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A101

Is laparoscopic sleeve gastrectomy safer than laparoscopic gastric bypass? A comparison of complications and mortality using the MBSAQIP data registry

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Background: Laparoscopic sleeve gastrectomy (LSG) has become more popular than laparoscopic gastric bypass (LGB) in the United States (US) in part due to a perception of fewer complications and a better safety profile. Machine learning algorithms are uniquely suited to modelling outcomes using a large dataset such the Metabolic and Bariatric Surgery Accreditation and Quality Improvement (MBSAQIP) Data Registry which captures all patients undergoing bariatric surgery in accredited centers in the US. We used traditional regression techniques and classification algorithms to create a model for surgical complications.

Methods: All cases of primary LSG and LGB performed in 2015 were identified. Outcomes were leak, serious morbidity (see Table for definition), and mortality within 30 days. Model predictors were selected using univariate logistic regression. Using a training dataset (70%), variables were further parsed using stepwise selection. Variable importance was tested using random forest algorithmic modeling on a subset of the data. Final models for each outcome were created with multivariate logistic regression. Model coefficients were applied to the testing dataset (30%) to calculate the predictive ability of each model using receiver operating characteristic (ROC) curves. The adjusted odds of each outcome was compared between LGB and LSG and stratified by body mass index (BMI).

Results: Of the 134,142 patients identified, 93,062 (69%) underwent LSG and 41,080 (31%) underwent LGB. In LSG patients, leak occurred in 705 (0.76%), serious morbidity in 5,354 (5.8%), and mortality in 96 (0.1%); whereas after LGB, leaks occurred in 637

(1.6%), serious morbidity in 4,791 (11.7%), and mortality in 82 (0.2%). In the adjusted multivariate model, LGB demonstrated a higher odds of all three complications compared to LSG. The odds ratio (OR) for leak was 2.0 (95% CI 1.8–2.3, p<0.0001), for serious morbidity was 2.1 (95% CI 2.0–2.2, p<.0001), and for mortality was 1.5 (95% CI 1.1–2.1, p=0.026) (Table). When stratified by BMI, the increased risk associated with LGB was relatively similar across BMI levels (Table). ROC curves demonstrated that the model for mortality had the strongest predictive ability with area under the curve (AUC=0.82), compared to the models for morbidity (AUC=0.65) and leak (AUC=0.62) (Figure).

Conclusions: In a large-scale bariatric-specific data registry, LGB was associated with twice the adjusted risk of leak, twice the serious morbidity, and a 50% greater risk of mortality compared to LSG. The increased risk of complications associated with LGB persisted across all BMI categories.

A102

Alarming Trends regarding Laparoscopic Sleeve Gastrectomy

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Background: The laparoscopic sleeve gastrectomy is now the most common bariatric operation in the United States. It has become a standard in the armamentarium of the bariatric surgeon, and is the only operation offered by some surgeons. However, there is a lack of long term data on outcomes of the sleeve, namely the rate of revision and durability of the weight loss. Newly published data from around the world is starting to show alarming trends in these two areas. This paper will examine the published and presented data with at least a 7 year follow up.

Methods: We performed a meta-analysis of publications with at least 7 years of follow up with the key words: sleeve gastrectomy, laparoscopic, weight regain, reflux, revisions, conversion, long

166 LAGB participants (27% of participants) underwent 223 related or probably related procedures. Reoperation occurred due to failure of weight loss, weight regain or failure of comorbidity response in 8% of LAGB participants, none among RYGB. The remainder of reoperations were done for other complications (Table). 306 cholecystectomies were excluded from further analysis as the relatedness to the index surgery could not be determined.

Conclusions: Abdominal reoperation for complications related to LAGB or RYGB may be required, more often following LAGB than RYGB.

A153
A risk nomogram for complications after laparoscopic bariatric surgery derived from the MBSAQIP registry

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Background: Previous risk calculators for complications after bariatric surgery have been developed using single-center data or large datasets that were not specific to bariatric surgery, and were developed before the widespread adoption of laparoscopic sleeve gastrectomy (LSG). The Metabolic and Bariatric Surgery Accreditation and Quality Improvement (MBSAQIP) data registry captures detailed bariatric-surgery specific information and reflects the recent increase in the number LSG cases. Machine learning techniques such as random forest algorithms are uniquely suited for use with such large datasets. We used these techniques to develop a novel risk score calculator for LSG and laparoscopic gastric bypass (LGB) based on pre-operative patient characteristics.

