

- 10:00am A701 – How Safe is Metabolic/Diabetes Surgery?\***  
Main Presenter: Ali Aminian, MD  
Authors: John Kirwan, PhD; Sangeeta Kashyap, MD; Bartolome Burguera, MD, PhD
- 10:15am A702 – Does Altered Alcohol Metabolism After Bariatric Surgery Increase Impairment?**  
Main Presenter: Ulysses Rosas, BA  
Authors: Natalia Leva, BA; Ulysses Rosas, BA
- 10:30am A703 – Branched-chain Amino Acids Metabolites Can Predict Type II Diabetes Remission 1 Year after Gastric Bypass\* - WITHDRAWN**  
Main Presenter: Alessandro Mor, MD  
Authors: Alessandro Mor, MD; Philip Omotosho, MD; Alfonso Torquati, MD
- 10:45am A704 – Diabetes Evolution after Sleeve Gastrectomy: Intermediate-term Outcomes\***  
Main Presenter: Samantha Beaulieu-Truchon, MD, MSc  
Authors: Samantha Beaulieu-Truchon, MD, MSc; Frédéric-Simon Hould, MD; Laurent Biertho, MD; Stefane Lebel, MD; Simon Marceau, MD; Picard Marceau, MD, PhD; Fady Moustarah, MD, MPH; Simon Biron, MD, MSc; Dre Odette Lescelleur, MD
- 11:00am A705 – Long-Term Outcomes in Roux-en-Y Gastric Bypass Patients: 10-13 Year Data\***  
Main Presenter: Nabeel Obeid, MD  
Authors: Nabeel Obeid, MD; Seth Concors, MD; Bradley Schwack, MD; George Fielding, MD; Marina Kurian, MD; Christine Ren-Fielding, MD
- 11:15am A706 – Interactions between Calcium Metabolism and Anti-reflux Medication after Sleeve Gastrectomy\***  
Main Presenter: Christoph Sperker, MD  
Authors: Christoph Sperker, MD; Ahmed Abraham, MD; Petra Hofmann-Strommer, DL; Birgit Lötsch, Registered, Dietician; Eva Russold, BSc; Ali Saalabian, MD; Johanna Brix, MD; Hans-Peter Kopp, MD; Anton Landsiedl, MD; Martin Schermann, MD; Stephan Kriwanek, MD; Rudolf Roka, MD; Thomas Gruenberger, MD
- 11:30am A707 – Clinical Outcomes in Patients with BMI 30 to 34.9 kg/m<sup>2</sup> (Obesity Class 1) Submitted to Laparoscopic Sleeve Gastrectomy**  
Main Presenter: Carmen Santander, MD  
Authors: Carmen Santander, MD; William Awad, MD; Cristian Martinez, MD; Alvaro Garay
- 11:45am A708 – Changes of Circulating Irisin and High Sensitivity C-Reactive Protein Levels Correlate in Morbidly Obese Individuals with Type 2 Diabetes after Roux-en-Y Gastric Bypass\***  
Main Presenter: Alessandro Mor, MD

\* Presentation under consideration for the John Halverson Young Investigator Award

Authors: Alessandro Mor, MD; Philip Omotosho, MD; Alfonso Torquati, MD

## **Paper Session VIII - Scientific Research**

**3:30pm–5:00pm**

- 3:30pm**      **A801 – Recalcitrant Hypoglycemia with Neuroglycopenia after Roux-en-Y Gastric Bypass is Caused by Postprandial Changes in Glucose, Gut and Pancreatic Hormone Responses to Altered Feeding Route, Not Nesidioblastosis.**  
Main Presenter: Guilherme Campos, MD  
Authors: Guilherme Campos, MD; Mohammad J Khoraki, MBBS; Dawn Davis, MD, PhD
- 3:45pm**      **A802 – Limb Length of Gastric Bypass and Modulation of the Anti-diabetic Effect and Portal Milieu**  
Main Presenter: Ali Tavakkoli, MD  
Authors: Atanu Pal
- 4:00pm**      **A803 – Comparative Physiogenomic Analyses of Weight Loss in Response to Two Modes of Bariatric Surgery**  
Main Presenter: Gualberto Ruano, MD, PhD  
Authors: Richard Seip, PhD; Pavlos Papasavas, MD, FACS; Darren Tishler, MD; Janet Ng, PhD; Andrea Stone, BS; Gualberto Ruano, MD, PhD
- 4:15pm**      **A804 – Roux-en-Y Gastric Bypass Surgery Increases Insulin Secretion in Zucker Diabetic Fatty Rats**  
Main Presenter: J. David Mosinski  
Authors: J. David Mosinski; Esam Batayyah, MD.FACS; Hector Romero Talamas, MD; Olivia Dan; Hazel Huang, MS; Anny Mulya, PhD; Amanda Scelsi, MS
- 4:30pm**      **A805 – GLP-2 Changes after RYGB Mediate Intestinal Hypertrophy and Contribute to Improved Glucose Balance**  
Main Presenter: Ali Tavakkoli, MD  
Authors: Atanu Pal; Ali Tavakkoli, MD
- 4:45pm**      **A806 – Sleeve Gastrectomy Compromises Skeletal Morphology and Damages Bone Marrow Health of Obese Rats as Compared to Their Controls**  
Main Presenter: Gabriel Pagnotti, MS  
Authors: Gabriel Pagnotti, MS; M. Ete Chan, Ph.D.; Vihitaben Patel, BE; Maria Altieri, MD, MS; Ariel Yang, BSBME; Clinton Rubin, Ph.D.; Jason Abraham; Jingxian Tan, Undergraduate

## **Top 15 Posters**

**1:30pm–3:00pm**

- 1:30pm**      **A5000 – Peri-operative Outcomes of End Stage Renal Disease Patients Undergoing Laparoscopic Roux-en-Y Gastric Bypass**  
Main Presenter: John Afthinos, MD  
Authors: John Afthinos, MD; Gurdeep Matharoo, MD; Karen E. Gibbs, MD

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- 1:35pm**      **A5001 – The Time to Weight-Loss Steady State after Gastric Bypass Predicts Long-Term Weight Loss Success.**  
Main Presenter: Tammy Kindel, MD, PhD  
Authors: Tammy Kindel, MD, PhD; Vishal Kothari, MD; Corrigan McBride, MD; Jon Thompson, MD
- 1:40pm**      **A5002 – Outcomes of Roux-en-Y Gastric Bypass in Super Obese Patients : Comparison between BMI 55-65kg/m<sup>2</sup> and ≥65kg/m<sup>2</sup>**  
Main Presenter: Rena Moon  
Authors: Rena Moon; Andre Teixeira, MD; Muhammad Jawad, MD
- 1:45pm**      **A5003 – Practice Patterns and Role of Medical Education Related to Bariatric Surgery**  
Main Presenter: Amy Larkin, PharmD  
Authors: Amy Larkin, PharmD; Jayashri Desai, MPH; Robert Kushner, MD
- 1:50pm**      **A5004 – Outcomes of Bariatric Surgery in Diabetic Patients with Diminished Pancreatic Secretory Reserve**  
Main Presenter: Ali Aminian, MD  
Authors: Ali Aminian, MD; Christopher Daigle, MD; Ricard Corcelles, MD, PhD; John Kirwan, PhD; Bartolome Burguera, MD, PhD; Sangeeta Kashyap, MD; Stacy Brethauer, MD; Philip R. Schauer, MD
- 1:55pm**      **A5005 – The Influence of Selenium on Weight Loss and Diabetes Remission After Bariatric Surgery**  
Main Presenter: John Morton, MD, MPH  
Authors: Joan Chapman, DO; Dan Azagury, MD; Homero Rivas, MD, MBA
- 2:00pm**      **A5006 – Comparing the Outcomes of Pain Management Strategies in Bariatric Surgery Patients**  
Main Presenter: Solomon Lubinga, BPharm, MS  
Authors: Solomon Lubinga, BPharm, MS; Heather Evans, MD, MS; Ryan Hansen, PharmD, PhD
- 2:05pm**      **A5007 – Predicting Sub-Optimal Weight Loss One Year after a Roux-en-Y Gastric Bypass with the Minnesota Multiphasic Personality Inventory – 2 – Restructured Form (MMPI-2-RF)**  
Main Presenter: Ryan Marek, MA  
Authors: Ryan Marek, MA; Anthony Tarescavage, M.A.; Megan Lavery, Psy.D.; Leslie Heinberg, PhD

## **Top 15 Posters (continued)**

**1:30pm–3:00pm**

- 2:10pm**      **A5008 – Concomitant Removal of Gastric Band and Gastric Bypass: Analysis of Outcomes and Complications from the ACS-NSQIP Database.**  
Main Presenter: Elie Ramly, MD  
Authors: Ghassan Chamseddine; Bassem Safadi, MD; Hani Tamim, PhD; Rami Kantar, MD; Elias Elias, MD, MPH

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- 2:15pm**      **A5009 – Goal Directed Program after Sleeve Gastrectomy Improves Weight Loss**  
Main Presenter: Guowei Kim  
Authors: Guowei Kim; Chuen Seng Tan, PhD, MSc, PhD; Anton CHENG, MD; Jaideepraj Rao; Thida Khin, MBBS, MSc.Healthcare, Management; Davide Lomanto, MD, PhD; Jing Yu Ng, MBBS, MRCS; Jimmy So, MBChB, FRCS, MPH; Asim Shabbir, MBBS, FRCS
- 2:20pm**      **A5010 – Does Sleeve Gastrectomy Hinder Growth in Children?**  
Main Presenter: Aayed Alqahtani, MD, FRCSC, FACS  
Authors: Mohamed Elahmedi; Aayed Alqahtani, MD, FRCSC, FACS
- 2:25pm**      **A5011 – Impact of Different Mechanical Stapling Platforms in Vertical Sleeve Gastrectomy (VSG)**  
Main Presenter: Mitchell Roslin, MD, FACS  
Authors: Lobat Hashemi, MS
- 2:30pm**      **A5012 – Bariatric Surgery in Transplant Patients**  
Main Presenter: Raquel Gonzalez-Heredia  
Authors: Raquel Gonzalez-Heredia; MARIO MASRUR, MD; Melissa Murphey, DNP; Enrique Elli, MD
- 2:35pm**      **A5013 – Prospective Evaluation of Initial and Repeat Use of a Novel Dual Intragastic Balloon**  
Main Presenter: Gontrand Lopez-Nava, MD  
Authors: Gontrand Lopez-Nava, MD; Inmaculada Bautista Castano, MD; Amaya Jiminez-Banos, MD; Teresa de Grado Machado, MD; Juan Pedro Fernandez Corbelle, MD
- 2:40pm**      **A5102 – Diabetes Resolution in Bariatric Patients Requiring Satin Therapy**  
Main Presenter: Darren Tishler  
Authors: Janet Ng, PhD; Kevin Ballard, PhD; Andrea Stone, BS; Beth Taylor, PhD; Darren Tishler, MD; Pavlos Papasavas, MD

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## A701

### How Safe is Metabolic/Diabetes Surgery?

Ali Aminian *Cleveland OH*<sup>1</sup>, Stacy  
Brethauer *Cleveland OH*, John  
Kirwan *Cleveland OH*, Sangeeta  
Kashyap *Cleveland OH*, Bartolome  
Burguera *Cleveland Ohio*, Philip  
Schauer *Cleveland OH*  
Cleveland Clinic<sup>1</sup>

**Background:** Safety and efficacy are two fundamental factors when a treatment modality is being evaluated in clinical practice. Although recent studies have shown the impressive effects of bariatric surgery on type 2 diabetes with respect to glycemic control, cardiovascular risk factor modification, and possibly long-term complete remission of a progressive disease, the safety profile of metabolic/diabetes surgery has been a matter of concern among patients and physicians.

