS score, as well as its components are all significantly correlated with time to surgery. Therefore, MeNTS score can be a useful tool for prioritizing elective cases as hospitals across the nation relax their restrictions on the performance of elective surgeries.

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Lessons Learnt In The Management Of Para-Duodenal Hernias: A Case Series

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Introduction: Para-duodenal hernias (PDH) are rare congenital internal hernias with non-specific symptoms. Left-sided para-duodenal hernia is three times more common than right-sided para-duodenal hernia with similar clinical presentation but different embryological origin. The current practical issues with regards to the management of para-duodenal hernias include the variability in presentation and the rarity of the condition. Management outcomes worsen with a lack of sufficient degree of suspicion for PDH, stemming from the absence of an evocative clinical picture to the surgeon physician. This results in delayed diagnosis and therefore an increased occurrence of complications such as strangulation, volvulus, incarceration, acute bowel obstruction, and bowel ischemia due to which para-duodenal hernias have a mortality rate of 20–50%. Para-duodenal hernias, therefore, pose a significant public health concern. Further awareness must be raised on the spectrum of presentation, efficient methods of evaluation, such as the usage rapid diagnostic tools and superior outcome yielding surgical techniques.
Materials and Methods: We report a series of eight cases of para-duodenal hernia who presented with varied clinical presentations ranging from vague abdominal pain to complete intestinal obstruction. CT findings were consistent with clustered bowel loops with displaced mesenteric vessels at the hernial orifice. Six cases had left-sided para-duodenal hernia, while two cases had right-sided para-duodenal hernia.
Results: Seven cases, based on their presentation underwent surgery either electively or on an emergent basis. Three cases underwent laparoscopic repair. One case had a recurrence and was re-operated four months later. One case developed enterocutaneous fistula following resection and anastomosis had prolonged hospitalization. There was no mortality among any of the cases. However, one case was unwilling to undergo surgery.
Conclusion: A pre-operative diagnosis of para-duodenal hernia is essential. Laparoscopic surgery is safe in select cases and is found to be beneficial.
Keywords: Para-duodenal Hernia, Internal hernia, Laparoscopic internal hernia repair, rare internal hernia, Obstructed internal hernia

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The da Vinci Single-port Robotic Platform in Pediatric Surgery: Assessment of Safety and Efficacy

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Introduction: We hypothesized that the da Vinci, Single-Port (SP) robotic platform enables efficacious minimally invasive surgery for a variety of intra-abdominal operations in children while optimizing patient outcomes and satisfaction. To assess safety and efficacy, 41 children underwent a wide variety of intra-abdominal SP robotic procedures.
Material and Methods: An IRB-approved prospective analysis of SP robotic procedures was carried out on patients aged 3 months to 18 years of age between February 2019 and August 2022. Patient demographics (age, BMI, ASA classification, primary conditions, comorbidities, cases performed), outcomes (case duration, estimated blood loss, intraoperative fluid/blood administration, length of admission, complications, analgesia), and patient perspectives (satisfaction, return to regular activities/work) were analyzed.
Results: ASA ranged 1 through 3, mean weight 61 kg, and mean BMI 26. The most frequent operations performed were inguinal hernia repair (n = 14) and cholecystectomy (n = 16). Mean operative duration was 119 min and mean blood loss was 25 cc. One patient received a transfusion due to a pre-existing metabolic anemia. 73.1% were treated as outpatients, 19.5% were admitted to the floor, and 7.3% were placed in an ICU for management of their comorbidities. One splenectomy/cholecystectomy patient with Sickle–Thalassemia disease returned to the OR for clot evacuation to confirm post-operative bleeding was not surgical in nature and one patient developed a surgical site infection. Pain and analgesia required were minimal, with 88% of respondents taking nothing or over the counter medications for less than 1 week and 7.5% taking narcotics only briefly; one Sickle Cell Disease patient required a longer prescription due to a vaso-occlusive crises unrelated to the surgery. Patient and family perceptions were positive, with 84.2% reporting satisfaction with the outcome and recovery after surgery and 15.8% reporting dissatisfaction with the presence of a scar. 46.7% of patients returned to full activity in 1 week or less, 13.3% in less than 1 month, and 40% in 1 to 4 months. 73.7% of parents returned to work in 2 weeks and 26.3% took longer than 2 weeks.
Conclusion: The SP robotic platform appears to be both effective and safe for use in children, with favorable acceptance among patients. While significant advantages over other minimally invasive modalities are difficult to prove given our small sample size, the ability to successfully perform complex operations via a single incision is appealing to patients, maintains the minimally invasive benefits of shortening admissions and postoperative pain, and warrants further investigation.

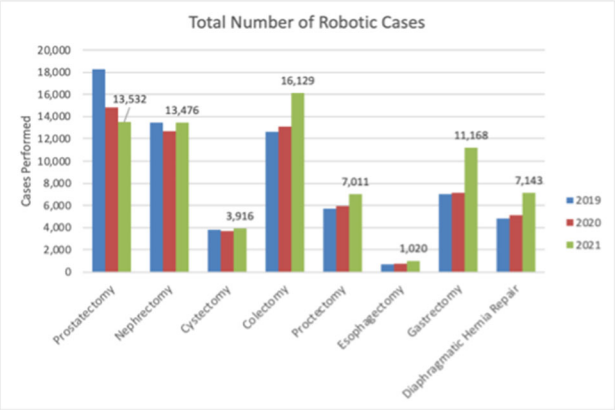
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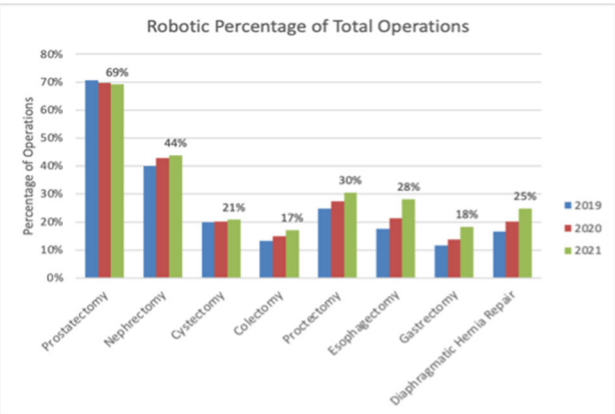
Increasing utilization of robotic surgery for gastrointestinal surgical operations at academic medical centers

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Introduction: Robotic surgery has been increasing in utilization and adoption across various specialties and operations. While the robotic approach has been well established and heavily utilized in minimally invasive urologic surgery, general surgery and advanced gastrointestinal procedures have generally had lower utilization rates. This study seeks to ascertain the growth in robotic surgery for gastrointestinal surgical operations across national academic medical centers.
Methods and Procedures: The Vizient database was used to gather data for robotic utilization across a spectrum of operations requiring inpatient hospitalization (Urologic: prostatectomy, nephrectomy, cystectomy, Gynecologic: hysterectomy, salpingo-oophorectomy, General Surgical: colectomy, proctectomy, esophagectomy, gastrectomy, diaphragmatic hernia repair, cholecystectomy, appendectomy, pancreatectomy, Thoracic Surgical: lung resection) from 2019 through 2021, across a total of 1.8 million surgical procedures, of which 380,000 were robotic. Robotic utilization for each case type was calculated and annual trends for adoption were evaluated.
Results: Robotic surgery cases have been increasing overall from 122,000 cases in 2019 to 138,000 cases in 2021. The greatest increase in adoption has come through advanced gastrointestinal operations, accounting for an additional 11,600 cases, or 73% of total growth. The percentage of robotic colectomies increased from 13% in 2019 to

17% in 2021, proctectomies from 25 to 30%, esophagectomies from 18 to 28%, gastrectomies from 12 to 18%, and diaphragmatic hernia repairs from 17 to 25%. Utilization for thoracic surgery with robotic lung resections additionally increased from 21 to 28%.





Conclusion: Urologic surgical procedures maintain the highest utilization rates of robotic surgery; however, the adoption rate has plateaued. The greatest growth in robotic surgery utilization has come among general surgeons, specifically with advanced gastrointestinal procedures. Thoracic surgeons have also demonstrated increased utilization with pulmonary resections and diaphragmatic hernia repairs.

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The metaverse and XR-guided navigation improves spatial awareness in robot-assisted endoscopic pancreatic surgery

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Robot-assisted endoscopic surgery lacks tactile perception, and spatial awareness is lacking as long as 3D-CT images are displayed on a flat display (TilePro in daVinci). To improve spatial recognition, we developed a surgical support system utilizing metaverse and XR (extended reality) and verified its usefulness in 20 pancreatectomies. We applied a holographic guide from 3D-CT images of individual patients to improve techniques and avoid misidentification.

In all surgeries (20/20, 100%), we could accurately reproduce the peripheral organs, arteries, and tumors from the CT images and display the resection lines to guide surgical procedures with avatars in a sterile space above the patient's abdomen during surgeries.

These systems were set-up within 5 min and did not affect postoperative adverse events (0/20, 0%). The avatars enabled them to work more efficiently and effectively in searching, brainstorming, and sharing virtual content as if they were in the same room. The holographic guidelines were helpful in on-the-job training, as surgeons could share their positions and movements of their hands.

This medical practice with the co-existence of presence makes it easier to record and experience the techniques of skilled surgeons as physical movements in the metaverse space, which significantly increases the efficiency of practice and contributes to the formalization of tacit medical knowledge, which is non-verbal information.

These technologies have already been used for surgical planning, simulation, surgical navigation, training, and remote education.

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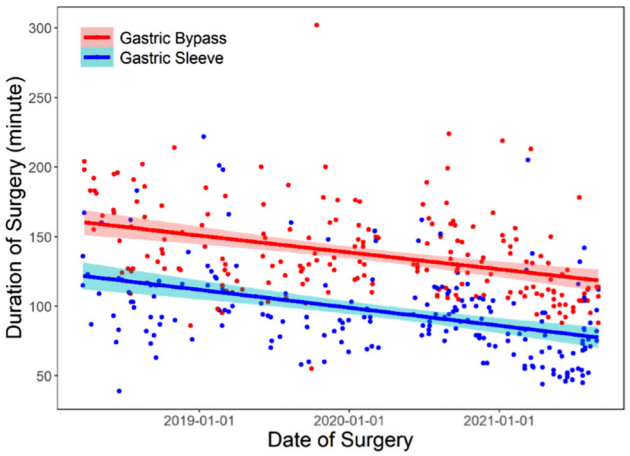
Efficiency improvements in Bariatric robotics

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Introduction: Robotic surgery is becoming more frequently implemented in general surgery residencies and fellowship programs. The value and role in bariatric surgery have been widely disputed mainly due to the feeling that it is inefficient and time consuming when compared to traditional methods. The aim of our study was to demonstrate an increase in efficiency with the implementation of a Bariatric surgery robotic program in a Minimally Invasive Surgery Fellowship Program over time.

Methods and Procedures: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database was queried from 2018 to 2021 at a Tertiary Referral Academic Institution. All patients who underwent primary robotic roux-en-y gastric bypass or sleeve gastrectomy were included in our study. We excluded patients who underwent duodenal-ileal bypass or had previous bariatric surgery undergoing revisions or conversions. We utilized the Electronic Medical Record to obtain length of operative times. We performed statistical analysis including linear regression of both roux-en-y gastric bypass and sleeve gastrectomy performed by year.

