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The Third International Consensus Summit on Sleeve Gastrectomy was held in New York, New York, at the Crowne Plaza Hotel in Times Square December 2 to 4, 2010. This follows two similar meetings—one held in New York in 2007 and one held in Miami Beach in 2009. This meeting had a record of 15 live surgeries from multiple operating rooms from three continents and more than 80 oral presentations on various subjects touching on this rapidly accepted, new intervention. We have selected a sample of eight of the most influential presentations from this meeting, and each author summarizes his or her presentation. It is important to note that sleeve gastrectomy has become one of the major bariatric interventions in many countries in South America, Europe, and Asia. It is in rapid progression in the United States with recent private insurers accepting to cover this medically necessary procedure.

The first session of oral presentations at the meeting has been classically dedicated to the understanding of the mechanism of this surgery, as reflected in the manuscripts by Gianos et al and Basso et al.

We now have five-year cohorts, which show acceptable weight loss with sleeve gastrectomy superior to gastric banding. Brethauer and Schauer review the meta-analysis data and Himpens addresses the six-year data with failures management. My team has performed a cross-sectional review of the effects of sleeve gastrectomy at 1, 3, and 5 years. Strain reports the results of this study.

Next, Jossart reviews routine hiatal hernia repair in sleeve gastrectomy. In the complications arena, Gandsas et al reviews the risks of bleeding.

This year, the live surgeries performed by Teixeira and Saber for single-port sleeve gastrectomy were convincing. Saber reviews the data here.

We hope you will enjoy this supplement, and we also welcome you to the Fourth Consensus Conference on Sleeve Gastrectomy in the spring of 2012, again most likely in New York City.
Understanding the Mechanisms of Action of Sleeve Gastrectomy on Obesity

by MELISSA GIANOS MD; ABRAHAM ABDEMUR, MD; and RAUL J. ROSENTHAL, MD, FACS

Bariatric surgery for severe obesity is associated with long-term weight loss and decreased mortality. Laparoscopic sleeve gastrectomy (LSG) has been recently introduced as a surgical option. It involves removing approximately 80 percent of the stomach, mainly the body and fundus, leaving behind only a gastric tube along the lesser curve. This gastric tube has been shown to have less distensibility than the whole stomach, with high intraluminal pressure, thus restricting the amount of food that can be consumed at one time.1 There is an increase in satiety with a subsequent reduction of food intake due to an elevated intragastric pressure or possibly from a decrease in ghrelin levels, which are secreted mainly by the fundus. The delay in gastric emptying is believed to occur due to the decrease in food intake after a restrictive surgery, such as LSG. It is unclear whether the patterns of gastric emptying (slow or fast) contribute to the pathophysiology of morbid obesity.2,3 Studies addressing gastric emptying have shown conflicting results.4 Some studies have concluded that gastric emptying is slowest with solid food after gastric partitioning (gastroplasty),5,6 but others have failed to demonstrate any significant data showing slower postoperative emptying of solid foods from the new gastric pouch and distal stomach postoperatively.6 In comparison, Melissas et al7 has found evidence of faster gastric emptying following sleeve gastrectomy. Although the mechanism of gastric emptying may play a significant role in weight reduction, it may also be responsible for gastrointestinal manifestations, such as reflux disease and or dumping syndrome.

SURGICAL TECHNIQUE

The aim of this operation is to create a restriction and reduce the size of the stomach to a 150cc tube by resecting the greater curvature. We use a seven-trocar technique for LSG with identical port placement to our laparoscopic Roux-en-Y gastric bypass (RYGB) procedure. After induction of anesthesia and endotracheal intubation, the abdominal cavity is accessed through a 1cm supraumbilical incision using an optical trocar. The abdominal cavity is insufflated with carbon dioxide to a pressure of 15mmHg. The operating ports are inserted under direct vision. The liver is retracted cranially, and the gastroesophageal (GE) junction is exposed. A point on the greater curvature approximately 6cm to the pylorus is identified as the distal extent of the resection. Ultrasonic shears were used to divide the vessels along the greater curve up to the angle of His. A 38Fr bougie is inserted transorally to the level of the distal stomach. Linear cutting staplers are used to vertically transect the stomach, creating a narrow gastric tube with an estimated capacity of 150mL. The staple line is then oversewn with a running 2/0 Vicryl® suture. A 19Fr drain is placed in the subhepatic space near the staple line. The resected portion of the stomach is extracted through the supraumbilical trocar site. All patients have a routine gastrograffin swallow study on Postoperative Day 1 and are commenced on oral fluids if normal.8 There are “three corners” that surgeons must pay special attention to when performing this procedure: 1. The Incisura angularis or the angle of the stricture. When resecting this part of the stomach, surgeons should pay attention to be sure the bougie stays in the pyloric region, that green cartridges are
used to divide what is known to be the thickest part of the stomach, and that there is no narrowing of the gastric outlet.

2. The gastroplenic ligament or the angle of bleed. Surgeons must take care in staying close to the stomach to avoid spleen parenchymal bleed.

3. The Angle of His or the angle of the leak. When resecting the stomach, surgeons should pay attention and stay lateral to the fat pad to avoid ischemia of the intra-abdominal esophagus that might result in staple line disruption and a leak. It is also important to mobilize the fundus by taking down the phrenoesophageal membrane in order to resect the fundus while doing the gastrectomy. Hiatal hernias if present, regardless of their size, must be repaired.

Because the sleeve is a high pressure system, it is imperative that there is no further narrowing or obstruction of the gastric outlet or body of the stomach, since both might be the reason for and perpetuate a proximal staple line disruption. Reinforcement of staple lines with suturing or buttressing are at the discretion of the surgeon.

THE HORMONAL BENEFITS OF SLEEVE GASTRECTOMY

Ghrelin, a 28 amino acid acylated peptide, is an epithelial endocrine element of the diffuse endocrine system in the gastrointestinal tract. It is the only known peripheral hormone with orexigenic properties. The physiological effects of ghrelin include the stimulation of appetite, leading to an increase in food intake and the reduction of metabolism and fat catabolism in humans. High levels of circulating ghrelin are also seen in the state of weight reduction, such as diet, cancer cachexia, and anorexia.

Ghrelin represents an endogenous hormone that binds to the growth hormone secretagogue receptor and stimulates arcuate and solitary tract nucleus in hypothalamus for growth hormone (GH) release, playing a principal role in body weight regulation. It partly exerts its effects through vagal afferent loops, where it opposes leptin via disinhibition of NPY and agouti generelated peptide (AgRP).