**Methods:** Data of diabetic patients undergoing laparoscopic Roux-en-Y gastric bypass (LRYGB) between 2007-2012 were retrieved from the American College of Surgeons-National Surgical Quality Improvement Program database. Seven control groups consisting of diabetic patients who underwent coronary artery bypass graft, infra-inguinal peripheral revascularization, various laparoscopic abdominal procedures, and total knee arthroplasty were also identified. Length of postoperative hospital stay, 30-day postoperative composite complication (presence of any of nine adverse events including stroke, myocardial infarction, acute renal failure, deep vein thrombosis, pulmonary embolism, pneumonia, sepsis, septic shock, need for transfusion), readmission, reoperation, and mortality rates were compared between LRYGB and the control groups.

**Results:** Of the 66,678 diabetic patients included, 16,509 underwent LRYGB. The mean operative time of LRYGB and length of hospital stay were 137.7±87.3 min and 2.57±3.04 days, respectively. Serious events within 30-days after LRYGB included need for transfusion (1.22%), sepsis (0.81%), pneumonia (0.66%), deep vein thrombosis (0.36%), septic shock (0.30%), acute renal failure (0.22%), pulmonary embolism (0.22%), myocardial infarction (0.16%), and stroke (0.05%), which led to composite complication and mortality rate of 3.43% and 0.30%, respectively. Thirty day readmission and

reoperation rate after LRYGB was 6.72% and 2.46%, respectively. The composite complication rate after LRYGB was comparable to laparoscopic cholecystectomy and hysterectomy. The length of hospital stay and readmission rate were similar to laparoscopic appendectomy (table 1). Mortality rate of LRYGB (0.30%) was comparable to knee arthroplasty (figure 1). Gastric bypass patients had significantly better short-term outcomes in all examined variables compared to coronary artery bypass graft, infra-inguinal revascularization, and laparoscopic colectomy. Patients who were taking insulin before LRYGB had higher complications (4.1% vs. 3.0%, p<0.001) and mortality (0.4% vs. 0.2%, p=0.048) compared to patients who were on oral anti-diabetics.

**Conclusions:** In conclusion, LRYGB can be considered a relatively safe surgical procedure in diabetic patients with comparable short-term morbidity to well-accepted procedures such as cholecystectomy and appendectomy, and mortality similar to knee arthroplasty. Findings of this study indicate that the 30-day mortality risk of LRYGB is one-tenth that of cardiovascular surgery, and earlier intervention with metabolic/diabetes surgery to treat diabetes and metabolic syndrome may eliminate the need for some later higher-risk procedures to treat cardiovascular complications of diabetes. Further analyses for long-term safety outcomes are warranted.

## A702

### Does Altered Alcohol Metabolism After Bariatric Surgery Increase Impairment?

John Morton *Stanford CA*<sup>1</sup>, Ulysses Rosas *Palo Alto CA*, Natalia Leva *Mill Valley CA*  
Stanford School of Medicine<sup>1</sup>

**Background:** Bariatric surgery offers the most effective and enduring weight loss for morbidly obese patients by altering the gastrointestinal anatomy. One unintended consequence that results from this is an altered alcohol metabolism. It has been previously reported that breath alcohol content (BAC) levels and time to sober were increased in patients after weight loss surgery. However, little is known whether this altered alcohol metabolism also changes psychomotor function and reaction time. The aim of this study is to investigate the effects of altered alcohol metabolism after bariatric surgery on psychomotor function and performance on DUI field sobriety test.

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**Methods:** 24 bariatric patients were prospectively recruited for this case-crossover study. Preoperatively and 6-months postoperatively BAC and time to sober were measured after consumption of 5 ounces of red wine (12.5% alcohol by volume). In addition, participants were asked to complete a questionnaire of drinking habits and reported symptoms of intoxication. A representative of the Sheriff's Department administered the alcohol Breathalyzer test on Drager Intoxilizer 7510 as well as administered standard field sobriety test. Participants also completed the Psychomotor Vigilance Task-192 (PVT)- a validated measure of alertness (measured reaction time), and psychomotor function. Patient demographic data was obtained, as well preoperative and 6- and 12-month postoperative BMI, waist circumference, and percent excess weight loss (%EWL). Student T-test and correlation analysis were used as appropriate. All analysis was performed using GraphPad Prism 6.

**Results:** Patients had an average age of 48.5 years, 78.9% were female, and 63.2% were white. Patients had an average preoperative BMI of 44.7 kg/m<sup>2</sup> and waist circumference of 131.8 cm. At 6-months postoperative, patients had a significantly increased BAC (preop 0.013 vs. 6mos 0.04%, p< 0.001) and increased time to sober (preop 45.4 vs. 68.8 minutes, p=0.043). At 6-months postoperative, patients experienced significantly greater median reaction times after alcohol consumption (preop 284 vs. 6mos 334 ms, p=0.002) and had slower response speeds (preop 3.53 vs. 6mos 3.04 (1/sec), p=0.003). Additionally, when the average difference of the reaction times, before and after alcohol consumption, was calculated patients had significantly slower reaction times after surgery (preop 8.91 vs. 6mos 40.1 ms, p=0.006). Law enforcement also classified a greater proportion of postoperative patients as visibly impaired on nystagmus field sobriety test (preop 0.0% vs. 6mos 25.0%, p=0.013).

**Conclusions:** Bariatric surgery not only alters alcohol metabolism by increasing BAC and time to sober, but may also increase their psychomotor impairment. Alcohol consumption after surgery lead to even slower reaction times as well as an increase in the number of patients being considered impaired by police officers when compared to preoperative scores. Bariatric patients should be continued to counsel regarding alcohol use.

A704

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### Diabetes evolution after sleeve gastrectomy: intermediate-term outcomes

Samantha Beaulieu-Truchon *Québec Canada*<sup>1</sup>, Frédéric-Simon Hould *Quebec Quebec*<sup>1</sup>, Laurent Biertho *Quebec Quebec*<sup>1</sup>, Stefane Lebel *Sainte Foy Quebec*<sup>1</sup>, Simon Marceau *Quebec City Quebec*<sup>1</sup>, Picard Marceau *Québec Québec*<sup>1</sup>, Fady Moustarah *Edmonton AB*<sup>1</sup>, Simon Biron *Quebec Qc*<sup>1</sup>, Dre Odette Lescelleur *Quebec Canada*<sup>2</sup>  
IUCPQ<sup>1</sup> IUCPQ, Quebec, Quebec, CA<sup>2</sup>

**Background:** To ensure optimal use of sleeve gastrectomy (SG) as treatment for type 2 diabetes mellitus (T2DM) in severely obese patients, intermediate-term data based on an accepted definition for remission of T2DM are missing. The objective of this study was to establish intermediate-term rates of improvement, remission and recurrence of diabetes after SG in severely obese patients with different degrees of T2DM.

**Methods:** A retrospective study of T2DM patients with body mass index (BMI)  $\geq 35$  kg/m<sup>2</sup> who underwent SG between 2006 and 2011 was conducted. The glycemic values and information on treatment were assessed at annual intervals including the last documented follow-up. Remission of T2DM was defined as glycated hemoglobin (HbA1c) < 6.5% and fasting plasma glucose (FPG) < 7.0 mmol/L in the absence of treatment. T2DM was improved when there was a decrease of HbA1c  $\geq 1.0\%$  and/or FPG  $\geq 1.6$  mmol/L without increasing the treatment against diabetes OR a decrease of  $\geq 50\%$  of antihyperglycemic treatment without increased serum glucose values.

**Results:** Patients were categorized preoperatively into three groups: 1- HbA1c and/or FPG values in diabetic range without treatment (n=26, HbA1c 6.4 $\pm$ 0.4%, BMI 50.0 $\pm$ 11.0 kg/m<sup>2</sup>, age 48.6 $\pm$ 9.1 years), 2- receiving oral hypoglycemic agents (n=95, HbA1c 6.9 $\pm$ 1.1%, BMI 48.2 $\pm$ 8.7 kg/m<sup>2</sup>, age 50.2 $\pm$ 10.6 years), 3- injecting insulin (n=52, HbA1c 7.9 $\pm$ 1.8%, BMI 47.9 $\pm$ 7.8 kg/m<sup>2</sup>, age 54.6 $\pm$ 9.3 years). Follow-up time for the whole cohort was 30 $\pm$ 11 months (range: 4 to 62 months). One year postoperatively, HbA1c and BMI were respectively: 1- 5.5 $\pm$ 0.3% and 38.0 $\pm$ 10.5 kg/m<sup>2</sup>, 2- 5.9 $\pm$ 0.7% and 36.0 $\pm$ 6.5 kg/m<sup>2</sup> and 3- 6.9 $\pm$ 1.1% and 36.2 $\pm$ 7.1 kg/m<sup>2</sup>. No statistically significant increase was noted in group 1 and 2 for the values of HbA1c during follow-up (p<0.01). In group 3, gradual augmentation of HbA1c was observed

## ASBMS

throughout follow-up and values reached preoperative levels at five years. Weight regain at last follow-up was similar in all groups with an average increase of 2.0 kg/m<sup>2</sup>. The cumulative 5 year improvement (without remission), remission and recurrence rates were respectively: 1- 0%, 81% and 4%, 2- 40%, 59% and 1% and 3- 81%, 10% and 2%. **Conclusions:** Despite significant weight loss, diabetes remission occurred in a small percentage of patients on insulin at the time of surgery. SG should be considered as treatment for T2DM before disease progression for better intermediate-term results.

### A705

#### Long-Term Outcomes in Roux-en-Y Gastric Bypass Patients: 10-13 Year Data

Nabeel Obeid *New York NY*<sup>1</sup>, Seth Concors *Cherry Hill New Jersey*<sup>2</sup>, Bradley Schwack *New York NY*<sup>2</sup>, George Fielding *New York NY*<sup>2</sup>, Marina Kurian<sup>2</sup>, Christine Ren-Fielding<sup>2</sup>

New York University School of Medicine<sup>1</sup> Univ. of Pennsylvania School of Medicine<sup>2</sup>

**Background:** Short- and mid-term data on bariatric surgery, including Roux-en-Y gastric bypass (RYGB), show sustained overall weight loss and improvement in obesity-related comorbidities. Very few long-term studies on RYGB are in existence, some of which are based on open procedures, different techniques (e.g. banded bypass and short limb length), or data from the previous two decades. The aim of our study was to investigate the long-term weight loss, remission of comorbidities, nutritional status, and complication rates among patients undergoing RYGB.

**Methods:** We conducted a retrospective review of a prospective database limited to patients undergoing RYGB ≥ 10 years prior to study onset, together with office visits and telephone interviews. Revisional surgery served as an endpoint, ceasing eligibility for study follow-up. Outcomes included weight loss measures and rates of comorbidity remission, long-term complications, and nutritional deficiencies.

**Results:** Between 10/2000 – 1/2004, RYGB was performed in 328 patients: 83% female, mean age 41.4 years, and mean preoperative body mass index (BMI) 47.5 kg/m<sup>2</sup>. Attempts were made to contact the 294 patients eligible for ≥ 10-year follow-up, and 134 (46%) were successfully contacted. Figure 1 illustrates weight loss outcomes, with 58.9% excess weight

loss (EWL) at ≥ 10 years. Higher %EWL was achieved at ≥ 10 years for those with preoperative BMI <50 kg/m<sup>2</sup> vs. ≥ 50 kg/m<sup>2</sup> (61.3% vs. 52.9%, p-value = 0.034). Thirty patients (9%) had revisional surgery for weight regain (mean 6.5 years postoperatively). Nine deaths (2.7%) occurred (mean 6.0 years postoperatively). Preoperatively, 56% had hypertension (HTN), 60% had hyperlipidemia (HL), and 20% had diabetes mellitus (DM). Blood pressure (p-value = <0.0001), lipid panel (p-value = <0.0001), and hemoglobin A1c (6.6% preop vs. 5.7% at ≥ 10 years, p-value = 0.0023) all improved. Using Kaplan-Meier estimates, at 10 years, remission of comorbidities was 46% for HTN, 46% for HL, and 58% for DM. Sixty-four patients (19.5%) had long-term complications requiring surgery (gastrogastric fistula, small bowel obstruction, internal or incisional hernia) at an average of 3.9 years postoperatively. Table 1 lists the prevalence of specific postoperative nutritional deficiencies.

