Abstract| Abdominal/Laparoscopy

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

Bryana Baginski MD
Baylor University Medical Center

Introduction/Background
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, 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.

IMPACT OF LIPOSOMAL BUPIVACAINE TAP BLOCKS ON PATIENT OUTCOMES IN MINIMALLY INVASIVE COLORECTAL SURGERY

Simmone Spielmann BS
Texas Tech University - Amarillo

Introduction/Background
As part of enhanced recovery after surgery protocols, there has been an increased interest in the optimization of analgesic techniques. This study compares the efficacy of liposomal bupivicaine transverse abdominis plane (TAP) blocks to traditional infiltration in their outcomes in minimally-invasive colorectal surgery patients. Traditional methods such as epidural anesthesia present an unfavorable side effect profile, while TAP blocks with conventional anesthetics have a short half-life and sub-optimal pain control. Liposomal bupivicaine (Exparel) is a longer-acting slow release anesthetic that has shown promise in pain control following colorectal surgery, particularly in the field of minimally invasive procedures.

Methods:
A retrospective study was done using patients who had undergone minimally-invasive (MIS) colorectal surgery, to study the effect of perioperative liposomal bupivicaine TAP block on postoperative outcomes. The parameters studied include length of stay, opioid consumption, and post-operative pain score. Patients aged 18 to 89 who were admitted for surgery between January 1, 2017 and September 20, 2019 were recruited in the study, and there were a total of 241 patients retrospectively included. The control group consisted of patients who underwent MIS colorectal surgery without receiving liposomal bupivicaine TAP block, and received a short-acting local anesthetic instead.

Results:
Liposomal bupivicaine TAP blocks in our study population showed statistically significant decreases in both length of stay and in the need for adjunct use of non-steroidal anti-inflammatory (NSAID) drugs for additional post-operative analgesia. The mean length of stay in the control group was 4.79 days, while in the liposomal bupivicaine group it was 4.14 days with a p-value of 0.011. The data additionally showed that 77% of patients in the control group required NSAIDs for pain control, as contrasted to only 45% of the Exparel, with a p-value of <0.001. While the Exparel also had decreased opioid and acetaminophen use, this requires a larger study population and additional investigation as it did not reach a level of statistical significance in our study. Pain scores and post-operative complication rates were similar between the two groups.

Conclusion
This study shows that liposomal bupivicaine TAP blocks significantly improved several post-operative outcomes in minimally invasive colorectal surgeries. These Exparel TAP blocks not only decreased the average length of stay for patients, but also decreased their need for additional analgesics. Future research could continue to investigate the potential benefits in additional parameters such as Acetaminophen and Opioid use post-operatively.

Abstract| Abdominal/Laparoscopy

Evaluating the optimal timing of ICG administration in Robotic Cholecystectomy

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Introduction/Background

The critical view of safety is integral to a successful cholecystectomy. Indocyanine Green (ICG) is a helpful adjunct in minimally invasive cholecystectomies. ICG, a water-soluble substance, is intravenously administered up to a maximal dose of 2 mg/kg with a standard concentration of 2.5mg per 1 ml. It is widespread practice to administer 2.5 mg of ICG at least 45 minutes prior to incision time. However, there are no recommendations for optimal ICG administration time in patients with inflammatory cholecystitis.

Methods:

We conducted a retrospective study on adult patients from January 2020 to July 2022 who underwent laparoscopic assisted robotic cholecystectomy. Primary outcomes included visualization of both Cystic Duct (CD) and Common Bile Duct (CBD), which were assessed from intraoperative (IO) videos that were reviewed by two independent blinded surgeons. Secondary outcomes included IO CBD injury and total operative time (OT).

Results:

Our final cohort of patients after our exclusion process resulted in 41 patients. Upon review of reported post operative diagnosis, 19% (n = 8) had Acute Cholecystitis (AC), 36% (n = 15) had Chronic Cholecystitis (CC), 44% (n = 18) had other (OTH) diagnosis (i.e., biliary colic, choledocholithiasis, and gallstone pancreatitis). Final pathology reports demonstrated 12% (n = 5) had AC, 17% had Acute on Chronic Cholecystitis (ACC), 73% had CC. Initial analysis was performed using Fischer Exact Test by categorizing total ICG time into under 45 minutes, between 45 minutes to 180 minutes, over 180 minutes. There were no patients with CBD injury. Overall, there was a statistically significant relation between CD visualization and ICG administration (p-value = 0.02) but there was no significance noted for CBD visualization (p-value = 0.11). Furthermore, there was no statistically significant relation between ICG administration time and visualization of either CD or CBD in patients with histopathological diagnosis of AC and ACC (p-value = 1 for both). However, there was statistically significant relation between ICG administration time and both CD and CBD visualization in patients with CC (p-value = 0.0025 for both). Within sub-cohorts of patients with or without CBD and/or CD visualization, linear regression analysis showed that there was no significant correlation between either CBD or CD visualization based on ICG time. No significant relation was noted between OT and ICG time within groups of AC, CC, and OTH (p-value of 0.65, 0.24, and 0.16 respectively). Overall, OT and ICG time were not strongly correlated (r = 0.07, p-value of 0.65).