Ghrelin receptors are also present in the stomach and other organs and tissues, suggesting effects beyond GH secretion stimulation.

The preprandial rise and postprandial reduction of ghrelin suggests its significance in the role of meal initiation.

GLP-1 (glucagon-like peptide) has multiple physiological functions but its role in gastric emptying and satiety are most significant following sleeve gastrectomy. GLP-1 decreases gastric emptying and intestinal peristalsis. It is released by the ileal L cells in response to a hypertonic meal passing through the distal ileum and colon. Serum concentration of GLP-1 has shown a postprandial increase in persons of normal weight that is not seen in the morbidly obese population.

In addition to its effect on gastric emptying, GLP-1 reacts with receptors in the brain to promote satiety, which inevitably leads to a decrease in food intake. Rapid gastric emptying was seen after LSG by Melissas et al.

Contributing factors supporting rapid gastric emptying include alterations in the contractility of the proximal stomach, the absence of receptive relaxation after LSG, the resection of the fundus containing the largest amount of ghrelin cells, and possible antral distention, which leads to changes in the enterohypothalamic axis. Bernstine et al measured gastric emptying in patients before and three months after LSG with multiple scintigraphic imaging in minute intervals. SG performed with antrum preservation showed no effect on gastric emptying since both the mean time of gastric emptying and retention among the different time intervals failed to show any significant differences.

ANTI-DIABETIC EFFECT

LSG-associated weight loss is believed to be secondary to the reduction of gastric volume and restriction of food intake. The exact mechanism behind LSG in the resolution of type 2 diabetes mellitus (T2DM) has not been clearly defined. Currently, there are theories that both hormonal and hindgut changes are
The hindgut theory hypothesizes that rapid delivery of undigested nutrients to the distal bowel upregulates the production of L-cell derivatives, such as GLP-1 and peptide-Y. GLP-1 is secreted by the ileal L-cells in response to eating and has shown to be increased in a LSG group of animal models. GLP-1 action stimulates insulin release and may increase the cell mass. Peptide-Y is also secreted from L-cells and ameliorates insulin resistance in mice. Melissas et al found that despite preservation of the pylorus in LSG, gastric emptying was accelerated, which supports the hindgut theory. In bariatric surgery, the primary goal is to produce long-term, sustainable weight loss and improve comorbidities, such as T2DM. The resolution of T2DM has been defined as discontinuation of all hypoglycemic medications and/or insulin and a normal fasting plasma glucose level, normal postprandial glucose excursions, and normal hemoglobin A1c (HbA1c). A decrease in gastric emptying half time after LSG can possibly contribute to better glucose homeostasis in patients with T2DM. Our studies have shown the effectiveness of LSG in its improvement or resolution in T2DM in most cases, which makes the LSG a promising surgical procedure for the treatment of morbid obesity and T2DM.

REFERENCES

Laparoscopic Sleeve Gastrectomy for the Treatment of T2DM in Patients with BMI <35kg/m²

by NICOLA BASSO, MD; FRANCESCA ABBATINI, MD; GIOVANNI CASELLA, MD; DANILA CAPOCCIA, MD; and FRIDA LEONETTI, MD

KEY POINTS
• Sleeve gastrectomy is effective in T2DM patients with BMI <35kg/m².
• Ten years T2DM duration is a reliable cut off for T2DM remission after LSG.
• The new frontier of sleeve gastrectomy for patients with T2DM will be to perform this procedure for BMI 30kg/m² and above.

BACKGROUND
Type 2 diabetes mellitus (T2DM) and obesity are diseases of epidemic proportions. The association between them is well established, as 90 percent of patients with T2DM are obese. However, some patients with T2DM are not obese, and for some nonobese T2DM individuals, insulin resistance is not essential to the development of diabetes.

T2DM is a common disease with numerous complications. Bariatric surgery is effective in controlling T2DM in patients with morbid obesity. This study aimed to evaluate preliminary results of laparoscopic sleeve gastrectomy (LSG) in controlling T2DM in patients with a body mass index (BMI) of 35kg/m² or less.

METHODS
Nine patients (7 women and 2 men) underwent LSG. The mean age was 45.5 years (range, 30–52 years). The mean BMI was 32.7kg/m² (range, 28–35kg/m²). Seven patients were on oral hypoglycemic agents, and two patients were on insulin treatment. The mean duration of T2DM was 7.1 years (range, 1–20 years). The preoperative fasting glycemia and HbA1c were 144mg/dL and 8.1 percent, respectively. The hypertension was present in five patients, one patient presented with dyslipidemia, and one patient presented with severe OSAS on C-PAP therapy. Patients were followed up and assessed for the diabetic state with routine laboratory tests and anthropometric measurements at one, three, six, nine, and 12 months. The T2DM resolution was intended as interruption of therapy and adequate glycemic control (HbA1c <6.5%).

RESULTS
All operative procedures were performed laparoscopically and no major complications occurred. The mean postoperative follow-up period was 12 months (range, 3–18 months). The mean postoperative BMI was 29.1, 28.2, 23.6, 22.6, and 21.1kg/m² at one, three, six, nine, and 12 months, respectively (6 patients). The T2DM resolution was achieved in eight out of nine patients (with T2DM duration of 5.2 years).

The non-cured patient had a 20-year duration of T2DM, a preoperative HbA1c value of 12.9 percent, a preoperative C-peptide value of 1.5ng/mL, and took 87 insulin unit/day plus oral antidiabetic drugs. Insulin requirement dropped to 26 insulin units daily at three months postoperative. In all other patients, antidiabetic therapy was discontinued within one month from the operation. Hypertension was controlled in all patients but one. Dyslipidemia was cured and OSAS was improved.

The mean postoperative glycemia was 93.1, 100, 93.2, 86, and 82.6mg/dL at one, three, six, nine, and 12 months (Figure 1). The mean postoperative HbA1c was 7.7, 6.1, 5.9, and 5.9 at three, six, nine, and 12 months. The weight reduction and the decrease of HbA1c are shown in Figure 2.
CONCLUSIONS

This study confirms the efficacy of LSG in the treatment of patients without morbid obesity with T2DM, with a percentage of resolution of 88.8 percent (8 out of 9). The eight patients had T2DM duration of less than 10 years with a mean of 5.2 years; the mean preoperative HbA1c was 7.3 percent and the mean C-peptide was 3.25ng/mL. The single patient not in remission had a 20-year duration of T2DM.

