

Top Five Papers

PL-101

COMPLICATION ANALYSIS AFTER 1351 CONSECUTIVE LAPAROSCOPIC SLEEVE GASTRECTOMY CASES

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Background: Laparoscopic Sleeve Gastrectomy (LSG) has become an attractive procedure, mainly due to its low morbidity rates. The aim of this study was to describe complications following LSG in a high-volume center.

Methods: We conducted a review of our prospective electronic database for all patients who underwent a LSG from August-2005 to October-2010.

Results: A total of 1351 patients underwent LSG during this period (77.9% females), preoperative age and BMI were 37±11 years and 37.5±4.39 kg/m² respectively. LSG was performed as primary procedure in 97.4% of patients and as revisional surgery in 2.6% (from previous laparoscopic adjustable gastric banding). There were no deaths. Conversion to open technique was required in one (0.07%) patient. The short-term complication rate was 2.3%: portal thrombosis (0.7%), suture line leak (0.4%), hemoperitoneum (0.4%) and intra-abdominal abscess (0.4%). Reoperation was required in 8 (0.6%) patients: leak in 5 patients (4 required a combined approach using laparoscopic exploration and endoscopic prosthesis), hemoperitoneum in 2 and conversion to a Roux-en-Y Gastric bypass due to a stenotic sleeve. Portal thrombosis was the most common complication in 10 (0.7%) patients, there are five patients on anticoagulant therapy and the remaining five were studied for a thrombophilic disorder, which was positive in only 2.

Conclusion: In our series, LSG proved to be a safe procedure, with a low morbidity rate and no mortality. Most complications can be treated conservatively with the aid of minimally invasive surgery. Causes for portal thrombosis need to be studied further.

PL-102

PERI-OPERATIVE COMPLICATIONS IN A CONSECUTIVE SERIES OF ONE THOUSAND DUODENAL SWITCH PROCEDURES

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Background: In the last 10 years, most bariatric operations have noted a large reduction in early complications, partly associated with the development of the laparoscopic approach. The aim of this study was to assess the current early complication rate associated with Biliopancreatic Diversion with Duodenal Switch (DS) since the introduction of a laparoscopic approach in our institution.

Methods: A consecutive series of 1000 patients who had a DS between November 2006 and January 2010 was surveyed. The primary end-point was mortality rate. Secondary end-points were major 30-day complication rate and hospital stay >10 days. Data are reported as a mean (SD), comparing the laparoscopic group (n=228) to the open group (n=772).

Results: The mean age of the patients was 43±10 years (40±10 vs. 44±10 years, p=0.001). Pre-operative BMI was 51±8 kg/m² (47±7 vs. 52±8 kg/m², p=0.001). Conversion rate in the laparoscopy group was 2.6%. There was one post-operative death (0.1%) due to a pulmonary embolism in the laparoscopy group (0.4% versus 0%, p=0.2). Mean hospital stay was shorter after laparoscopic surgery (6±6 vs. 7±9 days, p=0.01), and hospital stay >10 days was more frequent in the open group (4.4% vs. 7%, p=0.04). Major complications occurred in 7% of the patients, with no significant differences between the two groups (7.4 vs. 7%, p=0.1). There was no difference in the overall rate of leaks or intra-abdominal abscesses (3.5 vs. 4%, p=0.1); but gastric leaks were more frequent after open surgery (0 vs. 2%, p=0.02). During the mean 2 years of follow-up, there was one additional death from myocardial infarction, 2 years after an open DS.

Conclusion: The mortality and early complication rate associated with BPD-DS is similar to those of other bariatric procedures.

PL-103

PREVALENCE OF PSYCHIATRIC DISEASE

**AMONG MORBIDLY OBESE PATIENTS
UNDERGOING BARIATRIC SURGERY:
RESULTS FROM THE MICHIGAN
BARIATRIC SURGERY COLLABORATIVE**

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Background: Little is known about the prevalence of psychiatric disorders among patients undergoing bariatric surgery.

Methods: The Michigan Bariatric Surgery Collaborative enrolls 6,000 patients annually into a prospective clinical registry. Data is abstracted from patient medical records, with further information obtained from annual surveys. We examined the prevalence of psychiatric disorders among patients undergoing bariatric surgery between January, 2006 and August, 2010 and reviewed longitudinal survey data to assess changes in the use of antidepressant medication and quality of life using the Bariatric Quality of Life (BQL) and Health and Activities Limitation Index (HALex) instruments.

Results: During the study period, 23,411 patients underwent bariatric surgery. Psychiatric disorders were reported in 10,881(47%) and included depression 9,497(41%); anxiety 3,530(15%); bipolar disorder 489(2.1%); substance abuse 156(0.7%); and other psychiatric disorders 632(2.7%). Among patients completing baseline surveys, 5,402(42%) reported using antidepressant medication. Among those using antidepressants at baseline who completed follow-up surveys at 1, 2 and 3 years, most reported continued antidepressant use: 1,520(82%), 567(80%), and 109(80%), respectively. Quality of life scores increased between baseline and follow-up surveys (mean BQL 35.77 at baseline to 45.68 at 1 year and mean HALex 0.62 at baseline to 0.82 at 1 year, $p < .0001$) and were similar in patients with and without psychiatric diagnoses.

Conclusion: Psychiatric disorders are common among morbidly obese patients undergoing bariatric

surgery. Despite improvement in quality of life, there was no difference in the use of antidepressant medications before and after surgery. Further investigation into the potential effects of bariatric surgery on mental health is warranted.

P-104

**LONG-TERM RESULTS AFTER SLEEVE
GASTRECTOMY**

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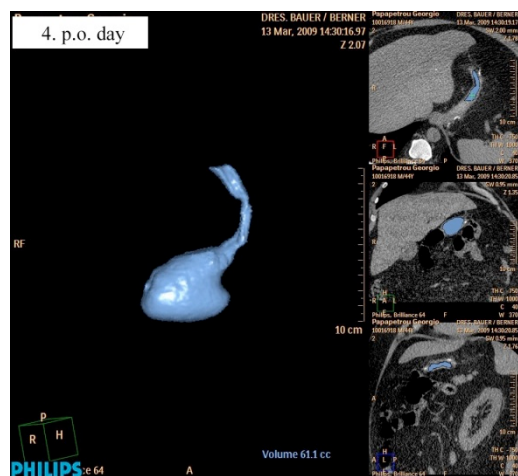
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Background: Laparoscopic sleeve gastrectomy (LSG) is emerging as a new promising therapy for the treatment of morbid obesity. In fact, LSG is a mainly restrictive procedure after one year and not inferior in terms of sustained weight loss during the first two years, but there are no long-term data.

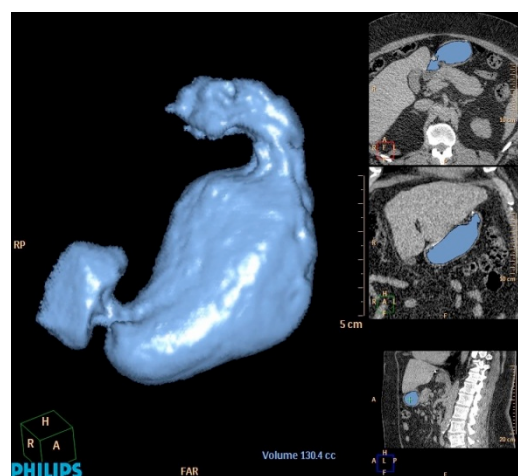
Methods: A total of 1,434 obese subjects [male 47%, female 53%; mean age 44.0 ± 10.0 years, mean preoperative BMI 57.8 kg/m^2] underwent LSG surgery from 2001-2010. The stomach was resected starting 3-5 cm far from pylorus. The orogastric bougie shows a diameter of 48 French (2001-2004/5), 32 French (2006/7-2008) and 42 French (2009-2010). Median resected stomach volume was 980 ml (750–2,500 ml).

Results: The BMI decreased from 57.8 kg/m^2 down to 39.6 kg/m^2 after 2 yrs, was followed by weight regain up to 48.4 kg/m^2 after 5 yrs. 22 % of the population underwent a second stage within this time period. Of the initial series of 58 patients (2001-2004) 40 underwent a second stage (69%). Initial sleeve volume, measured by virtual CT, increased from mean $56 \pm 18.2 \text{ ccm}$ up to $186 \pm 23.4 \text{ ccm}$. The most common cause was prepyloric dilatation of the antrum.

Conclusion: Sleeve gastrectomy is gaining popularity whether as a primary, staged or revisional operation. We report one of the largest single-center series to date of LSG and thoroughly examine the procedure's long-term weight loss effect. Like all restrictive procedures a high incidence of weight regain will be evident in the long-term. However, LSG in morbidly obese patients is major surgery. The staple line is long, with the potential for leakage and bleeding. Leakage is one of the most frequently reported causes of death after laparoscopic weight-loss operations including LSG, so we emphasize the importance of careful patient selection for choosing LSG.



Sleeve day 4 p.o.



Sleeve 8 yrs p.o.

and cardiovascular disease. Although bariatric surgery has shown strong evidence of risk factor reduction, evidence correlating the performance of bariatric surgery to direct reduction in major adverse events has been sparse. The goal of this study was to demonstrate that bariatric surgery has reduced the rate of myocardial infarction (MI), strokes, transient ischemic attacks (TIA), and death.

Methods: A review of the South Carolina Office of Research and Statistics database was conducted to identify hospitalized patients with morbid obesity. Patients who underwent primary bariatric procedures were compared to patients who underwent selected primary orthopedic and non-bariatric gastrointestinal surgical procedures. Patients were followed to the endpoints of first MI, stroke, TIA, or death.