Conclusion

Overall, CD visualization was significantly increased with length of ICG administrations. Compared to the acute cholecystitis group, chronic cholecystitis group had improved visualization of CD and CBD with earlier ICG administration. Though the power of the study is reduced due to the small sample size, we expect to strengthen our results with an expanded cohort. While the utility of ICG is established, there is

still more research needed to standardize diagnosis driven usage of ICG, specifically customizing to patient's type of biliary disease.

		ICG Timing						P - Value
		Under 45 minutes		45 minutes - 180 Minutes		Over 180 minutes		
Visualization		Yes	No	Yes	No	Yes	No	
Cystic Duct	AC	1	1	1	1	0	0	1
	CC	2	3	19	0	6	0	0.00006
	ACC	2	0	3	1	1	0	0.39
	Combined							0.02
Common Bile Duct	AC	2	0	1	1	0	0	0.24
	CC	2	3	19	0	6	0	0.00006
	ACC	2	0	3	1	1	0	0.39
	Combined							0.12

Abstract| Bariatric/Foregut

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/Background
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

Abstract| Bariatric/Foregut

The Influence of Psycho-Emotional Health on Type of Laparoscopic Anti-Reflux Surgery and Quality of Life in GERD Patients

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University of Texas Austin - Dell Medical School

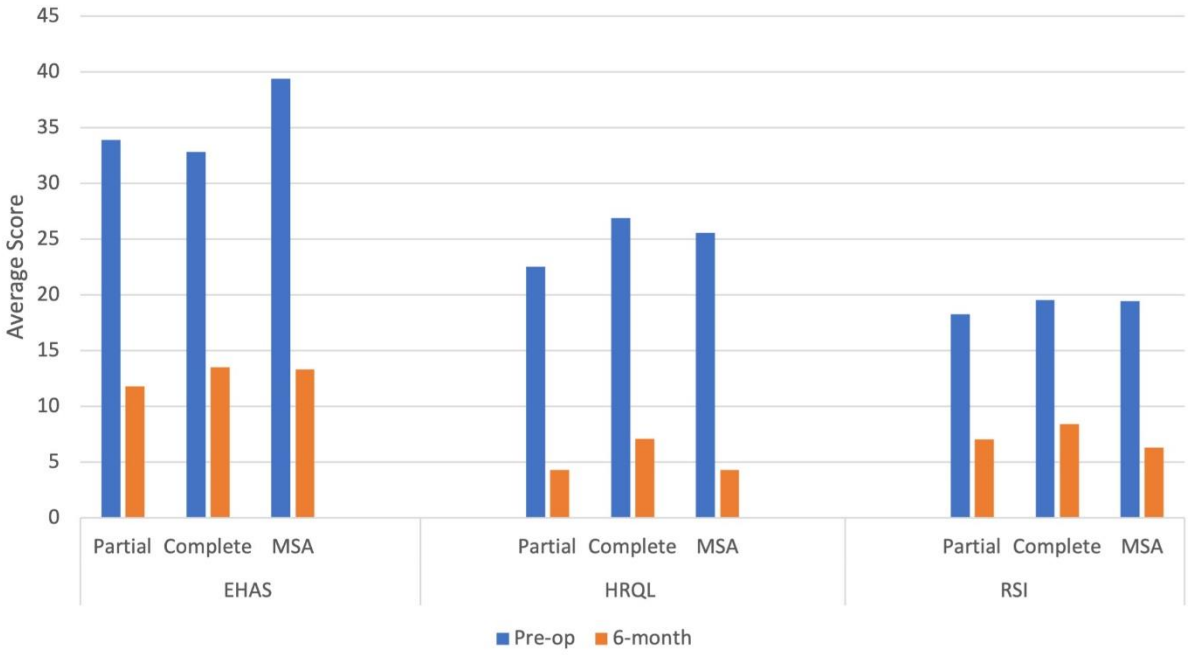
Introduction/Background
Poor psycho-emotional health has long been linked to compromised surgical outcomes, especially in anti-reflux literature. We recently reported that decreased psycho-emotional health did not negatively impact the improvement in GERD-specific patient-reported outcome measures (PROMs) following laparoscopic anti-reflux surgery (LARS). Psycho-emotional health is measured by utilizing the Northwestern University Esophageal Hypervigilance and Anxiety Scale (EHAS), where a higher score is worse. In this study, we sought to assess whether the type of LARS performed - partial fundoplication, complete fundoplication, or magnetic sphincter augmentation (MSA) - affects the degree of improvement in GERD symptoms through these same measures.

Methods:
We performed a retrospective cohort study of 108 adult patients with objective evidence of GERD who underwent either MSA (n = 14), complete fundoplication (n = 34), or partial fundoplication (n = 60). All patients completed the Gastroesophageal Reflux Disease-Health Related Quality of Life (GERD-HRQL), Laryngoesophageal Reflux Symptom Index (LPR-RSI), and EHAS surveys during the perioperative period. We then compared the degree of improvement of each of these scores against the type of LARS performed.