LSG seems to be a promising procedure for the control of T2DM and metabolic syndrome in patients with BMI of 35kg/m² or less, with results superimposable to those obtained by us in patients with BMI of 35kg/m² or more. In particular, it was confirmed that the 10-year diabetes duration is a cut-off prognostic factor. Furthermore, the present results of LSG alone seem to be equivalent to those obtained by LSG associated with ileal interposition or by biliopancreatic diversion.

REFERENCES

Beyond the Systematic Review

by STACY A. BRETHAUER, MD, and PHILIP R. SCHAUER, MD

KEY POINTS
• Five-year EWL after sleeve gastrectomy is 50 to 55 percent.
• A subset of patients will require a second-stage bypass procedure to achieve optimal weight loss after sleeve gastrectomy.
• High BMI, high-risk patients can achieve excellent long-term weight loss after LSG, and some will not require a second-stage operation.
• Sleeve gastrectomy results in remission of diabetes in 50 to 65 percent of patients.

S
ince the publication of a systematic review of the sleeve gastrectomy (SG) literature in 2009,1 there have been several important publications regarding this operation, its effects on comorbidities, and its durability. The recent publication of more long-term data has helped to define the role of SG as an effective and durable operation for the majority of patients who undergo this procedure.

In 2006, Himpens et al2 published a randomized trial comparing outcomes between laparoscopic sleeve gastrectomy (LSG) and laparoscopic adjustable gastric banding (LAGB). That paper reported significantly better weight loss at three years after LSG compared to LAGB. In a more recent study, Himpens et al3 reported the long-term weight loss data on 41 patients who underwent sleeve gastrectomy. The median preoperative BMI was 39kg/m². Three years after surgery, the mean EWL overall was 72.8 percent, and after the sixth year of follow-up, the mean EWL was 57.3 percent. Eleven patients underwent a second-stage duodenal switch procedure and increased their EWL to 70.8 percent at six years (mean BMI 27). The stand alone LSG patient group (n=30) had 53-percent EWL and a mean BMI of 31 at six years. This report demonstrates that some patients do regain weight long-term after LSG when it is used as a primary procedure and that weight loss can be improved by performing a second-stage procedure in selected patients. Gastroesophageal reflux disease (GERD) remains a concern after LSG and, in Himpens’s report, the overall incidence of GERD in patients with long-term follow up was 26 percent. The authors associate some of the new-onset GERD to the appearance of a neofundus that occasionally requires re-sleeve to control the symptoms. Despite these issues, patient acceptance of the LSG procedure remained good at six-plus years.

Another report of long-term outcomes after SG was recently published by Bohdjalian et al. The authors provide five-year weight loss data for 26 patients who underwent SG. Mean BMI prior to surgery was 48.2kg/m² and one-third of the patients were superobese. Mean EWL at five years was 55 percent. Four patients (15%) underwent a second-stage gastric bypass for weight regain (n=3) and reflux (n=1). After five years, 31 percent of patients were taking chronic acid suppression medication for GERD in this study. The authors also showed reduction in plasma ghrelin levels after SG that remained significantly reduced at five years compared to preoperative levels.

There are two other long-term studies of sleeve gastrectomy that were presented at the 3rd Annual International Consensus Summit for Sleeve Gastrectomy (Table 1). The study by Eid et al4 demonstrates that, even in patients with very high BMI, LSG can provide excellent long-term weight loss and comorbidity reduction without the addition of a second-stage procedure (submitted for publication). Of 74 patients with a mean preoperative BMI of 66, long-term, follow-up data were obtained for 69 (93% follow up, mean follow up of 73 months). Mean EWL at 72 and 96 months was 52 and 46 percent, respectively, in this group of high-risk patients who chose not to undergo a second-stage gastric bypass procedure.

A recent addition to this body of literature is a systematic review of the effects of sleeve gastrectomy on type 2 diabetes. Gill et al5 found 28 studies that met their criteria for inclusion in this review. The patient population included 673 patients with a mean preoperative BMI of 47.4. In this systematic analysis, LSG resulted in diabetes remission in 66.2 percent of patients. Of those studies that reported improvement and remission of diabetes, 97 percent of patients had either improvement or remission. The mean HbA1c decreased from 7.9 to 6.2 in the 11 studies that included this measure of

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glucose control. A randomized, controlled trial by Lee et al from Taiwan compared gastric bypass to sleeve gastrectomy. LSG resulted in remission of diabetes in 47 percent of patients at one year and was associated with an average three-percent reduction in HbA1c levels. Gastric bypass, however, had more powerful effects on the overall resolution of the metabolic syndrome than LSG in this study.

In summary, long-term outcome data for sleeve gastrectomy continue to emerge and these data support the continued use of this procedure as a primary or staging operation. It is not surprising that a subset of patients will require further therapy (a second-stage operation) for the treatment of a chronic disease like obesity. Similar to other bariatric procedures, 10 to 25 percent of patients regain some weight in the long term. One advantage of LSG noted by many authors is that weight loss can be salvaged in this group by the addition of a second-stage procedure. Chronic gastroesophageal reflux continues to be a concern after LSG and this should be taken into consideration when selecting patients for this operation.

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<th>TABLE 1. Long-term outcomes after sleeve gastrectomy</th>
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EWL= excess weight loss; BMI= body mass index; EBMI= excess body mass index
Long-term Results After Laparoscopic Sleeve Gastrectomy

by JACQUES HIMPENS, MD

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KEY POINTS

- LSG has a failure rate of 43% after 6+ years.
- One out of four patients develops GERD symptoms after 6+ years.
- Treatment can be either resection of a neo-fundus or Roux-en-Y gastric bypass.
- DS constitutes an effective solution for poor weight loss or weight regain after LSG.

Laparoscopic sleeve gastrectomy (LSG) is presently gaining wide acceptance as single surgical treatment for obesity. Long-term effects, however, are still lacking. We report the results of a cohort of consecutive patients who benefited from LSG over six years before assessment.

PATIENT MATERIAL AND METHODS

Between November 1, 2001, and October 30, 2002, 53 consecutive patients without diabetes, qualifying for a restrictive procedure, were submitted to LSG. Primary outcome measurements were the evolution of body mass index (BMI) gastroesophageal reflux disease (GERD), and the patients' final satisfaction level evaluated by the quality of life index (BAROS).