**Conclusions:** This analysis of 10-13 years of postoperative data reveals that there is significant, sustainable weight loss over time with the RYGB procedure. Higher levels of excess weight loss are achieved by those patients with a lower preoperative BMI. In addition, comorbid conditions are improved, with a substantial number in remission a decade later. While long-term complications and nutritional deficiencies can occur, RYGB remains a primary, durable, and effective treatment option for morbid obesity.

### A706

#### Interactions between calcium metabolism and anti Reflux Medication after Sleeve Gastrectomy

Christoph Sperker *Vienna Austria*<sup>1</sup>, Ahmed Abraham *Vienna Austria*<sup>1</sup>, Petra Hofmann-Strommer *Vienna Austria*<sup>1</sup>, Birgit Lötsch *Vienna Austria*<sup>1</sup>, Eva Russold *Vienna Austria*<sup>1</sup>, Ali Saalabian *Vienna Vienna*<sup>1</sup>, Johanna Brix *Vienna Vienna*<sup>1</sup>, Hans-Peter Kopp *Vienna Vienna*<sup>1</sup>, Anton Landsiedl *Wien Wien*<sup>1</sup>, Martin Schermann *Vienna Austria*<sup>1</sup>, Stephan Kriwanek *Vienna Vienna*<sup>2</sup>, Rudolf Roka *Vienna Austria*<sup>2</sup>, Thomas Gruenberger *Vienna Vienna*<sup>2</sup> Krankenanstalt Rudolfstiftung<sup>1</sup> SMZ OST - Donauspital<sup>2</sup>

**Background:** Malabsorption and micronutrient deficiencies are very well known problems after bariatric surgery. Therefore substitution and regular controls need to be performed. Calcium

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# ASBMS

levels are known not to depend only on vitamin D, but also on gastric pH levels. Patients who have to take anti reflux medication (PPI) for mild gastro esophageal reflux symptoms after laparoscopic sleeve gastrectomy (LSG) therefore might suffer from low calcium levels or secondary hyperparathyroidism consequently followed by bone demineralization. The aim of this study was to determine the effect of PPI medication on calcium levels, PTH levels and vitamin D levels after LSG.

**Methods:** All Patients undergoing bariatric LSG between 2007 and 2013 were enrolled into our tight follow up. Patients were examined preoperatively as well as four times a year for the first two years, twice for the third year and further on once a year. Calcium, vitamin D and PTH levels were monitored as well as weight parameters. All patients received standard vitamin, mineral and trace element substitution, which consisted of 3000 mg of calcium carbonate equal to 1200 mg Calcium per day, 800 IE vitamin D, as well as one tablet of vitamins and micronutrients, which is available as OTC and contains an additional 120 mg Calcium and 200 IE vitamin D. In addition to this Vitamin D was also substituted according to vitamin D blood levels with a mean of 2000 IE per day. Calcium metabolism parameters were then analyzed according to PPI medication, sex and age.

**Results:** A total of 385 patients with an average body mass index of 47,7kg/m<sup>2</sup> (32-74) and mean age of 36,9 (20-70) years were analyzed. 39 (10.1%) of these patients took PPI for at least three months during a mean follow up of 37 (5-84) months. Data showed highly significant ( $p < 0,0001$ ) lower calcium levels for the PPI group in comparison to the non PPI group, although both groups showed no hypocalcaemia. PTH levels also were significantly higher in the PPI group as expected ( $p < 0,0001$ ). On the contrary vitamin D levels did not indicate significant differences as well as age and sex did not have any influence on calcium or PTH levels.

**Conclusions:** Calcium homeostasis is known to show problems after malabsorptive bariatric procedures like gastric bypass or biliopancreatic diversion. Our data shows, that higher gastric pH levels due to PPI medication negatively influence calcium absorption as well. Therefore these patients might suffer from bone demineralization. Calcium and PTH levels should be monitored closely, especially in

patients with PPI therapy after sleeve gastrectomy.

## A707

### Clinical Outcomes in Patients with BMI 30 to 34.9 kg/m<sup>2</sup> (Obesity Class 1) submitted to Laparoscopic Sleeve Gastrectomy

Carmen Santander *Santiago Region Metropolitana*<sup>1</sup>, William Awad *Santiago Santiago*, Cristian Martinez *SANTIAGO SANTIAGO*, Alvaro Garay *Clinica Las Lilas*<sup>1</sup>

**Background:** Class 1 obesity can be associated with an increased risk of comorbidities and physical and health-related quality of life impairment. There is some controversy regarding indication of bariatric surgery to these patients because this group might be adequately managed with non surgical treatment. The aim of this study is to show our clinical results in patients with obesity class 1 submitted to laparoscopic sleeve gastrectomy (LSG) in terms of excess weight loss (%EWL) and resolution of associated comorbid conditions.

**Methods:** study Design: retrospective cohort study. Population: all patients with obesity class 1 (BMI: 30-35 kg/m<sup>2</sup>) submitted to LSG by our team between January 2008 and December 2012 with complete follow up. Description of the following variables: biodemographics, postoperative morbidity and mortality, associated comorbidities, percentage of excess weight loss (%EWL) according to follow-up, weight regain, evolution of comorbidities after 12 months and changes in quality of life after surgery assessed with BAROS score.

**Results:** 304 patients, 87.5% (266) female. Mean preoperative age 34.5 ( $\pm$  9.9) years (range: 15-59), mean preoperative BMI 33.2 ( $\pm$ 1.5) kg/m<sup>2</sup> (range: 30-35). According to preoperative comorbid conditions, 14.5% showed hypertension (HT), 81.3% insulin resistance (IR), 71.4% dyslipidemia (DLP), 63.5% hepatic steatosis, 11.85 sleep apnea hipopnea syndrome, 0.7% diabetes mellitus type 2 and 6.8% of women showed polycystic ovarian syndrome. All of them had been previously submitted to at least two attempts of unsuccessful medical treatment. Regarding mean %EWL according to follow up we have 110% ( $\pm$ 33.3) range: 47-206%, 112.4% ( $\pm$ 34.8) range: 47-181%, 112% ( $\pm$ 36.4), range: 55-181% y 101% ( $\pm$ 35), range: 57-155% at 12, 24, 36 y 48 postoperative months, respectively. The evolution of comorbid condition after 12 months

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# ASBMS

went as follows: 30% of patients with HT showed remission and 45% resolution. Patients with DLP showed 25% remission and 40% resolution. IR resolved in 67% of cases. Both patients with diabetes showed remission. Quality of life improved significantly 12 months after surgery and remained better than the baseline preoperative evaluation after 3 years. In terms of weight regain, defined as regain at least 10% of lowest BMI reached (considering 25 kg/m<sup>2</sup> as limit) at least 2 years after surgery, 13% of

## A708

### **Changes of Circulating Irisin and High Sensitivity C-Reactive Protein levels correlate in Morbidly Obese Individuals with Type 2 Diabetes after Roux-en-Y Gastric Bypass**

Alessandro Mor Durham NC<sup>1</sup>, Philip Omotosho Durham NC, Alfonso Torquati Durham NC Duke Surgery<sup>1</sup>

**Background:** Irisin has been recently reported to provide beneficial effects in obesity and diabetes. Elevation of high sensitivity C-reactive protein (hs-CRP) reflects the inflammatory state that has been shown to play a key role in obesity and its comorbidities. Our study aimed to compare the changes of circulating irisin levels in an obese diabetic population that underwent Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) versus a control matched population that underwent usual medical care plus diabetes support education (DSE) program. In addition, we aimed to explore the association between circulating irisin and hs-CRP levels after the interventions.

**Methods:** In a prospective controlled trial, we studied 58 obese individuals with type 2

patients experienced weight regain after 2 years, 15% of patients after 3 years, 20% after 4 years and 15% after 5 years follow up.

**Conclusions:** In our experience, LSG in patients with obesity class 1 achieves a significant excess weight loss and resolution of comorbid conditions at mid term follow up. Even if better evidence-based clinical recommendations are needed we think that bariatric surgery can be recommended after careful individual evaluation.

diabetes prior to and 12 months after intervention. Twenty-nine subjects underwent LRYGB and 29 subjects received DSE.

**Results:** At 12-month follow-up, compared to the DSE group, patients who underwent LRYGB lost more weight (LRYGB; -33.4 + 11.2 and DSE 0.2 + 4.9 kg; p<0.001), total body fat (p<0.001) and fat free mass (p<0.05). Circulating irisin (p<0.05) and hs-CRP level (p<0.05) were also significantly lower. Within the LRYGB group, the reduction of irisin level was positively associated with the changes of hs-CRP levels (r = 0.39, p<0.05).

**Conclusions:** To the best of our knowledge, this is the first study showing that LRYGB significantly reduces circulating irisin levels compared to usual medical care and DSE, in an obese diabetic population. After LRYGB, the irisin reduction significantly correlates with the reduction of hs-CRP. The elevation of circulating irisin levels suggests irisin resistance in the obese state and its decrease after LRYGB might reflect the resolution of irisin resistance. Future investigations are needed to confirm and explore the mechanisms of irisin resistance in obesity, its resolution after LRYGB and the pathophysiological significance.

## Paper Session VIII - Scientific Research

3:30pm–5:00pm

## A801

### **Recalcitrant hypoglycemia with neuroglycopenia after roux-en-Y gastric bypass is caused by postprandial changes in glucose, gut and pancreatic hormone responses to altered feeding route, not nesidioblastosis.**

Guilherme Campos Madison WI<sup>1</sup>, Mohammad J Khoraki Madison WI<sup>1</sup>, Dawn Davis Madison WI<sup>1</sup> University of Wisconsin - Madison<sup>1</sup>

**Background:** Roux en Y gastric bypass (RYGB) provides for significant weight loss and improvement in glycemic control in most patients. Postprandial hypoglycemia is a late complication of RYGB in about 1% of patients. Most patients can be managed by altering diet and medications, however a small subset develop incapacitating symptoms and neuroglycopenia. The pathophysiology of this

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disorder remains unclear. A key debate is whether the post-prandial hyperinsulinemia observed is due to inherent changes in pancreatic beta cell mass, such as overgrowth, or to alterations in food delivery and absorption leading to altered glucose, gut and pancreatic hormone levels and responses.

**Methods:** We studied five patients with symptomatic hypoglycemia after RYGB. All patients had failed medical therapy. We performed a 3-hour meal testing (MTT) orally and through a recently placed laparoscopic gastrostomy tube into the excluded stomach. We intended to determine nutrient delivery through the excluded stomach would ameliorate postprandial glucose, gut and pancreatic hormone levels and symptoms. During MTT we measured glucose, insulin, glucagon-like peptide-1 (GLP-1), gastric inhibitory peptide (GIP), Peptide YY (PYY) and Glucagon. We then performed laparoscopic reversal of RYGB to either normal anatomy or modified sleeve gastrectomy, and repeated the MTT and symptom evaluation 3 months after reversal.

**Results:** All five patients experienced significant and durable improvement in the symptoms and frequency of their hypoglycemia after RYGB reversal (Median follow-up=22 months, range 5 to 38 months). MTT revealed that glucose, insulin and GLP-1 excursions were significantly increased when nutrients were delivered through the RYGB anatomy; and significantly diminished when delivered through the excluded stomach gastrostomy tube and after RYGB reversal. Oral feeding through RYGB led to an increased rise in glucose between 0 and 15 minutes (paired t test,  $p=0.01$  and  $0.003$ , respectively) and a greater decline in glucose between times 15 and 90 minutes ( $p = 0.01$  and  $0.003$ , respectively). Compared to the levels obtained through the RYGB anatomy, insulin levels significantly decreased between G-tube feeding and post-reversal, with area under the curve (AUC) between 0-90 minutes ( $p=0.037$ ). We also found that postprandial GLP-1 levels were dramatically reduced with feeding through the excluded stomach and after reversal (AUC,  $p= 0.002$  and  $0.0003$ , respectively). PYY levels trended higher with RYGB feeding (AUC,  $p=0.07$ ) and Glucagon levels were not significantly different across the groups.