Methods: All cases of primary LSG and LGB performed in 2015 were identified. Outcomes at 30 days were leak, serious morbidity (see Table for definition), and mortality. Model predictors for each outcome were selected using univariate logistic regression (p < 0.005). A regression model was created using stepwise selection of variables in a training dataset (70% of observations). Variable importance was tested using random forest algorithmic modeling on a subset of the data. Final

models for each outcome were created with multivariate logistic regression. Model coefficients were applied to the testing dataset (30% of observations) to calculate the predictive ability of each model using receiver operating characteristic (ROC) curves.

Results: 134,142 patients underwent LSG (93,062, 69%) and LGB (41,080, 31%). Leaks in the first 30 days occurred in 1,342 patients (1%), serious morbidity in 10,145 (7.6%), and mortality in 178 (0.13%). When variable importance was ranked using random forest algorithmic modeling, body mass index (BMI) and age were the strongest predictors for all three outcomes. ROC curves demonstrated that the model for mortality had the strongest predictive ability with area under the curve (AUC) = 0.82 compared to the models for morbidity (AUC = 0.65) and leak (AUC = 0.62) (Table). Based on these models, we created a nomogram that incorporates patient characteristic to calculate a 30-day risk of mortality for patients undergoing LGB or LSG (Figure).

Conclusions: A combination of data and algorithmic modeling techniques were used to develop a risk score calculator that has good predictive ability for 30-day mortality following LGB or LSG. This calculator informs both surgical decision making and pre-operative patient counseling.

A154
Bariatric Surgery when Bleeding is Probable: Impact of Bleeding Disorder on Outcomes Following Bariatric Surgery

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Introduction: Bariatric patients with bleeding disorder (BD) pose a challenge for surgeons who have to balance the risks of thrombosis and perioperative bleeding. While there are limited publications of hemorrhagic complications after bariatric surgery, there are no clear guidelines as to which type of weight loss procedure is indicated in the setting of BD. The aim of this study was to assess the impact of BD on outcomes following the three most common bariatric procedures: laparoscopic

A5035

Robotic versus laparoscopic Roux-en-Y gastric bypass: Comparison of short-term surgical outcomes

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Background: Roux-en-Y gastric bypass (RYGB) is the most common and successful surgical weight-loss procedure and RYGB performed laparoscopically remains the gold standard in bariatric surgery. The use of robotic systems has been increasing because of its ability to overcome technical challenges of laparoscopic surgery. The objectives of this study was to compare robotic RYGB with laparoscopic RYGB in short-term surgical outcomes.

Methods: Between January 2016 and May 2017, 197 patients underwent robotic or laparoscopic RYGB for morbid obesity: 126 robotic and 71 laparoscopic. We performed a comparative analysis between two groups for short-term surgical outcomes.

Results: The patients characteristics were similar between the two groups. There were no differences between robotic or laparoscopic RYGB with any anthropometric measurements. Compared with the laparoscopic group, the robotic group had less intraoperative blood loss (55 vs. 120 ml, P < 0.05) and higher mean operation time (204 vs. 176 min, P < 0.05). No significant differences were observed in the time to flatus passage, days of eating liquid diet, and length of hospital stay. In addition, no difference was indicated in the incidence of postoperative morbidity. There was no mortality and leak in two groups.

Discussion: Robotic RYGB seems to be a safe and effective alternative to laparoscopic RYGB in short-term surgical outcomes.

A5036

Is it safe to perform concomitant cholecystectomy with laparoscopic gastric bypass?

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Background: Before laparoscopic techniques to perform gastric bypass were developed, most surgeons routinely performed cholecystectomy during open gastric bypass in order to avoid future complications of gallstone disease. Nowadays, laparoscopic cholecystectomy (LC) is only performed selectively during laparoscopic gastric bypass (LGB). We hypothesized that concomitant laparoscopic cholecystectomy adds little additional morbidity to laparoscopic gastric bypass.

Methods: We analyzed the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) data registry to identify all cases of LGB with and without LC performed in 2015. MBSAQIP contains all bariatric procedures performed in the United States at accredited centers. We compared demographics and outcomes, and then constructed a multivariate model to identify predictors of major complications.