Results: 396 total patients underwent primary robotic bariatric surgery between March 2018 and August 2021. 198 patients underwent sleeve gastrectomy and 198 patients underwent roux-en-y gastric bypass. During the queried time, patient demographics including age, sex, and BMI did not significantly change. The overall sleeve gastrectomy procedure duration decreased significantly from 107 min in 2018 to 77 min in 2021 ($p < 0.01$). The overall roux-en-y gastric bypass procedure duration decreased significantly from 158 min in 2018 to 119 min in 2021 ($p < 0.01$). After linear regression, our data were significant for an 11-min decrease in operative time per year for roux-en-y gastric bypass ($p < 0.01$) and a 10-min decrease in operative time per year for sleeve gastrectomy ($p < 0.01$).



Conclusion: The development of a Bariatric surgery robotic program in the context of a Minimally Invasive Surgery Fellowship program can become time efficient in as little as a few years. There are several factors and learning curves that must be overcome in the early stages of implementation but with continued support and acceptance by staff, robotics in Bariatric surgery can be time efficient and valuable.

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Lymph Node Yield Differences By Facility Operative Volume And Surgical Approach In Gastric Cancer: An NCDB Analysis

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Introduction: Lymph node (LN) yield is a key quality indicator associated with accurate staging in surgically resected gastric cancer (GC). Appropriate LN resection (ALNR) for GC has been defined as $\geq$ 16 LNs resected for proper staging, although in practice, this number is not always achieved and may be affected by surgical expertise and approach. The present study aimed to identify differences between hospital volumes and surgical approach on LN yield and rates of appropriate LN resection (ALNR).
Methods: Patients diagnosed with Stage I–IV GC who underwent surgery between 2004 and 2018 were identified in the National Cancer Database (NCDB) and categorized into 2 groups by hospital case volume. Descriptive and statistical analyses including a regression analysis evaluating the independent impact of hospital volume on ALNR were performed.
Results: The NCDB included 1,127 hospitals that contributed 9,545 GC cases. Median and maximum total hospital volumes were 14 and 151 cases, respectively. The cohort was categorized by hospital volume, where "Low-volume hospitals" (LVH) were those contributing $<$ 13 cases, nd "High-volume hospitals" (HVH) that contributed 14-151 cases. LVH included 933 hospitals and contributed a total of 4,709 cases and HVH included 194 hospitals and contributed 4,836 cases. The mean LN yield in HVH was higher than in LVH (28 [13.6] vs. 27 [14.0]). HVH more frequently achieved ALNR (61.2%) compared to LVH (48.6%), p = $<$ 0.001. After controlling for relevant factors, HVH showed higher likelihood of ALNR (Reference: LVH, HVH: OR 1.61, 95%-CI [1.36-1.86]).
When comparing minimally invasive surgery (MIS) and open approaches, 569 (11.7%) MIS cases were performed in HVH and 370 (65.0%) had ALNR. 339 (7.1%) MIS cases were performed in LVH of which 149 (43.9%) had ALNR (p = $<$ 0.001). HVH reported 4,267 (88.3%) open surgery cases of which 2,589 (60.6%) had ALNR, and LVH reported 4,370 (92.8%) open surgery cases of which 2,139 (48.9%) had ALNR (p = $<$ 0.001). MIS showed a mean LN yield of 22.7 (SD 15.4) in HVH and 16.4 (SD 13.3) in LVH. Open surgery was associated with a mean LN yield of 20.8 (SD 14.0) in HVH and 17.8 (SD 13.7) in LVH.
Conclusion: GC resections performed in HVH were more likely to have a higher ALNR rate and higher LN yield with MIS and open procedures compared to LVH. These disparities could impact patient outcomes, and lymphadenectomy optimization in open and MIS approaches may lead to improved staging and patient outcomes.

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Does introduction of new technology disrupt surgical workflow? A 5-year gastric bypass case series study

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Introduction: Variations in surgical workflow can significantly impact procedure efficiency, quality improvement, and patient outcomes. Quantitative methods to characterize the impact of factors like new technologies on surgical technique and in turn, on surgical workflow are needed. For example, measures over multiple cases can be developed to study the workflow changes when new technologies (e.g., robotic platform and instrumentation) are introduced throughout a surgeon's learning curve. In this work, we use a new metric to quantify surgical workflow changes over a 5-year case series to understand how surgical workflow is impacted by the introduction of new technology.
Methods and Procedures: A single surgeon's gastric bypass procedure case series, which included 84 cases from the first year of adopting robotic platform in 2015 through 2019, was studied. Each procedure was annotated with surgical tasks. Relevant tasks were grouped to constitute a single node to form a network representation of overall workflow. The cases were then separated into 6 chronological groups based on instrumentation. Variations in surgical workflow across the 6 different groups were compared using an aggregate measure of likelihoods of transitioning to and from all nodes for all procedures within each group. Network complexity was quantified as the average of node transition entropies normalized by number of cases per group.
Results: Procedure duration shows a continuous decrease from the earliest to the latest group; however, with the introduction of new instruments, an initial increase in workflow variability is observed presumably while the surgeon is optimizing its use. As the surgeon adjusts the operative workflow, the nodal entropy declines signaling maximum utilization of intended use of the new technology.
Conclusion: This study demonstrates that surgical workflow efficiency can be disrupted through the introduction of new technology. We showed that network entropy can be used to quantify workflow variations to understand the disruption. In some cases, the new technology introduction can create a greater number of options during a surgical procedure, leading to a greater degree workflow disruption. However, surgical procedure duration may be reduced with the incorporation of new technology. Further reduction of both procedure time and node transition entropy will occur as surgeons learn how to maximize the utility of the new technology.

Fig. 1 Network representation of workflow for 6 groups. Nodes are arranged based on overall average order of appearance

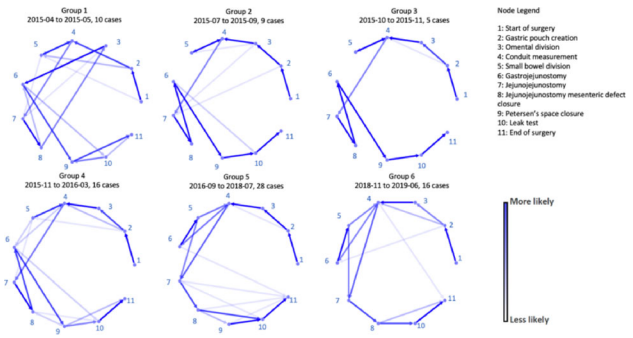
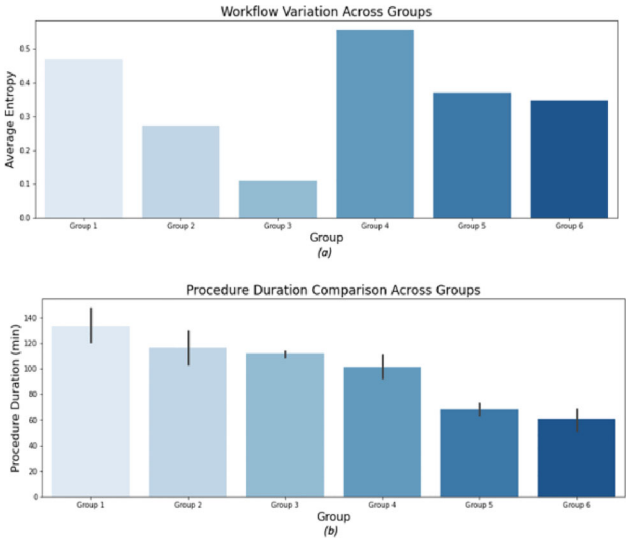


Fig. 2 (a) Workflow variation using node transition entropies and (b) procedure duration across 6 groups



P542

Endobronchial Dieulafoy lesion: a rare presentation of hemoptysis

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A Dieulafoy lesion is a defined as the presence of large and dysplastic arteries in the submucosa. This disease is most commonly encountered in the gastrointestinal tract but rarely may be seen in the bronchus and is associated with massive hemoptysis. This case report describes the presentation, diagnosis, treatment, and follow-up of a patient who presented with hemoptysis and was found to have an endobronchial Dieulafoy's lesion.

A 60-year-old female with a remote history of smoking presented with a one-day history of hemoptysis. She denied use of anticoagulants, NSAIDs, or herbal products that would predispose her to hemoptysis. Her family history was significant for lung cancer in both her mother and father. She was hemodynamically stable on admission. Chest CT revealed fairly extensive debris within the right lower lobe bronchus and bronchioles, non-specific ground-glass attenuation opacities throughout both lungs, and mild hyperinflation of the right lower lobe. She underwent bronchoscopy at which time an actively bleeding endobronchial vessel was visualized. Balloon tamponade of her right lower lobe and bronchus intermedius was performed with subsequent IR embolization of the right bronchial artery. She was transferred to the ICU postoperatively. She was successfully extubated on post-operative day 1 and was discharged on post-operative day 5.

She followed up in the outpatient office one week after hospital discharge at which time she reported no further episodes of hemoptysis. A repeat chest CT was obtained that revealed resolution of the ground-glass opacities in the right lung as well as clearing of the previously seen filling defects in the right mainstem bronchus, bronchus intermedius, and lower lobe segmental bronchi which was probably due to hemorrhage. No further follow-up was required after her three-month follow-up visit given the patient's clinical improvement and her CT scan showed significant improvement of her previous conditions.

P543

Identifying Risk Factors for Robotic Port Site Hernias—A Case Series

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Port site hernias are an uncommon but highly morbid potential complication of laparoscopic and robotic surgery. Although previous studies have attempted to establish guidelines for port site closure, there remains considerable debate regarding the closure of 8-mm robotic port sites. Here, we present three cases of robotic port-site herniation and discuss potential risk factors with the goal of guiding further research to assist with surgical decision making.

Case 1: A 62-year-old female underwent a robotic ventral incisional hernia repair via a standard left lateral approach using 8-mm robotic ports. Her port sites were not closed at the conclusion of the operation. She presented to the emergency department post-op day 4 with an acute port-site hernia at the left lower abdominal port site containing small bowel. The bowel was viable and the hernia was repaired via an open approach with biologic mesh reinforcement with no recurrence to date.

Case 2: A 65-year-old female with a history of a Robotic Whipple several years prior presented with port site herniation at the umbilical (12 mm) and right lower quadrant port sites (8 mm). At her index operation, the 8-mm ports were not closed. The right lower quadrant port site hernia contained a normal appendix. She underwent an uncomplicated robotic repair of both port site hernias as well as an appendectomy with no recurrence to date.

Case 3: A 53-year-old female who underwent a robotic ventral incisional hernia repair via a standard right lateral approach using 8-mm robotic ports as well as a 12-mm assistant port. The 8-mm ports were not closed. On post-operative day 2 she developed nausea and vomiting and was found to have an acute port site hernia at the right subcostal 8-mm port site. The hernia was repaired laparoscopically with subsequent closure of all 8-mm port sites with no recurrence to date.

Two of our three cases presented with port site herniation at an 8-mm ASIS port site. Based on literature review, the lower quadrant, ASIS port site is a common location for port site herniation. This may be due to either increased torque from a wider range of motion at this port site or due to this location being a relative point of fixation. Further research into the torque applied to robotic port sites and the resulting size of the facial defect after fascial splitting would be helpful in guiding the appropriate management of these 8-mm port sites.