RESULTS

Forty-one patients (77%) were available for follow up after six-plus years. Eleven patients were men. The median age at the time of surgery was 44 years (28–71 years) and the BMI was 39.0kg/m² (31–57kg/m²). Mortality in this series was zero. Two patients (3.5%) suffered a postoperative leak but eventually recovered well. Of the 41 patients in whom full evaluation could be achieved, 13 had to undergo a second procedure for poor weight loss within the six years (duodenal switch [DS] in 11 patients and re-sleeve in 2 patients). The patients who benefited from single-sleeve resection presented an excess weight loss (EWL) of 77.5 percent (±19.8) and 53.3 percent (±28.9), respectively, after three and six years, which is a statistically significant change (p<0.0001, student's t-test). The patients' BMIs came down from 39.9kg/m² (±5.9) to 26.6kg/m² (±4.3) after three years but went back up to 31.1kg/m² (±6.2) after six years (p=0.0001). For the entire patient population, including the 13 reoperations, the difference in weight loss between the third and the sixth year was statistically significant. EWL was 72.8% (±25.6) after three years and 57.3% (±29.1) after six years (p=0.0017). BMI increased from 27.3 kg/m² (±5.0) at three years to 30.1kg/m² (±6.5) at six years (p=0.0050).

GERD appeared de novo in eight (20%) patients during the first year but disappeared in all but one patient within the same year. After six years, however, 24 percent of the 41 patients complained of significant gastroesophageal reflux and needed proton pump inhibitors for symptom relief.

Patient satisfaction after six-plus years, expressed by the BAROS quality of life index, averaged a score of 5, which is a good result.

DISCUSSION

According to the present study, in an intention-to-treat evaluation, the mean long-term EWL at six-plus years after LSG stays above 50 percent, both for the single LSG and the LSG plus DS group. According to the Reinhold criteria, this constitutes an acceptable result. However, three issues must be weighed against this favorable result: First, since 23 of our 53 patients were either lost to follow-up or needed another procedure for correcting their poor weight loss, the objective failure rate of the LSG in this group was 43.4 percent. However poor, this result should be compared with the long-term numbers after other restrictive bariatric procedures. Second, although the number of patients in our cohort is small, the difference of percent EWL after three and six years appears to be highly significant, at least in the LSG alone group. Dietary changes (Figure 1), possibly linked to the reappearance of Ghrelin secretion outside the stomach, may be the culprit in this
matter. Therefore, and since the number of office visits appears to be linked with the weight loss results of a restrictive procedure, a tighter follow up is likely to improve the outcome, because it provides the occasion to correct dietary flaws appearing with time. However, when patients show weight regain and counseling remains unsuccessful, DS can be salutary (Table 1) and is to be preferred over gastric bypass.

Third, the incidence of GERD is cumbersome. Its evolution clearly shows a biphasic pattern, whereas the first wave of reflux within the first year is probably caused by lack of elasticity and disappears in a majority of patients, its reappearance after more than three years can be linked either to the appearance of a fundic regrowth, which can be evidenced by barium swallow, or to a phenomenon of stasis in the esophagus, which on its turn is caused by over-eating. This overeating might at least partly explain the striking similarity we recorded between the decrease in percent EWL and the appearance of GERD symptoms, occurring between the third and sixth postoperative year (Figure 2). In case of fundic regrowth, re-resection seems to be indicated, as demonstrated by Baltasar. When reflux becomes debilitating and no clear anatomical aberration can be found, the Roux-en-Y gastric bypass is the preferred treatment, as was shown by Crookes.

Remarkably, despite the relatively poor weight loss figures and the high incidence of de novo GERD, patient acceptance remains good, as indicated by the high BAROS score. This finding is in sharp contrast with the results of adjustable band gastroplasty, where late patient acceptance is rather poor, most likely because of the high incidence of late reoperations and loss of the band.

**CONCLUSION**

LSG is a safe restrictive procedure and is well accepted by the patients, despite the fact that the long-term weight loss results show an unfavorable evolution with time. The high incidence of de novo GERD is possibly linked with weight regain and is of major concern.

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A Cross-sectional Analysis of the Effects of Laparoscopic Sleeve Gastrectomy 1, 3, and 5 Years After Surgery

by GLADYS WITT STRAIN, PhD, RD; TAHA SAIF, MD; MICHEL GAGNER, MD, FRCSC, FACS, FASMBS; RICARDO COSTA, BS; MICHEAL ROSSIDIS, BS; GREGORY DAKIN, MD; PAUL CHRISTOS, DPH; and ALFONS POMP, MD

AUTHOR AFFILIATION: Drs. Strain, Saif, Costa, Rossidis, Dakin, Christos, and Pomp are all from Weill Cornell College of Medicine, New York, New York. Dr Gagner is Clinical Professor of Surgery from the Department of Surgery, Herbert Wertheim College of Medicine, Florida International University, Miami, Florida. The authors do not have conflicts of interest relevant to the content of this article.

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KEY POINTS
- Patients with LSG had similar BMIs at Years 1, 3, and 5.
- Excess BMI loss was different at the three yearly time points.
- There were no differences in percentage of body fat at Years 1, 3, and 5.
- HRQoL resembled community norms, although physical health differences in the three groups were significant.
- BDI scores were elevated at Year 5 compared to Year 1.
- Explanations for these findings after LSG require continued investigation.

BACKGROUND
The laparoscopic sleeve gastrectomy (LSG) was originally designed as a first stage to produce an initial weight loss prior to a more complex second stage for high-risk, super obese patients. Over the last 10 years, LSG has evolved with bougie size modifications as a primary bariatric procedure. We evaluated patients who had a LSG at one, three, and five years after surgery who had no revisions after their original procedure.

METHOD
A retrospective chart review was completed. Patients who had LSGs and had not scheduled consultation with their surgeon for 24 months were contacted by phone to schedule a visit. Patients without insurance were offered a no-cost research visit for measurements, blood draw for nutrient status, and form completion, including the Short Form 36 Health Survey (SF36), The Impact of Weight on the Quality of Life-Lite (IWQOL-lite), and Beck Depression Inventory (BDI). Longer-term patients were queried regarding their interest in revision for further weight loss. Using an analysis of variance, we compared patients one, three, and five years after surgery. The Chi-square test was used when two groups of patients were being compared (e.g., Years 1 and 5 or Years 3 and 5).