Results:
There was a statistically significant improvement in the GERD-HRQL, LPR-RSI, and EHAS for all types of LARS performed (Graph 1, $p < 0.001$). On linear regression analysis, for patients with a higher baseline EHAS score, partial fundoplication was independently associated with greater improvements in GERD-HRQL (β -0.337, $p = 0.01$) and LPR-RSI (β -0.214, $p = 0.018$). The association was not observed for MSA ($p = 0.08$ for GERD-HRQL and $p = 0.22$ for LPR-RSI) and complete fundoplication ($p = 0.84$ for GERD-HRQL and $p = 0.30$ for LPR-RSI).

Conclusion
Consistent with our previous findings, this study suggests that patients with greater anxiety about GERD benefit more from LARS. Additionally, this study demonstrates that patients with objective evidence of GERD and a higher baseline EHAS score may benefit more from a partial fundoplication with a greater degree of improvement in their symptom severity scores. Further evaluation of a larger cohort is needed to find nonresponders and determine if the type of fundoplication has a greater impact on these patients.

Graph 1. Baseline vs. 6-month changes in PROMs



Single center experience with expansion of same day discharge colectomies

Stephen Chiang MD
University of Texas HSC - Houston

Introduction/Background

Enhanced recovery after surgery pathways have provided widespread benefits to both patients and hospital systems. As we continue to improve on these protocols, there has been great interest in ambulatory colectomies which has been shown to be feasible and safe in well selected patients. There remains; however, limited data on how to effectively implement same day discharge (SDD) protocols. This study aims to evaluate how our single center SDD experience evolved over time and to identify factors associated with failure of SDD.

Methods:

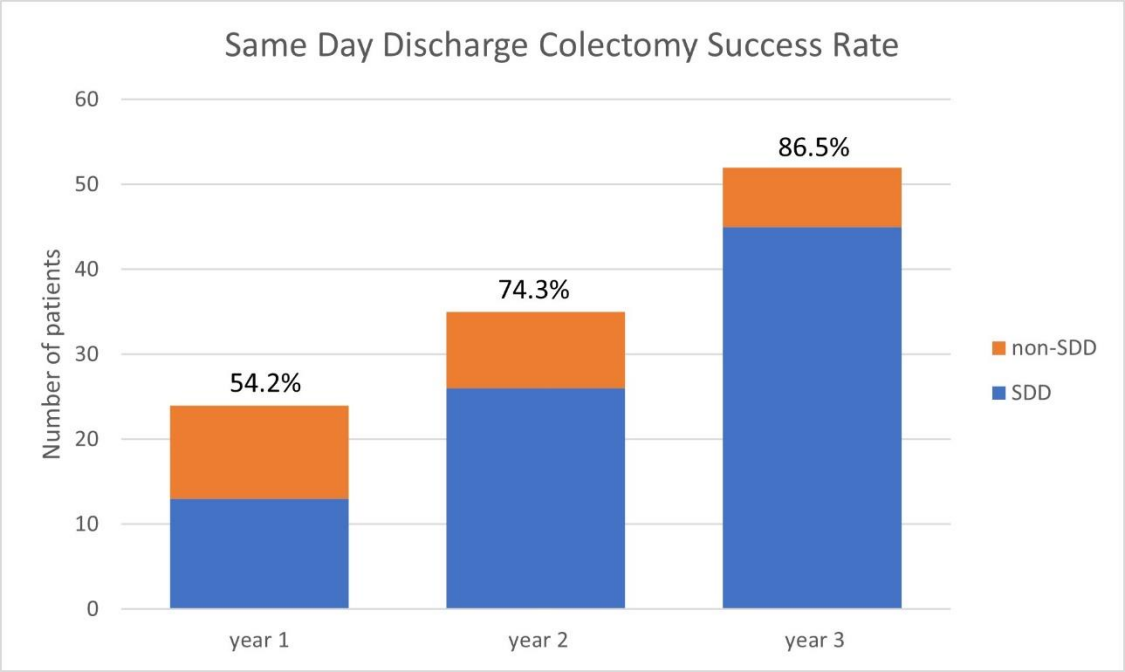
A retrospective review was performed on all patients that were identified as candidates for ambulatory colectomies performed between August 2019 to September 2022 at a single institution. The patients were evaluated by the surgical team in the recovery area to determine if they met criteria for SDD. Demographic data, operative details, and post-operative complications were compiled and compared between the SDD and non-SDD groups. The reason that a patient was deemed to be unsuitable for SDD post-operatively was also recorded. The number of patients identified as candidates and success rate of SSD over time was compared throughout the years to evaluate the growth of the program.

Results:

A total of 111 patients were identified as candidates for same day discharge colectomy, of which 83 were successful SDD. The number of patients identified for SDD in the first year was 24, with a success rate of 54.2%. This increased to 34 patients in the second year with a success rate of 74.3%, which was further expanded to 54 patients in the third year with an 86.5% success rate. Multiple factors were not found to contribute to failure of SDD including age, BMI, prior abdominal surgery, indication for procedure. The only statistically significant factors found to contribute to SDD falilure were increased operative time (149 min vs. 269 min; $p<0.01$) and increased estimated blood loss (48 mL vs. 77 mL; $p<0.01$). The mean length of stay for the non-SDD group was 2.07 days with 13/28 patients able to be discharged on POD 1. Readmission rate within 30 days was 7.2% in the SDD group vs. 14.3% in the non-SDD group. One anastomotic leak each was identified in the SDD group and the non-SDD group.