Results: From 1996-2008, 48,299 patients were hospitalized with a diagnosis of morbid obesity; of these 4,790 bariatric, 1,325 gastrointestinal and 3,078 orthopedic surgical patients meeting inclusion criteria were identified. Life table analysis demonstrated significantly improved event-free survival in the bariatric patients within 6 months of surgery, and sustained over time (event-free survival at 10 years: 77% bariatric, 62% GI, 64% orthopedic ($p < 0.05$)). Adjusting for differences in age and relevant comorbidities, bariatric surgery was found to be an independent predictor of event-free survival (HR=0.57, 95% CI: 0.47, 0.69 vs. orthopedic patients; HR=0.35, 95% CI: 0.29, 0.43 vs. GI patients) in morbidly obese patients undergoing selected, non-emergent surgical procedures.

Conclusion: Bariatric surgery was significantly associated with a reduced risk of life-altering adverse health events and death in this population.

PL-105

BARIATRIC SURGERY REDUCES RISK OF MAJOR ADVERSE CARDIOVASCULAR EVENTS IN MORBIDLY OBESE ADULTS

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Background: Morbid obesity is associated with the development of major risk factors for cerebrovascular

Safety in Bariatric Surgery

PL-106

PREDICTIVE RISK FACTORS OF ACUTE RESPIRATORY FAILURE IN BARIATRIC SURGERY: DATA FROM THE NATIONWIDE INPATIENT SAMPLE (NIS), 2006-2008

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Background: Acute respiratory failure is one of the most common postoperative complications after bariatric surgery and is defined as acute respiratory distress and pulmonary insufficiency. We evaluated

the effect of patient characteristics, comorbidities, payor-type, teaching status of hospital, and surgical techniques on postoperative respiratory failure in bariatric surgery.

Methods: Using the National Inpatient Sample database, from 2006-2008 clinical data of morbidly obese patients who underwent bariatric surgery was examined. Regression analysis was performed to identify factors predictive of respiratory failure.

Results: A total 304,515 patients underwent bariatric surgery during this period. The overall rate of respiratory failure was 1.35%. The highest rate of respiratory failure (4.10%) was observed in open gastric bypass (GBP). The respiratory failure rate was lower in laparoscopic compared to open operation (0.94% vs. 3.87%, $p<0.01$) and non-GBP vs. GBP procedures (0.82% vs. 1.54%, $p<0.01$).

Using multivariate regression analysis, age older than 50 [odds ratio (OR): 1.84], male sex (OR: 1.88), diabetes mellitus (OR: 1.15), congestive heart failure (OR: 5.07), chronic lung disease (OR: 1.64), renal failure (OR: 2.91), alcohol abuse (OR: 1.82), peripheral vascular disease (OR: 2.38), smoking (OR: 1.10), open operation (OR: 3.28), GBP (OR: 2.51), and Medicare-payor (OR: 1.85) were associated with higher rate of respiratory failure. However, race, hypertension, liver disease, sleep apnea, hyperlipidemia and teaching status of hospital were factors not associated with respiratory failure.

Conclusion: In the presence of multiple risk factors that increase the risk for developing respiratory failure, it might be appropriate to select a lower risk bariatric operation such as the gastric banding.

PL-107

FEASIBILITY OF LAPAROSCOPIC GASTRIC BYPASS PERFORMED ON AN OUTPATIENT BASIS

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Background: It has been suggested that laparoscopic gastric bypass may be successfully performed on outpatient basis as a surgical weight loss procedure. As early outcomes have improved, the feasibility and appropriateness of discharging patients within 23 hours has been questioned. We report our series of select patients undergoing laparoscopic gastric bypass surgery on an outpatient basis.

Methods: A retrospective analysis of a single institution's database over a five-year period, comprising more than 1,500 consecutive patients undergoing laparoscopic Roux-en-Y gastric bypass was examined. All patients were stratified into those who were discharged within 23 hours and those who were discharged after a 23-hour period. Analysis of patients readmitted within 45 days was performed and variables contributing to readmission were identified. Post-operative morbidity, mortality and complications were examined.

Results: Eighty-two percent ($n=1,267$) of patients in this series were discharged on an outpatient or 23-hour basis. Of these, four or 0.32% of patients were readmitted with a significant post-operative complication. Of patients who had hospital stays greater than 23-hours, the majority (74%) were discharged on the second post-operative day. Variables leading to inpatient admission were examined. Ten patients (0.64%) had a leak at the gastrointestinal anastomosis. Only one of these patients had been discharged on an outpatient basis. The average BMI and age for this group was 51 kg/m² and 36 kg/m², respectively. There was one death ($<0.1\%$) within 45 days in this series.

Conclusion: Laparoscopic Roux-en-y gastric bypass may be safely performed on an outpatient basis in select patients. The majority of patients undergoing gastric bypass can be discharged within 23 hours, when deemed clinically appropriate without any increase in early readmissions or complications.

PL-108

ANALYSIS OF FACTORS PREDICTIVE OF MORTALITY IN BARIATRIC SURGERY

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Background: No studies have examined predictors of mortality in bariatric surgery using a large cohort of patients within a national database. We analyzed preoperative factors that may predict in-hospital mortality in bariatric surgery using data from a database of academic medical centers.

Methods: We conducted an analysis of the University HealthSystem Consortium (UHC) database 2002-2009. Data from the UHC for all patients who underwent bariatric surgery for the treatment of morbid obesity were obtained. Factors examined included race, gender, age, the presence of comorbidities or diabetes, the technique of surgery (laparoscopic vs. open), the type of operation (bypass

vs. band), and payer type. The primary outcome examined was in-hospital mortality.

Results: 105,287 patients underwent bariatric surgery. The type of operation included laparoscopic gastric bypass (45%), open gastric bypass (41%), and laparoscopic gastric banding (14%). The overall in-hospital mortality was 0.17%. The death rate per 1,000 bariatric operations decreased from 4.0 in 2002 to 0.6 in 2009. Using regression analysis, factors predictive of higher in-hospital mortality were male (adjusted odds ratio [AOR], 3.2), gastric bypass procedure (AOR, 5.8), open surgical technique (AOR, 4.8), the presence of any comorbid conditions (AOR, 6.0), the presence of diabetes (AOR, 1.6), Medicare payer (AOR, 3.0), and age $\geq$ 60 years (AOR, 1.9).

Conclusion: Within the context of this analysis of academic centers, mortality after bariatric surgery has decreased substantially since 2002 from increasing utilization of the laparoscopic technique. Knowledge of factors predictive of mortality may aide surgeons in surgical-decision making and better inform patients about their risks for bariatric surgery.

PL-109

SMALL BOWEL OBSTRUCTION AFTER ANTECOLIC ANTEGASTRIC LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS: A SINGLE CENTER 7-YEAR REVIEW

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Background: The reported incidence of small bowel obstruction (SBO) after laparoscopic Roux-en-Y gastric bypass varies between 1.5-3.5%. It has been suggested that the antecolic antegastric laparoscopic Roux-en-Y gastric bypass (AA-LRYGB) is associated with a low incidence of internal hernia (IH). Therefore we routinely did not close mesenteric defects.

Methods: The records of 652 consecutive patients undergoing AA-LRYGB from January 2003 to August 2009 in a single institution were retrospectively reviewed to determine the incidence, etiology, clinical symptoms, radiologic diagnostic accuracy and operative outcomes of SBO.

Results: Of the 652 patients, 63 (9.6%) developed SBO. The majority (6.9%, 45 patients) had a SBO due to internal hernia (IH). In 41 (91%) cases, the IH

was at the jejunojejunostomy, 4 cases had an IH at Petersen's space. Adhesions and ventral hernia were found in 14 (2%) and 4 (0.6 %) cases.

Twenty nine out of 63 cases had negative CT-findings and IH was diagnosed on CT in only 33% (14/45) of patients with IH. All patients underwent diagnostic laparoscopy. The conversion rate was 29% (13 cases). No bowel resections had to be performed.

Conclusion: In contrast to previous reports, a high incidence of SBO with a high rate of IH at the jejunojejunostomy site was found in our series. Accuracy of CT is low and diagnostic laparoscopy is mandatory when SBO is suspected. Since 2010 we started closing the jejunojejunostomy site and data on SBO are being collected prospectively. We believe that closing of the mesenteric defects is a mandatory step, even in an AA-LRYGB.

PL-110

IS AMBULATORY LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS FROM THE BARIATRIC OUTCOMES LONGITUDINAL DATABASE (BOLD) ASSOCIATED WITH HIGHER ADVERSE EVENTS?

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Background: The 14th Milliman Guidelines recently recommended the goal length of stay (LOS) after laparoscopic gastric bypass (LGBP) should be ambulatory to improve resource utilization. This study's aim was to assess LGBP outcomes by LOS.

Methods: Data were obtained from BOLD for 51,788 laparoscopic gastric bypass (GBP) procedures performed between 2007 and 2010. Logistic regression models were used to evaluate age, gender, race, BMI, insurance status, comorbidities and LOS as predictors for 30 day mortality, serious complications and readmissions.

Results: Overall patient demographics were: Median Age, 45; Median BMI, 46.3 kg/m²; % Female, 78.6; % Caucasian, 77.8; % Private Insurance, 86.2; % Comorbidities >5 , 39.1%. Overall 30 day outcomes included mortality, 0.1%; serious complications,

0.5%; and readmissions, 3.8%. Median LOS was 2 days and the distribution of LOS was (%): 0 (1.0), 1 (18.4), 2 (59.0), 3 (17.5), >4 (4.1). Using the median LOS of 2 days as reference, the logistic regression analysis revealed that LOS of 0 was significantly associated with increased risk of 30 day mortality (OR 13.02, $p<.0001$) as was LOS of 1 day (OR 2.02, $p<.05$). For LOS of 0 days, there was a trend toward an increase in the rate of 30 day serious complications (OR 1.9, $p<.16$). There was no significant trend between LOS status and 30 day readmission rates.

Conclusion: In this large, prospective clinical database, LOS of 1 day or less for LGBP patients was significantly associated with an increased risk of 30 day mortality and a trend toward an increased risk of 30 day serious complications.