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Development of a Canadian Colorectal Robotic Surgery Program: The First Three Years

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Introduction: Although robotic colorectal surgery is prevalent in many American centres, Canadian uptake has been limited. Our study describes the experience and results of establishing the first colorectal robotic surgery program in Western Canada.
Methods: We used a prospective database to review the robotic-assisted procedures from November 2018 to November 2021 at a single Canadian tertiary center. In the first phase of the study, all robotic surgery patients were assessed. In the second phase, all patients receiving open, laparoscopic, or robotic abdominal perineal resection (APR) and low anterior resection (LAR) were compared with laparoscopic and open patients from a retrospective database prior to the initiation of the robotic program. Demographic information, procedural details, pathology reports, and information regarding short-term post-operative course were collected.
Results: During the study period, 136 patients underwent robotic colorectal surgery, of whom 62.5% of patients were male. Median age was 62 (IQR 54-70); median BMI was 27 (IQR 23.3-31.7). The indication in 72% of these patients was rectal adenocarcinoma. Common procedures were LAR (n = 60, 44%) and APR (n = 32, 23.5%). Median OR time (OT) per quarter decreased over three years (Q1 = 310, range 170-663; Q4 = 255, range 145-367). Median hospital stay (HS) decreased (Q1 = 5, range 2-34; Q4 = 4, range 1–18). In the second phase, only LAR/APR robot cases were considered (n = 92; 66.3% male, median age 62 [IQR 56-70], median BMI 27.5 [IQR 23.2-32.0]) and compared to LAR/APR patients prior to 2018 (laparoscopic = 57, open = 129). In the fourth quarter, robot OT was 262 (range 211-367), in comparison to laparoscopic (OT = 225) and open (OT = 206). Median hospital stay for robotic patients was lower (HS = 5) in comparison to laparoscopic (HS = 6) and open (HS = 7). Readmission rate 30-days postoperatively was lower for robotic patients (7.2%) versus laparoscopic (8.8%) and open (15.5%).

Most impressively, prior to the robotic colorectal surgery program initiation, 69% of pelvic cases were done open at our institution, compared to only 19% after program initiation.
Conclusion: Developing a colorectal robotic program with similar post-operative outcomes is feasible in the Canadian context. There is a significant decrease of OT with surgeon experience, and robotic surgery demonstrates decreased hospital stays and readmissions. Future studies will analyze patient quality of life outcomes related to robotic surgery.

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Should We Approach All Pancreatic Tumors Robotically?

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Introduction: Pancreatic surgery remains one of the most challenging fields in general surgery, and the majority of pancreatic tumors are still approached via laparotomy. The aim of this study was to assess the value of approaching every pancreatic tumor robotically to increase the rate of successful minimally invasive resections and reduce unuseful laparotomies. We compared our robotic surgery perioperative data and outcomes versus open and laparoscopic approaches from the literature.
Methods: A retrospective review of our medical records identified 84 patients who underwent robotic pancreatic cancer surgery from November 2012 to July 2022. Perioperative data and patient outcomes were assessed by retrospective review of a prospectively maintained database.
Results: 84 patients underwent robotic-assisted surgery for pancreatic cancer, where one group (n = 46) underwent distal pancreatectomy and another group (n = 38) underwent pancreatoduodenectomy. The mean age was 62.4 ± 12.7 and 62.6 ± 14.9 years, respectively. The mean operative time was 211.7 ± 48.9 and 409.4 + 27.4. Mean estimated blood loss was 126.5 ± 85.0 and 268.8 ± 226.7. R0 was achieved in 94.9% and 76.7% of cases. Mean lymph node harvest was 9.1 ± 7.3 and 19.03 ± 11.59. No intraoperative complications were noted. The conversion rate was 17.9% and 56.4%. Postoperative morbidity was 23.8% and 38.9%. One patient (2.6%) who underwent pancreatoduodenectomy required reoperation. The mean length of stay was 6.9 ± 2.3 and 13.7 ± 3.2. There was no postoperative mortality.
Conclusion: In our experience, robotic-assisted pancreatic surgery is associated with a similar length of stay, operative time, and lymph node yield, but reduced blood loss, morbidity, and mortality rates compared to open and laparoscopic approaches.

Table 1. Robotic versus Open and Laparoscopic Distal Pancreatectomy Results (Retrospective studies)

Study	Patients, n	Type of Approach [open (O), laparoscopy (L), robotic (R)]	Pathology	Median values					Postoperative morbidity (%)	Reoperation (%)	90-day mortality (%)
				Surgery time (min)	EBL (mL)	LN harvest (count)	R0 (%)	LOS (days)			
Hilst et al. 2017	856	O	Pancreatic Neoplasms*	240	300	18	60	9	22**	NA	4
Magge et al. 2013	34	O	Pancreatic Adenocarcinoma	294	570	12	88	8	50	0	0
Magge et al. 2013	28	L	Pancreatic Adenocarcinoma	317	290	11	86	6	39	0	0
Hilst et al. 2017	356	L	Pancreatic Neoplasms*	239	200	14	67	8	17**	NA	2
Our Experience	46	R	Pancreatic Neoplasms*	206	100	9	94	6	24	0	0

*EBL - Estimated blood loss; LN - lymph node; R0 - Resection margins free of neoplastic involvement; LOS - Length of stay; * - These include: pancreatic adenocarcinoma, neuroendocrine tumor and other benign and malignant pancreatic conditions; ** - Only complications with Clavien-Dindo score ≥3 were reported; NA - Not available.*

Table 2. Robotic versus Open and Laparoscopic Pancreaticoduodenectomy Results (Retrospective studies)

Study	Patients, n	Type of Approach [open (O), laparoscopy (L), robotic (R)]	Pathology	Mean values					Postoperative morbidity (%)	Reoperation (%)	90-day mortality (%)
				Surgery time (min)	EBL (mL)	LN harvest (count)	R0 (%)	LOS (days)			
Wang et al. 2018	178	O	Pancreatic Neoplasms*	410	502	12	94	27	48	NA	0
Varley et al. 2019	149	O	Pancreatic Neoplasms*	432	500	NA	81	10	NA	8.1	2.7
Stauffer et al. 2016	193	O	Pancreatic Adenocarcinoma	375	600	17	80	9	67	6.2	5.2
Stauffer et al. 2016	58	L	Pancreatic Adenocarcinoma	518	250	27	85	6	53	1.7	3.4
Our Experience	38	R	Pancreatic Neoplasms*	409	269	19	77	14	39	2.6	0

*EBL - Estimated blood loss; LN - lymph node; R0 - Resection margins free of neoplastic involvement; LOS - Length of stay; * - These include: pancreatic adenocarcinoma, neuroendocrine tumor and other benign and malignant pancreatic conditions; ** - Only complications with Clavien-Dindo score ≥3 were reported; NA - Not available.*

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Minimally invasive robotic appendectomy for resection of a large appendiceal mucinous neoplasm: case report and review of the literature

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General surgeons commonly perform the procedure of appendectomy, but rarely encounter a malignancy of the appendix. Mucoceles, including appendiceal mucinous neoplasms, are found in just 0.2–0.3% of appendiceal specimens. In the past, many advocated against a minimally invasive approach for removal of appendiceal mucinous neoplasms due to risk of spillage resulting in pseudomyxoma peritonei. Reports of minimally invasive resections are limited.

We present the case of a 66-year-old male with a large, low-grade appendiceal mucinous neoplasm (LAMN) removed with robotic appendectomy. The patient initially presented to his urologist with gross hematuria and a calcified appendiceal lesion concerning for a mucocele was identified incidentally on CT urogram. During robotic appendectomy, the mass was not disrupted and was able to be removed entirely intact. The mass measured 13 × 8 cm. There was no lymphovascular invasion and the surgical margins were negative. He was discharged the same day in good condition.

In this case, we review the literature of appendiceal neoplasms and discuss our patient's presentation and diagnosis, including CT imaging. In addition, we describe our minimally invasive treatment approach and provide intra-operative images. This case is an example of safe removal of a LAMN utilizing a minimally invasive surgical technique, which decreased hospital length of stay and minimized complications otherwise associated with traditional laparotomy.

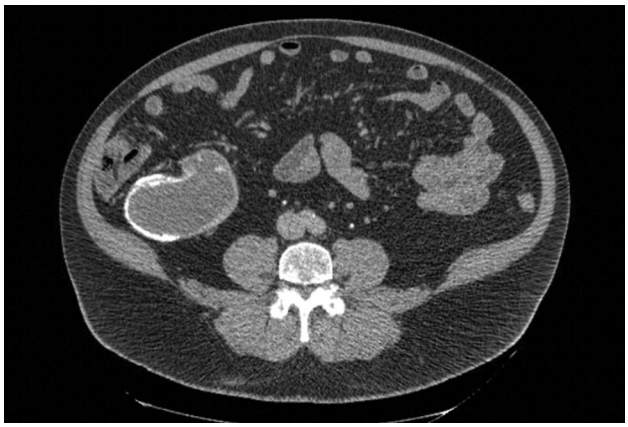


Fig. 1 Axial CT imaging of the abdomen demonstrating a calcified mass in the right lower quadrant



Fig. 2 Coronal CT imaging of the abdomen demonstrating a calcified mass in the right lower quadrant

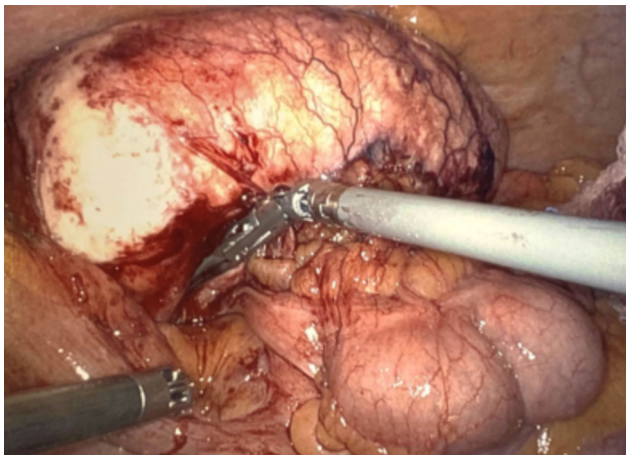


Fig. 3 Intra-operative robotic view of the appendiceal mucocele



Fig. 4 The resected low-grade appendiceal mucinous neoplasm (LAMN)

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First in human clinical experience using the Maestro collaborative robotics platform

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Introduction: Over the past 20 years, laparoscopic surgeons have experienced the pros and cons of both conventional and tele-robotic approaches, in terms of OR workflow, as well as staff and training requirements. The Maestro System, developed by Moon Surgical, is a collaborative robotic platform designed to overcome the challenges of both approaches by augmenting the surgeon at the bedside and giving them full control over all the off-the-shelf surgical instrumentation used during a procedure. We are presenting the outcomes of the First-in-Human clinical experience using the Maestro System.

Methods and Procedures: 27 patients scheduled to undergo non-emergent abdominal laparoscopic surgery for cholecystectomies, hernias, colectomies, sleeve gastrectomies, and gastric bypasses were enrolled in the approved LIFT OFF study, a feasibility, prospective, single-center, and single-arm study. The study primary endpoints were device-related safety as well as technical feasibility. Additional endpoints included procedure duration and ease of use of the Maestro system.

Results: All procedures were performed without any device-related adverse event and conducted entirely with the Maestro system after only a short training session, showing adaptability of the device to many clinical situations. The single operator evaluated the device as easy to use, with a short learning curve well inferior to 10 procedures and no visible impact on procedure duration. The procedures did not require a surgical assistant for scope nor retraction management nor any additional operating room staff for study nor device management purposes.
Conclusion: Our first observations provide evidence that performing a minimally invasive non-emergent laparoscopic cholecystectomy using the Maestro system is safe and effective, compared to conventional laparoscopic cholecystectomy, with minimal training requirements and efficient staff utilization. Additional data on more patients and diverse clinical indications will be needed to confirm the value of this approach.