Conclusion

SDD colectomy is safe in well-selected patients and complications remain rare, though more complicated cases with longer operative time and increased blood loss are more likely to be unsuitable for SDD. As we continued to build on our SDD colectomy experience, we were able to identify more patients for inclusion and improve our successful implementation rate.


Same Day Discharge Colectomy Success Rate
60
50
40
30
20
10
0
Number of patients
54.2%
74.3%
86.5%
year 1
year 2
year 3
non-SDD
SDD

Perioperative Outcomes of Robotic and Laparoscopic Surgery for Colorectal Cancer: A Propensity Score Matched Analysis

Emile Farah MD
University of Texas Southwestern Medical Center

Introduction/Background
Robotic colorectal surgery is becoming the favorable surgical approach for colorectal cancer (CRC). Compared to laparoscopy, robotic surgery offers several technical advantages that could improve outcomes. There is limited data reporting the perioperative outcomes of these two surgical approaches in the management of CRC. In this study, we aim to compare perioperative outcomes of robotic and laparoscopic surgery for CRC using a nationally representative clinical database.

Methods:
Using the colectomy-targeted ACS-NSQIP database (2015-2020), we identified colorectal procedures for malignant etiologies using CPT codes. We included right colectomy (RC), left colectomy (LC), and low anterior resection (LAR). After estimating the conditional probability of undergoing robotic surgery (propensity score), optimal pair matching was performed. We defined textbook outcomes (TO) as: absence of 30-day mortality, no complications or return to OR, length of stay <5 days (75th percentile), no readmission. We used a multivariate logistic regression to estimate the average treatment effect. Data were matched and analyzed using R Foundation.

Results:
Out of 234,304 colectomy cases screened for eligibility, our final cohort included 53,209 patients. Laparoscopic to robotic 2:1 optimal pair matching was performed for RC and LC, and 1:1 for LAR. Matched datasets were evaluated for baseline covariate balance and homogeneity. The largest standardized mean difference was 0.048 in matched data sets. Multivariate regression analysis showed an improvement in textbook outcomes (OR= 1.4 p<.001) favoring robotic over laparoscopic in RC and LC, but not in LAR (Figure 1). Robotic LAR was associated with increased severe complications (OR=1.2 p<0.001). For all three procedures, the mean robotic conversion rate (3.1%) was significantly lower than the mean laparoscopic conversion rate (9.23%) (OR= 0.5 p<0.001). The mean operative time (OT) was significantly longer in robotic (225 minutes) compared to laparoscopy (mean= 177 minutes) (OR=1.3 p<0.001).

Conclusion
Robotic surgery for CRC offers an advantage over conventional laparoscopic surgery by improving textbook outcomes in right and left colectomy. This advantage is not seen in robotic LAR, which also showed an increased risk of severe complications. For all three procedures, the robotic approach was associated with a longer operative time, but a lower conversion rate. Our future efforts will aim to explore and compare the long-term outcomes of robotic and laparoscopic CRC surgery.

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

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University of Texas Medical Branch - Galveston

Introduction/Background
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 largely left to surgeon preference. Heavyweight mesh provides increased tensile strength to the repair but is also associated with a greater foreign body reaction and mesh sensation. We evaluated the effect of mesh weight on 30-day postoperative outcomes following lateral abdominal wall hernia repair.

Methods:
Patients who underwent a lateral abdominal wall hernia repair with 30-day follow-up were identified in the Abdominal Core Health Quality Collaborative (ACHQC) database. The mesh used in the repair was categorized as heavy or non-heavyweight mesh; heavyweight was defined as density >75g/m2, and non-heavyweight was <75g/m2. Outcomes of interest were compared between the two groups using multiple logistic regression with adjusted odds ratios (OR).

Results:
The ACHQC identified 4130 lateral abdominal wall 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 used in their repair. Postoperatively, heavyweight mesh patients were less likely to develop a surgical site occurrence (OR 0.79; 95% CI 0.64-0.97; p=0.02) or be readmitted (OR 0.73; 95% CI 0.56-0.96; p=0.02) compared to those with non-heavyweight mesh. The difference in surgical site occurrence was attributed to a significantly 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, surgical site occurrence requiring procedural intervention, and reoperation (Table).

Conclusion
Heavyweight mesh use in lateral abdominal wall hernia repair is associated with decreased rates of surgical site occurrence 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.