Co-Morbid Condition

PL-111

ROUX-EN-Y GASTRIC BYPASS (RYGB) ACHIEVES SUBSTANTIAL RESOLUTION OF MIGRAINE HEADACHES IN THE SEVERELY OBESE

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Background: Migraine headaches (MH) are common and more severe in the morbidly obese. We analyzed the impact of RYGB on MH in the morbidly obese.

Methods: We analyzed our database of 702 morbidly obese patients that underwent RYGB between 2000-09. We identified patients with physician-diagnosed MH actively on medication.

Results: Data are Mean $\pm$ SEM (range). Out of 102 patients with preoperative MH, 21 were excluded due to short follow-up of less than 12 months, while the remaining 81 were followed-up for 38.6 ± 3 (16-103) months. These 81 patients were 90% female and had BMI of 48 ± 1 (37-85) kg/m² and age 40 ± 1 (18-62) years. Following significant surgical weight loss, clinical improvement of MH was seen in 89% of patients within 5.6 ± 0.9 (1-36) months ($p=0.00001$; Chi-Sq test), with 57 reporting complete resolution and 15 reporting partial resolution (9 experienced no change).

We then compared patients that developed MH after obesity onset (MHAO Group) to those who had MH before obesity onset (MHBO Group), where 6 patients were excluded as indeterminate. The MHAO Group had 51 patients where 48 showed clinical improvement (41 complete, 7 partial and 3 no resolution). The MHBO Group had 24 patients where 18 showed clinical improvement (11 complete, 7 partial and 6 no resolution). Interestingly, the MHAO Group showed a significantly greater rate of complete resolution of MH after RYGB compared to the MHBO Group ($p=0.0057$; Chi-Sq test).

Conclusion: Weight loss following RYGB substantially resolves migraine headaches, especially when obesity onset precedes the development of migraine. Whether RYGB-induced endocrine alterations also contribute to improvement of migraine remains to be determined.

PL-112

HIGHER THAN EXPECTED PREVALENCE OF ASYMPTOMATIC PSEUDOTUMOR CEREBRI: A PROSPECTIVE TRIAL OF 532 BARIATRIC PATIENTS

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Background: The overall incidence of pseudotumor cerebri (PTC) has been estimated at 0.001% in general and rises to 0.019% among overweight patients. About 25% of affected patients are asymptomatic until they present with visual loss. We hypothesized that asymptomatic PTC would be highly prevalent among obese individuals seeking bariatric surgery.

Methods: Over two years, clinical data were collected on candidates for bariatric surgery (with no history of PTC) who were concurrently screened for optic disc edema (the hallmark finding in PTC) by high definition non-mydratic fundus imaging and a symptom questionnaire. All images were reviewed by a single neuro-ophthalmologist who was masked to the patient's identity and clinical presentation. All patients with abnormal images were referred for full neuro-ophthalmic evaluation.

Results: The study group of 532 patients (78% women) had a mean age of 45.4 ± 10.7 years and mean BMI of 47.6 ± 9.0 kg/m². High definition non-mydratic fundus imaging was normal in 489 patients (91.9%). This technique identified 43 patients (8.9%) with abnormal fundic images. Subsequent evaluation

by the neuro-ophthalmologist revealed ocular abnormalities other than papilledema in 27 patients (5.1%) and normal examination in 7 patients (1.3%). Five patients (0.9%) declined further evaluation. Four patients (0.8%) had confirmed papilledema and normal brain MRI, confirming the diagnosis of asymptomatic PTC.

Conclusion: In our large study population, we identified a significantly higher prevalence of asymptomatic PTC (0.8%) than previously reported or would have been predicted based on current literature. This finding is particularly noteworthy in light of the significant association with visual loss and warrants future investigation into the utility and optimal method of screening morbidly obese patients for this comorbidity.

PL-113

ROUX-EN-Y GASTRIC BYPASS (RYGB) AMELIORATES POLYCYSTIC OVARIAN SYNDROME (PCOS) AND DRAMATICALLY IMPROVES CONCEPTION RATES: A NINE-YEAR ANALYSIS

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Background: PCOS is a common cause of infertility especially in the morbidly obese. We evaluated long-term effects of RYGB on PCOS and infertility.

Methods: 566 morbidly obese females underwent RYGB from 2000-09. Thirty-one patients (5.5%) had history of PCOS before surgery. Six post-menopausal patients and 5 patients lost to follow-up were excluded. Telephone interviews were conducted with the 20 eligible patients.

Results: Mean age and BMI were 32 years and $52.8 \pm 9.08 \text{ kg/m}^2$ before surgery. The mean duration of obesity and PCOS prior to surgery was 20 ± 8.2 and 8.6 ± 6.1 years, respectively. All 20 patients had at least 2 of 3 diagnostic criteria for PCOS: a) clinical or biochemical evidence of hyperandrogenism, b) anovulation, or c) polycystic ovaries. Among these 85% had oligomenorrhea, 70% had hirsutism and 45% had Type 2 diabetes mellitus (T2DM) on medication. Prior to surgery, 8 patients conceived with or without hormonal treatment, 2 patients did not desire pregnancy whereas 10 patients did not conceive. The mean post-operative follow-up was 46.7 ± 35.3 months.

Following surgical weight loss, menstrual cycle became regular in 82% (n=14) at a mean duration of

8 months. Of the 14 patients with hirsutism, 29% had resolution of symptoms. In patients with T2DM, 77.8% had complete remission. Of the 10 patients who did not conceive prior to surgery, 4 no longer desired pregnancy while all the remaining 6 became pregnant within 3 years of surgery – 5 spontaneously and 1 with in-utero insemination.

Conclusion: Surgical weight loss following RYGB achieves excellent amelioration of PCOS manifestations and the post-operative conception rate in infertile PCOS subjects desiring pregnancy was 100%.

PL-114

CHANGES IN RENAL FUNCTION FOLLOWING ROUX-EN-Y GASTRIC BYPASS: A PROSPECTIVE TRIAL

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Background: Studies of the impact of Roux-en-Y gastric bypass (RYGB) on renal function have shown mixed results. We constructed this prospective repeated-measures controlled trial to more accurately characterize this response and identify the best method of gauging renal function in this setting.

Methods: Clinical data, serum creatinine (SC), and 24-hour urine were collected 1 week before and 6 months following RYGB. Glomerular filtration rate (GFR) was calculated utilizing the Modification of Diet in Renal Disease (MDRD) formula. Creatinine clearance (CCL) was measured as a 24-hour collection (24CCL) and calculated by the Cockcroft-Gault (CG) formula.

Results: The study population of 37 patients (81% women) had a mean age of 47 ± 11 years, had mean BMI of $47.6 \pm 6.3 \text{ kg/m}^2$, and achieved a mean % excess weight loss (EWL) of $60.9 \pm 17.1\%$. SC decreased from $0.83 \pm 0.21 \text{ mg/dl}$ to $0.72 \pm 0.16 \text{ mg/dl}$ ($p < 0.001$) and mean GFR improved from $91.6 \pm 29.7 \text{ ml/min/1.73 m}^2$ to $104.9 \pm 23.5 \text{ ml/min/1.73 m}^2$ ($p < 0.01$). Preoperatively, CG significantly overestimated CCL when compared with 24CCL ($197.1 \pm 88.2 \text{ ml/min}$ vs. $136.5 \pm 53.0 \text{ ml/min}$, $p < 0.001$). In all patients, improvement in 24CCL correlated with EWL ($r = 0.32$) and %EWL ($r = 0.16$), and significantly correlated with decrease in BMI ($r = 0.51$, $p < 0.005$). In hypertensive patients, improvement in 24CCL significantly correlated with EWL ($r = 0.43$, $p < 0.05$), %EWL ($r = 0.40$, $p < 0.05$), and

decrease in BMI ($r=0.60$, $p<0.001$) and was negatively correlated with age ($r=-0.45$, $p<0.05$).

Conclusion: This study demonstrates that renal function improves following RYGB and is best identified by change in GFR. CG, a popular estimate of CCL, is particularly inaccurate in bariatric patients as it includes body weight. Improvement in 24CCL is correlated with the EWL success of the patient, especially hypertensive patients, and this relationship diminishes with age.

PL-115

DISTAL AIRWAY DYSFUNCTION IN OBESE SUBJECTS CORRECTS FOLLOWING BARIATRIC SURGERY

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Background: Obesity is frequently associated with respiratory symptoms despite normal large airway function as assessed by spirometry. However, reduced FRC and ERV are commonly seen and may reflect distal airway dysfunction. Impulse oscillometry (IOS) uses airflow and pressure oscillations to measure airway resistance (R20), distal airway heterogeneity (R5-20), and respiratory elastance (X5) and may identify distal airway abnormalities not detected by spirometry.

Methods: 330 patients had spirometry and IOS prior to bariatric surgery. Data were analyzed for 40 patients with normal spirometry who lost >20% body weight and completed repeat pulmonary testing.

Results: IOS detected pre-operative distal airway dysfunction despite normal spirometry by demonstrating elevated R20 ($4.80\pm0.18\text{cmH}_2\text{O/L/s}$), R5-20 ($2.26\pm0.23\text{cmH}_2\text{O/L/s}$), and X5 ($-3.51\pm0.33\text{cmH}_2\text{O/L/s}$). Following bariatric surgery, BMI decreased ($44.66\pm6.25\text{kg/m}^2$ to $33.10\pm4.59\text{kg/m}^2$, $p<0.000$). Improvements in FRC ($57.48\pm10.22\%$ predicted to 71.05 ± 16.88 , $p<0.000$) and ERV ($42.60\pm20.43\%$ predicted to 75.00 ± 33.64 , $p<0.000$) were demonstrated. Significant improvement in distal airway function was evidenced by a decrease in R20 (3.87 ± 0.12 , $p<0.000$), R5-20 (1.24 ± 0.16 , $p<0.000$), and X5 (-1.87 ± 0.16 , $p<0.000$).