RESULTS
Seventy-seven patients (35 at Postoperative Year 1, 19 at Year 3, 22 at Year 5) were not significantly different in gender (70.1% female), age (46.7±14.3 years), and body mass index (BMI) at the three time points after surgery (p=0.12). However, when Postoperative Year 1 was compared to Year 3, P=0.04. For excess BMI loss, the groups were different (P=0.04) with Year 3 being different from Year 5 (P=0.01). Comparing the percentage of body fat, no significant differences were found (38.1%, 37%, and 46.3%, respectively). On ANOVA, the BDIs were not different (5.8, 9.1, and 11.1, respectively); however, when Year 1 depressive symptoms were compared to Year 5, more symptoms of depression were reported at year 5 (P=0.05). For the IWQOL-Lite, differences in total scores did not reach significance (P=0.06); however, when Year 1 was compared to Year 5, they were different.
(P=0.027). The domain of public distress was less at Year 1 than Year 5, which had a P value of 0.04. Other domains were not significant. For the SF36, the physical health differences were significant for the three yearly time points (P=0.001 by ANOVA). Year 5 compared to Year 1 had more physical health problems (P=0.001), as did Year 5 compared to Year 3 (P=0.002). The other domains, physical function, social function, general health, vitality, body pain, and physical role, followed a similar pattern with significant ANOVAs and the five-year analysis being different from Years 1 and 3. For mental health and emotional roles, there were no differences in the groups. After surgery and the resultant weight loss, the HRQoL measures were no longer different from community norms. Nutrient status and the evaluation of the sleeve remnants are in progress.

**CONCLUSION**

Patients receiving a LSG had similar BMIs at Year 1, 3, and 5; however, their excess BMI loss was different. There were no significant differences in percentage of body fat at the three yearly time points. After surgery, the HRQoL resembled community norms, although physical health differences in the three groups were significant. BDI scores were significantly elevated at Year 5 compared to Year 1. The trend in negative physical and mental health changes beginning to occur between the groups in Year 3 and 5 should focus research attention on this critical time. As it becomes available, future analysis of longitudinal data may offer more complete explanations for these findings to help activate measures to prevent regression and negative changes as the LSG procedure matures.
Routine Hiatal Hernia Repair to Prevent GERD after Sleeve Gastrectomy

by GREGG H. JOSSART, MD, FACS

KEY POINTS
• Reflux, esophagitis, and hiatal hernias occur in up to 40 percent of the bariatric population.
• Early sleeve gastrectomy data suggest reflux is a problem that can be made worse or evolve over five years in over 30 percent of patients.
• Emerging evidence suggests a combined hiatal hernia repair can cure reflux.
• The best technique for a hiatal hernia repair and sleeve gastrectomy has not been established.

Sleeve gastrectomy (SG) has emerged as an acceptable procedure for almost any bariatric patient. During the open bariatric surgery era, SG was the restrictive component of the duodenal switch (DS). The advent of laparoscopic bariatric surgery facilitated the SG as a first-stage, lower-risk option in high-risk patients. In the last five years, SG has proven to be a reasonable single-stage option for the lower body mass index (BMI) group of patients and for patients with unique contraindications to adjustable gastric banding or intestinal bypass procedures.

Recent reports have documented that up to 40 percent of bariatric patients have existing gastroesophageal reflux disease (GERD), esophagitis, and/or hiatal hernias, and are at risk for an exacerbation of their reflux if it is not addressed at the time of surgery.

The technique of SG has not been well standardized, and controversy exists regarding management of hiatal hernias and reflux. The earliest patients tended to have larger pouches with less disruption of the phrenoesophageal ligament and a larger antrum. As the pouch volume has decreased to improve weight loss, the pouch has become a higher resistance gastric tube, and the lower esophageal sphincter (LES) may be anatomically compromised by the disruption of the phrenoesophageal ligament. Narrowing at the angularis may create a functional obstruction that presents symptomatically with a complaint of reflux. One must also be aware that results are not static—indeed pouch malformations leading to obstruction and reflux can occur over time. Reflux symptoms have been reported to occur over six years in up to 21 percent of patients.

Combining a hiatal hernia repair with a sleeve gastrectomy in those patients who have even minimal hernias may prove to be an essential part of the sleeve gastrectomy technique. Current data are very limited and must be extrapolated from historical techniques. Combining a posterior hiatal hernia repair or a modified Hill procedure does seem to control reflux in limited series to date. An algorithm for evaluating reflux and determining who is a candidate for a combined hiatal hernia repair and SG versus an alternate bariatric procedure has not been established.

Routine Hiatal Hernia Repair to Prevent GERD after Sleeve Gastrectomy

by GREGG H. JOSSART, MD, FACS

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underdiagnosis of a hiatal hernia will lead to a broad range of upper gastrointestinal complaints and pouch malformations in future years. One should expect to repair hernias in approximately 40 percent of patients. One must also consider that reluctance to offer a SG in this setting and to recommend a gastric bypass commits the patient to a lifetime risk of ulcers and intestinal obstructions that they would have been able to avoid with SG. If a sleeve patient does develop reflux at any point in the future, a gastric bypass can always be offered at that point in time.  

The hiatal hernia repair in a SG option is obviously without a fundoplication. Historically, hiatal repairs without fundoplication have been performed by Hill and Alison with acceptable results. The author recommends circumferential dissection to completely reduce the cardia and the distal esophagus into the abdomen. Sutures should be placed posteriorly and anteriorly to avoid anterior hiatal dilation during weight loss. The endoabdominal fascial membrane traversing the anterior hiatus spans a 1 to 3 cm separation of the anterior crural muscles. These must be approximated to avoid recurrence. It is also reasonable to anchor the cardia to the left crus at the point of insertion of the phrenoesophageal ligament, which is always divided during the hiatal dissection. The last technical option that may be extremely important in reducing reflux symptoms related to distal obstruction at the angularis is an omentopexy. The more narrow a sleeve is and with greater antral resection, there is a tendency for the pouch to “coil” or form an intermittent volvulus that presents with a range of symptoms. Suspending the divided edge of the gastrocolic omentum to the staple line may help to reduce or eliminate this problem.

In summary, SG is actually a complex operation, and many technical details need to be considered. Durable weight loss and minimal morbidity will most likely be closely associated with not only pouch size but optimal management of the hiatus.

REFERENCES
Laparoscopic sleeve gastrectomy (LSG) as a stand-alone procedure is becoming an appealing option for the surgical management of morbid obesity. The procedure was originally introduced as the first step in a staged, two-step duodenal switch (DS) procedure designed for high-risk patients. Essentially, a thin, sleeve-like stomach is created that achieves comparable weight loss outcomes and decreased morbidity compared to the standard Roux-en-Y gastric bypass (RYGB) without the inherent risk of nutritional deficiencies. Because the bowel is not manipulated and an anastomosis is not created, LSG may be viewed as a less complex procedure. However, LSG still constitutes major surgery and is not exempt from major complications. Peri- and postoperative bleeding is one such complication, occurring in 1.0 to 1.6 percent of cases and may result in extended hospital stay, morbidity (e.g., transfusion, infection, abscess formation, or reoperation), and mortality. Preventive preoperative and intraoperative strategies and prompt diagnosis and treatment are essential to mitigate the effects of a significant bleeding event.