	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

Table. Postoperative 30-day outcomes of heavyweight mesh patients compared to non-heavyweight mesh (reference). **p<0.05; CI, confidence interval; SSI, surgical site infection; SSO, surgical site occurrence; SSOPI, surgical site occurrence requiring procedural intervention*

Body Mass Index Effect on Minimally Invasive Ventral Hernia Repair: A Systematic Review and Meta-Analysis

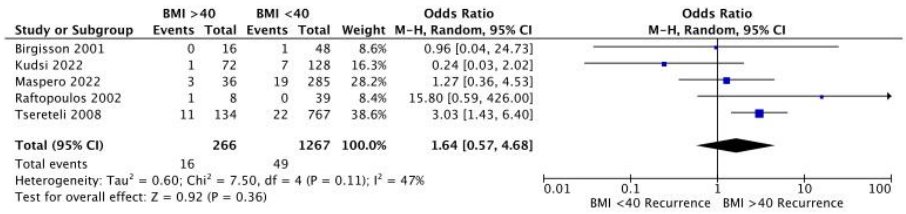
Sergio Mazzola Poli de Figueiredo MD
University of Texas Medical Branch - Galveston

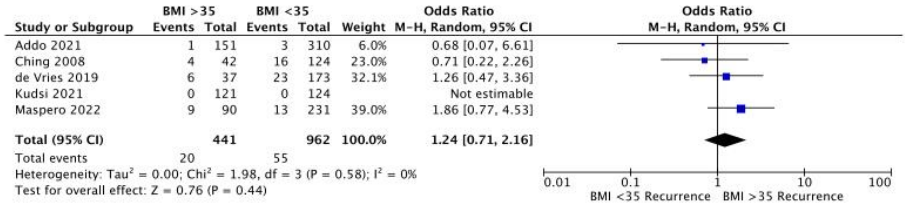
Introduction/Background
Obesity is one of the most important risk factors for complications after ventral hernia repair (VHR) and minimally invasive (MIS) techniques are preferred in obese patients as it minimizes wound complications. It is common practice to attempt weight loss to achieve a specific Body Mass Index (BMI) goal, however, patients are often unable to reach it and fail to become surgical candidates. Therefore, we aim to perform a meta-analysis of studies comparing outcomes of obese and non-obese patients undergoing laparoscopic or robotic VHR.

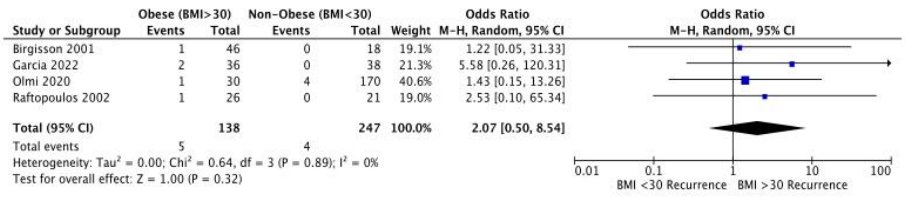
Methods:
A literature search of PubMed, Scopus, and Cochrane Library databases was performed to identify studies comparing obese and non-obese patients undergoing MIS VHR. Postoperative outcomes were assessed by means of pooled analysis and meta-analysis. Statistical analysis was performed using RevMan 5.4. Heterogeneity was assessed with I2 statistics.

Results:
6,483 studies were screened and 26 were thoroughly reviewed. 11 studies and 3,199 patients were included in the meta-analysis. BMI>40 kg/m2 cutoff analysis included 5 studies and 1533 patients; no differences in hernia recurrence (OR 1.64; 95% CI 0.57-4.68; P=0.36; I2=47%), seroma, hematoma and surgical site infection (SSI) rates were noted. BMI>35 kg/m2 cutoff analysis included 5 studies and 1403 patients; no differences in hernia recurrence (OR 1.24; 95% CI 0.71-2.16; P=0.58; I2=0%), seroma, hematoma and surgical site infection (SSI) rates were noted. BMI>30 kg/m2 cutoff analysis included 4 studies and 385 patients; no differences in hernia recurrence (OR 2.07; 95% CI 0.5-8.54; P=0.32; I2=0%), seroma, hematoma and surgical site infection (SSI) rates were noted.

Conclusion
High BMI patients undergoing minimally invasive ventral hernia repair have similar hernia recurrence, seroma, hematoma and surgical site infection rates compared to lower BMI patients. Further prospective studies are required to establish optimal management in obese patients undergoing VHR.


BMI >40
BMI <40
Odds Ratio
Odds Ratio
Study or Subgroup
Events Total Events Total Weight M-H, Random, 95% CI
M-H, Random, 95% CI
Birgisson 2001 0 16 1 48 8.6% 0.96 [0.04, 24.73]
Kudsi 2022 1 72 7 128 16.3% 0.24 [0.03, 2.02]
Maspero 2022 3 36 19 285 28.2% 1.27 [0.36, 4.53]
Raftopoulos 2002 1 8 0 39 8.4% 15.80 [0.59, 426.00]
Tsereteli 2008 11 134 22 767 38.6% 3.03 [1.43, 6.40]
Total (95% CI) 266 1267 100.0% 1.64 [0.57, 4.68]
Total events 16 49
Heterogeneity: Tau² = 0.60; Chi² = 7.50, df = 4 (P = 0.11); I² = 47%
Test for overall effect: Z = 0.92 (P = 0.36)
0.01 0.1 1 10 100
BMI <40 Recurrence BMI >40 Recurrence