Results: Of 44,427 LGB patients, 1,426 (3%) underwent a concomitant LC and 43,001 (97%) did not. The percentage of female patients and BMI did not differ statistically between groups. Patients undergoing concomitant LC were, on average, one year older (46 vs 45 years, p = 0.046). Other differences were previous cardiac surgery (2.0 vs 1.1%, p = 0.001), therapeutic anticoagulation (3.2 vs 2.3%, p=0.025), and ASA III-V (85 vs 82%, p<0.001), which were all greater in the LGB+LC group. Concomitant LC added an average 27 minutes to the operation (149 vs 122 minutes, p<0.001). Postoperative length of stay averaged 5 hours longer in patients undergoing concomitant LC (2.4 vs 2.2 days, p<0.001), and there were no mortalities in this group (0 vs 0.2%, p = 0.181). 30-day complications were similar between the groups (Table).
On multivariate analysis, LC was not a significant independent risk factor for serious complications. In the LC subgroup multivariate analysis, only operative time was an independent factor of major complication (OR 1.004 per minute, CI 1.001-1.007, p=0.018).

Conclusion: Concomitant laparoscopic cholecystectomy with laparoscopic gastric bypass was performed in only 3% of cases, slightly increased operative time and length of stay, but did not result in increased postoperative complications or morbidity. Concomitant laparoscopic

and one readmission for dehydration. In the 38/40 Fr bougie group, there were one leak requiring stent placement, 5 readmissions for dehydration, and one superficial surgical site infection.

Conclusion: Laparoscopic sleeve gastrectomy bougie size does not significantly affect short term %EWL up to 1 year or 30-day complications.

A5134

Are Pathologic Findings in Sleeve Gastrectomy Surgery Related to Postoperative Outcomes?

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Introduction: Sleeve gastrectomy (SG) is the most popular bariatric surgical procedure in the United States. During SG surgery, the partially resected gastrectomy undergoes histopathological evaluation. Many studies have demonstrated the high prevalence of gastritis and Helicobacter Pylori in patients undergoing SG but few studies have reported the incidental histopathological findings of SG specimens. The primary aim of this study is to examine the histopathological findings of SGs. The secondary aim is to evaluate a possible association with postoperative outcomes.

Material and Methods: Data was obtained from electronic medical records from June 2015 until September 2016. All consecutive SGs (n=269) performed by four bariatric surgeons at University of Illinois and Healthcare System were included. Histopathological findings and were analyzed and further analyses will be conducted examining the relationship between histopathological findings and postoperative outcomes.

Results: A total of 269 consecutive SG were included in the study, 85.9% (n=231) women and 14.1% (n=38) men. The mean age was 40.8 (SD=11.9) years old and the mean BMI at the time of surgery was 50.3 (SD=10.6). Patients' race and Hispanic/Latino background were as follows: 55% (n= 148) African American, 20.8% (n=56) Hispanic or Latino, 14.1% (n=38) White, 0.3% (n=1) Asian, 9.7% (n=26) other or unknown race. Histopathological findings were as follows: 23.0% (n=62) unremarkable, 44.6% (n=120)

chronic gastritis, 22.7% (n=61) Helicobacter Pylori infection, 20.1% (n=54) active chronic gastritis (4 of which had crypt abscesses), 18.6% (n=50) lymphoid aggregates, 7.1% (n=19) reactive gastropathy (suggestive of irritant, reflux, drug or chemical injury), 6.3% (n=17) chronic inactive gastritis, 5.9% (n=16) vascular congestion and hemorrhage, 3.7% (n=10) polyps (9 fundic gland polyps and 1 hyperplasic polyp), 3.3% (n=9) intestinal metaplasia, 2.6% (n=7) dilated fundic glands (suggestive of proton pump inhibitor effect), 1.5% (n=4) benign tumors (2 gastrointestinal stromal tumors, 1 neuroendocrine tumor and 1 neuroendocrine hyperplasia), 1.1% (n=3) focal erosion, 0.7% (n=2) follicular inflammation and 0.4% (n=1) atrophic gastritis. Additional analyses will be performed to explore the association between the histopathological findings and postoperative outcomes.

Conclusions: Histopathological evaluation of the gastrectomy specimens rarely reveals positive pathology findings and are usually benign. The incidence of benign tumors was 1.5%. No malignancies were registered in the whole series. Further analyses will be conducted to determine how the pathological findings may affect the postoperative outcomes. Such investigations may lead to additional insights regarding pre-surgical interventions that may assist with postsurgical outcomes.

A5135

Is it safe to perform concomitant cholecystectomy with laparoscopic sleeve gastrectomy?