Although most authors would agree that postoperative bleeding results from technical errors, it is important to consider predisposing factors in any patient undergoing LSG. Bleeding prevention begins with preoperative screening to document the use of any medications that interfere with any step in the coagulation cascade. A detailed medical history should also identify any medical or surgical condition that may result in postoperative bleeding (Table 1).

Apart from patient-specific factors, multiple potential bleeding sources are associated with LSG. Specifically, the surgery is performed in close proximity to several major vessels and organs, including the short gastric vessels, the gastroepiploic artery, omentum, spleen, and liver. Therefore, meticulous dissection of the stomach is essential, and mastering the anatomic landmarks is advantageous as it facilitates the recognition of anatomic variations prone to intraoperative hemorrhage. The authors also recommend using hemoclips while mobilizing the stomach to secure the short gastric vessels or large diameter vessels from the omentum. Finally, preoperative low calorie diets effectively reduce liver size and, therefore, decrease the bleeding risk due to liver fracture during surgical manipulation. In addition to the potential anatomical bleeding sources, the long staple line required to create the gastric sleeve poses a theoretic bleeding risk that has received much attention, and many preventive surgical techniques have been proposed. In December 2010, the International Consensus Summit for Sleeve Gastrectomy, New York, New York, agreed that the staple line should be reinforced by any means to reduce the bleeding risk. To date, several studies have shown the advantages of treating the staple line by oversewing with nonabsorbable sutures.
sutures,\textsuperscript{12,13} applying fibrin sealant,\textsuperscript{14} or incorporating buttressing materials.\textsuperscript{15,16} Several groups have advocated oversewing the bare staple line with a sero-serosal layer to prevent bleeding following LSG.\textsuperscript{13,17} However, the surgeon should be aware that this approach has the potential to significantly reduce the size of the “sleeve” or gastric tube resulting in a postoperative stricture.\textsuperscript{18} Fibrin sealant has also been reported as an effective aid to reduce bleeding and leaks following RYGB,\textsuperscript{14} but specific data documenting reduced bleeding risk following LSG are lacking. Using buttressing material along the staple line has also been shown to reduce the risk of peri- and postoperative bleeding.\textsuperscript{19} Currently, two absorbable polymer membrane products, the Seamguard,\textsuperscript{20} (WL Gore & Associates, Flagstaff, Arizona) and the Duet TRS\textsuperscript{21} (Covidien Autosuture, Mansfield, Massachusetts), and a nonabsorbable bovine pericardium-based product\textsuperscript{15} (Peristrips, Synovis Surgical Innovations, St. Paul, Minnesota) are the methods of choice when used in conjunction with linear cutting devices. Table 2 compares the different strategies available to manage the staple line.

Once the gastrectomy is completed, we do not routinely recommend hyperinsufflation of the sleeve pouch to test the integrity of the staple line. The increased pressure risks disrupting the staples and may cause hemorrhage. Perioperative bleeding during LSG can be detected during the course of the operation, and maintaining a mean blood pressure of no less than 70 mmHg during the perioperative period will likely prompt the surgeon regarding proper homeostasis. However, we discourage the use of hemo-clips to control staple-line bleeding as this technique may impair the proper firing of an endoscopic stapler when attempting to divide the gastric tube during revisional surgery.\textsuperscript{22} In many cases, postoperative bleeding from the staple line may not require any particular intervention but observation alone. However, this may result in a perigastric hematoma that, if infected, will develop a delayed abscess with a potential fistula.

Early postoperative bleeding after LSG is commonly detected within the first 24 to 48 hours. A combination of pneumo-peritoneum and a low mean blood pressure may hide bleeding from small diameter vessels that will become evident when the patient recovers from anesthesia.\textsuperscript{23} The use of drains has proven futile to help diagnose postoperative bleeding following LSG.\textsuperscript{24} Therefore, the patient’s overall clinical status should prompt the surgeon to suspect a bleeding complication. Postoperative

### Table 1. Predisposing conditions that may result in peri- and postoperative bleeding

<table>
<thead>
<tr>
<th>MEDICATIONS</th>
<th><strong>Nonsteroidal anti-inflammatory drugs (NSAID)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clopidogrel (Plavix\textsuperscript{a})</td>
<td>Fondaparinux (Arixtra\textsuperscript{a})</td>
</tr>
<tr>
<td>Warfarin (Coumadin\textsuperscript{a})</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MEDICAL CONDITIONS</th>
<th>Vitamin K deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal failure</td>
<td>Thrombocytopenia</td>
</tr>
<tr>
<td>Inherited platelets disorders</td>
<td>Antibodies to thrombin and factor V following exposure to bovine thrombin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SURGICAL CONDITIONS</th>
<th>Hepatomegaly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splenomegaly</td>
<td></td>
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</tbody>
</table>

| **Previous major surgery that may require adhesiolysis** |  |

### Table 2. Bleeding rate following sleeve gastrectomy

<table>
<thead>
<tr>
<th>Author</th>
<th>N</th>
<th>Staple Line Reinforcement</th>
<th>% of Bleeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textsuperscript{21}Alley et al</td>
<td>85</td>
<td>Duet</td>
<td>2.4%</td>
</tr>
<tr>
<td>\textsuperscript{15}Gandsas et al</td>
<td>292</td>
<td>Bovine pericardium</td>
<td>0.6%</td>
</tr>
<tr>
<td>\textsuperscript{13}Lalor et al</td>
<td>148</td>
<td>Oversewing</td>
<td>0.7%</td>
</tr>
<tr>
<td>\textsuperscript{26}Tagaya et al</td>
<td>30</td>
<td>Oversewing</td>
<td>3.3%</td>
</tr>
<tr>
<td>\textsuperscript{25}Cottan et al</td>
<td>126</td>
<td>None</td>
<td>2.3%</td>
</tr>
<tr>
<td>\textsuperscript{3}Rubin et al</td>
<td>120</td>
<td>Oversewing</td>
<td>0%</td>
</tr>
<tr>
<td>\textsuperscript{3}Himpens et al</td>
<td>80</td>
<td>Oversewing</td>
<td>1.25%</td>
</tr>
</tbody>
</table>
assessments should include the signs of hemorrhage, including tachycardia, hypotension, low urine output, and drop in hemoglobin. Once the diagnosis is entertained, the scope of treatment will depend on the overall clinical assessment, ranging from conservative management (the administration of intravenous fluids and blood products) to surgical re-exploration. Of note, intraluminal hematomas during the early postoperative period can be the source of an outlet obstruction. This is important to diagnose as the source of a mechanical stricture.  