Conclusion: Despite normal baseline spirometry, distal airway dysfunction was detected by IOS in obese subjects. Bariatric surgery reduced mass loading, leading to restoration of FRC and ERV with consequent improvement in airway resistance, heterogeneity, and elastance. Distal airway dysfunction that resolves following bariatric surgery may provide a potential mechanism for respiratory symptoms associated with obesity.

General Interest and Revisions

PL-116

OUTCOMES OF LAPAROSCOPIC SLEEVE GASTRECTOMY FOLLOWING FAILED LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING (LAGB) PROCEDURES.

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Background: The Purpose of this study was to describe a technique and examine the safety and efficacy of sleeve gastrectomy (SG) following failed LAGB.

Methods: Data on all patients who underwent a SG following a failed LAGB at The John Flynn Hospital (Australia) from June 1, 2006 to October 10, 2010 were reviewed. All revisional SG procedures were performed a minimum of 4 weeks following band removal.

Results: 37 patients (28 female, 9 male) with a mean preoperative body mass index of 39.3kg/m^2 underwent a revisional SG. The indications for removal of LAGB were patient intolerance or failure of weight loss ($n=17$), band migration ($n=13$), band erosion ($n=6$), and recurrent port site infection ($n=1$). There was no mortality or staple line leaks in this series. There was one an unplanned operation; a 44 year old male who had a stricture at the site of gastric stapling and required revisional surgery by way of a mini-gastric bypass. There was one unplanned readmission; a 25 year old female 8 days post procedure with epigastric pain and fever, contrast swallow failed to reveal a leak, she recovered with conservative treatment. The average length of stay was 3.6 days. At a mean follow up of 14 months, the post SG BMI was 36kg/m^2 .

Conclusion: These initial observations suggest sleeve gastrectomy as a revisional procedure following failed LAGB can be performed with minimal morbidity and achieve weight loss.

ADJUSTABLE GASTRIC BANDING OVER PREVIOUS FAILED GASTRIC BYPASS AS A REVISIONAL BARIATRIC PROCEDURE IS SAFE AND EFFECTIVE

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Background: Roux –en –Y Gastric Bypass (RYGB) procedure is the most commonly performed operation in the United States to treat Morbid Obesity. Unfortunately RYGB is associated with a failure to achieve or maintain 50% EWL or a BMI < 35kg/m² in an estimated 8-40% of patients. Laparoscopic or open revision of RYGB has a very high complication rate. To decrease the complexity of stoma and pouch revision LASGB (Laparoscopic adjustable silicone gastric banding) was offered to patients.

Methods: A Retrospective review of 61 patients from January 2008 to September 2010 who underwent LASGB after initial RYGB as a salvage procedure were followed for 1 year for weight loss and complications.

Results: 61 patients (58 females and 3 males) underwent LASGB, their mean weight and BMI during RYGB were 312 lbs and BMI of 52 kg/m², respectively. The lowest mean weight they achieved was 194lbs. Their mean weight/BMI at revision was 238lbs/40 kg/m², respectively. The percent excess weight loss at 2, 4, 6 8 month and 1 year were 9, 14, 18, 22, 28%, respectively.

Conclusion: The results from this series have indicated that addition of LASGB causes significant weight loss in patients with poor weight loss outcomes after RYGB. There were no complications in this series. LASGB over previous RYGB is a safe and effective procedure.

DOES LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING CREATE HIATAL HERNIAS?

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Background: Unrecognized hiatal hernia (HH) post-laparoscopic adjustable gastric band (LAGB) has been postulated as a potential etiology of LAGB dysfunction. We hypothesized that HH might develop subsequently to LAGB insertion.

Methods: We retrospectively reviewed all consecutive outcomes in LAGB patients in our institutional longitudinal prospective bariatric surgical database. The incidence of HH developing post-LAGB, with no evidence pre-procedure, was determined.

Results: Between 2005 and 2009, 695 gastric bands were implanted. Twelve patients (1.2%) developed a HH post-LAGB, after having a confirmed normal upper GI contrast study both prior to and after LAGB placement. No HH was visualized during initial surgery.

Symptoms leading to surgical revision were dysphagia (6), severe GERD (4), nausea and vomiting (1) and recurrent band slippage (1). Pre-revision UGI studies showed a HH in 5 cases, LAGB slip in 4 and esophageal dysmotility or dilation in 3. Mean EBWL at time of revision was 48.9% (+/-18) and time from band placement was 23.4 months (+/-10.2). Average initial BMI was 45.6 kg/m². In all cases, a HH was clearly identified at time of surgical revision, with or without band slippage into the mediastinum.

Conclusion: These data suggest that HH might develop subsequently to LAGB insertion in previously normal patients. This creates the potential for intra-mediastinal slippage of the band and proximal stomach causing persistent or intermittent symptoms such as dysphagia. Persistent dysphagia after band deflation requires careful inspection of the hiatus during surgical revision even in the absence of a radiological description of HH.

COMPARISON BETWEEN PROXIMAL ROUX-EN-Y GASTRIC BYPASS (RYGB) VS. THE VERY LONG RYGB (VLRyGB): FIVE-YEAR OUTCOMES.

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Background: The malabsorptive VLRYGB may be more beneficial in super obese patients; nevertheless, it may be associated with a higher morbidity. We aimed to compare outcomes of RYGB and VLRYGB in patients with BMI 57-63 kg/m².

Methods: Prospectively collected data on 149 consecutive patients (113 women and 36 men; age: 44 ± 10 yrs) with a BMI 57-63 kg/m² who underwent RYGB from 2000-10. In our practice, patients with BMI <60 kg/m² underwent a proximal RYGB; whereas patients whose BMI ≥ 60 kg/m² underwent VLRYGB (common channel 100 cm from the ileocecal valve).

Results: Pre-op BMI for RYGB (n= 118) was 59 ± 2 and 61 ± 2 for VLRYGB (n=31). BMI for both groups decreased to 38 ± 5 and to 38 ± 6 at 1 and 5 years (p ≤ 0.0001), respectively. Follow up was complete up to 95% at 1 year, 86% at 3 years and 83% at 5 years. RYGB patients exhibited iron deficiency anemia (1%), hypoalbuminemia (4%), hypocalcemia (4%); low vitamin D (2.5%) and low vitamin B12 (0%) vs. 45% 20%, 22%, 6.5% and 3% respectively for VLRYGB (all p ≤ 0.01).

Conclusion: Proximal RYGB achieves similar long term weight results in patients whose BMI is 57-63 kg/m² and reduces the likelihood of protein and vitamin deficiency compared to the malabsorptive VLRYGB. We no longer recommend VLRYGB for patients in this BMI range; further studies to define the role of VLRYGB in higher BMI are warranted.

Demographics

	Proximal RYGB	VLRYGB
#	118	31
Male	24	12
Female	94	19
BMI Avg	59	61
BMI STD	2	2
Age Avg	49	49
Age STD	12	8

Micro and Macronutrient Deficiencies

Deficiencies	Proximal RYGB (%)	VLRYGB (%)	Power (P≤)
Iron Deficiency Anemia	1	45	0.0001
Calcium	4	22	0.0001
Albumin	4	20	0.0001
Vitamin D	2.5	6.5	0.0007
Vitamin B12	0	3	0.010

PL-120

ENDOSCOPIC STENT MANAGEMENT OF ANASTOMOTIC COMPLICATIONS AFTER FOREGUT SURGERY

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Background: Anastomotic complications after upper gastrointestinal (GI) surgery present an arduous therapeutic challenge. Avoiding revisional surgery is desirable and may be possible with the advent of endoscopically placed stents. We reviewed our experience with stent management of anastomotic complications after foregut surgery.

Methods: A prospectively maintained database at our surgical endoscopy unit was reviewed to identify patients who underwent endoscopic stent placement after various foregut procedures. Data were obtained on patient demographics, primary surgical and endoscopic procedures, and outcome.

Results: Over 43 months, 18 patients (12 female; mean age 51 ± 15 years) underwent endoscopic stent placement for anastomotic complications, 14 of whom were bariatric patients. Thirty-one stents (21 covered metal, 5 salivary, 5 silicone-coated polyester) were used to treat anastomotic leaks (n=13), strictures (n=3), and fistulae (n=2). Symptomatic improvement occurred in all but 2 patients (89%) and early oral intake was initiated in 11 (61%). Stent treatment was successful in definitively managing the anastomotic complication in 13 patients (72%). Five patients required further surgical or endoscopic intervention. Stent migration occurred in 4 cases and was amenable to endoscopic management. Two deaths occurred, both unrelated to stent placement.

Conclusion: Endoscopic stent management of anastomotic complications after foregut surgery is effective in resolving symptoms, expediting enteral nutrition and particularly successful for treating anastomotic leaks. In the absence of stents specifically designed for surgically altered GI anatomy, some factors that may reduce the risk of stent migration include appropriate stent selection, anchoring the stent proximally, and regular surveillance after placement.

PL-121

EXCELLENT LONG-TERM RESULTS AFTER REVISIONAL GASTRIC BYPASS IN FAILED

BARIATRIC SURGERY - A STUDY WITH 92% FIVE-YEAR FOLLOW-UP

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Background: When purely malabsorptive or restrictive bariatric operations fail to achieve the desired weight loss or yield specific complications revisional surgery can be warranted. Early favorable results have stimulated us to use RYGB as our standard operation in failed bariatric surgery.

Methods: We have studied 124 consecutive patients (42.1 years, BMI 38.3 kg/m², 103 women) five years after revisional RYGBP in our clinic. Former procedures were jejunoileal bypass (n=3), horizontal gastroplasty (n=2), vertical banded gastroplasty (n=34), fixed gastric banding (n=21) or silicone adjustable gastric banding (n=64).