**Conclusions:** The pathophysiology of post-RYGB hypoglycemia seems to be primarily due to altered post-prandial glucose and hormone levels, rather than inherent beta-cell hyperfunction or hyperplasia; and reversal of

RYGB is an effective treatment option. Increased postprandial GLP-1, in combination with large rise in glucose levels leads to enhanced insulin secretion after RYGB. In some insulin sensitive patients, this result in an unresponsive drop in glucose levels after the meal that leads to hypoglycemia. We hope that these insights will help develop new strategies for the treatment of this devastating complication and prevent the unnecessary performance of pancreatectomy as a treatment option.

### A802

#### **Limb length of gastric bypass and modulation of the anti-diabetic effect and portal milieu**

Atanu Pal *Boston MA*<sup>1</sup>, Ali Tavakkoli *Boston MA*<sup>1</sup>  
Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA 02115<sup>1</sup>

**Background:** The anti-diabetic effects of Roux-en-Y Gastric Bypass (RYGB) are well documented and have been attributed to changes in foregut anatomy, with isolation of the proximal small intestine from the nutrient stream. To study the importance of the Bilio-Pancreatic (BP) limb in glucose homeostasis, we investigate the metabolic effects of varying BP limb length in a rodent model. We specifically assess its effect on intestinal glucose fluxes and the portal hormonal milieu.

**Methods:** Rats underwent RYGB with either a 20-cm (RYGB-20cm,  $n=7$ ) or 40-cm (RYGB-40cm,  $n=5$ ) BP limb, and were compared to a control group ( $n=7$ ). After a two-week period of recovery, these rats underwent portal and systemic blood sampling at baseline and during an intestinal glucose infusion. The portosystemic glucose gradient was used to estimate intestinal glucose utilization (IGU) and intestinal glucose absorption (IGA). Portal and systemic levels of Glucagon-Like Peptide 1 (GLP-1), which is involved in glucose homeostasis, were measured.

**Results:** IGA was reduced following RYGB-20cm (332 vs. 199mg/h;  $p<0.05$ ), and reduced further following RYGB-40cm (104mg/h;  $p<0.05$ ; Figure 1). IGU was increased following RYGB-20cm (43 vs. 162mg/h;  $p<0.05$ ), without further increase in utilization in RYGB-40cm (164mg/h). RYGB also led to an increase in glucose-stimulated GLP-1 levels in the systemic (115 vs. 990pg/ml, Control vs. RYGB-20cm;  $p<0.05$ ) and portal circulation (1032 vs. 2131pg/ml Control vs. RYGB-20cm;  $p<0.05$ ), with non-significant

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further increases in these values following RYGB-40cm.

**Conclusions:** RYGB has several effects that could lead to improved glucose homeostasis: increased glucose utilization, decreased glucose absorption and increased GLP-1 levels. Increasing BP limb length led to a further significant decrease in glucose absorption as well as a tendency to increased glucose utilization and post-prandial GLP-1 levels. These data support the role of BP limb length in modulating the anti-diabetic effect of RYGB and the prospect of metabolic customization of RYGB in the management of Type 2 Diabetes.

### A803

#### **Comparative Physiogenomic Analyses of Weight Loss in Response to Two Modes of Bariatric Surgery**

Richard Seip *Hartford CT<sup>1</sup>*, Pavlos Papasavas *Hartford CT<sup>1</sup>*, Darren Tishler *Hartford CT<sup>1</sup>*, Janet Ng *Hartford CT<sup>1</sup>*, Andrea Stone *Glastonbury CT<sup>1</sup>*, Gualberto Ruano *Hartford Connecticut<sup>1</sup>*  
Hartford Hospital<sup>1</sup>

**Background:** The reduction in body mass following surgical weight loss is variable, leading, unpredictably, to sub-optimal outcomes in some patients. Approaches to optimize the matching of patient to surgical interventional procedure in order to improve outcomes, are needed. We hypothesized that genetic biomarkers may be related to BMI change following laparoscopic gastric banding (LAGB) or Roux-en-Y gastric bypass (RYGB).

**Methods:** We applied genotype testing for 330 single nucleotide polymorphisms (SNPs) in genes relevant to metabolic regulation, in 162 obese patients who underwent LAGB or RYGB. Patients in our bariatric registry were selected for small (lowest quartile) or large (highest quartile) magnitude of BMI decrease at one year post intervention, by surgical procedure. Groups I (n=43) and II (N=40) were LAGB patients whose BMI decreased < 4.7 units or >10.2 units, respectively. Groups III (n=39) and IV (n=39) consisted of RYGB patients whose BMI decreased <13.6 units or >19.8 units, respectively. We compared reference allele observed – expected frequencies across Groups using the chi square test with Bonferroni correction (alpha = 0.05/330, 0.00015). For each Group, we also examined a histogram illustrating the frequency distribution of ratios of allele frequency for all SNPs for the Group in

question, relative to the allele frequency in the remaining groups. SNPs with high ratios (z score > 3, indicating a value 3 standard deviations above the mean ratio) were identified.

**Results:** The mean percent excess weight losses ( $\pm$  sd) corresponding to Groups I, II, III, and IV were: 17(12), 66(30), 54(16), and 78(17), respectively. We discovered different SNPs to discriminate the following: 1) the response to surgical intervention in general, TNFAIP6 rs3771892 (A allele Group I + III, 0.31 > A allele Groups II + IV, 0.125); 2) the response to banding, APOE (rs439401 [A Group I, 0.200 < A Group III, 0.549] and rs405509 [A Group I, 0.250 < A Group III, 0.585]; and 3) the response to bypass, MTHFR (methylenetetrahydrofolate rs2066470 (A Group III, 0.268 > A Group IV, 0.063). In addition, histogram analysis revealed 6 SNPs in Group I, 8 in Group II, 4 in Group III, and 4 in Group IV with high ratios, suggesting potential utility as biomarkers predictive of surgical weight loss response.

**Conclusions:** With further validation, information derived from patient DNA may be useful to predict surgical weight loss outcomes, and guide selection of surgical approach.

### A804

#### **Roux-en-Y Gastric Bypass Surgery Increases Insulin Secretion in Zucker Diabetic Fatty Rats**

J. David Mosinski *Cleveland Ohio<sup>1</sup>*, Ali Aminian *Cleveland OH<sup>1</sup>*, Esam Batayyah *Cleveland OH<sup>1</sup>*, Hector Romero Talamas *Cleveland OH<sup>1</sup>*, Christopher Daigle *Cleveland OH<sup>1</sup>*, Olivia Dan *Strongsville OH<sup>1</sup>*, Hazel Huang *Cleveland Ohio<sup>1</sup>*, Anny Mulya *Cleveland OH<sup>1</sup>*, Amanda Scelsi *Cleveland OH<sup>1</sup>*, Philip Schauer *Cleveland OH<sup>1</sup>*, Stacy Brethauer *Cleveland OH<sup>1</sup>*, John Kirwan *Cleveland OH<sup>1</sup>*  
Cleveland Clinic<sup>1</sup>

**Background:** There is now substantial evidence that Roux-en-Y Gastric Bypass (RYGB) surgery resolves obesity-induced type 2 diabetes in a majority of patients. However, the mechanism driving this response remains to be determined. Type 2 diabetes manifests as insufficient insulin secretion from beta-cells in the pancreatic islets. In this study we hypothesized that rerouting the intestinal pathway via RYGB surgery would improve pancreatic beta-cell function.

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**Methods:** Thirty-two adult Zucker Diabetic Fatty (ZDF) rats were randomized into four groups (Sham, RYGB, Pair-Fed to RYGB, and Lean controls), with 8 animals per group. Glucose metabolism was assessed using an oral glucose tolerance test both pre and 30 days post surgery. At the completion of the study tissue was harvested and the pancreatic islets were isolated after collagenase digestion. Islets (N=10) were incubated in 2 mM or 20 mM glucose to assess glucose stimulated insulin secretion (GSIS).

**Results:** Compared to Sham, RYGB surgery significantly reduced body weight ( $P<0.02$ ) at the 30-day time point. RYGB surgery also improved overall glucose tolerance ( $P<0.05$ ), and decreased fasting glucose levels when compared to both the Sham ( $P<0.01$ ) and Pair-Fed groups ( $P<0.01$ ). When islets were incubated in 2 mM glucose the RYGB group demonstrated significantly higher insulin secretion compared to Sham ( $P<0.05$ ). In the 20 mM glucose incubation the RYGB islets produced significantly higher insulin secretion when compared to both the Sham and the Pair-Fed islets ( $P<0.01$ ). Pancreatic sections were immunostained for insulin, and these data revealed normalization of the islets from the RYGB compared to Sham and Pair-Fed groups.

**Conclusions:** In conclusion, in ZDF rats we found that RYGB surgery increases glucose stimulated insulin secretion from pancreatic islets and this may be one of the mechanisms that contributes to the remission of type 2 diabetes after bariatric surgery.

## A805

### GLP-2 changes after RYGB mediate intestinal hypertrophy and contribute to improved glucose balance

Atanu Pal *Boston MA*<sup>1</sup>, Ali Tavakkoli *Boston MA*<sup>1</sup>  
Brigham and Women's Hospital, Harvard Medical School, Boston, MA<sup>1</sup>

**Background:** Roux-en-Y Gastric Bypass (RYGB) is emerging as a metabolic operation with an important role in managing Type 2 Diabetes (T2D). However, lack of mechanistic understanding hinders the development of less invasive procedures that can replicate its effects. Recent studies have highlighted changes in intestinal morphology and metabolism as a contributing factor to the metabolic benefits of RYGB. We propose that these changes are mediated by changes in the intestinotrophic hormone Glucagon-Like Peptide-2 (GLP-2).

**Methods:** Rats underwent RYGB (n=7) and, after a two-week period of recovery, underwent portal and systemic blood sampling in the fasting state. They were compared to a control group (n=7). The fasting portosystemic glucose gradient was used to calculate intestinal glucose balance (IGB), which is the net balance of glucose-utilizing and gluconeogenic fluxes in the intestine. Hypertrophy was assessed by measuring total weight of the small intestine and segmental weights of the proximal and distal Bilio-Pancreatic (BP) limb, Roux limb, common limb and terminal ileum. Portal and systemic levels of GLP-2 were measured at baseline and after infusion of luminal glucose. Intestinal mRNA expression of proglucagon (a protein from which GLP-2 is cleaved) and of two rate-limiting gluconeogenic enzymes (PEPCK and G6Pase) were measured.

**Results:** The fasting portosystemic glucose gradient was more negative following RYGB (-27 vs. -6mg/dl,  $p<0.05$ ), corresponding to an increased net glucose uptake from the systemic circulation by the gut (162 vs. 39mg/h; Figure 1). Total small intestinal weight was increased following RYGB (10.8 vs. 5.8g;  $p<0.001$ ). Hypertrophy was most marked in the Roux limb (1.7 vs. 0.6g;  $p<0.01$ ), and was also seen in the common limb and distal BP limb. Proglucagon expression was significantly increased in all segments that showed hypertrophy and also markedly increased in the terminal ileum. Fasting and meal-stimulated GLP-2 levels were increased in both the systemic circulation and portal circulation. PEPCK and G6Pase expression was decreased in all intestinal segments, except the BP limb where there was no significant change.

**Conclusions:** RYGB leads to a marked increase in net glucose uptake from the systemic circulation by the gut, which can be an important mechanism in improving glucose homeostasis. This increased glucose uptake correlates with intestinal hypertrophy and increased expression and secretion of GLP-2. A decrease in intestinal gluconeogenesis may also be contributory. These data provide a critical insight into the surgical physiology of RYGB and identify potential novel therapeutic targets.