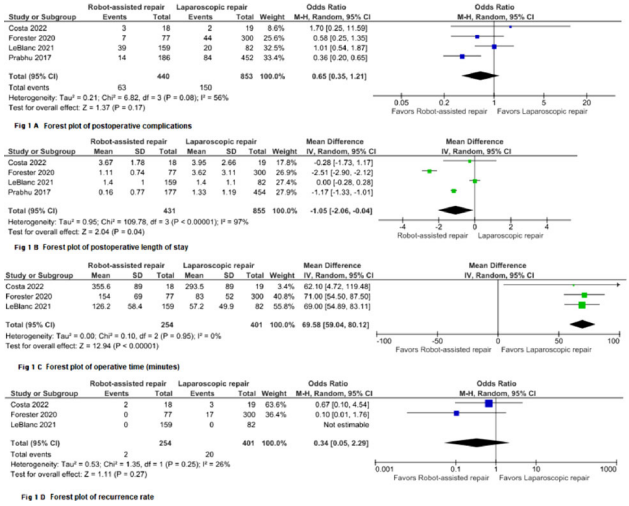
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Robot-assisted incisional hernia repair compared with laparoscopic incisional hernia repair: a systematic review and meta-analysis

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Introduction: Every year, millions of abdominal surgical procedures are performed worldwide, and incisional hernia is a latent complication that can be present, whose incidence is estimated to be around 10–15% of all laparotomies. The number of procedures has increased exponentially with the introduction of the robotic-assisted surgical approach to incisional hernia repair. However, the potential benefits of surgical robotics in incisional hernia repair with a focus on patient outcomes compared to the laparoscopic technique are unclear. Therefore, we aimed to perform a systematic review and meta-analysis comparing the efficacy and safety outcomes of robot-assisted and laparoscopic techniques for incisional hernia repair.
Methods: PubMed, Embase, Scopus, Cochrane databases, and conference abstracts were systematically searched for studies that directly compared robot-assisted incisional hernia repair with laparoscopic techniques and reported safety or efficacy outcomes in follow-up $\geq$ 1 month. The primary endpoints of interest were postoperative complications and hospital length of stay. Statistical analysis was performed using RevMan 5.4.1. Heterogeneity was assessed with I2 statistics.
Results: Out of 2104 database results, we included 4 studies that met the inclusion criteria with a total of 1293 patients treated for incisional hernia repairs and 440 underwent robot-assisted repair. The range of follow-up in the studies was one month to 24 months. Overall, postoperative complications (OR 0.65; 95% CI 0.35–1.21; $p < 0.17$; I2 = 56%) appeared to occur less frequently in the robot-assisted repair compared to laparoscopic surgery; length of hospital stay (OR − 1.17; 95% CI − 2.06, − 0.04; $p < 0.04$; I2 = 97%); and recurrence rate (OR 0.34; 95% CI 0.05–2.29; $p < 0.27$; I2 = 26%) were decreased for the robot-assisted group, although a strong statement cannot be made due to the heterogeneity. However, the robotic-assisted repair had a significantly longer operative time (mean difference 69.58; 95% CI 59.04–80.12; $p < 0.001$; I2 = 0%.).
Conclusion: In conclusion, these results suggest that the robotic approach was associated with longer operative time than laparoscopic repairs, but with shorter length of stay and lower complication and recurrence rates. Further trials are warranted in defining the role of robotic-assisted repair of incisional hernia.

Fig. 1 Forest plot of robot-assisted incisional hernia repair compared with laparoscopic repair



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Adoption and Comparative Outcomes of Robotic vs. Laparoscopic Cholecystectomy

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Introduction: A laparoscopic cholecystectomy (LC) has become the standard of care over open approach during past decades in the USA; however, increasing number of cholecystectomies are currently being performed using robotic platforms with constant advancement in surgical robotic technology. We examined the robotic cholecystectomy (RC) adoption trend at our institution and compared perioperative outcomes between surgical approaches.
Methods: We identified all patients who underwent cholecystectomy as the index operation at our institution from January 2016 through July 2022. The surgical approach and clinical outcomes (perioperative complications, same-day discharge, and 30-day readmission rates) were collected. The change in surgical approach over time was calculated using a simple linear regression. Comparisons of means were conducted using a two-tailed two-sample t test. Rate comparisons were conducted using a two-tailed two-proportion z test.
Results: 665 patients underwent a cholecystectomy as the index operation during the study period. Overall, the most used surgical approach was laparoscopic (n = 488, 73.4%), followed by robotic (n = 165, 24.8%), nd open (n = 12, 1.8%). The increasing proportion of RC was statistically significant (p = 0.04) with decreasing number of LC over the study period (Fig. 1). Age, perioperative complications, and 30-day readmission rates were not significantly different between RC vs. LC, but RC patients were more likely to be discharged on the day of surgery (44.2% vs 27.9%, p = .0002) (Table 1). There were 23 conversions to open from LC (4.8%), but none of RC converted to open.

Conclusion: This longitudinal review reflects increasing adoption of RC at our institution. The higher rate of same-day discharge after RC may be due to patient selection bias and surgeons' preference, while perioperative complication rates and 30-day readmission rates were not significantly different between two MIS approaches. Significant rise in robotic utilization over the recent years with comparable outcomes to laparoscopic approach suggests that robotic surgery will continue to extend its horizon. We plan to study further how other variables, such as surgical urgency, preoperative diagnosis, surgeon preference, and patient comorbidities, can influence choice of surgical approach.

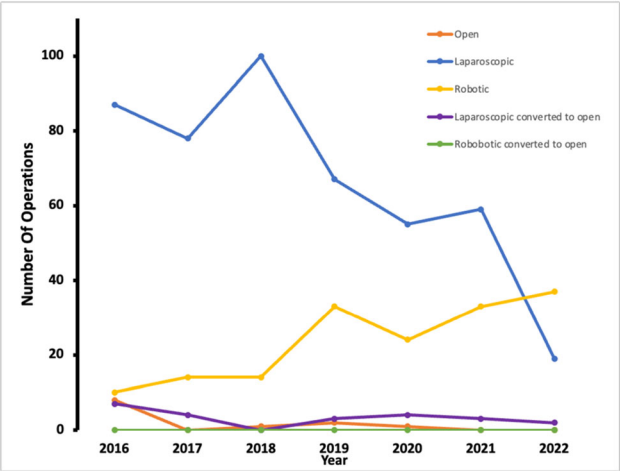


Figure 1

Table 1

	Laparoscopic (n=488)	Robotic (n=165)	p-value
Age			
Mean (SD)	59.8 (15.8)	60.8 (15.6)	0.4664
Median (Range)	62 (29-97)	64 (22-93)	
Surgical Complications	48 (9.8%)	22 (13.3%)	0.2077
Same-day Discharge	136 (27.9%)	73 (44.2%)	0.0001
30-day Readmissions	34 (7.0%)	12 (7.3%)	0.8966
Conversion to Open	23 (4.8%)	0	

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Compare the outcomes between Robotic vs Laparoscopic rectal tumor surgery within an Enhanced Recovery After Surgery(ERAS) protocol

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Background: Robotic rectal surgery has been reported with some benefits, such as lower conversion rate than laparoscopic rectal surgery. Several trials had reported that Enhanced Recovery After Surgery (ERAS) had benefit when combined with laparoscopic rectal surgery. This study aims to compare the outcomes between Robot-assisted surgery vs Laparoscopic surgery for rectal tumor within an ERAS protocol.
Method: This retrospective study included 118 rectal tumor patients receiving minimal invasive surgery(Laparoscopic surgery or Robot assisted surgery) within ERAS protocol from June 2019 to August 2022. Patient characteristics, operative data (operation time, etc.), and post-operative data (Length of hospital stay, etc.) were collected and compared among different groups.
Results: A total of 118 patients with rectal tumor were included in this study. 85 patients underwent Robot-assisted surgery and 33 patients underwent Laparoscopic surgery. The average hospital Length of Stay(LOS) is 8.1 days of all patients. The Robot-assisted surgery group has less average hospital LOS than Laparoscopic surgery group (mean 7.05 vs 11.12 days). Other operative data and outcomes are being collected to make statistical results.
Conclusion: Within ERAS protocol, Robot-assisted rectal surgery has better short-term outcomes than Laparoscopic rectal surgery in Length of hospital stay. While other operative data and outcomes need further investigation.

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Impact of an index robotic foregut surgeon on a general surgery program

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Objectives: Index addition of a single robotic foregut surgeon contributes greatly to a teaching hospital. Our hospital is a 404 bed, University affiliated hospital. The general surgery service is composed of 9 general surgeons primarily performing open and laparoscopic surgery. We analyzed the impact of incorporating a new predominantly robotic foregut surgeon on case volume, case mix index, robot utilization, and resident education. We evaluated the financial impact of this expansion on the hospital.
Methods: Using robot manufacturer data and our operative records, we collected robotic general surgery cases performed two years prior to hiring our foregut surgeon and compared this with the following two years. We used a Chi-squared test to determine if the increase in volume was significant. We reviewed hiatal hernia repair, heller myotomy, sleeve gastrectomy, ventral hernia repair, inguinal hernia repair, and cholecystectomy. The financial impact of these cases was compiled from their DRG (diagnosis related group) value.
Results: Total robotic general surgery cases pre-foregut surgeon participation was 90. The total number of tracked robotic cases increased to 333 during the timeframe of this review. This was a 270 percent increase. This large difference was also statistically significant according to our Chi-squared test, showing a p-value $< .05$. Foregut and bariatric procedures underwent dramatic increases in volume. Over the respective two-year window, hiatal hernia repairs increased from one case to 25, Heller Myotomies from zero to 8, sleeve gastrectomies from zero to 33, ventral hernias from four to 76, inguinal hernias from 84 to 142 and cholecystectomies from one to 38. The total hospital compensation for the latter epoch cases totaled over 1.7 million dollars (Table 1).

Procedure	Number before service expansion	Number after service expansion	National payment rate per procedure	Total payment after service expansion
Robotic Hiatal Hernia Repair	1	25	$34,565	$829,560
Robotic Heller Myotomy	0	8	$34,565	$276,520
Robotic Vertical Sleeves	0	33	$19,282	$636,306
				Total: $1,742,386

Conclusion: Addition of an index foregut robotic surgeon expanded case volume, case variety, and case complexity. Of note, this growth occurred despite the pandemic decrease in elective surgery, a confounding variable. An index robotic champion resulted in broader general surgeon utilization of the robot platform. It generated a new significant stream of revenue. Resident participation and exposure to robotic surgery improved. In conclusion, an index robotic foregut

surgeon can have a disproportionate impact on volume growth, revenue generation, and resident education.

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Better effect of Robotic Colectomy application within an Enhanced Recovery After Surgery protocol: A single-institution retrospective study

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Background: The robotic platform Xi system expanded the surgical working field and made colectomy more feasible than before. However, studies have compared outcomes and compliance between robotic and laparoscopic colon resection surgery according to the Enhanced Recovery After Surgery (ERAS) protocol are still lacking. The purpose of this study is to evaluate the difference between two ways of minimally invasive approaches in colectomy.
Method: We retrospectively review patients who underwent laparoscopic and robotic colectomy within an ERAS protocol from June 2019 to August 2022. Patient demographics, perioperative data, and short-term outcomes were collected and analyzed from patient charts and ERAS database. Primary outcome was length of postoperative stay. Secondary outcomes were postoperative complications, 30-day readmission, rate of conversion to open surgery, and compliance to the ERAS protocol.
Result: A total of 194 patients were included. Robotic group (N = 90) had shorter length of postoperative stay than laparoscopic group (N = 104) (mean 5.7 vs 7.7 days), less postoperative complications (7% vs 18%), less 30-day readmission rate (4% vs 9%), and less conversion rate (1.1% vs 8.6%). Preadmission and preoperative compliance to ERAS protocol were similar between two groups, while intraoperative and postoperative compliance were higher in robotic group.
Conclusion: Our experience indicated that robotic approach has better short-term outcomes and compliance of ERAS protocol than laparoscopic approach in colon resection surgery.