Results: The operating time was 155 (75-355) minutes. Ten patients (8%) underwent reoperation in the first 30-day period whereof four patients (3.2%) had early leakage in the gastrojejunostomy. No perioperative mortality occurred. A response rate of 92% was achieved at five-years. Median BMI was 30.8 kg/m². The original bariatric procedure did not predict the weight result of RYGB. Ninety-two % of the patients reported themselves to be very satisfied or satisfied with the result of the operation on their well-being in general. Eight had undergone subsequent surgery due to complications (intestinal obstruction, stricture at the gastrojejunostomy and gastro-gastric fistulation), 9 patients due to incisional hernia and 5 due to gallstones. Thirty patients (24%) had undergone an abdominoplasty.

Conclusion: The risks of undergoing revisional RYGB are higher than in primary operations, but the long-term weight result and patient satisfaction are very good. We believe that RYGB is a suitable method for helping patients for whom other bariatric procedures have failed.

PL-122

LONG TERM RESULTS OF A RANDOMIZED TRIAL COMPARING BANDED VERSUS STANDARD LAPAROSCOPIC ROUX- EN -Y GASTRIC BYPASS.

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Background: The banded gastric Bypass was designed to diminish weight regain in the long term. In 2008 we reported the initial results of a randomized controlled trial designed to compare surgical morbidity and maximum weight loss of morbidly obese patients undergoing Banded and standard Laparoscopic Roux- en- Y Gastric Bypass (LRYGB).

Objective: To analyze the 5 year results of the randomized trial.

Methods: A total of 60 patients who underwent LRYGB between May 2003 and March 2005 were randomized into 2 groups. Half of the patients underwent the standard version of the procedure and a 6.5cm Marlex® band was placed around the gastric pouch in the other half. Surgical morbidity, mortality, and 5 year weight loss were comparatively analyzed.

Results: There were 58 females and 2 males with a mean preoperative BMI of 47.4 kg/m². In 43 patients, 5-year follow up was obtained. There was no operative mortality. One patient died 3 years after surgery due to metastatic melanoma. The comparative analysis of BMI and Excess Body Weight loss over time are shown in the table.

All comparisons between groups: p=ns

Conclusion: There were no statistical differences in %EBWL and BMI at 5-year follow-up between the banded and the standard LRYGB.

	1 year		2 years		5 years	
	BLRYGB	LRYGB	BLRYGB	LRYGB	BLRYGB	LRYGB
	25	27	18	20	21	22
%EBWL	68.1	70.7	69.1	71.4	61.6	59.8
BMI kg/m ²	31.1 ± 4.1	30.2 ± 4.3	30.9 ± 4.7	30.1 ± 4.3	32.9 ± 5.2	32.8 ± 4.3

p = ns

Basic Science

PL-123

INSULIN-SENSITIZING EFFECTS OF GASTRIC BYPASS SURGERY (GBS) ARE MEDIATED THROUGH THE NECDIN-E2F4 INTERACTION

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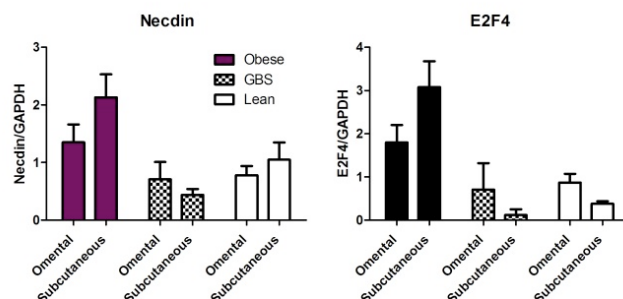
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Background: The insulin/IGF-1 signalling pathway promotes adipocyte differentiation and therefore insulin sensitivity via suppression of neccdin expression, which represses PPAR promoter activity via interaction with E2F4. The aim of this study is to test the hypothesis that this pathway represents one of the mechanisms by which GBS induces resolution of insulin resistance.

Methods: In Vivo: Omental and subcutaneous fat biopsies and plasma were obtained from 10 obese patients undergoing GBS, 9 patients one year post-GBS, and 7 normal weight individuals (BMI 20-29 kg/m²). Neccdin and E2F4 gene expressions were measured by quantitative real time PCR and the gene expression was normalized for the GAPDH gene. Circulating free IGF-1 was measured by a RIA. In Vitro: Mesenchymal stem cells (MSC) were isolated from omental fat obtained from obese undergoing GBS. MSC were differentiated into mature adipocytes and treated with des-IGF-1 (24-h).

Results: Free IGF-1 levels were significantly higher in the post-GBS patients as compared to pre-GBS obese patients (2.55±1.54 vs 1.32±0.65 mcg/l, p=0.03) and similar to normal weight controls (2.54±1.27 mcg/l). As shown in the Figure, Neccdin and E2F4 gene expression in the adipose tissue were significantly downregulated after GBS when compared with obese and with levels similar to lean controls. The in vitro experiments confirmed these findings. In human mature adipocytes, treatment with des-IGF-1 induces downregulation of Neccdin and E2F4 gene expression in a dose-dependent manner (p=0.01).

Conclusion: After GBS, activation of the insulin/IGF-1 signalling pathway suppresses expression of neccdin, which represses PPAR promoter activity via interaction with E2F4. This can represent one of the mechanisms that induce resolution of insulin resistance observed after GBS.



COMPARING OBESITY ALLELES AMONG DIVERSE BARIATRIC PATIENT POPULATIONS

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Background: Genetic factors likely play a role in obesity and outcomes after bariatric surgery. Single Nucleotide Polymorphisms (SNP) in the obesity-associated genes INSIG2, FTO, MC4R, PCSK1 have been associated with Class III obesity in Caucasians. We assessed whether these SNP variants are also associated with obesity in the primarily non-Caucasian obese population of BHC.

Methods: 200 patients undergoing bariatric surgery at BHC were enrolled in a study to compare phenotype and genotype to the GHS bariatric study cohort (n=1,138). One blood sample was obtained per patient at the time of standard of care blood testing for genetic analysis. Phenotypic measures including race/ethnicity, weight, height, date/type of surgery and medical comorbidities were collected. Frequency of INSIG2, FTO, MC4R and PCSK1 SNP homozygosity was determined for the BHC population and compared to the GHS database. Chi-square tests were used for comparison.

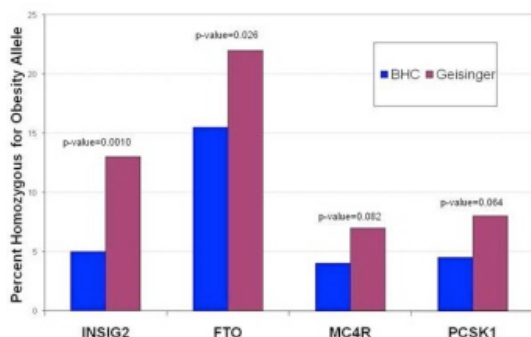
Results: Phenotypic data are represented in Table 1. Genetic analysis revealed a significant difference in expression between the two study populations of INSIG2 and FTO but not of MC4R and PCSK1.

Conclusion: Diverse bariatric patient populations exist between BHC and GHS. INSIG2 and FTO are expressed at significantly higher frequencies in the Caucasian GHS population versus the non-Caucasian BHC population, while MCR4 and PCSK1 are not.

Table 1.

N		BHC N=200	GHS N=1,138	p-value
Gender	Female, N (%)	174 (87%)	910 (80%)	0.017
Race	Hispanic, N (%)	155 (78%)	6 (<1%)	<0.0001
	Black, N (%)	27 (14%)	22 (2%)	
	White, N (%)	10 (5%)	1107	

			(97%)	
	Other, N (%)	8 (4%)	3 (<1%)	



Frequency of homozygous obesity SNPs

PL-125

REDUCED CARDIOVASCULAR RISK IN OBESE PATIENTS AFTER BARIATRIC SURGERY IS RELATED TO CERAMIDE-MEDIATED REDUCTION IN APO B LEVEL AND (ApoB)/ (ApoA-I) RATIO

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Background: Obesity-associated hyperlipidemia and hyperlipoproteinemia are risk factors for cardiovascular disease (CVD). Recently, sphingomyelin (SM), a ceramide-derived sphingolipid, was identified as a new independent risk factor of CVD. We hypothesize that the effect of gastric bypass (RYGB) on reduced cardiovascular risk is related to ceramide-mediated improvement in lipoprotein profile.

Methods: Plasma ceramide subspecies (C14:0, C16:0, C18:0, C18:1, C20:0, C24:0, and C24:1), ApoB and ApoA were quantified preoperatively and 3 and 6 months after RYGB. Brachial artery reactivity testing (BART) was performed before and 6 months after RYGB.

Results: Ten patients (9 female; age 48 yrs; BMI, $48.5 \pm 1.8 \text{ kg/m}^2$) were included in the study. At 6 months post-op, mean BMI decreased to $35.7 \pm 1.6 \text{ kg/m}^2$ corresponding to $51.3 \pm 3.2 \%$ excess weight loss. ApoB, ApoB/ApoA ratio and insulin resistance estimated from HOMA-IR were significantly reduced compared to pre-surgery values. The ratio of

ApoB/ApoA correlated with reduction in total plasma ceramide and ceramide subspecies (C18:0, C18:1, C20, C24:0 and C24:1) ($p < 0.05$). ApoB and the ratio were positively correlated with the reduction in TG, LDL and HOMA-IR ($p < 0.05$). BART is inversely correlated with ApoB and total ceramide ($p = 0.05$). The change in BART is significantly correlated with decreased in C16:0 ceramide ($p < 0.03$).

Conclusion: Our data show that reduced lipid profiles and decreased CVD risk factors after gastric bypass surgery may be mediated by changes in ceramide lipid.