BMI >35
BMI <35
Odds Ratio
Odds Ratio
Study or Subgroup
Events Total Events Total Weight M-H, Random, 95% CI
M-H, Random, 95% CI
Addo 2021 1 151 3 310 6.0% 0.68 [0.07, 6.61]
Ching 2008 4 42 16 124 23.0% 0.71 [0.22, 2.26]
de Vries 2019 6 37 23 173 32.1% 1.26 [0.47, 3.36]
Kudsi 2021 0 121 0 124 Not estimable
Maspero 2022 9 90 13 231 39.0% 1.86 [0.77, 4.53]
Total (95% CI) 441 962 100.0% 1.24 [0.71, 2.16]
Total events 20 55
Heterogeneity: Tau² = 0.00; Chi² = 1.98, df = 3 (P = 0.58); I² = 0%
Test for overall effect: Z = 0.76 (P = 0.44)
0.01 0.1 1 10 100
BMI <35 Recurrence BMI >35 Recurrence


Obese (BMI>30)
Non-Obese (BMI<30)
Odds Ratio
Odds Ratio
Study or Subgroup
Events Total Events Total Weight M-H, Random, 95% CI
M-H, Random, 95% CI
Birgisson 2001 1 46 0 18 19.1% 1.22 [0.05, 31.33]
Garcia 2022 2 36 0 38 21.3% 5.58 [0.26, 120.31]
Olmi 2020 1 30 4 170 40.6% 1.43 [0.15, 13.26]
Raftopoulos 2002 1 26 0 21 19.0% 2.53 [0.10, 65.34]
Total (95% CI) 138 247 100.0% 2.07 [0.50, 8.54]
Total events 5 4
Heterogeneity: Tau² = 0.00; Chi² = 0.64, df = 3 (P = 0.89); I² = 0%
Test for overall effect: Z = 1.00 (P = 0.32)
0.01 0.1 1 10 100
BMI <30 Recurrence BMI >30 Recurrence

Evaluating Safety and Effectiveness in Management Strategies for High-Risk Choledocholithiasis: Defining the Optimal Approach

Shah-Jahan Dodwad DO
University of Texas HSC - Houston

Introduction/Background
Optimal management of high-risk choledocholithiasis (HR-CDL) varies based on institutional resource availability. While pre-operative endoscopic retrograde cholangiopancreatography (ERCP) is often performed prior to cholecystectomy, the ideal management pathway remains undefined. At our safety-net hospital, we hypothesized that proceeding directly to laparoscopic cholecystectomy (LC) with intra-operative cholangiogram (IOC) prior to ERCP is a safe and effective management strategy for HR-CDL.

Methods:
Adult patients with HR-CDL who underwent inpatient LC at a safety-net hospital from 2016-2020 were retrospectively identified and included. HR-CDL was defined as the presence of total bilirubin >4.0 mg/dL, common bile duct (CBD) stone on sonography, clinical ascending cholangitis, or both CBD diameter >6mm and total bilirubin 1.8-4.0 mg/dL. Patients were divided into surgery-first and ERCP-first groups. Safety was assessed using rates of re-operation, readmission, retained CBD stones after discharge, and CBD injury. Effectiveness was assessed by incidence of non-therapeutic pre-operative ERCP or negative IOC and rate of successful endoscopic CBD clearance. Hospital length of stay (LOS) was compared between surgery-first and ERCP-first patients. Time to ERCP, time to surgery, and total hospital LOS for the surgery-first and ERCP-first groups were compared. Univariate analyses were performed.

Results:
Of 228 patients, 68 (30%) were surgery-first and 160 (70%) were ERCP-first. Demographics were similar between the two groups. There were no differences in rates of re-operation (0% vs 0.6%, p=0.51), readmission (4.4% vs. 6.3%, p=0.58), retained stones after discharge (4.4% vs 4.4%, p=0.99), or CBD injury (0 in both groups) between the surgery-first group and the ERCP-first group, respectively. Of the ERCP-first group, 19 (12%) patients had a non-therapeutic ERCP. Of the surgery-first group, 34 (50%) had a negative IOC. While overall hospital LOS was similar between both groups (3.4 days vs 3.4 days, p=0.51), among patients with negative cholangiography hospital LOS was 0.6 days shorter for patients undergoing surgery first, though statistical significance was not reached (2.7 days vs 3.3 days, p=0.17).

Conclusion
In patients with HR-CDL, our data suggests that surgery-first management is safe and effective. Furthermore, 50% of surgery-first patients had a negative IOC, potentially sparing these patients an additional unnecessary procedure and prolonging hospital LOS. These findings help clarify optimal management of HR-CDL.

Abstract| Hepatobiliary and Pancreas

No Drain, No Problem: Serum-Based Marker Prediction of Postoperative Pancreatic Fistula

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Introduction/Background

Clinically-relevant postoperative pancreatic fistula (CR-POPF) is a relatively common and feared complication after pancreaticoduodenectomy (PD). Postoperative day (POD) 1 drain amylase concentration (DAC) has been shown to be the most accurate predictor of the future development of a CR-POPF. This is problematic as up to 41% of pancreatic surgeons report not regularly leaving intraperitoneal drains after PD. This study aims to assess the ability of serum-based biomarkers to identify patients with CR-POPF after PD compared to the current standard.