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Eliminating the fulcrum point with a transformative single-port robotic surgery platform

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Purpose: The fulcrum point of multi-port robotic minimally invasive surgery has been the topic of much research and debate, presenting an obstacle to overcome during training and requiring careful consideration in the design of soft tissue robots1. In multi-port robotics, each robotic arm pivots around a fulcrum at the entry point to the abdomen such that movements of the end effector are inverted and automatically translated by the robot to mimic the movement of the surgeon2. While multi-port robotics attempt to minimize trocar movement at the fulcrum, unnecessary torque may still be applied by the robotic arm to the abdominal wall tissues, causing potential issues maintaining pneumoperitoneum, possible increased post-operative pain at the entry site, as well as raising concern for higher herniation rates.
Materials and Methods: A novel single-port, transformative robotics platform eliminates the fulcrum effect as the 2 articulating instrument arms and end effectors encompass joints that move entirely within the abdominal cavity limiting the potential of unnecessary forces at the access port. The biomimetic instruments are designed to replicate the motions and capabilities of a surgeon's arms, with shoulder and elbow joints, in addition to an unlimited 360-degree wrist joint rotation. This study simulated the entry of this two-arm robotic system at 3 different access points: transvaginal, umbilical, and Pfannenstiel. The simulation then kept the angle of entry of the arms relative to the abdominal access point constant while measuring the reach throughout its entire workspace in the abdomen by generating a set of 200,000 different configurations of the robotic arms. Maintaining a constant angle of entry simulates the elimination of the fulcrum effect.
Results: The results show that, due to the shoulder, elbow, and wrist joints of the arms that perform all their articulation after entry, the reachable workspace encompasses the entirety of the average male and female abdomen from the para-aortic nodes to the pelvic floor, across from abdominal sidewall to sidewall and from the abdominal wall to vertebrae, thus allowing multiquadrant surgery, enabling a feasible and effective surgical approach without any fulcrum effect on the abdominal wall access ports.
Conclusion: The design of this new robotic technology has the potential to provide a broad applicability to surgical treatment by expanding single-port surgery or natural orifice translumenal endoscopic surgery approaches thus reducing collateral tissue damage, scarring, and the effect a mechanical fulcrum at each point of entry has on abdominal tissue3.

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Robotic removal of retained gallstones after laparoscopic cholecystectomy—safely resolving a 7-year saga of chronic abdominal pain using new technology

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Background: Retained gallstones is a common postoperative complication after laparoscopic cholecystectomy that often results from intraoperative gallbladder perforation and spillage. Recent systematic reviews report an incidence range of 6–40%.[1] Common risk factors include excessive force of traction, inflammation/adhesions, male sex, advanced age and BMI.[1] Management of retained gallstones includes antibiotics, percutaneous drainage, and surgical removal.[1] The degree of inflammation, along with the angle/view of Morison's pouch may make a laparoscopic approach difficult. To our knowledge, there have been no prior reported cases that use a robotic modality to manage retained gallstones.
Case Presentation: This is a 59-year-old male with no significant medical history who originally underwent a laparoscopic cholecystectomy for biliary colic. The procedure was remarkable for severe cholecystitis and spillage of biliary contents that was reportedly suctioned and removed. Since discharge, the patient had intermittent episodes of subjective fevers and epigastric/flank pain, which resulted in multiple inpatient and outpatient visits over 7 years. Initial imaging and work-up were consistent with intrahepatic abscess of unclear etiology. The differential included retained gallstones, pyogenic abscess, and H. Pylori infection (Figs. 1, 2). He was treated with multiple IR drainages, H. Pylori regimens, and outpatient consultations for other potential etiologies. He sought a second opinion with our clinic, where a diagnosis of chronic peri-hepatic abscess from dropped gallstones was made and he was brought to the operating room for a robotic diagnostic laparoscopy. Using the Da Vinci Xi system, densely adherent and chronically inflamed tissue was encountered in the right upper quadrant. Extensive lysis of adhesions was performed and a window into the chronically inflamed Gerota's fascia at Morison's pouch was safely achieved, with multiple stones

removed, and surgical drain left in place. The drain was removed and the patient has had complete resolution of abdominal pain.
Discussion: Chronically retained gallstones and resultant inflammation coupled with the difficult anatomical positioning of Morison's pouch may make laparoscopic approach to retained gallstones prohibitively difficult. A robotic approach allows for greater degrees of freedom and excellent optics to safely address densely adherent and inflamed tissue in Morison's pouch. When anticipating extensive adhesions in difficult anatomical positions, a robotic approach may provide a safe, minimally invasive option.
Works Cited: Demirbas et al. "Retained abdominal gallstones: a systematic review." Surg Lap Endo Percut Tech. Apr 2015.
Keywords: retained gallstones, robotic surgery, surgical management, Morison's pouch

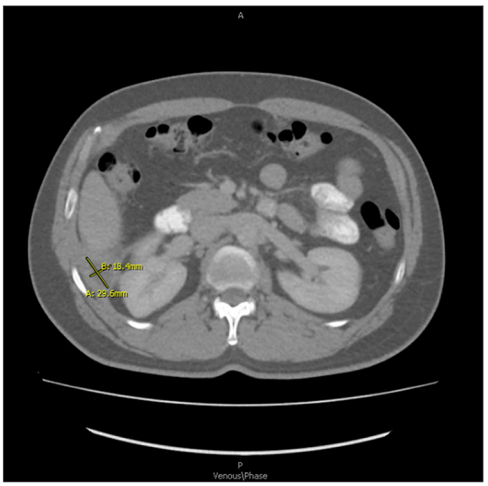


Figure 1. Equivocal CT-AP imaging, axial (1 year after surgery) representative of infra-hepatic abscess vs. potential retained stones. Radiology at this time felt the findings were more consistent with abscess.

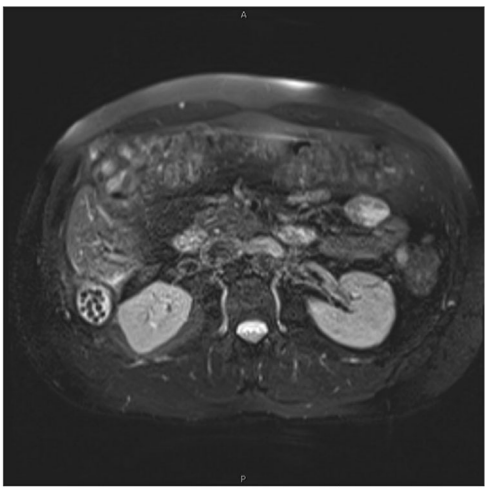


Figure 2. More convincing MRCP in 2 years after surgery, that visualizes more clearly retained gallstones. At this time, it was still felt by other providers that the patient's epigastric / flank pain could be explained by other etiologies.

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Use of augmented intelligence-based point-to-point measurement tool during robotic bariatric surgery to create a consistent sleeve gastrectomy

Amit Trivedi, MD; Sarah Wong, MD; Pascack Valley Medical Center

Sleeve Gastrectomy is currently the most frequently performed bariatric surgery procedure in the USA. While the majority are done using laparoscopic techniques, there is a growing trend toward the use of robotic platforms to perform this procedure. Robots, such as the Asensus Surgical Senhance® Surgical System, have integrated augmented intelligence tools to assist the surgeon in real time during the surgery. One such tool allows the surgeon the ability to digitally measure the distance between any two points in the operative field. The vast majority of surgeons start their stapling along the greater curvature of the stomach at an estimated distance between 4 and 6 cm from the pylorus which is prone to variation. An accurate and reproducible measurement of the distance from the pylorus will allow for the creation of a more consistent sleeve gastrectomy. In this study, we used the digital measurement tool to compare the distance from the pylorus the surgeon estimated, with the actual measurement given by the digital measurement tool. In this small study, significant variation was noted between what the surgeon estimated as their standard distance from the pylorus to what the actual measurement was due to multiple factors, including surgeon experience, parallax error, and anatomical movements.
Methods: Three consecutive sleeve gastrectomy patients were selected for this study. Prior to any dissection, the pylorus was identified and a mark was placed on the pylorus using an endoscopic marking pen. A second mark was made along the greater curvature where the surgeon would start their stapling (Fig. 1). This surgeon's convention is to always aim for the distance between the two points to be 4 cm. This estimated measurement was then confirmed with the digital measurement tool.
Results: With the intended distance to be 4 cm, the actual digital measurements were 5.4 cm (Fig. 2), 3.1 cm (Fig. 3), and 4.1 cm. (Fig. 4). The discrepancy was 1.4 cm, .9 cm, and .1 cm, respectively.
Conclusion: In this very small patient sample, there was variation in what the surgeon was estimating and the real measurement. A digital measurement tool that gives reproducible measurements between two points in real time during a procedure has the potential to allow for a decrease in variability of cases. Additionally, accurate measurements may have clinical implications, such as with tumor margins vs. surgeon estimation. A larger sample study is needed to further validate differences in surgeon distance estimates vs. digital measurements.

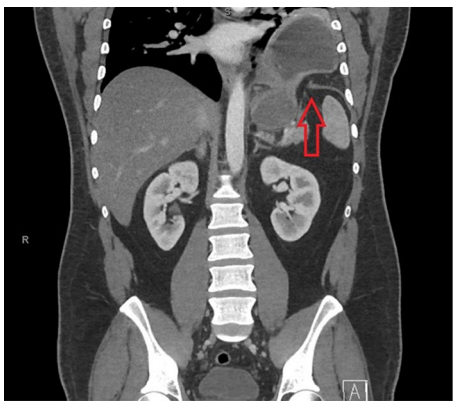
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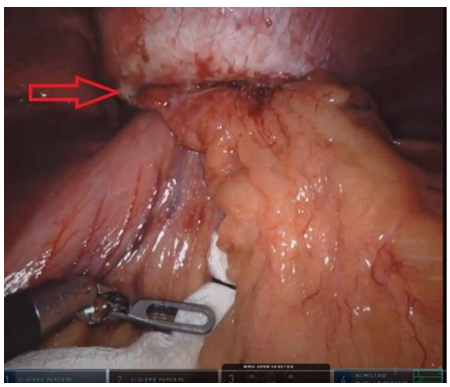
Transabdominal Minimally Invasive Repair of a Left Chronic Traumatic Diaphragmatic Hernia

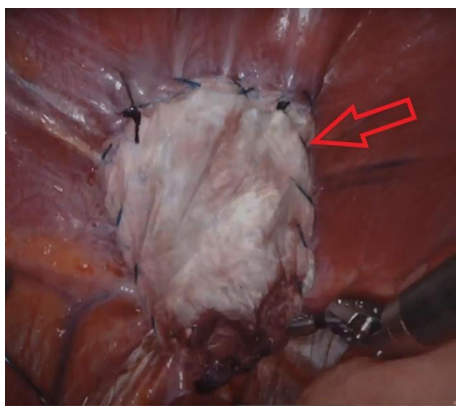
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Traumatic diaphragmatic hernia (TDH) is a condition of unknown exact incidence, with reported rates widely variable in the literature. TDH is thought to be more common in penetrating thoracoabdominal trauma compared to blunt trauma. The left side is thought to be more commonly affected than the right in blunt and penetrating trauma, due to the protective effects of the liver on the right hemidiaphragm in blunt trauma and due to the right-handedness of the majority of the population in penetrating trauma from assault. Although large defects are evident on CT imaging and detection rate is improved with higher resolution CT scanners, smaller defects may require laparoscopy for definitive diagnosis if there is a high

index of suspicion. Traumatic diaphragmatic defects that are recognized immediately are taken to the operating room for repair. However, missed injuries may eventually lead to incarceration and strangulation of abdominal viscera. The mechanism of diaphragmatic injury in blunt trauma is thought to be due to sudden increase in the pleuroperitoneal pressure gradient. In this case report, we present a case of a 32-year-old male who sustained a left diaphragmatic rupture which was missed on initial evaluation. This eventually resulted in herniation of omentum and stomach which resulted in worsening abdominal pain and prompted the patient to come to the hospital for an evaluation two months after initial injury. Although TDH traditionally is approached via thoracotomy or laparotomy, we demonstrate that a transabdominal minimally invasive approach with robot-assisted laparoscopic repair is a viable option, with the potential to reduce the morbidities associated with the open approach.