PL-126

IMPACT OF SLEEVE GASTRECTOMY ON MARKERS OF BONE METABOLISM IN A FEMALE RAT MODEL OF DIET-INDUCED OBESITY

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Background: The majority of patients undergoing bariatric surgery are females, a group at risk for osteoporosis. Intestinal bypass results in malabsorption and has been associated with increased bone turnover and decreased bone density despite routine administration of nutritional supplements. Sleeve gastrectomy avoids intestinal bypass and minimizes the potential for malabsorption. The purpose of this study is to evaluate the impact of sleeve gastrectomy on bone metabolism using a female rodent model.

Methods: Sprague-Dawley female rats were given a 60% high-fat diet. At 12 weeks, they were assigned to undergo either sleeve gastrectomy or sham surgery. Blood was collected at 16 weeks for a chemistry panel and Multiplex assay. Two-sample t-test was used to compare groups.

Results: Animals in the sleeve gastrectomy group had significantly lower weight (273 ± 32 vs. 309 ± 29 g, $p < 0.02$) and lower albumin levels (3.69 ± 0.2 vs. 3.22 ± 0.3 g/dL, $p < 0.01$) than the sham group. There were no significant differences in calcium, phosphate, alkaline phosphatase, or PTH levels. Osteopontin and osteocalcin levels were both higher in the sleeve group (22 ± 5 vs. 15.5 ± 3.7 ng/mL, 99 ± 20 vs. 74 ± 19 ng/mL, $p < 0.01$).

Conclusion: Increased levels of osteopontin and osteocalcin following sleeve gastrectomy are consistent with increased bone turnover. Calcium, phosphate, and parathyroid hormone levels remain unchanged. These results support the idea that increased bone turnover following bariatric surgery is

primarily an effect of caloric restriction or decreased weight load versus malabsorption. Future studies are needed to evaluate Vitamin D levels and the long-term impact on bone turnover and density.

PL-127

ASSESSMENT OF ENERGY EXPENDITURE BEFORE AND AFTER BARIATRIC SURGERY

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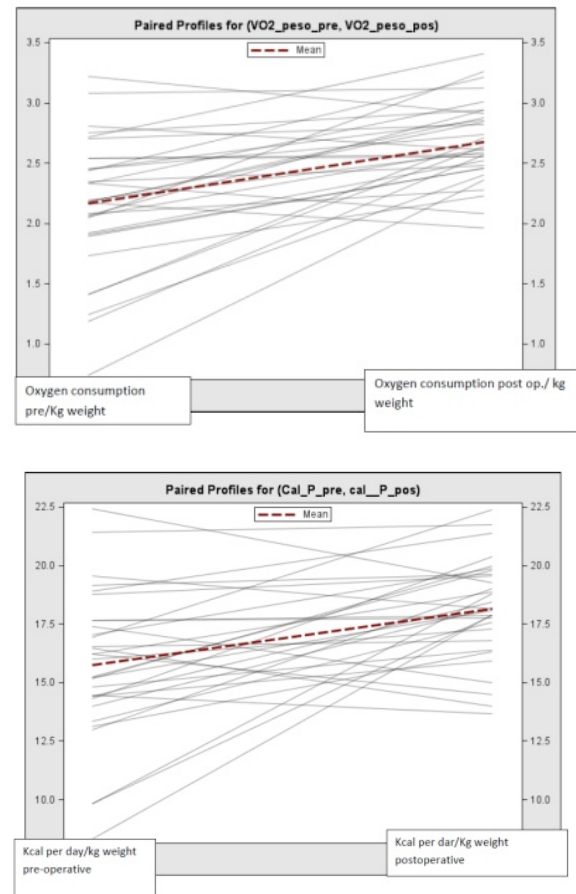
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Background: With dietary weight loss, a reduction in resting energy expenditure (REE) greater than can be accounted for by changes in body composition is believed to contribute, in part, to weight regain. Experimental animal studies find that Roux-en-Y gastric bypass (RYGB) results in an increase in REE and oxygen consumption (VO₂) when expressed per kg of body weight. In this study, we have examined in a clinical fashion the effects of RYGB on REE and VO₂ in RYGB patients

Methods: The study included 31 RYGB patients who underwent preoperative indirect calorimetric evaluations and body composition analyses before and 6 months following surgery. At both measurement periods, REE and VO₂, adjusted for changes in body size (kg) were analyzed, along with anthropometrics, i.e., fat mass (FM%), fat-free mass (FFM%), and body mass index (BMI). Statistical tests were used to correlate and analyze variables.

Results: The data show that RYGB increased REE (kcal/kg body weight) by 15.3% (p<0.01) and VO₂ (per kg) by 23.5% (p<0.01). We further found that REE was positively correlated to FFM% and negatively correlated with FM%.

Conclusion: After RYGB there is a significant increase in basal metabolic rate and a higher consumption of oxygen per kg of weight. An increase in energy expenditure with RYGB may be responsible, in part, for the long-term weight loss success of this bariatric procedure.



PL-128

ACUTE INSULIN RESPONSE AND TYPE 2 DIABETES REMISSION AFTER BILIOPANCREATIC DIVERSION

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Background: Beta-cell function of type 2 diabetes patients before and after biliopancreatic diversion (BPD) was evaluated by acute insulin response to intravenous glucose (AIR), and its relationship with diabetes remission explored.

Methods: 15 morbidly obese (MO, BMI >35 kg/m²), 15 obese (OB, BMI 30.0-34.9 kg/m²), and 15 overweight (OW, BMI 25.0-29.9 kg/m²) diabetics were studied before and following BPD. Diabetes was considered to be remitted when fasting serum glucose (FSG) and HbA1c were ≤125 mg/ml and

≤6%, respectively, and controlled when HbA1c was ≤7%, on free diet and without antidiabetic therapy.

Results: In Group MO mean AIR sharply increased by the 1st month, with further rise at 12 months (pre-BPD, 1, 4, 12 months mean values: 6.8, 25.1, 23.0, 33.3 μU/ml); in Group OB an increase was found at 4 and 12 months (2.2, 5.7, 7.8, 14.0 μU/ml), while in Group OW a slight increase was observed only at 12 months (2.1, 2.8, 2.3, 6.1 μU/ml). 12 month diabetes remission and control rate in Groups MO, OB, OW were 93%, 40%, 20%, and 100%, 100%, 80%, respectively. 12 month remission was independently predicted by preoperative BMI and AIR ($r^2=0.62$), with diabetes duration, therapy, preoperative FSG, HbA1c, HOMA unrelated to metabolic outcome.

Conclusion: In morbidly obese diabetic patients AIR is immediately restored and progressively increased up to normal values after BPD, suggesting key role of insulin secretion recovery in the excellent metabolic outcome. AIR response progressively decreases in the lower BMI ranges, in keeping with the lower diabetes remission rate.

PL-129

IMMEDIATE AND EARLY EFFECTS OF MALABSORPTIVE AND RESTRICTIVE PROCEDURES ON FASTING GLUCOSE, INSULIN AND INSULIN RESISTANCE IN THE MORBIDLY OBESE DIABETIC PATIENTS

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Background: Obesity surgery causes resolution/improvement of type 2 diabetes mellitus (T2DM). Our aim was to examine the effects of biliopancreatic diversion (BPD) and gastric banding (GB) on BMI, fasting insulin, glucose & leptin in morbidly obese diabetic subjects with T2DM.

Methods: 13 morbidly obese patients (7 BPD, 6 GB) had serial measurements of fasting glucose & insulin

at baseline, immediately following surgery (day 1-7), & at 1, 6 & 12 months. Homeostatic model assessment- insulin resistance (HOMA-1R) was calculated. Data were analyzed using paired t test (CI 95%).

Results: In the BPD group, glucose levels normalized at day 3 (5.6 ± 1 mmol/L), being statistically significant at 6 & 12 months (5 ± 0.7 , 4.4 ± 0.5 mmol/L). Insulin levels improved from day 1, statistically significant at day 2 (19 ± 9 μU/L), 5, 6 & 7 (14.2 ± 7 , 15.2 ± 8 and 17.4 ± 8 μU/L). All antidiabetic medications were stopped at the 4th postoperative day. In the GB group, no statistically significant changes were seen in the glucose levels. Statistically significant changes in the insulin were seen on day 1 & 2 (19 ± 13 , 13 ± 6.5 μU/L). HOMA-1R improved in both the groups $1.6 \pm 1.2^{**}$ (BPD), $4.3 \pm 1.4^{*}$ (GB). Pearson correlation between changes in BMI and leptin ($r=0.972$, $p=0.005$) was significant in the BPD group.

Conclusion: BPD causes immediate remission of T2DM. Leptin may play an important role in early improvement of insulin resistance in fasting states following BPD. In the GB group, glucose homeostasis improved but the patients were still on (reduced) anti-diabetic medications suggesting that it may be mainly due to decreased intake and weight loss.

Effects of BPD and LGB on BMI, fasting insulin and leptin

	BPD GROUP			LGB GROUP		
	BMI (kg/m ²)	Leptin (μg/L)	Insulin (μU/L)	BMI (kg/m ²)	Leptin (μg/L)	Insulin (μU/L)
Baseline	59±15	49±26	25.5±6.5	44±3	38±17	27.4±1
1months	50±9**	40±29*	23.4±19	41±4**	29±11	20.7±9
6months	45±9**	32±32**	14±9.5*	37±3**	31±7.7	14 ±3.8*
12 months	38±7**	8±19**	7.8±5**	36±2**	28±17*	15 ±5*

*P≤0.05, **P≤0.01

PL-130

ROUX-EN-Y GASTRIC BYPASS (RYGB) IMPROVES MITOCHONDRIAL FUNCTION IN THE LIVER OF OBESE RATS VIA NRF2

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Background: Obesity-related fatty liver disease is linked to mitochondrial dysfunction and oxidative

stress. RYGB decreases both steatosis and oxidative stress in the liver. Nuclear erythroid 2-related factor 2 (Nrf2) is a transcription factor that regulates mitochondrial function and protects cells by activating antioxidants and detoxifying enzymes.