## A806

### Sleeve Gastrectomy Compromises Skeletal Morphology and Damages Bone Marrow Health of Obese Rats as Compared to Their Controls

\* Presentation under consideration for the John Halverson Young Investigator Award

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Gabriel Pagnotti *Stony Brook NY*<sup>1</sup>, M. Ete Chan *Stony Brook New York*<sup>1</sup>, Vihitaben Patel *Stony Brook New York*<sup>1</sup>, Maria Altieri *Stony Brook New York*<sup>2</sup>, Ariel Yang *Stony Brook NY*<sup>2</sup>, Dana Telem *Stony Brook NY*<sup>2</sup>, Clinton Rubin *Stony Brook NY*<sup>2</sup>, Aurora Pryor *Stony Brook NY*<sup>2</sup>, Jason Abraham<sup>3</sup>, Jingxian Tan *Flushing New York*<sup>3</sup>  
Stony Brook University Department of Biomedical Engineering<sup>1</sup> Stony Brook University Department of Surgery<sup>2</sup> Stony Brook University Department of Biomedical Engineering<sup>3</sup>

**Background:** High-fat diets and diabetes are associated with increased fracture risk, however, it is not completely clear how bone marrow (BM), home to stem, immune, and bone regulating cells, is affected. By-products of these insults affect bone health, disrupting the marrow-derived mesenchymal stem cell (MSC) pool, influencing bone quality and marrow health. Sleeve Gastrectomy (SG), an oft-prescribed bariatric surgical intervention for obese patients, is performed by resecting 70% of the stomach's greater curvature. Clinically, this procedure successfully reduces patient weight and improves fasting glucose; however, post-operative alterations in bone morphology and bone mineral density have been observed, increasing fracture risk. A study was performed aimed at quantifying SG's influence on the bone and marrow of obese rats.

**Methods:** In order to assess the effects of obesity and SG on the skeletal phenotype, 20 Wistar rats (Charles River) were used to model morbid obesity. A 59% fat diet was introduced at 56w and, at 6mo of age, animals were divided between those having undergone either SG (2/3 of the stomach resected) or sham surgery (SH). Animals were sacrificed at 12w post-surgery. At euthanasia, fasting blood glucose was taken after overnight fasting (~12h). Right femora and tibiae were harvested for micro-computed tomography analysis. Bone marrow was isolated from the femoral midshaft and stained with fluorochrome-conjugated antibody for flow cytometric analyses.

**Results:** Fasting glucose levels attained at

sacrifice were -15% ( $p < 0.05$ ) lower than SH. Both anterior-posterior (AP) and medial-lateral (ML) femoral diameters were measured at the mid-diaphysis. AP diameters in SG were 10% ( $p < 0.009$ ) longer than SH, while ML diameters were 6% ( $p < 0.02$ ) shorter than SH. Micro-CT analyses of the distal femoral metaphysis demonstrated that trabecular bone volume fraction had decreased by -26% ( $p < 0.07$ ) from SH. Structure model index, a measure of bone quality in which higher numbers indicate more rod-like trabeculae, had increased by 20% ( $p < 0.10$ ) in SL as compared to SH. While average trabecular thickness decreased by -8% ( $p < 0.04$ ) in SL, the average spacing between the trabeculae had increased by 41% ( $p < 0.08$ ) in comparison to SH. Cortical bone volume fraction and thickness had significantly decreased from SH by -2% ( $p < 0.13$ ) and 2% ( $p < 0.07$ ), respectively. Further, tissue mineral density decreased by -3% ( $p < 0.008$ ) in the cortex of SG, suggesting a trend towards compromised mineralization and reflected by a 10% increase in endosteal volume ( $p = 0.05$ ). Flow cytometric analyses on femoral BM indicated -40% ( $p < 0.001$ ) fewer bone marrow cells in SG. Double surface marker (CD29, CD90.1) tagging demonstrated -66% ( $p < 0.001$ ) fewer MSC's in SG as compared to SH.

**Conclusions:** These data demonstrate that simulated SG of morbidly obese rats results in regulation of fasting glucose. However, the positive outcomes of SG are accompanied by phenotypic deficits in both trabecular and cortical bone mass and quality, reflecting observed clinical outcomes. Additionally, total bone marrow cell counts had significantly decreased as a result. It is possible that, as a result of SG, bone remodeling constituents in the marrow may have a diminished capacity to regulate bone health, thus, playing a critical role in destabilizing bone metabolism and hindering bone quality.

Top 15 Posters

1:30pm–3:00pm

A5000

Peri-operative Outcomes of End Stage Renal Disease Patients Undergoing Laparoscopic Roux-en-Y Gastric Bypass

\* Presentation under consideration for the John Halverson Young Investigator Award

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John Afthinos *New York NY*<sup>1</sup>, Gurdeep Matharoo *Old Bridge NJ*<sup>1</sup>, Karen E. Gibbs *Staten Island NY*<sup>1</sup>  
Staten Island University Hospital<sup>1</sup>

**Background:** End Stage Renal Disease (ESRD) is a growing chronic health issue in the U.S. Many of these patients also struggle with obesity. Increasing obesity has been shown to worsen the outcomes in renal transplant patients and can also limit access to transplantation. This has led some of these patients to pursue pre-transplant surgical weight loss. We sought to evaluate peri-operative outcomes in ESRD patients undergoing Laparoscopic Roux-en-Y Gastric Bypass (LRYGB).  
**Methods:** The Nationwide Inpatient Sample (NIS) Database was queried for the years 2005 to 2010 for LRYGB operations performed on patients with and without ESRD. The patients' age and comorbid conditions were evaluated. Multivariate logistic regression was then performed to assess predictive risk factors for in-hospital morbidity and mortality.  
**Results:** A total of 366,098 patients undergoing LRYGB were identified, of which 306 (0.1%) had ESRD. When comparing the ESRD cohort to the non-ESRD cohort, the ESRD cohort was older (47 + 8.3 vs. 43.7 + 11.2,  $p < 0.0001$ ). A higher percentage of males was seen in the ESRD cohort (43.5% vs. 19.4%,  $p < 0.0001$ ). There was a higher prevalence of DM (75% vs. 34%,  $p < 0.0001$ ) and sleep apnea (43% vs. 24%,  $p < 0.0001$ ). Multivariate analysis revealed that ESRD is an independent predictor of post-operative hemorrhage (OR 3,  $p = .003$ ). The length of stay was significantly longer for the ESRD group (4.1 + 3.3 vs. 2.4 + 3,  $p < 0.0001$ ). However, ESRD was not a significant predictor of post-operative morbidity or mortality.  
**Conclusions:** ESRD patients composed a small percentage of the bariatric surgical population. Despite increased age and associated comorbidities, ESRD did not confer an increased overall morbidity or mortality after LRYGB. There was an increased risk of bleeding and an extended length of stay; these were not unexpected findings. With appropriate counseling, risk stratification and clinical management, patients with ESRD may safely undergo weight loss surgery with acceptable peri-operative outcomes.

**A5001**

## **The time to weight-loss steady state after gastric bypass predicts long-term weight loss success.**

Tammy Kindel *Omaha NE*<sup>1</sup>, Vishal Kothari *Omaha NE*<sup>1</sup>, Corrigan McBride *Omaha NE*<sup>1</sup>, Jon Thompson *Omaha NE*<sup>1</sup>  
University of Nebraska Medical Center<sup>1</sup>

**Background:** While the effect of pre-operative patient characteristics on long-term weight loss outcomes after laparoscopic roux-en-y gastric bypass (LRYGB) has been robustly studied, the individual patterns of weight loss post-operatively and subsequent effect on long-term success has been relatively unexplored. We sought to determine the patterns of individual weight loss and the effect these early patterns have on long-term success by using a novel method of measurement based on the time to post-operative weight loss steady-state (SS). We hypothesized that the longer the adaptation period and time to SS, the greater the weight loss.

**Methods:** An electronic bariatric database was retrospectively reviewed for patients who underwent LRYGB as a primary bariatric procedure from 01/2001-12/2010 at a single institution. Patients were included if follow-up weights were available at 6 months, 9 months, 12 months, 18 months or 2 years, and 3 or 4 years post-operatively. SS was defined as the post-operative month when the patient had  $\leq 3\%$  excess weight-loss (EWL) or a weight gain during the next 12 months. Patients were then stratified into groups by similar time to SS and compared by EWL at SS (S-EWL) and EWL at last known follow-up (F-EWL).

**Results:** 178 patients met follow-up criteria for inclusion with an average age of 43.7 years and pre-operative weight of 133.5 kg. Average follow-up was 5.6 years. The average time to SS for all patients was 15.5 months post-operatively. Only 7.9% of patients lost more than 3% EWL long-term once achieving their initial SS weight. One patient reached SS by 3 months (S-EWL: 44.0%, F-EWL: 4.0%). 14 patients achieved SS at 6 months (S-EWL: 46.6  $\pm$  11.2%, F-EWL: 34.6  $\pm$  18.4%), 32 patients at 9 months (S-EWL: 55.0  $\pm$  13.9%, F-EWL: 45.5  $\pm$  18.2%), 56 patients at 12 months (S-EWL: 71.6  $\pm$  14.4%, F-EWL: 55.8  $\pm$  19.9%), 39 patients at 18 months (S-EWL: 79.7  $\pm$  16.6%, F-EWL: 63.5  $\pm$  20.2%), 25 patients at 2 years (S-EWL: 75.9  $\pm$  20.3%, F-EWL: 62.7  $\pm$  25.7%), 10 patients at 3 years (S-EWL: 81.2  $\pm$  13.7%, F-EWL: 64.0  $\pm$  28.5%), and 1 patient at 4 years post-operatively

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(S-EWL: 106.9%, F-EWL: 72.9%). Patients with a time to SS of <12 months had a significantly lower S-EWL and F-EWL compared to SS achieved at 18 months or later ( $p<0.01$ ). **Conclusions:** Few patients achieve meaningful weight-loss after SS. The time to SS varies significantly among patients. Further studies are needed to explore what mechanisms dictate the time to SS such as patient physiology, patient behavior, and surgical technique. Achievement of SS within the first year after surgery is associated with significantly lower S-EWL and F-EWL. These findings support the close follow-up of patients for the first 18 months to identify patients at risk for rapid physiologic adaptation with resultant unsatisfactory weight-loss outcomes. Prospective studies are needed to determine if behavioral or surgical interventions early during the SS period can improve F-EWL.

## A5002

### **Outcomes of Roux-en-Y Gastric Bypass in Super Obese Patients : Comparison between BMI 55-65kg/m<sup>2</sup> and ≥65kg/m<sup>2</sup>**

Rena Moon Orlando FL<sup>1</sup>, Andre Teixeira Orlando FL<sup>1</sup>, Muhammad Jawad Ocala FL<sup>1</sup>  
Orlando Regional Medical Center<sup>1</sup>