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Quantifying Effect of Increasing Endoflip Balloon Volume on Gastroesophageal Junction Distensibility

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Introduction: Intraoperative Endoflip is gaining popularity as a method of quantifying changes to the gastroesophageal junction (GEJ) during anti-reflux surgery (ARS). However, these measurements may differ depending on intraoperative variables. In this study, we sought to further quantify changes in GEJ distensibility with increasing Endoflip balloon volumes.
Methods: A retrospective review of a prospectively maintained ARS database was conducted between 2020 and 2022, including patients who underwent hiatal hernia repair and fundoplication with intraoperative Endoflip with a single surgeon. Patients were included if they had Endoflip measurements at more than one balloon fill volume. Prism was used for statistical analysis.
Results: Sixty patients underwent ARS at multiple balloon fill volumes. Endoflip measurements of cross-sectional area (CSA), intraballoon pressure (IBP), and distensibility index (DI) were obtained at 30, 40, and 50 mL of balloon fill volume. Measurements were taken intraoperatively post-induction, post-hiatal hernia repair, and post-fundoplication at 10 mmHg of pneumoperitoneum in reverse Trendelenburg. CSA and IBP showed significant increases with increasing balloon volume from 30 to 40 ml (39.4mm2, 10.0 mmHg, respectively) and 40 ml to 50 ml (72.3mm2, 18.4 mmHg, respectively) post-induction ($p < 0.0001$). This trend continued post-fundoplication, with an average CSA change of 22.8 mm2 from 30 to 40 mL and 34.3 mm2 from 40 to 50 mL ($p < 0.0001$) and IBP change of 16.8 mmHg from 30 to 40 mL and 20.0 mmHg from 40 to 50 mL ($p < 0.0001$). There was no statistically significant change in distensibility with increasing balloon volume at any stage of the operation. Preoperative DI decreased by an average of 0.23 mm2/mmHg from 30 to 40 mL and 0.11 mm2/mmHg from 40 to 50 mL ($p = 0.73$). Post-fundoplication DI decreased 0.06 mm2/mmHg with a change from 30 to 40 mL and increased by 0.07 mm2/mmHg from 40 to 50 mL ($p = 0.76$). Linear regression at all stages of the operation comparing fill volume with DI showed slopes that were not significantly different from zero. When comparing the percent change in CSA to IBP with each increase in balloon volume, we found that the increase in values were roughly proportional, with a maximum mean difference in percent change of 5.8%.
Discussion: We found no statistically significant changes in gastroesophageal junction distensibility with changes in balloon volume between 30, 40, and 50 mL at 10 mmHg of pneumoperitoneum. This suggests a proportional increase in cross-sectional area and intraballoon pressure with increases in balloon volume. Moreover, post-fundoplication measurements of DI may be compared regardless of the balloon volume at which it was obtained.

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Phase Recognition in Inguinal Herniorrhaphy—An Outsourced Competitive Model for AI implementation

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Background: Automated surgical phase recognition in intraoperative videos is an important tool that can be implemented in video-based assessment and workflow analysis. Computer Vision (CV), a field of

Artificial Intelligence (AI), is paramount to this application. Creation of a CV algorithm depends on video acquisition, annotation, and algorithm training and validation. In a new collaboration for research on surgical video, we proposed an approach for competitively outsourcing the engineering component of CV projects. A masters-level class of engineering students was tasked with creating a CV algorithm for phase recognition of robotically assisted laparoscopic inguinal herniorrhaphy (RALIHR).

Methods: Recordings of RALIHR were obtained from a large tertiary referral center. Phases were labeled by the surgical team by a collaborative approach with the engineering team. Students were tasked with optimizing the recognition algorithm as a class assignment using the Kaggle platform.

Results: The dataset contained 130 videos (70 training & 60 test), where 16 surgical phases were defined. Twelve groups of 2–3 students competed, and two groups produced algorithms with F1 score > 80% (Table 1). The three highest performing groups used TMRNet as their base model.

Conclusion: A competitive approach to CV model creation among engineering students is feasible and early results compare to published CV models produced by experienced engineers.

Table 1 Performance of Top 3 groups in descending rank order

Group	Macro F1 Score	Model Name	Basis	Style	Size of model (Mb)	Time for training
1	0.82467	TMRNet	SV-RCnet	Recurrent conv net + LSTM	241	3 h
2	0.81564	TMRnet	SV-RCnet	Recurrent conv net + LSTM	14,256	–
3	0.79971	TMRnet	SV-RCnet	Recurrent conv net + LSTM	137	4 h

Conv convolutional, *LSTM* long short-term memory, *CNN* convolutional neural network, *Temp* temporal; all proper names (e.g., TMRNet, Resnet-18) are described in citations

P561

Can esophagogastric anastomosis in Robotic Ivor Lewis esophagectomy be improved with a robotic stapler?

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Introduction: Esophageal cancer continues to be a largely fatal malignancy, with overall five-year survival ranging from 15 to 20%. Since the introduction of robotic systems in esophageal cancer surgery, the minimally invasive surgical approach is getting more acceptance as the best treatment modality. Formerly esophagogastric anastomosis was performed with either a hand-sewn technique or a circular stapler. The recent introduction of robotic stapler seeks to reduce postoperative complications and improve patient outcomes. This study aimed to compare our robotic versus circular stapler anastomosis peri-operative data and outcomes.

Methods and Procedures: A retrospective review of our medical records identified 49 patients who underwent robotic Ivor Lewis esophagectomy from November 2012 to August 2022. Peri-operative data and patient outcomes were assessed by retrospective review of a prospectively maintained database.

Results: 49 patients (42 males [85.7%]) underwent robotic Ivor Lewis esophagectomy. In 21 patients, a robotic linear stapler was used for anastomosis and in 28 patients a circular stapler was utilized. Groups were homogeneous in all demographic and operative parameters. Compared to the circular stapler, the linear stapler group had a shorter length of stay (LOS) (12.0 ± 4.1 *vs.* 19.5 ± 15.1 days, $p = 0.158$), lower postoperative complication rates (26.3% *vs.* 44.0%, $p = 0.227$), and lower frequency of the anastomotic leak occurrence (4.8% vs. 18.5%, $p = 0.153$). 30-day mortality was lower in the linear stapler group (0% vs. 7.7%; $p = 0.233$).

Conclusion: In our experience, a robotic stapler for Ivor Lewis esophagectomy is associated with reduced LOS, lower postoperative complications, and anastomotic leak rates, as well as reduced 30-day mortality even though statistical significance could not be established due to the small study size. Further research regarding the optimal anastomotic technique is needed.

Table 1. Linear vs Robotic stapler for esophagogastric anastomosis in Ivor Lewis esophagectomy

Index	Robotic stapler ($n = 28$)	Circular stapler ($n = 21$)	*p*-value
Age (years)	64.8±8.3	63.1±10.4	0.529
Sex			0.409
Male	19	23	
Female	2	5	
Mean BMI (kg/m2)	27.1±4.8	27.7±6.2	0.847
Mean ASA score	2.6±0.5	2.5±0.6	0.443
Mean surgery time (min)	377.1±37.8	365.8±24.7	0.543
Mean EBL (mL)	105.6±116.4	109.5±140.2	0.947
Postoperative complications (%)	26.3	44.0	0.227
Anastomotic leakage (%)	4.8	18.5	0.153
Mean LOS (days)	12.0±4.1	19.5±15.1	0.158
30-day mortality (%)	0.0	7.7	0.233

BMI - body mass index; ASA - American Society of Anesthesiologists; EBL - estimated blood loss; LOS - length of stay

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Closure of Ostomy at Synchronous TAPP (COAST): Initial results of a prospective cohort study

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Introduction: The long-term risk of stoma site hernia remains between 30 and 50% after enterostomy reversal. Prophylactic placement of synthetic mesh has been shown to decrease the incidence of subsequent incisional hernia without an increased risk of infection. Studies have described an onlay or inlay mesh placement, but none have attempted a minimally invasive transabdominal preperitoneal (TAPP) repair in conjunction with minimally invasive enterostomy reversal. At our institution, the closure of ostomy and synchronous TAPP (COAST) procedure was developed to incorporate a robotic-assisted laparoscopic mesh placement at the time of stoma reversal. The purpose of this study is to examine clinical outcomes for patients who underwent the COAST procedure.

Methods and Procedures: The COAST procedure is a robotic-assisted laparoscopic stoma (both colostomy and ileostomy) reversal with concurrent TAPP. This procedure was performed on a pilot of patients at an academic colorectal practice who underwent stoma reversal between August 2020 and January 2022. Patient demographics, operative details, and postoperative outcomes were all reviewed.
Results: A total of 10 patients underwent the procedure, mean age was 55.9 years (range 39-78), and a majority were male (M = 9, F = 1). Mean follow-up time since the procedure is 18.1 months (ranges 12-25). Two patients (20%) required reoperation: one patient had bleeding of the ostomy site, while the other had an anastomotic leak. The patient who had an anastomotic leak underwent exploratory laparotomy and reanastomosis, but did not require mesh explantation. The mesh was seen 4 months later at robotic cholecystectomy. There is no incidence of incisional hernia. The largest defect was 8 cm x 8 cm.
Conclusion: COAST is a safe procedure with no incisional hernias at follow-up and a small risk of reoperation. It is fiscally responsible and an effective alternative to a staged ostomy takedown with hernia repair later.