Cytochrome C oxidase subunit II (COXII) is central to electron transfer in the mitochondrial respiratory chain. Objective: We hypothesized that RYGB activates Nrf2 and COXII in livers of obese rats.

Methods: SD rats were fed high-fat diet; obese rats underwent either RYGB (n=20) or sham (n=20) operation. Tissues were harvested at 13 weeks post-operatively. Nuclear fraction and mitochondrial extracts were used for immunoblotting; Immunostaining was done on liver sections for COXII, Nrf2 and macrophage markers ED2 and F4/80. Gels were quantified using densitometry; $p \leq 0.05$ was significant.

Results: RYGB increased mitochondrial marker (COXII) expression in liver sections compared to obese sham control ($3,330 \pm 56$ vs. $2,056 \pm 37$; $p < 0.001$) Total (nuclear and cytoplasmic) Nrf2 expression decreased after RYGB ($2,456 \pm 45$ vs. $4,352 \pm 76$, RYGB vs. Sham, $p < 0.001$); however, RYGB increased the nuclear fraction of Nrf2 ($2,341 \pm 46$ vs. $1,352 \pm 35$; RYGB vs. Sham $p < 0.001$). Nrf2 protein co-localized with both Kupffer cells markers ED2 or F4/80.

Conclusion: RYGB increases COXII that improves mitochondrial function and mitochondrial respiration. RYGB increased the nuclear translocation of Nrf2 that is involved in transcription of anti-oxidant and detoxifying enzymes. Taken together, these data suggest that RYGB is associated with improved mitochondrial function and improved anti-oxidant production. The role of Kupffer cells warrants further investigation.

Sleeve Gastrectomy

PL-131

GASTRIC PLICATION: OUR EXPERIENCE IN 100 PATIENTS

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Background: The sleeve gastrectomy has shown good results in weight loss. However, it is not exempt of complications such as leaks and staple line hemorrhage. In 2009, we initiated a protocol with a new procedure which consists of plicating the

stomach resulting in a smaller gastric lumen producing satiety. The results in excess weight loss (EWL) have been comparable to those in sleeve gastrectomy.

Methods: From November 2009 to July 2010, 100 patients (74F, 26M) underwent laparoscopic gastric plication as surgical treatment for obesity. In 5 of these patients, the gastric plication was performed as a revision procedure.

Results: Mean initial body mass index (BMI) was 39.7 ($30-61$) kg/m^2 . The percentage of excess weight loss (%EWL) was 22.7% at one month, 43.1% at 3 months and 56.6% at 6 months. There were 2 complications: one patient with pulmonary embolism and another with disruption of the suture line with perforation of the fundus due to excess vomiting.

Conclusion: After evaluating 100 patients, we can say this procedure is feasible. The results are comparable to those of the sleeve gastrectomy with fewer complications and a lower cost (no implants or staples are used). However, more studies are needed to determine its place in obesity surgery.

PL-132

GASTROESOPHAGEAL REFLUX FOLLOWING SLEEVE GASTRECTOMY IN MORBIDLY OBESE PATIENTS

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Background: Gastroesophageal reflux disease (GERD) is highly prevalent in morbidly obese patients, and having a high body mass index (BMI) is a risk factor for development of this co-morbidity. The effect of sleeve gastrectomy (SG) on GERD is poorly known.

Methods: We studied the effect of the SG on GERD in patients with morbid obesity (MO). A retrospective review of 28 consecutive patients undergoing a sleeve gastrectomy for MO between September 2008 and September 2010 was performed.

Results: 18 females and 10 males were identified with a mean age of 42 years (18-60). The mean weight and BMI was 166 kg and 55.5 kg/m^2 . The mean excess weight loss was 40% (17% to 83%) with a mean follow up time of 30 weeks (8 to 92). All patients had a pre and post operative UGI swallow study as part of their routine care. 18% were noted to have new onset of GERD on their postoperative UGI following their SG procedure. Using the GERD score

questionnaire, all patients were contacted to evaluate their reflux symptoms. We had a 64% response rate with 22% of patients indicating new onset GERD symptoms despite being on daily PPI therapy. All respondents were extremely happy with their surgery and weight loss to date.

Conclusion: SG may increase the prevalence of GERD despite satisfactory weight loss. Further studies evaluating esophageal manometry and ambulatory 24-h pH need to be done to better evaluate the effect of the sleeve gastrectomy on gastroesophageal reflux.

PL-133

SUPEROBESE PATIENTS: EFFICACY OF LAPAROSCOPIC DUODENAL SWITCH AS SECOND STEP AFTER LAPAROSCOPIC SLEEVE GASTRECTOMY

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Background: Morbidity and mortality after bariatric surgery in superobese patients allegedly can be reduced by performing surgery in two steps. The authors report a retrospective study gathered from a prospectively kept database for superobese patients (BMI>50kg/m²) submitted to laparoscopic duodenal switch (LDS) after laparoscopic sleeve gastrectomy (LSG).

Methods: From October 2004 to June 2010, 31 patients benefited from LDS after LSG. Mean age was 45.8±10.1 (21-64) years. Mean interval time between the two procedures was 13.9±8.4 (6-37) months. At the time of LSG, mean weight and BMI was 168.8±35.4 (127-255) kg and 58.3±6.7 (50-74,5) kg/m². At the time of LDS, mean weight, BMI and %EWL was 136.3±32.6 (92-220) kg, 47.1±7.2 (37,8-64,3) kg/m², and 31.6±12,2 (-11.7/±54,6) %. At the time of LSG, 26 patients suffered from 43 obesity comorbidities. Three of the latter (6.9%) had been resolved in 3 patients before the second step of LDS.

Results: Mean operative time for LDS was 175.5±60.6 (75-285) min. No mortality was registered. Four patients presented early complications (1 anastomotic leak, 1 small bowel perforation, 1 renal insufficiency, 1 pneumonia). Mean hospital stay was 6.6±11.3 (3-35) days. All patients, with exception of 3, were followed-up for a mean time of 28.8±21.4 (4-71) months. During follow-up, mean weight, BMI, and %EWL (as compared to the pre-LSG weight) was 99.4±23.7 (62-

150) kg, 3.,5±5.8 (24.9-46.3) kg/m², and 54.8±16 (18.9-84.8) %. Twenty two obesity comorbidities (51.1%) were resolved in 14 patients. Three patients required surgery for late complications (1 ventral hernia, 1 anastomotic stenosis, 1 protein deficiency).

Conclusion: Two step LDS in 31 superobese patients had no mortality and acceptable morbidity considering the high operative risk in this group. This procedure is efficient in term of weight loss and comorbidities resolution.

PL-134

IS THERE “TOO OBESE FOR OBESITY SURGERY”? LAPAROSCOPIC BARIATRIC SURGERY IN BMI OF 70-125 KG/M²

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Background: Data on laparoscopic bariatric surgery in the extremely obese (BMI > 70 kg/m²) is limited. Anatomic limitations and severe co-morbidities pose unique risks for these patients. The aim of this study is to assess the safety and feasibility of laparoscopic bariatric surgery in obese patients with a BMI > 70 kg/m².

Methods: Prospectively collected data was retrospectively reviewed for patients with a BMI > 70 kg/m² who underwent bariatric surgery at a single institution. Patient demographics, surgical procedure, BMI, %Excess weight loss (EWL), co-morbidities, length of follow-up, early (<30 days) and late (>30 days) complications, and length of hospital stay were measured.

Results: Between 01/2004 and 09/2010, 49 patients with a mean pre-operative BMI of 80.7 kg/m² (range 70-125) underwent 61 bariatric procedures. Twenty six sleeve gastrectomies, 11 gastric bypasses and 12 two stage procedures (sleeve gastrectomy followed by a gastric bypass) were performed. At a mean follow up of 17.4 months the mean BMI decreased to 60.9 kg/m², representing 36% EWL. A two-staged procedure resulted in significantly greater %EWL (54.5%) compared to either sleeve gastrectomy or gastric bypass (25.4% and 43.8% respectively, p=0.002). Sixty cases (98.4%) were completed laparoscopically, with only 1 case requiring conversion (1.7%) to open. Early complication rate was 16.4%, the majority being minor complications, while late complications occurred in 14.8%. There was a single late death in this series.

Conclusion: Laparoscopic bariatric surgery can be performed safely on patients with a BMI > 70 kg/m².

Best weight loss results are achieved when performing a staged procedure.

PL-135**STAPLE-LINE REINFORCEMENT DURING LAPAROSCOPIC SLEEVE GASTRECTOMY USING THREE DIFFERENT TECHNIQUES: A RANDOMIZED TRIAL**

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Background: Main drawback of laparoscopic sleeve gastrectomy (LSG) is the severity of post-operative complications. Staple line reinforcement (SLR) is strongly advocated. The aim of this study was to prospectively and randomly compare three different techniques of SLR during LSG.

Methods: From April 2010 to September 2010 patients submitted to LSG were randomly selected for the following three different techniques of SLR: oversewing (group A), buttressed transection with Seamguard® (group B) and staple-line roofing with Floseal® (group C). Primary end-points were reinforcement operative time, incidence of post-operative staple-line bleedings and leaks. Operative time was calculated as follows: oversewing time in group A, positioning of Seamguard in group B, roofing of the entire staple line in group C.

Results: Sixty patients were enrolled in the study (42 women and 18 men). Mean age was 42.6 years (range, from 28 to 59). Mean pre-operative BMI was 48.2 kg/m² (range, from 40 to 62). Mean time for SLR was longer in group A (14.4 minutes, range from 8 to 18) compared to group B (2.2 minutes, range from 1 to 4) and group C (4.2 minutes, range from 3 to 6) (p<0.01). Three major complications were observed, 1 for each group (1 leak in group A, 1 bleeding in group B and 1 leak in group C) with no significant differences between the groups. No deaths occurred.

Conclusion: SLR with either Seamguard or Floseal is faster compared to oversewing. No significant differences were observed regarding post-operative staple-line complications.