**Background:** The ideal bariatric procedure for super obese patients (body mass index (BMI)  $\geq 50$  kg/m<sup>2</sup>) has been debated among surgeons. Reports on the outcomes of Roux-en-Y gastric bypass (RYGB) in the super obese population are scarce, not to mention those of patients with BMI higher than 65kg/m<sup>2</sup>. The aim of our study is to evaluate and compare the safety and efficacy of RYGB in super obese patients, by comparing patients with BMI 55-65kg/m<sup>2</sup> to those with BMI  $\geq 65$ kg/m<sup>2</sup>. **Methods:** Between January 2004 and November 2013, a total of 2,717 patients underwent RYGB at our institution. Of these patients, 375 (13.8%) had preoperative BMI between 55-65kg/m<sup>2</sup> and 98 (3.6%) had BMI  $\geq 65$ kg/m<sup>2</sup>. A retrospective review was performed in these patients, noting the outcomes and complications of the procedure. **Results:** Patients with BMI 55-65kg/m<sup>2</sup> were younger at a mean age of 38.6 $\pm$ 10.2 kg/m<sup>2</sup> (range 19-61) as patients with BMI  $\geq 65$ kg/m<sup>2</sup> showed a mean age of 41.8 $\pm$ 10.6 kg/m<sup>2</sup> (range 19-64) ( $p<0.01$ ) at the time of RYGB. One (1.0%) mortality occurred in the BMI  $\geq 65$ kg/m<sup>2</sup> group. Fifteen (15.3%) patients required more than one readmission in the BMI  $\geq 65$ kg/m<sup>2</sup>

group, while 30 (2.7%) did in the BMI 55-65kg/m<sup>2</sup> group. Eight (8.2%) patients in the BMI  $\geq 65$ kg/m<sup>2</sup> group required a total of 11 reoperations, and 12 (3.2%) patients in the BMI 55-65kg/m<sup>2</sup> group underwent a total of 13 reoperations. Readmission ( $p<0.01$ ) and reoperation ( $p<0.03$ ) rates were significantly lower in the BMI 55-65kg/m<sup>2</sup> group. Reasons for readmissions included abdominal pain (n=6), nausea/vomiting (n=4), hematemesis (n=2), pleural effusion (n=2), and rectal bleeding (n=1) in the BMI  $\geq 65$ kg/m<sup>2</sup> group. Reasons for reoperations were small bowel obstruction (n=2), extensive adhesions (n=2), gastric outlet obstruction (n=1), gastro-gastric fistula (n=1), jejuno-jejunal anastomotic leak (n=1), and neuroglycopenia (n=1) in this group of patients. At a mean follow-up period of 20.2 $\pm$ 19.5 months (range, 1-114), the mean percentage of excess weight loss (%EWL) was 44.8 $\pm$ 18.9% (range, 2.6-87.8) in the BMI  $\geq 65$ kg/m<sup>2</sup> group, and 46.1 $\pm$ 20.15 (range, 0.1-99.9) in the BMI 55-65kg/m<sup>2</sup> group. The difference in weight loss was not statistically significant ( $p>0.55$ ). **Conclusions:** RYGB showed similar weight loss in patients with BMI 55-65kg/m<sup>2</sup> and BMI  $\geq 65$ kg/m<sup>2</sup>. However, readmission and reoperation rates were significantly higher in the BMI  $\geq 65$ kg/m<sup>2</sup> group.

## A5003

### **Practice Patterns and Role of Medical Education Related to Bariatric Surgery**

Amy Larkin Lexington KY<sup>1</sup>, Jayashri Desai New York NY<sup>1</sup>, Robert Kushner Chicago IL  
Medscape Education<sup>1</sup>

**Background:** Obesity is a major public health crisis. In the past 10 years, the prevalence of obesity in the United States has increased from 20.0% to 35.7%. [CDC 2012; Ogden 2012] The prevalence of class II and III obesity (BMI  $>35$ ) is 21.8%. [Flegal 2012] Despite recognition as a disease, bariatric surgery for obesity remains underutilized, with only 1% of eligible patients receiving surgical treatment. [Martin 2010] This study's objective was to assess current knowledge and practice gaps of physicians related to referral for bariatric surgery and their relationship with participation in certified medical education (CME). **Methods:** An educational needs assessment survey instrument was developed consisting of 16 survey items. These included demographic, knowledge-, and practice-based, questions regarding bariatric surgery. Self-reported

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responses were captured using Likert scale ratings or multiple-choice items. It was posted online to healthcare providers without monetary compensation. Confidentiality of survey respondents was maintained and responses were de-identified and aggregated prior to analyses. The survey launched on February 27, 2014 and participant responses were collected over the following 6 weeks. An unpaired t-test was used to assess the difference in means for select questions. P-values <0.05 were considered to be statistically significant.

**Results:** Of 234 physician respondents, 47% see >10 moderately to severely obese (BMI >35) patients weekly. However, 48% of respondents do not consider referring any for bariatric surgery, 36% consider referring 1-2 patients per week, and 16% consider referring >3 patients per week. Nearly 80% reported referring <10 patients for bariatric surgery in the past year. Forty percent of respondents reported that they participated in bariatric surgery-related CME within the past year (13% in the past 3 months, 5% in the past 6 months and 23% in the past 12 months). Of the 60% who had not participated in CME in the past year, 8% said CME was not important and 92% had not seen any CME on this topic. When asked about self-reported knowledge of bariatric surgery, 13% selected very knowledgeable, 25% knowledgeable, 39% somewhat knowledgeable, 16% slightly knowledgeable, and 8% not at all knowledgeable. There was a correlation between self-reported referral rates for bariatric surgery and self-reported knowledge about bariatric surgery ( $P < 0.0001$ ). There was also a correlation between more recent participation in CME on the role of bariatric surgery in obesity treatment and self-reported knowledge ( $P < 0.0001$ ), as well as self-reported referral rates ( $P < 0.0001$ ).

**Conclusions:** This assessment of physicians' knowledge and clinical practices identified gaps in bariatric surgery referral for moderately to severely obese (BMI >35) patients that was linked to low self-reported knowledge. Participation in bariatric surgery-related CME was shown to improve physician self-reported knowledge and referral for eligible patients. Data from this study can be used to inform the design of focused educational interventions to improve patient care.

## A5004

## Outcomes of Bariatric Surgery in Diabetic Patients with Diminished Pancreatic Secretary Reserve

Ali Aminian *Cleveland OH*<sup>1</sup>, Christopher Daigle *Cleveland OH*, Ricard Corcelles *Cleveland Ohio*, John Kirwan *Cleveland OH*, Bartolome Burguera *Cleveland Ohio*, Sangeeta Kashyap *Cleveland OH*, Stacy Brethauer *Cleveland OH*, Philip Schauer *Cleveland OH*  
Cleveland Clinic<sup>1</sup>

**Background:** Although the marked and durable effects of bariatric surgery on early type 2 diabetes (DM) is known, there is limited data on the impact of surgery in patients with reduced beta-cell function/reserve.

**Methods:** Clinical outcomes of 22 poorly controlled diabetic patients who underwent laparoscopic bariatric surgery in a 10-year period and had a fasting serum c-peptide  $\leq 0.5$  ng/mL were assessed.

**Results:** Patients had type 1 (n=9), type 1.5 (n=1), and prolonged type 2 (n=12) DM, a mean age of  $49.0 \pm 9.1$  years, a median duration of DM of 20 years, and a median of 7 obesity- or DM-related comorbidities. All patients were on insulin before surgery. Surgical procedures included gastric bypass (n=14), sleeve (n=6), and banding (n=2) without any intraoperative complication. In total, 8 patients (36.4%) developed postoperative complications including DKA (n=3) and DVT (n=3). At a mean follow up of  $40.8 \pm 27.5$  months, a mean percent excess weight loss of  $67.9 \pm 20.4\%$  was associated with a significant change in A1C, daily insulin requirement, and lipid profile (table 1). At the last follow-up point, three patients (13.6%) were off insulin, three patients had A1C <7%, and one patient had remission of DM. Hypertension improved in 50% of patient.

**Conclusions:** In conclusion, bariatric surgery can result in improvement of glycemic status and comorbid conditions of obese diabetic patients with diminished beta-cell reserve and may facilitate medical management of DM.

## A5005

## The Influence of Selenium on Weight Loss and Diabetes Remission After Bariatric Surgery

John Morton *Stanford CA*<sup>1</sup>, Ulysses Rosas *Palo Alto CA*, Joan Chapman *San Jose CA*, Dan Azagury *Stanford CA*, Homero Rivas *Palo Alto CA*

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# ASBMS

Stanford School of Medicine<sup>1</sup>

**Background:** Bariatric surgery for morbid obesity often leads to resolution of type 2 diabetes (DM2). While the mechanisms of diabetes remission is in active investigation, selenium may play a role in resolution of DM2 after weight loss surgery. Observational and prospective data suggests that increased selenium levels are positively correlated with an increased incidence of DM2. However, little evidence exists as to the role of selenium in DM2 remission after bariatric surgery. The aim of this study is to evaluate the role of selenium in the resolution of DM2 and improved glycemic control after bariatric surgery.

**Methods:** 222 bariatric patients were included in this retrospective analysis. Demographic data was obtained, and BMI, percent excess weight loss (%EWL), and selenium were collected preoperatively, and 3-, 6-, and 12-months postoperatively. HbA1C, fasting glucose, fasting insulin, HDL cholesterol, triglycerides and high sensitivity C-reactive protein (CRP) were also collected at all preoperative and postoperative time points. Resolution of Diabetes Mellitus 2 (DM2) was determined based on ADA criteria (complete HbA1C < 6.0 or FG < 100 and partial HbA1C < 6.5 or FG < 125). Student T-test and correlation analysis were used as appropriate. All analysis was performed using GraphPad Prism 6.

**Results:** Patients had an average age of 46.8 years, 76.6% were female, 49.5% were white, and had an average preoperative BMI of 45.1 kg/m<sup>2</sup>. Average total number of preoperative comorbidities was 3.9, with 27.4% of patients considered diabetic. In the entire population, no significant differences were found in serum selenium levels at any time point (preop 140.5, 3mos 133.9, 6mos 131.9, 12mos 138.7 mcg/L, p=0.329). Correlation analysis revealed 12-month selenium levels to be positively correlated to 3-month insulin levels (r=0.424, p=0.005). Significant positive correlations were found between 3-month serum selenium levels and 6-month HbA1C (r=0.446, p=0.002), 6-month FG (r= 0.573, p<0.001), and 6-month %EWL (r=0.294, p=0.043). 3-month selenium was negatively correlated with 6-month BMI (r=0.298, p=0.040). Patients who were considered diabetic preoperatively had significantly higher levels of serum selenium 6-months postoperatively compared to non-diabetics (DM2 144 vs. No DM2 126 mcg/L, p=0.038). Additionally, those patients with 12-month diabetes resolution had

significantly lower levels selenium at 6-months (Resolution 127 vs. No Resolution 177 mcg/L, p=0.017) and 12-months (Resolution 146 vs. No Resolution 206 mcg/L, p=0.031) when compared to patients who did not experience DM2 resolution at 12-months postoperative.

**Conclusions:** Following bariatric surgery, higher levels of serum selenium were correlated with increased levels HbA1C, fasting glucose, and fasting insulin. When analyzed by DM2 status, diabetic patients had higher postoperative levels of selenium. Additionally, those patients who did not experience resolution of diabetes at 12-months postoperative, had higher postoperative levels of selenium. Higher postoperative serum selenium levels and supra-supplementation of selenium may decrease resolution rates of type 2 diabetes in bariatric patients. Special attention should be paid to the amount of selenium supplement given to bariatric patients, especially if diabetic, as current supplements for bariatric patients exceed the daily recommended amount of selenium.

## A5006

### Comparing the Outcomes of Pain Management Strategies in Bariatric Surgery Patients

Solomon Lubinga *Seattle WA*<sup>1</sup>, Heather Evans *Seattle WA*<sup>1</sup>, Ryan Hansen *Seattle WA*<sup>1</sup>  
University of Washington<sup>1</sup>

**Background:** Bariatric surgery can be a life-changing event for patients, however recent evidence suggests that the weight loss from these procedures is not associated with a decrease in chronic opioid use. Opioid analgesics are commonly employed for post-surgical pain management, but these medications are wrought with side effects, and lead to significant morbidity and mortality. In an effort to identify strategies for reducing opioid exposures, we sought to compare the outcomes of bariatric surgery patients whose surgical pain was initially managed with liposomal bupivacaine compared to standard care in the US hospital setting.

**Methods:** We performed a retrospective cohort study using patients (>=18 years, who underwent elective bariatric surgery) from the Premier Inpatient Hospitalization Database from January 2013 through June 2013. We estimated generalized linear models adjusting for age, race and insurer/payer to assess differences in total hospitalization costs (gamma log-link model),

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# ASBMS

length of stay (negative binomial model), post-operative opioid use (gamma log-link model), and rates of adverse events (binomial complementary log-log link model) comparing patients who received intraoperative liposomal bupivacaine with patients who received standard care. We computed Average Treatment Effects (ATE) for each outcome using the method of recycled predictions.