Table 1

Patient demographics(sex, age)	Time since operation(months)	Size of defect(cmxcm)
Male,59	25.3	6 × 4
Male,68	24.4	5 × 4
Male,63	23.4	5 × 5
Female,66	17.9	5 × 5
Male,39	17.5	6 × 6
Male,57	16.6	6 × 6
Male,54	15.4	5 × 5
Male,43	15.0	6 × 6
Male,78	11.7	5 × 4
Male,45	19.0	8 × 8

P564

Robotic Approach to Surgical Management of Small Bowel Obstruction is Safe and Feasible: A Case Series

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Introduction: Operative management of small bowel obstructions (SBOs) has historically consisted of laparotomy and open adhesiolysis. With increased training and surgeon experience with laparoscopy, minimally invasive approach became increasingly popular. Robotic surgery has become a more widespread technique in many surgical specialties, often with improved outcomes and reduced complications. This is particularly important for surgeries that carry high risk for missed enterotomies, such as difficult adhesiolysis. However, there are no studies to date that describe the feasibility and safety of the robotic approach for management of SBOs.
Methods: This is a retrospective case series of patients who underwent minimally invasive robot-assisted surgery for operative management of SBO. Electronic medical records of patients diagnosed with SBO requiring surgery between 2017 and 2021 were reviewed and 32 patients were identified. Patient demographics and preoperative comorbidities were collected, as well as postoperative outcomes and complications.
Results: The median age of our population was 65 years. There were 29 females and 3 males. In terms of race, 21 patients were Caucasian, 10 were African American, and 1 Asian. The median number of major comorbidities in patients was 2 (min 0, max 4). The median operative time was 99 min. Nasogastric tube (NGT) decompression was kept postoperatively in 17 (53.1%) patients with a median duration of 3 days. Overall median time to return of bowel function was 2 days, and median length of stay postoperatively was 4 days. Out of 32 patients, 7 (21.9%) had a Clavien–Dindo grade III or higher complication with 3 patients requiring reoperation and 1 (3.1%) death. Two patients had recurrence of their obstruction. Patients with more major comorbidities (> = 2) were noted to require increased operative time (111.5 min vs. 80.5 min) and longer duration of NGT decompression postoperatively (2.5 vs 0 days). The time to return of bowel function was approximately equal between the high and low comorbidities groups (2 vs 2.5 days), but patients with increased comorbidities had a longer length of stay postoperatively (6.5 vs 2.5 days), as well as increased complications and recurrence of SBO.
Conclusion: The robotic approach to lysis of adhesions for surgical management of SBO is a feasible and safe approach with appropriate surgeon experience. Patient selection is key; those with fewer comorbid conditions may benefit the most from this approach. Future prospective studies should be conducted to compare robotic and laparoscopic approach surgery in this patient population.

P565

Gastrointestinal stromal tumor (GIST) in a patient with Neurofibromatosis type 1: A robotic-assisted resection

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Background: Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal tumors of the gastrointestinal (GI) tract, accounting for 80% of all GI tumors. Neurofibromatosis type 1 (NF1) is an autosomal-dominant disorder caused by the inactivation of the NF1 gene. Gastrointestinal stromal tumor (GIST) has been reported to occur in approximately 6% in patients with NF1. Surgical resection has been described as open, laparoscopic, or robotic assisted.
Methods: A 43-year-old male patient with a history of NF1 presented with abdominal pain, nausea, hematemesis, and bloody stools. The patient's past medical history was consistent with hypertension and alcoholism. The abdominal CT scan documented a mass-like area within right side of abdomen, which appeared solid. Differential diagnosis included abnormal enlarged lymph node or a neoplastic mass. The patient was scheduled for a surgical procedure and a robotic-assisted laparoscopic resection of small bowel with an associated mesenteric mass was performed. The specimens resected were a loop of jejunum and an associated mesenteric mass.
Results: The postoperative course was uneventful. Pain well controlled since the day of surgery, with no nausea or vomiting reported throughout the hospital stay. At post-operative day 4, full return of bowel function was achieved, with the bowel movements described as non-bloody, semi-solid stools. The patient was then discharged home on 5th postoperative day. The pathological report documented five jejunal/mesenteric GISTs strongly positive for CD117 (c-Kit) and DOG-1 with "moderate grade risk," according to Miettinen's classification.
Conclusion: In this case report, we described the robotic-assisted laparoscopic approach. The benefit of this minimally invasive procedure includes shorter hospital stay, earlier return of bowel function, less post-operative pain, and avoidance of large surgical scars.

Moreover, we confirmed the typical location of GIST associated with NF1, which is usually in the small bowel, as opposed to gastric, which tend to occur in the sporadic group. The multicentric location of the tumor was also noted in our case report, a fact that is well described in GIST associated with NF1. Finally, the pathology report was significant for CD117, spindle cell predominant, and benign in nature, histologic findings that are closely related to GIST associated with NF1.

P566

Robotic-Assisted Repair of Acute Traumatic Ventral and Diaphragmatic Hernias: A Case Report

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Traumatic diaphragmatic hernias occur when abdominal contents enter the thoracic cavity through tears in the diaphragm caused by either penetrating or blunt force trauma to the chest or abdomen. In the setting of blunt diaphragmatic rupture, motor vehicle collisions account for 90% of cases, with the left diaphragmatic leaflet two to three times more likely to rupture than the right leaflet. The diagnosis is often missed on initial evaluation as the patient's clinical symptoms are more likely to be from more severe thoracic and abdominal injuries. However, providers must maintain a high degree of clinical suspicion for the diagnosis because strangulation of the herniated visceral tissue is associated with a mortality rate of 30-60%. Here, we present a case of a 72-year-old female who sustained right ventral and diaphragmatic hernias from blunt abdominal trauma caused by the handlebars of her electric bicycle. Her diagnosis was delayed as she was asymptomatic on initial presentation and there were no signs of diaphragmatic injury on imaging. Secondary scans of the chest later identified a ventral wall defect containing herniated fat, and under direct visualization, a large defect was present with extension on to the diaphragm. Due to her stable condition and location of the rupture, she underwent robotic-assisted repair of both her ventral and diaphragmatic hernias, and the primary closure was reinforced with OVITEX permanent mesh. She had an uneventful post-op course and was discharged on post-op day two with follow-up in the clinic. This case highlights the benefits of minimally invasive surgery in trauma patients who are hemodynamically stable, the advantages of robotic-assisted repair compared to the video-assisted laparoscopic approach, and the use of OVITEX mesh to reinforce the primary closure of a large defect.

P567

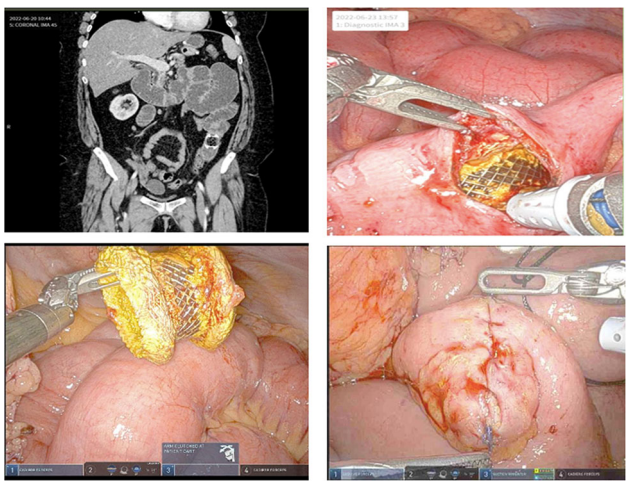
Technical Challenges in Robotic-assisted Exploration for Migrated LAMS stent Causing Small Bowel Obstruction

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Introduction: Choledocholithiasis in patients with previous gastric bypass poses a unique and challenging problem. Due to the reconstructed anatomy, common bile duct cannulation through typical ERCP is not feasible and interventions to sweep the biliary tree or perform sphincterotomy must be achieved through alternative methods. One such method includes forming a gastro-gastric fistula between the gastric pouch and gastric remnant through an endoscopically placed lumen opposing metallic stent (LAMS). No clear recommendations have been made as far as the timeline for stent removal. We report an interesting case of small bowel obstruction secondary to migrated LAM stent.

Case Description: A 51-year-old female with history of Roux-en-Y gastric bypass and simultaneous cholecystectomy presented with an inflamed gallbladder remnant and choledocholithiasis. She subsequently underwent a LAMS procedure, ERCP, and sphincterotomy followed by robotic cholecystectomy of the gallbladder remnant a month later. She was scheduled to have the stent removed 3 months later; however, the patient failed to follow up. She presented to the ED one month later with a small bowel obstruction with a transition point at the site of a migrated metallic stent. An upper double-balloon enteroscopy was unable to identify and retrieve the stent. Subsequently, a robot-assisted diagnostic laparoscopy was performed. The LAM stent was located distal to the jejuno-jejunal anastomosis. A 2-cm enterotomy along the axis of the small bowel was made and the gastric stent was retrieved and exteriorized. The patient tolerated the procedure well and her postoperative course was uneventful. She was discharged on POD6.

Discussion regarding our operative approach revolved primarily around two technical questions. Firstly, despite the lack of haptic feedback, while running the bowel from the ligament of Treitz distally, it was relatively easy to locate stent based on visual inspection. The second technical dilemma was regarding the technique for stent extraction. A proximal enterotomy and "milking" the stent retrograde similar to treatment of gallstone ileus would tear the bowel lumen due to the rough edges of the stent. An enterotomy directly overlying the stent was performed and the stent was extracted. The enterotomy was closed in two layers transversely to decrease likelihood of developing a stricture.



Conclusion: LAMS procedures are not without adverse events, such as bleeding, buried LAMS syndrome, and stent dislodgement and migration. Robotic approach to surgical retrieval of the migrated stent is feasible with attention to technical challenges as proposed in our case report.

P568

Medical student elective in robotic surgery: Can medical students gain proficiency in robotics as easily as residents?

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Objective: To delineate a student curriculum for robotic surgery certification given the rapid increase in prevalence of robotic-assisted

surgeries and lack of training at the medical student and resident levels.

Background: Resident and medical student involvement in robotic-assisted surgical cases has been difficult to achieve due to the steep learning curve and paucity of robot-assisted surgical training programs throughout the country.

Methods: Fourth-year medical student completion of online training modules, in-service training, simulation curriculum, and completion of 10 bedside cases.

Results: During a month-long surgical sub-internship, a fourth-year medical student elected to complete the Core Curriculum for Fundamentals of Robotic Surgery with Intuitive da Vinci robotic surgical systems. Completion provides opportunities for students to use the console and assist in minimally invasive surgical cases, further their learning at other clinical sites throughout the fourth-year enrichment phase, and prepare them for robotic surgery during residency.

Conclusion: Earlier involvement in robotic-assisted laparoscopic surgery enriches student learning and prepares them for the steep learning curve during residency training. At our institution, the curriculum committee just approved a four-week elective for fourth-year medical students that will begin in January 2023. Further studies can be done to assess the amount of student participation, completion, and preparedness for residency in the surgical field using the robotics curriculum.

P569

Is Robotic Approach The Way To Improve Results Of Giant Paraesophageal Hernia Repair?

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Introduction: Giant paraesophageal hernia (GPEH) is primarily seen in elderly patients with multiple comorbidities. Catastrophic complications can occur without surgical intervention. Until recently, laparoscopic minimally invasive hernia repair was the standard of care. However, the da Vinci Surgical System has emerged as a novel way to improve upon the gold standard. The aim of this study was to compare our robotic perioperative data and outcomes with the laparoscopic approach from the literature.

Methods: A retrospective review of our medical records identified 92 patients who underwent robotic repair of GPEH from November 2012 to July 2022. GPEH was defined as at least $\geq$ 50% of the stomach displaced into the thoracic cavity. Perioperative data and patient outcomes were assessed by retrospective review of a prospectively maintained database.

Results: 92 patients (69 women [75%]) underwent surgery for GPEH with a median percentage of the herniated stomach of 100% (range 50-100%). The mean age was 71.1 $\pm$ 12.7 years (range 22–93 years). The mean American Society of Anesthesiologists score was 2.5 $\pm$ 0.6. The mean operative time and hospital length of stay were 166.4 $\pm$ 29.5 min (range 128–209 min) and 5.8 $\pm$ 3.1 days (range 3–18 days), respectively. There were four conversions to open repair (4.4%) and two patients (2.2%) required reoperation. No deaths occurred in the perioperative period.