Metabolic Surgery

PL-136**LAPAROSCOPIC ROUX-EN-Y GASTRIC BYPASS FOR THE TREATMENT OF TYPE II DIABETES MELLITUS WITH BODY MASS INDEX 25- 35 KG/M², A PROSPECTIVE STUDY**

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Background: Laparoscopic Roux-en-Y gastric bypass (LRYGB) can dramatically ameliorate type 2 diabetes mellitus (T2DM) in morbidly obese patients. However, little evidence supports the effectiveness of LRYGB in low body mass index (BMI) patients.

Methods: After getting IRB approval, twenty-four patients with T2DM underwent LRYGB. Data, including patient demographics; BMI; co-morbidities; and details of diabetes mellitus, including disease duration, family history, medication use, and remission were prospectively collected and analyzed.

Results: The mean age of 2 (8.3 %) men and 22 (91.6%) women was 47 years (range, 28–63 years); mean BMI, 30.5 (range 25.0–34.6 kg/m²); and mean duration of T2DM onset, 6.8 years (range, 1–20 years). There was no mortality, but 2 (9%) patients experienced complications: an early gastrojejunostomy hemorrhage and intolerable loose stools that required revision of the bypassed limb. Fasting plasma glucose and HbA1c significantly decreased from their pre-operative values of 191.9 mg/dL and 10.4% to 115.8 mg/dL and 6.3% (p < 0.001) at 6 months and 103.5mg/dL and 5.97% (p < 0.001) at 12 months respectively. 19 (79.1 %) patients achieved remission of T2DM, whereas 3 (12.5%) achieved glycemic control and 2 (8.3%) showed improvement. Insulin use and duration of DM can predict the remission and glycemia outcome.

Conclusion: LRYGB achieved good surgical result in low-BMI patients; insulin use and duration of T2DM predict glycemic outcomes.

PL-137**MEDIUM TERM OUTCOMES IN INSULIN DEPENDENT DIABETICS FOLLOWING LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING**

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Background: Weight loss surgery is effective in control of type 2 diabetes. This study examines the effect of gastric banding on a consecutive cohort of unselected insulin dependent diabetics.

Methods: Between April 2003 and December 2009, 200 patients with diabetes underwent laparoscopic adjustable gastric banding. All insulin dependent diabetics with at least one year follow-up were included in this analysis. Data collection included BMI, weight, blood pressure, HbA1c, fasting glucose, total cholesterol, triglyceride, and medication dose preoperatively and 1, 2 and 3 years postoperatively.

Results: Pre-operatively 69 patients were taking insulin with a mean daily preoperative dose of 132.3 units (range 15 – 500 units). At one year, 27 of these patients had discontinued using insulin (34.8%). At 2 years a total of 34 patients had discontinued using insulin (54.8 % of patients who were on insulin preoperatively and had completed 2 years of follow-up). At 3 years 40 patients had discontinued using insulin (80 % of patients who were on insulin preoperatively and had completed 3 years of follow-up). These changes were accompanied with an improvement in HbA1c, fasting glucose, total serum cholesterol, triglyceride, and mean arterial pressures. There were no patients who were started on insulin following the procedure. The % Excess BMI loss did not have a significant effect on the decrease in insulin levels.

Conclusion: Laparoscopic gastric banding can be considered a powerful treatment option in the management of obese insulin treated diabetics and becomes increasingly effective with time up to 3 years following surgery.

PL-138

A MODIFIED SLEEVE GASTRECTOMY FOR THE TREATMENT OF TYPE 2 DIABETES MELLITUS AND THE METABOLIC SYNDROME IN OBESITY.

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Background: Ghrelin is a gastrointestinal peptide hormone (a 28-amino-acid peptide) produced primarily by “X/A” cells in the oxyntic glands of the stomach fundus, and cells lining the duodenum. A Modified Sleeve Gastrectomy (MSG) in which a great party of gastric fundus and a body of the

stomach, up to the region one inch near the pylorus vein is removed, may contribute to decline circulating Ghrelin levels.

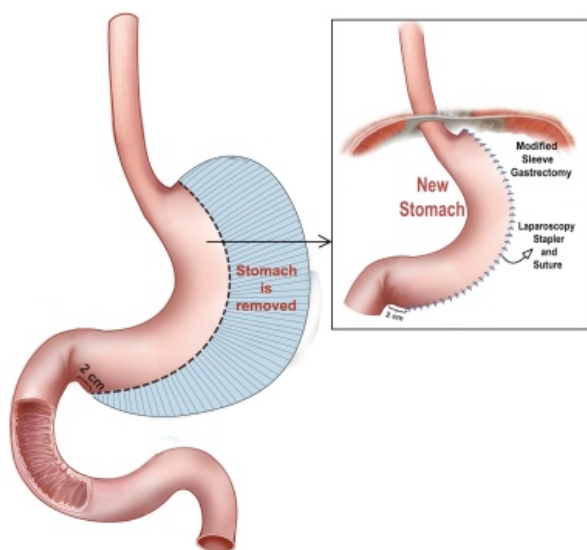
Methods: Following prospectively 126 patients with Type 2 Diabetes Mellitus (T2DM) and Metabolic Syndrome (MS), after Modified Laparoscopic Sleeve Gastrectomy (MLSG), in which we performed a resection of the stomach in three stages up to one inch to the pylorus.

Results: 30 months after surgery, 110 patients (87.3%) had normal fasting blood sugar (FBS) levels (<99 mg/dL), and 6 had had FBS between 101 and 114 mg/dL; glycosylated hemoglobin (HbA1c) averaged 5.1% (normal from 4% to 6%) in both groups. All patients stopped using insulin, and three started using an oral hypoglycemic medication, twice a day (lunch and dinner). Morbidity was 2.3% and mortality was 0.7%.

Conclusion: The MLSG in our experience is a safe procedure, with low morbidity and appears control T2DM and the treatment of exogenous overweight and morbid obesity.

Effects of bariatric and metabolic surgery on obesity

PROCEDURE	REMISSION RATE (%)
modified laparoscopic sleeve gastrectomy	86 - 88
laparoscopic adjusted silicone gastric banding	40 - 47
laparoscopic Roux-en-Y gastric bypass	83 - 92
laparoscopic biliopancreatic diversion	95 - 100



PL-139

LAPAROSCOPIC DUODENO-JEJUNAL BYPASS (LDJB) V/S LDJB WITH SLEEVE GASTRECTOMY (LDJBS) IN T2 DIABETES MELLITUS (T2DM) NON-OBESE PATIENTS

Marcos Berry, MD¹, Cristóbal Guixé, MD¹, Lionel Urrutia, MD¹; Nelson Bello¹, Rodolfo Lahsen, MD¹. *Clinica las Condes, Santiago, Chile.* **Background:** Bariatric surgical procedures resolve diabetes within days to weeks after discharge. Based on Rubino's research, LDJB has been proposed as treatment for non obese T2DM patients. The objective of this work is to evaluate the LDJB vs. LDJBS as a surgical option in this specific group of patients.

Methods: Under strict protocol we enrolled a prospective case series of 19 patients from March 2008 to August 2009. The first 8 patients underwent transection of the duodenum 2 cm distal to the pylorus, duodeno-jejunostomy, biliopancreatic limb of 150cm, alimentary limb of 100cm. For the following 11 patients we added a sleeve gastrectomy with 56 Fr bougie.

Results: 18 male and 1 female. Mean age: 45 y/o (34-62). Mean preop BMI was 27.7 (26-31) kg/m². BMI postoperative was 25.3 kg/m² in LDJB and 23 kg/m² LDJBS (p=0.001). Mean preoperative glucose level was 176 mg% and mean post-operative level was 151.6 mg% in LDJB and 116.4 mg% (p=0.01) in the LDJBS group. The mean preop HbA1c level was 9.2% in the LDJB group and 9.4% (p=0.9) in the LDJBS group. The mean postoperative HbA1c

level in the LDJB was 7.51% vs 6.12% in the LDJBS (p=0.02).

Four patients presented complications in the LDJB, mainly gastroparesis. No complication related to LDJBS. No mortality.

Conclusion: LDJB alone showed good metabolic control in the T2DM non obese patients, with a higher complication rate specially gastroparesis. After we added a sleeve gastrectomy, the LDJBS group, we report even better metabolic control and fewer complications.

PL-140

COMPARISON OF THE POST-PRANDIAL GUT HORMONE CHANGE BETWEEN LAPAROSCOPIC SLEEVE GASTRECTOMY AND GASTRIC BYPASS FOR THE TREATMENT OF TYPE 2 DIABETES MELLITUS

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Background: We had previously reported that laparoscopic gastric bypass (LGB) is more effective in diabetes treatment than laparoscopic sleeve gastrectomy (LSG) in low BMI diabetic patients but the mechanism remains speculative. This study was to compare the post-prandial gut hormone patterns between these two groups.

Methods: Mixed meal test and associated gut hormones were evaluated at 16 LSG patients and 16 LGBP patients. All patients were included in our randomized trial. The studied gut hormones included ghrelin, GIP, glucagon, pancreatic peptide (PP), CCK, GLP-1, PYY. Adipose related hormone, leptin and resistin were also evaluated. The differences of each hormone at different time points as well as the area under curve (AUC) were compared between the two groups.

Results: At 1 year after surgery, remission of T2DM was higher in LGBP group than the LSG group (93.3% vs. 46.7%; p<0.05). Participants assigned to LGBP had lost more weight, achieved a lower waist circumference and glucose, HbA1c and blood lipid levels than LSG. Significant differences of gut hormone changes between the two groups were found in ghrelin, CCK, PP and resistin but no significant differences were observed in GIP, glucagon, GLP-1 and PYY.

Conclusion: This study demonstrates that both LSG and LGBP had strong hind-gut effect after surgery but LGBP had a significant duodenum exclusion effect on CCK and PP.