**Results:** The study cohort included 7299 patients with 188 (2.58%) being administered liposomal bupivacaine during surgery. Patients in the liposomal bupivacaine group were on average younger (45.26 v 43.64,  $p = 0.007$ ). A significantly higher proportion of non-white people received liposomal bupivacaine (3.67% v 1.95%,  $p < 0.001$ ), as did a significantly higher proportion of managed care patient (3.45% v 0.89%,  $p < 0.001$ ). There were no differences by gender (2.92% female v 2.47%,  $p = 0.313$ ). Averaging over the distribution of age, race and insurer/payer, patients who were injected with liposomal bupivacaine had \$1978 lower total hospitalization costs (95% CI: \$1122 to \$2835). There was no difference in length of stay (ATE: -0.004, 95% CI: -0.209 to 0.200). Predicted mean morphine equivalent dose consumption was 10.80 mg (95% CI: 2.60, 19.00) lower in the liposomal bupivacaine group. The probability of respiratory adverse events was 0.136 (95% CI: 0.037, 0.235) lower in patients on liposomal bupivacaine, while probabilities of bowel obstruction, surgical site infection and urinary tract infection were similar between the two groups.

**Conclusions:** Intra-operative injection of liposomal bupivacaine for the management of post-surgical pain among adults undergoing bariatric surgery appears to be associated with lower total hospitalization costs and decreased rates of respiratory adverse events. More research is needed to optimize the use of this medication in this at risk population, including focusing on patients with sleep apnea and pre-surgical continuous positive airway pressure therapy.

## A5007

### **Predicting Sub-Optimal Weight Loss One Year after a Roux-en-Y Gastric Bypass with the Minnesota Multiphasic Personality Inventory – 2 – Restructured Form (MMPI-2-RF)**

Ryan Marek Kent Ohio, Yossef Ben-Porath Copley OH<sup>1</sup>, Anthony Tarescavage Parma OH<sup>1</sup>, Kathleen

Ashton Cleveland OH<sup>2</sup>, Megan Lavery Cleveland OH<sup>2</sup>, Leslie Heinberg Cleveland OH<sup>2</sup>  
Kent State University<sup>1</sup> Cleveland Clinic<sup>2</sup>

**Background:** The Roux-en-Y Gastric Bypass (RYGB) procedure demonstrates good efficacy and effectiveness for weight loss among bariatric surgery candidates; however, some patients do not achieve their weight loss goals. Many bariatric surgery candidates undergo a Presurgical Psychological Screening (PPS), which includes objective psychometric testing. Recent literature suggests that the Minnesota Multiphasic Personality Inventory – 2 – Restructured Form (MMPI-2-RF), an objective psychological/personality assessment instrument, demonstrates good reliability, validity, clinical utility, and generalizability across bariatric surgery candidate samples. The current study seeks to extend past literature on the MMPI-2-RF by examining which pre-surgical scale elevations on the instrument can predict suboptimal weight loss one year post-surgery.

**Methods:** The sample consisted of 345 bariatric surgery candidates who produced a valid presurgical MMPI-2-RF protocol, underwent a RYGB, and had one-year weight loss data. The majority of the sample were women (76.2%). Ethnic breakdowns were as follows: 64.7% were Caucasian, 20.4% were African American, and 14.9% were of another ethnicity. The mean age of the sample was 46.7 (SD = 11.5). The mean presurgical BMI was 47.2 kg/m<sup>2</sup> (SD = 8.8), and the mean %Excess Weight Loss (%EWL) at one year postoperative was 59.5% (SD = 19.6).

**Results:** Following convention, 98 individuals (28.4%) who did not meet 50% EWL at 12 months postoperative were classified as achieving sub-optimal weight loss. To examine the increase in risk for achieving sub-optimal weight loss at the one year postoperative time point, we calculated relative risk ratios (RRRs) using various pre-surgical MMPI-2-RF cutoffs. Several scales demonstrated statistically significant RRRs. For example, bariatric surgery candidates who scored at or above 65T on the Behavioral/Externalizing Dysfunction scale (a broad measure indicating difficulties with under-controlled behaviors such as substance abuse and impulsivity) at their presurgical evaluation were at a 2.06 (95% CI = 1.06 – 3.99) greater risk for achieving sub-optimal weight loss than those who scored below 65T on the Behavioral/Externalizing Dysfunction scale. Candidates who scored at 60T or above on the Aggression scale were at a 1.95 (95% CI = 1.21

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## ASBMS

– 3.16) greater risk for achieving sub-optimal weight loss than those who did score below 60T or above on the Aggression scale. **Conclusions:** Patients who score at 65T or higher on Behavioral/Externalizing Dysfunction and 60T or higher on Aggression of the MMPI-2-RF at the time of their presurgical evaluation are at greater risk of achieving sub-optimal weight loss one year following RYGB. Thus, patients who at the time of their presurgical screening report a broad range of behaviors and difficulties associated with under-controlled behavior (e.g., substance abuse, poor impulse control) and physically aggressive behavior are at greater risk for sub-optimal weight loss following RYGB. Inadequate self-control should be the focus of intervention for these patients. Several other statistically significant RRR findings emerged and will be discussed.

### A5008

#### **Concomitant Removal of Gastric Band and Gastric Bypass: Analysis of Outcomes and Complications from the ACS-NSQIP Database.**

Elie Ramly *Beirut Beirut*<sup>1</sup>, Ramzi Alami *Beirut N/A*<sup>1</sup>, Hani Tamim *Beirut Beirut*<sup>1</sup>, Rami Kantar *Cambridge Massachusetts*<sup>1</sup>, Ghassan Chamseddine *Beirut Beirut*<sup>1</sup>, Elias Elias *Beirut Beirut*<sup>1</sup>, Bassem Safadi<sup>1</sup>  
American University of Beirut<sup>1</sup>

**Background:** Objectives: To compare mortality and morbidity of Laparoscopic Roux-en-Y gastric bypass (LRYGB) versus LRYGB with concomitant gastric band removal (LRYGBP/GBR). Background Since the approval of adjustable gastric banding in the US, a significant number of patients have undergone this procedure with substantial long term failure rates. Conversion of band to RYGB is an established procedure. However, multiple reports have indicated higher morbidity and mortality rates associated with this operation, especially when performed as a single staged procedure.

**Methods:** Data from The American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) database (a prospective validated outcomes registry) was obtained for the time period of 2008 to 2012 using CPT codes for LRYGB and LGBR. Demographics, preoperative comorbidities and postoperative mortality and morbidity data were retrieved. Sepsis was the primary outcome measure with overall morbidity as a secondary

outcome. Bivariate and multivariate analyses were carried out using SAS (Statistical Analysis System).

**Results:** During the study period, 46,851 (98.5%) patients had LRYGB and 711 (1.5%) had LRYGB/GBR for a total of 47,562 patients analyzed. On bivariate analyses, mean operative time was lower for patients undergoing LRYGB rather than LRYGB/GBR ( $134.4 \pm 56.5$  vs  $180.13 \pm 72.4$  min,  $p < 0.001$ ). There was no statistically significant difference in the rate of postoperative mortality (0.16% vs 0.14,  $p > 0.999$ ), sepsis (0.83% vs 0.84%,  $p = 0.963$ ) or other postoperative outcomes such as return to the operating room, wound infection, and venous thromboembolism. The odds ratio (OR) for sepsis remained not significant (OR = 0.81; CI = [0.35-1.84]) after multivariate analysis.

**Conclusions:** Laparoscopic Roux-en-Y Gastric Bypass with concomitant Gastric Band Removal (LRYGBP/GBR) is not associated with a higher morbidity and mortality compared to Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) alone. The data implies that a one-step revisional procedure is appropriate when converting a failed gastric band to a RYGB.

### A5009

#### **Goal Directed Program after Sleeve Gastrectomy Improves Weight Loss**

Guowei Kim *Singapore Singapore*<sup>1</sup>, Chuen Seng Tan *Singapore Singapore*<sup>2</sup>, Anton Cheng *Singapore NA*<sup>3</sup>, Jaideep Raj Rao<sup>4</sup>, Thida Khin *Singapore Singapore*<sup>4</sup>, Davide Lomanto *Singapore Singapore*<sup>4</sup>, Jing Yu Ng *Singapore Singapore*<sup>4</sup>, Jimmy So *SINGAPORE SINGAPORE*<sup>4</sup>, Asim Shabbir *Singapore Singapore*<sup>4</sup>  
National University Hospital, Singapore<sup>1</sup> National University of Singapore<sup>2</sup> Khoo Teck Puat Hospital, Singapore<sup>3</sup> Tan Tock Seng Hospital, Singapore<sup>4</sup>

**Background:** Laparoscopic sleeve gastrectomy is gaining popularity in recent years, with many recent studies showing good efficacy and acceptable complication rates. No study to date has looked into the role of a standardized, goal directed, weight loss program and its effect on weight loss in patients who have undergone bariatric surgery. The aim of our study is to determine if a goal directed weight loss program improves weight loss after sleeve gastrectomy.

**Methods:** We compare patients who underwent laparoscopic sleeve gastrectomy in three bariatric centers from April 2010 to July 2013, of

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# ASBMS

which one center utilizes a standardized weight loss program with targeted weight loss goals to strive towards. Excess weight loss (EWL) results from this center were compared with the other two centers that implement a standard weight loss program without goal directed protocols. Two-sample t-test was used to compare the EWL between the groups. To model the longitudinal EWL profile, the generalized estimating equations (GEEs) approach to fit the linear regression was used to account for the correlation over time.

**Results:** A total of 211 patients were studied with 129 patients who followed the goal directed weight loss program. There was no statistical difference between both groups when comparing variables such as sex, ethnicity, pre-operative comorbidities, age, height and pre-operative weight/excess weight/body mass index. At 3, 6, 9 and 12 months post-sleeve gastrectomy, patients in the goal directed program achieved mean EWL of 40%, 54%, 62% and 67% respectively when compared to 36%, 50%, 54% and 55% respectively among patients not in the goal directed program. These results reached statistical significance ( $P < 0.05$ ) at 12th months. Using the GEE, we found the interaction between goal directed program status and months to be significant ( $P = 0.003$ ). The difference in mean of EWL (%) between patients with goal directed program and those without were 5.21 (95%CI: -1.33 to 9.09), 3.98 (95%CI: -1.14 to 9.09), 5.45 (95%CI: -0.10 to 11.00) and 9.43 (95%CI: 3.82 to 15.03) at 3, 6, 9 and 12 months respectively. The difference in the estimated marginal mean of EWL between patients with goal directed program (55.7; 95%CI: 52.8 to 58.5) and those without (49.7; 95%CI: 46.1 to 53.3) was also significant (6.02; 95%CI: 1.43 to 10.6).

**Conclusions:** Our results suggest that the use of a standardized goal directed weight loss protocol for patients who have undergone laparoscopic sleeve gastrectomy improves weight loss outcomes in the short to mid-term period.

## A5010

### Does sleeve gastrectomy hinder growth in children?

Mohamed Elahmedi<sup>1</sup>, Aayed Alqahtani *Riyadh Central Region*<sup>1</sup>  
King Saud University<sup>1</sup>

**Background:** Bariatric surgery is the most successful method of inducing rapid, sustained

weight loss with resolution of comorbidities. However, offering bariatric surgery to severely obese children is met with considerable reluctance. Concerns are raised, as the scientific community wonders whether bariatric surgery may have a harmful effect on growth. Different methods exist to assess child growth, of which height z-score is a highly sensitive and reproducible method.

**Methods:** After previously reporting on the success of laparoscopic sleeve gastrectomy in inducing significant and sustained weight loss with resolution of comorbidities, we extracted one-year and two-year height change data (height, height z-score and height z-score difference). We then divided the cohort into four groups: (1) young children: aged 5 to 8.99 years, (2) prepubertal children: aged 9 to 12.99 years, (3) teenagers: aged 13 to 16.99 years, (4) young adults: aged 17 to 21 years.