Studies continue to support LSG as a viable and safe surgical option for the long-term weight management of patients with morbid obesity. Meticulous dissection of the stomach and reinforcement of the staple line may yield the best outcomes, reducing bleeding risk. Prospective, randomized trials are needed to identify the staple line reinforcement strategies associated with the most favorable outcomes and minimal complications.

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Single-incision Laparoscopic Sleeve Gastrectomy

by ALAN A. SABER, MD, MS, FACS, FASMBS

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KEY POINTS

- In “expert hands,” SILS sleeve gastrectomy is safe, feasible, and reproducible.
- In the sleeve gastrectomy, a 2.5cm incision would be needed to extract the gastric specimen, making the single-incision approach ideal for this particular procedure.
- In addition to cosmetic advantage, the 2.5cm single intraumbilical incision of SILS sleeve gastrectomy is associated with less postoperative pain and a shorter hospital stay compared with conventional multiport laparoscopic sleeve gastrectomy.

DEVELOPMENT AND EVOLUTION OF SINGLE-INCISION LAPAROSCOPIC SLEEVE GASTRECTOMY

Single-incision laparoscopic sleeve gastrectomy is a novel approach that is gaining popularity. This procedure was first developed by the author in 2008.1 Since then, as a part of our innovation, we have made several technical refinements in our attempt to pave the way toward wider adoption and greater reproducibility and feasibility of the single-incision laparoscopic surgery (SILS) technique. This evolution has led to the procedure as it is today.2,4

Our evolution was gradual with one change made each time. Our publications represent this step-by-step refinement of technique with our goal being to prove safety and feasibility of such a new technique with refinements to make it reproducible. In 2008, we published the first paper in the literature describing SILS sleeve gastrectomy. In this pilot study, we used three trocars through a umbilical incision, rigid instrumentation, and a rigid scope. A Nathanson liver retractor is placed through a separate subxiphoid 5mm incision.1

Next, we reported our progression from rigid instrumentation to flexible instrumentation, flexible tip scope, and transumbilical liver retraction. This eliminated the extrambilical incision, making the procedure a true single-incision laparoscopic sleeve gastrectomy—with no incisions outside the umbilicus.2

This was followed with our early experience using SILS multichannel ports to avoid the clinching of laparoscopic instruments, allowing switching instruments and trocar without compromising the pneumoperitoneum.3 Having demonstrated the feasibility of the SILS approach, we started tailoring this approach to accommodate the more extremely figured patients in the bariatric population.4 This article describes the challenges of doing the SILS sleeve gastrectomy in a specific group of patients—patients with super-super obesity (body mass index [BMI] of 60kg/m² or greater) with central obesity. Through this publication, we were later able to arrive at the nucleus for a strategic algorithm through which the proper single-incision approach could be chosen and tailored to each patient according to his or her body mass index, body habitus, and liver size.

Recently, we published the first study comparing single-incision laparoscopic sleeve gastrectomy and conventional multiport laparoscopic sleeve gastrectomy.5 All procedures were performed by the same surgeon (Saber). All the patients were selected arbitrarily within the 12-month period for either SILS or the multiport approach according to predetermined exclusion criteria, and then based on the availability of flexible instrumentation, flexible tip scope, and multichannel single-access ports in both institutions where the procedures were to be performed. The predetermined exclusion criteria for the SILS group included patients who had undergone previous bariatric surgery, upper abdominal open surgery, or ventral hernia mesh repair.

A statistically significant difference was found between the two groups with regard to the mean postoperative pain scores (mean pain score 4 in SILS group vs. 6.5 in laparoscopic group; P=0.003) and lengths of hospital stay (mean hospital stay 1.7 days in SILS group vs. 2.3 days in laparoscopic group; P=0.022). This translated into a reduced need for opioid analgesia, with 20 percent less used in the SILS group than in the conventional laparoscopic group. A modest increase was seen in the operating room time in the SILS.
abdominal access, while minimizing the torque effect of a thick abdominal wall in a patient with obesity. In contrast, for patients with a much greater BMI, central obesity, large livers, and long umbilicus-subxiphoid distances, we advanced the single incision toward the epigastric area.

**Lost triangulation.** In conventional laparoscopy, trocars directed from multiple points of access would conventionally guide instruments toward the target organ, such that adequate manipulation could be achieved (Figure 1A). However, the single-incision approach involves rigid instruments that either implement a co-axial (Figure 1B) or a “crossing” arrangement (Figure 1C) diverting out from a common point of origin and deviating away from the target organ. The use of flexible instruments restores the triangulation. We have found that combining flexible and rigid instruments has resulted in a more comfortable configuration (Figure 1D, E), increasing maneuverability and the feasibility of advanced surgical procedures using SILS.

**Abdominal wall “torque effect.”** Using the thinnest part of the abdominal wall (i.e., the umbilicus) could minimize this torque effect, providing a wider range of motion for the instruments and trocars in different directions.

**Umbilical recession.** A receded umbilicus could potentially reduce the feasibility of the transumbilical approach in patients with superobesity, favoring the advancement of the trocars toward the subxiphoid.

**Fatty liver retraction.** The high incidence of fatty liver in the bariatric population could potentially obscure the operative field. We have found that instructing all our bariatric patients to consume a low-calorie diet for 2 to 4 weeks before their scheduled surgery causes the liver to shrink, making its retraction more feasible. Intraoperatively, we have developed a technique in which an internal liver system is fashioned through transdiaphragmatic sutures, lifting the fatty liver and achieving adequate retraction. Alternatively, the mobilized portion of the stomach could be used to retract the liver to provide additional exposure of the angle of His, eliminating the need for suture liver retraction.

The intraumbilical location of the incision makes the postoperative scar essentially invisible (Figure 2).

**CONCLUSION**

In expert hands, SILS sleeve gastrectomy is a safe and feasible procedure. Our results have documented that single-incision laparoscopic sleeve gastrectomy is associated with less postoperative pain, a lower requirement for analgesia, and a shorter hospital stay compared with conventional multiport laparoscopic sleeve gastrectomy. The SILS approach resulted in weight loss and comorbidity improvement outcomes similar to those with the conventional multiport counterpart.