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Background: Concomitant prophylactic cholecystectomy during bariatric surgery was once routinely performed in order to minimize the future risks of gallstone disease. Now, concomitant laparoscopic cholecystectomy is only selectively performed. This study analyzed outcomes of laparoscopic sleeve gastrectomy (LSG) with and without cholecystectomy (LC) using data from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) data registry.

Methods: All cases of LSG reported to MBSAQIP in 2015 were studied. The MBSAQIP contains all bariatric procedures performed in the United States at accredited centers. We compared demographics and outcomes, and then constructed multivariate models to identify predictors of major complications and surgical site infections (SSI).

Results: Of 98,292 LSG operations, 2,046 (2%) had concomitant LC and 96,246 (98%) did not. Patients undergoing concomitant LC averaged one year older (45 vs 44 years, p = 0.01) and were more likely to be female (85 vs 79%, p < 0.001). BMI was similar in both groups. Hyperlipidemia (21 vs 23%, p=0.012), diabetes (21 vs 23%, p=0.03), sleep apnea (33 vs 35%, p=0.046), and previous surgery (5.5 vs 6.6%, p=0.043) were greater in the LSG group, while ASAIII-V was greater in the LSG+LC group (78% vs 73%, p<0.001).
Concomitant cholecystectomy added an average of 27 minutes (104 vs 77 minutes, p<0.001), and length of stay was slightly longer (1.9 vs 1.7 days, p=0.002). There were no mortalities in the LSG+LC group (0 vs 0.1%, p = 0.27). 30-day complications of cardiac arrest, superficial and organ space SSI, UTI, and need for reoperation were significantly higher in the LSG+LC group in univariate models, (Table), but on adjusted multivariate models for major complications, LC was not a significant independent risk factor. In multivariate analysis of all SSIs (superficial, deep, and organ space), LC was an independent risk factor (OR 1.9,CI 1.2-3.0, p = 0.006), as were BMI, age, operative time, GERD, diabetes, previous surgery, and sleep apnea.

Conclusion: Concomitant laparoscopic cholecystectomy with laparoscopic sleeve gastrectomy was not associated with an increased risk of major complications, but was associated with a twofold risk of surgical site infections.

A5136
Benefit of Staple Line Reinforcement: Single Center Experience following 740 Consecutive Sleeve Cases using Staple Line Reinforcement and A Standardized Technique

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Background: Laparoscopic Sleeve Gastrectomy (LSG) is the most commonly performed bariatric procedure in the United States. Despite its popularity, the surgical technique is not standardized. A recent report from the MBSAQIP database showed an increased incidence of staple-line leak with the use of staple-line reinforcement (SLR) compared to no reinforcement. The purpose of our study is to evaluate patient outcomes in our center following LSG in relation to staple-line leak and other complications using a standardized technique that incorporates the use of an absorbable synthetic buttress material as SLR.

Methods: A retrospective analysis of prospectively collected data on consecutive patients undergoing LSG in an MBSAQIP accredited center between January 2009 and December 2015 was performed. LSG was performed using a 36 Fr bougie and an absorbable synthetic copolymer made of glycolic acid and trimethylene carbonate as SLR. Transection of the greater curvature of the stomach was started 4 cm from the pylorus. Staple line was not routinely reinforced or imbricated. No drains were used. Primary outcomes included length of stay, complications, readmissions and reoperations at 30-days.

Results: A total of 740 consecutive LSG patients were included in our analysis. Overall 30-day complication rate was 2.8%. 30-day major and minor complication rates, as defined by the standardized outcome reporting for the ASMBS, were 2.3 and 0.5 %, respectively. Major complications included only 1 staple-line leak (0.1 %) and 7 bleeds (0.9 %). Thirty-day readmission and reoperation rates were 1.9 and 0.5 %, respectively. Our leak rate (0.1 %) was 9 fold lower than the leak rate of LSG performed with SLR (0.96 %) and 6 fold lower than the leak rate of LSG without SLR (0.65 %), as reported by the MBSAQIP. Our bleed rate (0.9 %) was between that of LSG with SLR (0.75 %) and LSG with no SLR (1.00 %), as reported by the MBSAQIP.

Conclusion: The incidence of leak in our institution using a standardized technique with SLR seems to be significantly lower than the average leak rate reported in the literature for both SLR and no SLR. The issue of SLR remains controversial. Further randomized controlled studies are needed to settle the issue of whether SLR results in higher or lower complication rates.