**Results:** One year after LSG, the height z-score had changed by an average of  $-0.06 + 0.56$ ,  $-0.04 + 0.32$ ,  $-0.06 + 0.38$  and  $0.09 + 0.33$  for groups (1), (2), (3), and (4) respectively. Two years after LSG, the height z-score had changed by an average of  $0.14 + 0.53$ ,  $0.08 + 0.78$ ,  $0.08 + 0.61$  and  $0.03 + 0.35$  for those groups. The mean BMI change observed at two years of follow-up ranged between -14.2 to -23.4 for all age groups (Table 1). No significant difference was observed regarding height z-score change between the four groups.

**Conclusions:** Contrary to current concerns, children who undergo LSG at any age experience normal height gain, suggesting no effect of the procedure on growth and skeletal maturity.

## A5011

### Impact of Different Mechanical Stapling Platforms in Vertical Sleeve Gastrectomy (VSG)

Mitchell Roslin *New York NY*, Lobat Hashemi *Franklin MA*<sup>1</sup>  
Research Director, Covidien<sup>1</sup>

**Background:** Although the mechanical endoscopic stapler is the sentinel instrument in VSG, there has been little investigation regarding the impact on outcomes of the two different commercial platforms. Each device has different mechanisms for staple deployment. One system uses graduated compression (GC) by deploying staples of different heights. The smallest being placed first and near the cut line, and then progressively deploying larger height

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# ASBMS

staples away from the cut line thereby reducing tissue stress on the outer row. The other uses constant compression (CC) deploying three lines of the same height simultaneously. The purpose of this investigation is to determine whether these differences change early clinical outcomes

**Methods:** All inpatient discharges for sleeve gastrectomy (ICD-9-CM procedure code 43.82) for all live discharges, for all patients 18 +, and excluding cases where buttress material were selected from a comprehensive hospital admission database (Premier Perspective Database 1/1/12 through 6/30/13). 437 cases that utilized GC and 2457 CC were found and analyzed. Descriptive statistics were calculated for patient demographic and hospital characteristics. Comparison of patient demographic and hospital characteristics was performed using 2-sided chi-square or Fisher Exact test for categorical variables and t-tests for continuous variables. Propensity Score methodology was used to match patients (1:1) in the GC group to CC group using age, gender, Charlson Comorbid Index (CCI), APR-DRG severity of illness, insurance type, discharge status, hospital's region, teaching status and bed size. 430 of the GC group patients were matched to 430 of the CC group.

**Results:** Mean age of the groups was similar 42.6 GC vs 43.8 CC. CC patients had a higher CCI (.48 GC vs .61 CC  $p=.002$ ) and higher number of patients labeled with severe illness. GC was more likely to be used in southern hospitals, as well is in larger facilities  $p<.0001$ . With unadjusted outcomes there was no difference in leaks, GC patients had lower risk of blood transfusion (.46% vs 1.55%  $p=.0492$ ), GC patients had lower rate of ICU admission (.22 % vs 1.99%  $p<.001$ ). Following matching of patients to eliminate population difference there was still a tendency for GC patients to have a lower risk of blood transfusion (.47% vs 1.63%  $p=.0617$ ). The difference in ICU admission became less pronounced (.23% vs 1.4%  $p=.0817$ ).

**Conclusions:** Although critical to the success of the procedure, there has been little investigation regarding the potential impact that the different stapling platforms can have with clinical outcomes. To ascertain any difference requires a large sample and query of data base with access to multiple hospitals. While there are obvious limitations such as being dependent on the accuracy of what is reported, inability to account for variables such as oversewing and bougie size, our results suggest a tendency for

GC to be associated with a lower rate of blood transfusion. This tendency remains even after matching patients by propensity score. The potential importance of these results may be amplified by the increasing recognition that early bleeding may be associated with an increased chance for leakage.

## A5012

### Bariatric surgery in transplant patients

Raquel Gonzales-Heredia *CHICAGO ILLINOIS*<sup>1</sup>, Mario Masrur *Chicago IL*<sup>1</sup>, Melissa Murphey *chicago IL*<sup>2</sup>, Enrique Elli *Chicago IL*<sup>2</sup>  
UNIVERSITY OF ILLINOIS AT CHICAGO<sup>1</sup> UNIVERSITY OF ILLINOIS AT CHICAGO<sup>2</sup>

**Background:** Obesity is a particular problem in patients undergoing organ transplantation. Reports show almost one third of transplant patients become obese within 3 years after a liver transplant. In the United States alone, 7% of patients undergoing liver transplants are considered obese. The reason for this weight gain is mainly the immunosuppressive therapy that the patient receives after a transplant. Bariatric surgery represents a valid therapeutic option for patients who become morbidly obese after liver, kidney and pancreas transplantation and other failed nonsurgical therapies.

**Methods:** A total of 409 consecutive patients underwent a minimally invasive sleeve gastrectomy as one stage surgery at University of Illinois at Chicago Medical Center from January 2008 to January 2014. Out of 409 patients, 6 had a previous kidney transplant, 2 patient had a previous liver transplant and another one had a pancreas transplant.

**Results:** The mean age of the transplant patients was 50.5±14.6 years. The mean preoperative BMI was 48.54±2.96 Kg/m<sup>2</sup>. The average operative time was 72.5±33.7 minutes.

The mean length of stay was 4.5±3 days. No complications, no conversions to open and no operations were registered in these patients. Immunosuppressive therapy was not modified after surgery. There were no postoperative complications and no complications related with the graft. The mean excess weight loss at 12 months follow up was 51.2±1.2%

**Conclusions:** Sleeve gastrectomy is a feasible technique with good postoperative outcomes as a bariatric procedure after orthotopic liver, kidney and pancreas transplantation. This surgery doesn't increase perioperative risk in those patients.

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## A5013

### Prospective Evaluation of Initial and Repeat Use of a Novel Dual Intra-gastric Balloon

Gontrand Lopez-Nava *Madrid Spain*<sup>1</sup>,  
Inmaculada Bautista Castaño *MADRID MADRID*<sup>1</sup>,  
Amaya Jiménez-Baños *MADRID MADRID*<sup>1</sup>,  
Teresa de Grado Machado *MADRID MADRID*<sup>1</sup>,  
Juan Pedro Fernandez Corbelle *MADRID MADRID*<sup>1</sup>  
Sanchinarro University Hospital<sup>1</sup>

**Background:** Numerous published studies have shown the intra-gastric balloon to be a safe and effective non-surgical, reversible obesity treatment option when coupled with a comprehensive bariatric patient follow up program. We report our results with both single and sequential placement of the ReShape Duo® integrated dual intra-gastric balloon (DIGB) in conjunction with a comprehensive patient care program.

**Methods:** Patients were prospectively enrolled between September, 2012 and June, 2013. Prior to device placement, patients received counseling to set appropriate expectations regarding nausea and vomiting during the initial stomach accommodation period. Each patient had outpatient, endoscopic placement of a DIGB filled with a total of 900cc of saline (450cc in each balloon). Patients received counseling from a skilled interdisciplinary team for a minimum of 12 months. Study outcomes included weight loss and durability parameters for all subjects, as well as for two subgroups: subjects treated with a single Duo implantation (SINGLE-DUO), and subjects treated with two consecutive Duo implantations (SEQ-DUO).

**Results:** Fifty-five (55) subjects (46 females, 9 males) averaged 39 years of age, had a mean BMI of 38.6 (range 29.8-48.2) and weight of 107.2 kg (range 81.2-164.0 kg). On the date of initial DIGB removal from these 55 subjects (mean implantation duration  $8.2 \pm 2.1$  months) mean weight loss (WL), percent excess weight loss (%EWL) and percent total body weight loss (%TBWL) were  $16.6 \pm 9.7$  kg,  $47.4 \pm 27.0\%$  and  $15.5 \pm 8.2\%$ , respectively. SINGLE-DUO subjects (n=39) continued to receive regular counseling, SEQ-DUO subjects (n=16) had immediate reinsertion of a second DIGB and also received regular counseling. SINGLE-DUO subjects after a mean of 4.3 months (0-9.5) of post-removal follow-up had unchanged weight parameters (WL= -0.1 kg, %EWL = +1.4%, %TBWL = 0.2% compared with values at DIGB

removal). Similar results were found in SEQ-DUO subjects over a mean of 3.1 months of ongoing DIGB treatment; all subjects remain implanted. No safety issues were associated with sequential DIGB placements. For the entire study cohort (n=55) from baseline through a mean follow-up of  $12.0 \pm 4.1$  months, weight loss is substantial with WL =  $16.8 \pm 10.4$  kg, %EWL =  $48.4 \pm 29.9\%$ , and %TBWL = 15.7%. **Conclusions:** Use of the ReShape Duo device coupled with a comprehensive patient care program demonstrated clinically significant weight loss and weight loss durability. No safety issues were observed with sequential ReShape Duo placements.

## A5102

### Diabetes Resolution in Bariatric Patients Requiring Statin Therapy

Janet Ng Hartford CT1, Kevin Ballard Hartford Connecticut1, Andrea Stone Glastonbury CT1, Beth Taylor Hartford CT1, Darren Tishler Hartford CT1, Pavlos Pappas Hartford CT1  
Hartford Hospital1

**Background:** Many obese patients eligible for bariatric surgery are concurrently treated with statin therapy. Studies indicate a small but significant risk of new-onset diabetes in patients on statin medication, suggesting that statin drugs may be associated with detrimental metabolic side effects. It is unclear whether these drugs also influence weight loss.

**Methods:** Retrospective review of a prospectively maintained database. Patients included if they had baseline and 1-year follow-up data. Patients were divided into 4 groups: diabetics on statins (n=357), diabetics not on statins (n=200), non-diabetics on statins (n=314), and non-diabetics not on statins (n=704). We evaluated HbA1c, lipids, fasting glucose and insulin, and weight loss. Diabetes remission was defined using BOLD categories. Bloodwork data was available for 185 patients. Analyses used 2x2 ANOVAs (DM status x statin status) to assess differences within each surgery type.

**Results:** In the entire sample, DM status (32.9%) and statin use (44.1%) prior to surgery decreased ( $p < 0.01$ ) to 16.2% and 25.8% at 1-year after surgery, respectively. Compared to diabetics not treated with statins (n = 200), diabetics treated with statins (n = 357) lost more weight ( $-26.7 \pm 17.5$  kg vs.  $-22.5 \pm 15.2$  kg for statin vs. non-statin, respectively;  $p = 0.02$ ). In non-diabetics, statin therapy preoperatively did

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not influence weight loss in non-diabetics (-27.0±17.6 kg vs. -27.9±16.6 kg for non-statin (n = 704) vs. statin users (n = 314; p = 0.42). Statin use prior to surgery did not influence bariatric surgery-induced decreases in HbA1c, lipids, glucose, or insulin in diabetics (all p≥0.24) or non-diabetics (p≥0.22). A total of 159/357 (44.5%) of diabetics on statins had remission of DM at 1-year after surgery versus 124/200 (62.0%) of DM not on statins (p<.001). This difference was also observed for and lapband (37.7% versus 57.5%; p=.001) but not RYGB (61.1% versus 70.7% (p=.18). In the RYGB group, 203/468 patients were on statins and 188/468 were diabetic. There was an interaction between statin therapy and DM status (p=.03). In general, those who were using statins lost more weight (mean=-42.8 kg) compared to those who were not on statins (mean=-35.8 kg, p<.001), however the weight loss difference between statin users and non-statin users was more pronounced in those who were diabetic (meanst&DM=42.1 kg; mean~stDM=31.3 kg). There were no main effects or interactions of statins on 1-year HbA1c (p=.65), insulin (p=.59), fasting glucose (p=.22), and lipids (p=.09-.74). In the LAGB group, 437/1034 were on statins and 336/1034 were diabetic. There were no main effects or interactions on any outcome variables (p=.15-78).

**Conclusions:** These data suggest that while statin therapy does not influence weight loss from bariatric surgery in non-diabetics, it may augment weight loss in patients with diabetes after 1 year. In particular, RYGB patients achieved greater weight loss on statins versus no statins. We also found that statin use did not impact DM remission for RYGB. While our weight loss findings may be associated with an indirect impact of statins, our data do not support a detrimental effect of statin therapy in obese patients undergoing RYGB, although it did affect DM remission rates in LAGB.

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