Methods:

This is a retrospective analysis of 53 consecutive patients who underwent a PD between April 2021 and July 2022. Available albumin, C-reactive protein (CRP), C-reactive protein-to-albumin ratio (CAR), DAC, Procalcitonin, and white blood cell count values were evaluated by POD for each patient using Student's T-test, Mann-Whitney U test, Wilcoxon matched signed-rank test, and ANOVA with Bonferroni adjustment where appropriate. The discriminatory abilities of CAR, CRP, and DAC for CR-POPF were compared using receiver operating characteristics (ROC) curves.

Results:

Of the 51 patients included in the analysis, 6 (11.8%) developed a CR-POPF. There were no perioperative deaths. Figure 1 compares the biomarker values between those with and without a CR-POPF.

Paired-sample ROC analysis of the 26 patients with complete DAC, CAR, and CRP data on POD 1. No difference was demonstrated between the AUC for POD 1 DAC and CAR ($p = 0.281$) or between DAC and CRP ($p = 0.200$). Values of 5131.0 IU/L, 15.5, and 52.5 mg/L or greater on for DAC, CAR, and CRP respectively were found to be positive screening tests for the future development of a CR-POPF on POD 1. This produced a sensitivity of 100% for all three markers and a specificity of 95.5% for DAC, 68.2% for CAR, and 72.7% for CRP.

Conclusion

Serum-based biomarkers, CAR and CRP, each demonstrate a remarkable ability to screen for CR-POPF after PD on POD 1. In fact, both were found to be equivalent to the often-touted POD 1 DAC predictive ability. The results of this study support that reliable, early identification of patients who will develop a post-PD CR-POPF can be made without a peritoneal drain. A heightened level of clinical scrutiny and low-threshold for cross-sectional imaging in the so-identified patients will allow for early intervention with antibiotics, percutaneous drain placement, and surgical intervention as necessary.

Table 1. Central tendencies of biochemical markers between groups

Biochemical Marker			No CR-POPF (n = 45)	CR-POPF (n = 6)	p-value
Albumin, g/dL	POD 1	Mean ± SD	3.45 ± 0.43	3.20 ± 0.32	< 0.001
	POD 2		3.15 ± 0.33	2.98 ± 0.17	< 0.001
	POD 3		3.06 ± 0.36	2.87 ± 0.10	< 0.001
CAR	POD 1[a]	Median (IQR)	13.0 (7.50)	21.7 (40.8)	0.013
	POD 2[a]		47.1 (35.1)	109.9 (47.2)	< 0.001
	POD 3[b]		44.8 (45.9)	134.0 (48.5)	< 0.001
CRP, mg/L	POD 1[a]		48.0 (24.0)	66.0 (108)	0.021
	POD 2[a]		160.0 (106.0)	333.5 (103.0)	< 0.001
	POD 3[b]		148.0 (150.0)	395.5 (131.0)	< 0.001
DAC, IU/L	POD 1[c]		181.5 (1,705)	19 567.0 (139,772)	< 0.001
	POD 3		100.0 (404.0)	2 384.0 (16,107)	< 0.001
	POD 5[d]		15.5 (98.0)	1 788.0 (17,646)	< 0.001
Procalcitonin, ηg/mL	POD 1[e]		0.93 (2.0)	0.37 (3.0)	0.642
	POD 2[f]		0.85 (1.0)	0.52 (2.0)	0.832
	POD 3[e]		0.53 (1.0)	0.73 (1.0)	0.409
WBC count, κ/μL	POD 1	Mean ± SD	13.2 ± 3.4	16.5 ± 4.4	0.037
	POD 2		12.8 ± 3.9	18.7 ± 6.7	0.003
	POD 3		11.7 ± 4.0	14.8 ± 5.9	0.106

Abbreviations: CR-POPF, clinically relevant postoperative pancreatic fistula; POD, postoperative day; CAR, C-reactive protein-to-albumin ratio; CRP, C-reactive-to-protein; DAC, drain amylase concentration; WBC, white blood cell.

[a]Data not available for 25 patients. [b]Data not available for 28 patients. [c]Data not available for one patient. [d]Data not available for 14 patients. [e]Data not available for 26 patients. [f]Data not available for 24 patients.

Combination of CDK 4/6 inhibitor Palbociclib with Rapamycin synergistically inhibits the growth of hepatocellular carcinoma cells

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Introduction/Background
Aberrant cell-cycle regulation is common in cancer, making it an attractive therapeutic target. The cell cycle inhibitor Palbociclib has been shown to have a cytostatic effect on hepatocellular carcinoma (HCC) cells via the induction of quiescence and senescence, though it has limited cytocidal effect. We hypothesized that arrested cells upregulate mTOR signaling to stay metabolically active and investigated the effect of combining Palbociclib with the mTOR inhibitor Rapamycin on HCC cell lines in-vitro.