**REFERENCES**


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**FIGURE 2.** The intraumbilical location of the incision makes the postoperative scar essentially invisible.
ICSSG-3 Meeting Summary

by MICHEL GAGNER, MD, FRCSC, FACS, FASMBS

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The Third International Consensus Summit on Sleeve Gastrectomy was held in New York, New York, at the Crowne Plaza Hotel in Times Square, December 2 to 4, 2010. This follows two similar meetings: one held in New York in 2007 and one held in Miami Beach in 2009. The meeting had more than 450 delegates and was divided in three days.

During the meeting, we had a record of 15 live surgeries from multiple operating rooms from three continents. It started very well with an opening from our colleagues Cadiere (Belgium) demonstrating a conversion of gastric banding to sleeve, and Dhari (France) and Verhaeghe (France) doing their own technique of sleeve gastrectomy. This was followed by a laparoscopic gastric plication, beautifully executed by Ramos (Brazil) and supported by an endoscopy, performed by Neto (Brazil) and a special bougie with intraoperative pressure monitoring, avoiding too tight suturing. Additions of duodenal switches, performed by Roslin (United States) and Prachand (United States), generated interest as a procedure that could salvage weight regain after SG. Single-port sleeve gastrectomies were shown simultaneously from two operating rooms being performed by Saber (United States) and Teixeira (United States). The procedures were beautifully executed and certainly convinced some participants of the cosmetic benefit of this approach without compromising the sleeve itself. Jacobs (United States) demonstrated a difficult revision—an interesting re-sleeve procedure—and several other surgeons performed sleeves with their techniques and variants using different staplers, mobilization maneuvers, and suturing/reinforcements. The big debate during the live surgery sessions was mainly on how far to start the stapling from the pylorus, with half of the surgeons cutting the antrum literally from 1 to 2cm from the pylorus, using a maximum staple height. Weiner (Germany) was adamant that, based on his own computerized axial tomography (CAT) scan 3D volumetric study and personal experience, if the antrum was not resected, many failures would occur. Subsequently, in the following two days, participants heard more than 80 oral presentations on various subjects touching on this rapidly accepted, new intervention, with multiple debates on controversial issues on the second day.

The first day of sessions began with talks on understanding the mechanisms/physiology and also the rationale, indications, and contraindications of SG. This session was particularly interesting because it began with a presentation by Del Genio (Italy) on how SG does not induce gastroesophageal disease, based on 24-hour pHmetry and manometry/impedance. A frequent belief is that SG induces severe gastroesophageal reflux disease (GERD) due to the intragastric pressure; however, the findings of this study seem to refute this idea and show that food regurgitation seems to occur, which gives the impression of acid reflux. Studies by Verhaeghe (Brazil) on volumetry have shown again that the sleeve does expand over time, and this is responsible for stabilization of weight loss and weight regain over time. Inabnet (United States) demonstrated how SG can induce resolution of diabetes by promoting an increase in beta-cell mass in animal models, which partly explains the effectiveness of SG in patients with type 2 diabetes mellitus (T2DM) and BMIs of 35kg/m² or less shown in a cohort from Rome Italy by Basso (Italy). Lipid profiles are also modified after SG, reinforcing the data on the effectiveness of SG in metabolic syndromes presented by Strain (United States). Significant weight loss and improvements in high-density lipoprotein (HDL) and triglyceride (TG) levels were observed, as well as improvement in total cholesterol (TC)/HDL and TG/HDL ratios; however, total cholesterol and low-density lipoprotein (LDL) levels were unchanged.

After the coffee break, a series of presentations on cohorts of patients with more than five years of data was presented. This has been the major criticism all along—that SG results in a good weight loss in the short term, but long-term results have been unknown. These results have been presented in various ways by Schauer (United States), Prager (Austria), Himpens (Belgium), Weiner (Germany), and Strain (United States). Basically, the five-year data and beyond show a 50-percent excess weight loss (EWL), which is about 20-
percent less than the peak results at two years (70% EWL). The curve seems to parallel the weight regains seen with gastric bypass (and is still better than gastric banding), and was corroborated by the data presented by Lacy (Spain). However, volumetric studies of these patients show a gastric cylinder getting wider and the antrum dilating (when it has been left in place). Much discussion took place about the role of a tight sleeve to prevent this dilatation as much as possible without preserving the antrum. It is likely that the five-year results to come will be much better than those initial data, where most teams were in their learning curves.

The afternoon session was dedicated to complications, and of note this year, increasing reports of mesenteric vein thrombosis; however, this complication has a very low incidence and maybe related to technique or perioperative management. Leaks are treated more rapidly and aggressively nonoperatively with a combination of percutaneous drainage of collection and use of endoluminal stents placed by a combination of gastroscopic and fluoroscopic guidance. Most presenters agreed that these have to be made of nitinol and coated with silicone and more than one is often required. The incidence of these leaks seems to be higher when a smaller bougie is used. Concerning the presence of hiatus hernias, there was a consensus that they should be repaired as much as possible at the time of the SG to avoid an intrathoracic migration with severe reflux. Many surgeons are now routinely searching for these hernias and correcting them simultaneously.

The second day of presentations began with talks on revisions and conversions. A hot topic was the conversion of bands to sleeve, which appears to be a very popular operation in Europe where gastric banding was the primary surgery since the mid 1990s. There was an agreement that this conversion is more difficult than a primary sleeve, and hence should not be started before having a solid experience in primary sleeve; this is because the leak rate is higher, especially where the band capsule is located and where the gastrogastric tunnel has to be opened. Himpens (Belgium) and Iannelli (France) have used the duodenal switch with increasing frequency for weight regain after SG, while others have had less success with re-sleeve, but found it to be an adequate procedure for individuals with BMIs of 50kg/m² or less. It is too soon to know if gastric bypass after sleeve will be an adequate weight loss operation, though it is certainly indicated for severe GERD after sleeve. Santoro (Brazil) has proposed a bipartition (with the addition of a gastroileostomy on the antrum of the sleeve)—an interesting procedure creating a double flow of food with early ileal stimulation. The eight-year results show promising weight loss with minimal nutritional problems.

The afternoon session had enough presentations for two simultaneous rooms. One session was dedicated to sleeve and T2DM, another to a special cohort (with special attention to the elderly and how this operation can be done with <24 hour stay). Other sessions concentrated on new techniques, such as single port and transvaginal access, as well as SGs performed without stapling. Comparisons between SG and gastric bypass were also presented. The conference ended with a summary of the third questionnaire distributed to all participants at the beginning of the meeting, presented by Deitel (Canada) which will be the subject of a separate publication, comparing recent and previous trends.

The conference was extremely well received and we are encouraged to do another one in the Spring of 2012.

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