Conclusion: In our experience, robotic GPEH surgery is associated with a similar length of stay and lower rates of recurrence, reoperations, and mortality. The longer operative time is likely a result of more severe cases, with 29.4% involving herniation of other organs.

Table 1. Robotic Versus Laparoscopic Repair of GPEH

Study	Patients, n	Retrospective (R), Prospective/trial (P)	Type of repair [laparoscopy (L), Robotic (R)]	Median % of Stomach Herniation into Chest	Surgical Time, min	Hospital Stay (days)	30-day mortality (%)	Radiologic recurrence, (%)	Reoperation (%)	Mean follow up (months)
Aly *et al.*, 2005	100	R	L	>50	87.4	3.6	0	23.3*	4.0	47
Luketich *et al.*, 2010	662	R	L	70	N/A	4	1.7	15.7	3.2	30
Prassas *et al.*, 2015	55	R	L	N/A	90	9	1.82	N/A	14.5	64
Our Experience	94	R	R	100	166.4	5.8	0	2.2	2.2	57

* 14 out of 60 patients

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Bilateral Spigelian Hernias Robotic Repair: A Novel Approach to a Rare Surgical Entity

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Spigelian hernias are an uncommon protrusion defect noted between the rectus abdominis and the transversus abdominis muscles, at the semilunar line, with a low incidence of approximately 0.12% to 2% of all ventral hernias. They are associated with bowel incarceration and strangulation, hence surgical repair is indicated. Furthermore, the incidence of bilateral cases is noted to be even lower in the general population. Therapeutic alternatives for spigelian hernias include open repair; however, laparoscopic repair stands as the standard of care in these cases. Feasible and successful robotic repair has been reported, with associated advantages in terms of visualization and surgical instrument mobility. We present the first ever reported cases of bilateral spigelian hernias repaired using robotic approach. We present two female Puerto Rican patients aged 63 and 54. Both patients were referred to our institution complaining of abdominal pain. Imaging studies found bilateral spigelian hernias. In both cases, using the Da Vinci Surgical System, Trans-abdominal Preperitoneal Repair was performed with creation of preperitoneal flaps, reduction of hernia contents, primary repair, and reinforcement with bilateral Symbotex mesh systems. Both patients were discharged home-tolerating oral intake with adequate wound healing. On follow-up visits, patients denied abdominal discomfort and had adequate wound healing. Robotic surgery for spigelian hernias poses an advantage over laparoscopic repair as improved visualization, mobility, and precision in movements allow for more gentle tissue manipulation. Furthermore, this is the first evidence of safe and effective repair in the uncommon entity of bilateral cases, providing a newer alternative in the setting of such presentation.

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Medium- and long-term outcomes after laparoscopic redo paraesophageal hernia repair

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Aim: Although laparoscopic paraesophageal hernia repair has demonstrated to be a safe technique with a satisfactory surgical outcome, the high number of recurrences in the follow-up, with series up to 42%, continues to be the Achilles heel of this morbid condition. Up to 6% of these patients will require a new surgery, technically demanding with a higher morbidity and mortality rate. The aim of this

study is to assess intraoperative and postoperative outcomes, as well as the quality of life of patients undergoing laparoscopic redo of paraesophageal hernia (LRPH) in our institution.
Methods: We retrospectively analyzed a prospectively collected database patients with recurrence of paraesophageal hernia (types II–III–IV) who underwent a LRPH between 2005 and 2021. Variables evaluated included demographics, intraoperative findings, surgical, morbidilty, mortality, and health-related quality of life outcomes.
Results: A total of 48 patients who underwent of LRPH were included in the analysis. The mean age was 61 years (range 31,81). Primary hiatal hernia repair was laparoscopically approached in 93.8% (n = 45) of patients. The main symptoms that patients reported were the same frequency dysphagia and reflux in 37.5% (n = 18). 4 (8.5%) patients required conversion to open surgery (1 due to firm adhesions and 3 to difficulty in identifying the anatomy). A re-Nissen fundoplication was fashioned in 60.4% (n = 29), Toupet funduplication in 20.8% (n = 10), and Dor fundoplication in 8.3% (n = 4). Reinforcement mesh was used in 12.7% (n = 6) of patients. The median length of the surgery was 186 min (95-390 min). 7 (14.5%) patients presented intraoperative complications (gastric perforation, pleural opening, hepatic bleeding). 3 (6.3%) patients developed major complications on the Clavien–Dindo scale (grades III, IV, and V). 43 (89.6%) of them completed the quality of life test (GIQLI, Visick) during the follow-up period. Visick score I or II (symptoms resolved or improved) was recorded by 58.2% patients. The mean GIQLI score was 96.12 (median 97). The mean follow-up was 25 months (range 1–104).
Conclusion: In skilled hands and in centers of expertise. laparoscopic redo paraesophageal hernia (LRPH) can offer good postoperative outcomes with an improvement in quality of life.

P674

Elevated urokinase Plasminogen Activator-1 levels in wound fluid after colorectal resection likely accounts for the elevated plasma levels noted for two weeks after surgery

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Introduction: Urokinase-type Plasminogen Activator-1 (uPA) is a secreted protease that converts plasminogen to plasmin. Activated plasmin catalyzes many physiopathological processes requiring extracellular matrix (ECM) remodeling. uPA together with the uPA receptor (uPAR) and PAI-1 plays a wide regulatory role as regards to tumor cell proliferation, adhesion, migration, and metastasis. uPA and uPAR promote immune cell activation at sites of matrix remodeling during wound healing. uPA directly and via plasmin leads to activation of angiogenic growth factors, including VEGF and IGF. uPA over expression has been noted in colorectal cancer (CRC); high-tumor levels correlate with a poor prognosis. Persistently elevated postop plasma uPA levels (11–66% over baseline) after CRC resection (CRCR) has been noted previously. We believe wound uPA levels will be high and account for much of the postop uPA plasma elevations. This study's purpose was to determine perioperative uPA blood and wound fluid (WF) levels after CRCR.
Method: Consenting CRCR patients (pts) enrolled in an IRB-approved tissue/data bank in whom a pelvic drain had been placed for whom adequate plasma and wound fluid samples were available were studied. Clinical and pathologic data were collected. Plasma and WF samples were taken simultaneously on postoperative day (POD) 1, 3, and a late time point between POD7 and 13. The POD 7–13 samples were bundled and considered as a single time point. Samples were centrifuged and stored at − 80 °C. uPA levels were determined in duplicate via ELISA and reported as median and 95% CI. The Wilcoxon and Mann–Whitney test were used for analysis ($p < 0.05$).
Results: 29 CRCR pts (male: 12, female 17; colon 5, rectal 24; mean age 65.2 ± 11.4 years) were studied; the surgical methods used were minimally invasive in 25 and open in 4 pts (mean incision length MIS 8.2 ± 3.4 and open 23.8 ± 7.7). The mean length of stay was 9.6 ± 6.3 days. Significantly higher plasma uPA levels were found on POD1, 3, and 7–13 ($p = 0.02$ to $p < 0.01$) versus preop levels. Also, WF uPA levels were many times higher than the corresponding plasma levels at each postop time point ($p < 0.001$)(see table).
Conclusion: Median postop plasma uPA levels were again noted to be significantly elevated over baseline. WF levels were 529–1086%higher than the corresponding plasma levels. The wounds may account for much of the plasma elevations noted post-CRCR. Although unproven, uPA, by promoting angiogenesis, may facilitate growth of residual tumor deposits postop.

Title: uPA protein levels in preop and post op Plasma vs. postop Wound fluids

Time	Plasma (ng/ml)	(n)	Wound fluids (ng/ml)	(n)	*p*
PreOp	690.8; 95% CI: 553.9- 828.2	29	N/A	N/A	N/A
POD1	709.5;95%CI: 621.9- 955.3	29	8421; 95% CI: 5285.5- 12191.7	28	< 0.001
POD3	799.2;95%CI: 648.5- 946.8	27	5735;95% CI: 4367.3- 6428.8	25	< 0.001
POD 7-13	782.3;95%CI: 726.5- 1233.9	16	4921;95% CI: 3999.3- 10849.8	17	< 0.001

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Matrix metalloproteinases 9 levels are significantly elevated in both the plasma and wound fluid for two weeks after colorectal cancer resection

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Introduction: Matrix metalloproteinase 9 (MMP9) plays a key role in extracellular matrix (ECM) remodeling and production of bioactive molecules in subcellular environments that impact many physiological processes. TNF-a, IL-8, VEGF, and FGF2 stimulate MMP9 production in endothelial cells (EC) that regulates proteolytic tissue remodeling and impacts both physiologic and pathologic angiogenic restructuring. MMP9 supports tumor metastasis but also plays a role in wound healing and keratinocyte migration. MMP9 is produced by WBC's, ECs, and other cell types. Plasma MMP9 levels are elevated in colorectal cancer (CRC) patients (pts). Further, plasma MMP9 elevations lasting three weeks after CRC resection have been noted. The etiology of this postop change is unclear, a possible source is the healing wounds. The purpose of this study was to simultaneously measure the levels of MMP-9 in the plasma and fluid from the surgical wounds perioperatively in CRC pts undergoing resection.
Methods: Consenting CRC pts undergoing elective surgery enrolled in an IRB-approved tissue/data bank for whom there was adequate volumes of plasma and wound fluid (WF, from intra-abdominal Jackson–Pratt drains) were eligible. Demographic, clinical, and pathologic data were reviewed. Preoperative (preop) and postoperative (postop) blood and postop WF samples were simultaneously obtained on postop day (POD) 1, POD3, and a time point between

POD 7–13. Centrifuged samples were stored at − 80 °C. Late samples (POD 7–13) were bundled into a 7-day block and considered as a single time point. MMP9 levels were determined in duplicate via ELISA. The Wilcoxon and Mann–Whitney test were used for analysis (sig. $p < 0.05$).

Results: Blood and WF samples from 29 CRC pts (male: 12, female: 17; colon 5, rectal 24; mean age 66.10 ± 12.27 years) were studied. MIS procedures were done in 25 pts (mean incision length (IL) 8.3 ± 3.5) and open surgery in 4 pts (mean IL 23.8 ± 7.8). The mean length of stay was 9.2 ± 6.3 days. Preop levels versus plasma MMP9 levels were elevated on postop day (POD)1, 3, and 7–13 ($P < 0.001$). WF MMP9 levels were 4–15 times higher than the corresponding plasma levels at all postop time points ($p < 0.0001$) (Table 1).

Conclusion: Median postop plasma MMP 9 levels were found to be 2–2.8 times higher than preop. Of note, wound MMP9 levels were 4–15 times higher than corresponding plasma levels. Elevated wound MMP9 levels likely account, in part, for the increased plasma levels. Elevated plasma MMP9 may promote the growth of residual tumor deposits after surgery.

Title: MMP9 protein levels in preop and post op Plasma vs. postop Wound fluids

Time	Plasma (ng/ml)	(n)	Wound fluids (ng/ml)	(n)	*p*
PreOp	85.80; 95% CI: 50.32- 140.12	29	N/A	N/A	N/A
POD1	206.6;95%CI: 141.12- 329.44	29	3169.0; 95% CI: 2072.0- 4534.4	29	< 0.001
POD3	200.5;95%CI: 118.44- 296.68	27	812.0;95% CI: 440.0- 1837.6	25	< 0.001
POD 7-13	205.1;95%CI: 103.16- 289.72	17	1435.0;95% CI: 426.4- 4213.2	17	< 0.001

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