Methods:
We employed single sample gene set enrichment analysis (ssGSEA) of 10 paired RNA-seq and 15 paired proteomic data sets as well as 371 HCC tumors from TCGA to identify commonly altered molecular markers in HCC, including cell cycle related genes. Subsequently, we studied the effect of Palbociclib and Rapamycin on two HCC cell lines, SNU398 and HuH7. We treated the cell lines with increasing doses of Palbociclib and used cell counting to assess growth inhibition, as well as beta-galactosidase activity assay to assess induction of senescence. We then treated both cell lines with Palbociclib for ten days followed by Palbociclib plus Rapamycin for 4 days and performed an MTT assay to assess relative viable cell number. We also did a fixed ratio treatment with Palbociclib and Rapamycin, followed by calculation of combination index to determine the nature of their interaction. Finally, we performed Western Blot analysis for various proteins of the cell cycle and mTOR pathways to elucidate the effects of combination treatment.

Results:
ssGSEA revealed significant positive enrichment of several cell cycle and mitosis related gene sets. Palbociclib treatment showed a dose-dependent inhibition of growth as well as increase in senescence associated beta-galactosidase staining for both SNU398 and HuH7 cell lines. Addition of Rapamycin demonstrated a dose-dependent potentiation of Palbociclib induced growth inhibition, and fixed ratio treatment with the two drugs established a synergistic effect as indicated by a combination index of less than 1. Western blot analysis showed increased levels of intrinsic CDK inhibitors p16, p15, p21 and p27 with Palbociclib treatment. Western blot analysis of proteins of mTOR pathway revealed that Palbociclib treatment caused an increase in levels of p-mTOR as well as its downstream signaling proteins p-4eBP1, p-p70 and p-s6, and addition of Rapamycin suppressed their levels.

Conclusion
HCC cells overexpress genes and proteins that drive cell cycle progression. Palbociclib induces senescence in hepatocellular carcinoma cell lines along with an associated upregulation in mTOR signaling, and combination with Rapamycin has a synergistic effect on growth inhibition in-vitro possibly by eliminating senescent cells. In vivo studies using murine HCC models are currently ongoing to further assess anti-tumor efficacy of this combination treatment.

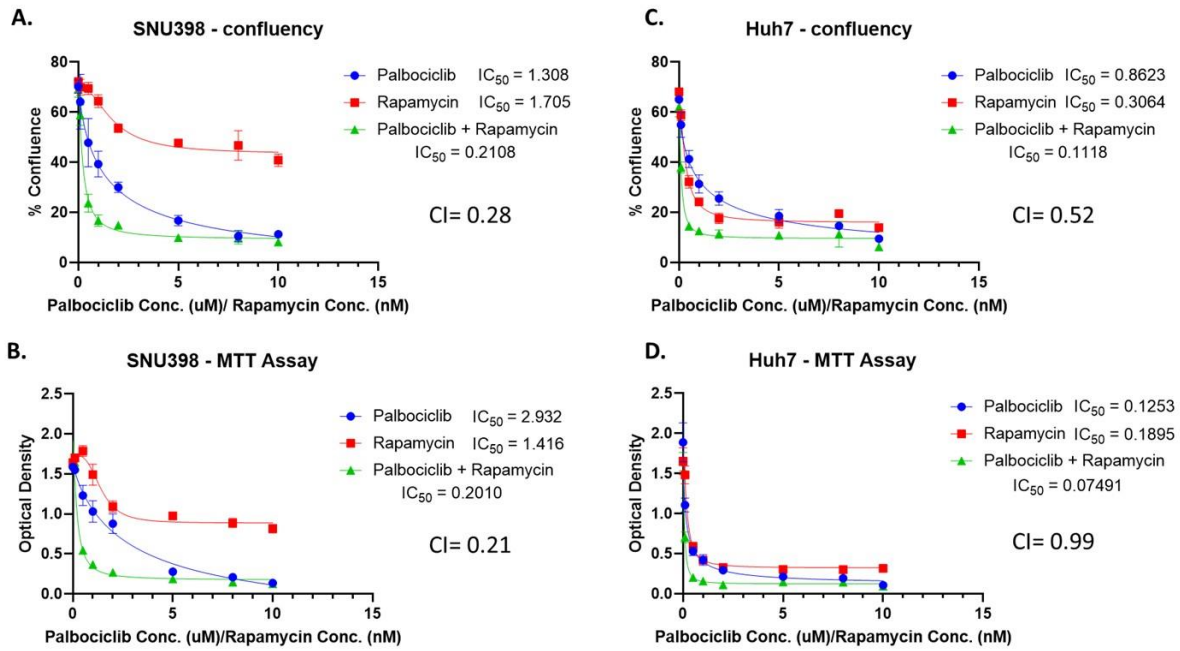

Fig. Palbociclib shows synergism with Rapamycin in vitro as indicated by a combination index of less than 1, calculated by measuring growth inhibition as % confluence of SNU 398 (A) and HuH7 (C) as well as MTT assay for both cell lines (B,D)