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Original article

Laparoscopic repeat sleeve gastrectomy versus duodenal switch after isolated sleeve gastrectomy for obesity

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Abstract

Background: Repeat sleeve gastrectomy (re-SG) and the addition of the duodenal switch (DS) are possible options to increase weight loss after isolated SG (ISG). We report the feasibility, safety, and outcomes of laparoscopic re-SG versus DS in patients presenting with insufficient weight loss or weight regain after ISG.
Methods: From November 2003 to December 2009, 7 and 19 patients underwent laparoscopic re-SG and DS, respectively, mainly because of the patients' dietary habits: volume eating (hyperphagia) was treated by re-SG and eating meals too frequently (polyphagia) by DS.
Results: At ISG, the mean weight and BMI was 127.7 ± 31.4 kg, and 45.1 ± 11.8 kg/m^2 for the re-SG group and 119.8 ± 20.9 kg and 41.2 ± 5.5 kg/m^2 for the DS group, respectively. The mean interval between ISG and reoperation was 37.1 ± 20.3 months for the re-SG group and 29.8 ± 24.9 months for the DS group. At reoperation, the mean weight, BMI, and percentage of excess weight loss (%EWL) was 109.7 ± 21 kg, 38.9 ± 8.7 kg/m^2, 24.3 ± 16.6% for the re-SG group and 107.6 ± 19.6 kg, 36.9 ± 4.2 kg/m^2, and 19.5 ± 19.9% for the DS group, respectively. The mean operative time was 137.5 ± 75.5 minutes for the re-SG group and 152.6 ± 54.3 minutes for the DS group. No conversion to open surgery was required, and no mortality occurred. One patient in the re-SG group developed a leak at the angle of His. In the DS group, 1 patient presented with bleeding, 1 patient with a duodenoileostomy leak, and 1 patient with a duodenoileostomy stenosis. The mean hospital stay was 11.5 ± 20.5 days for the re-SG group and 4.7 ± 2.7 days for the DS group. The mean follow-up was 23.2 ± 11.1 months for the re-SG group and 24.9 ± 20.1 months for the DS group. The mean weight, BMI, and %EWL was 100 ± 21.1 kg, 35.3 ± 8.3 kg/m^2, 43.7 ± 24.9% for the re-SG group and 80.7 ± 22.5 kg, 27.3 ± 5.2 kg/m^2, 73.7 ± 27.7% for the DS group, respectively. During follow-up, 3 patients in the DS group required corrective surgery for late complications.
Conclusion: The results of the present study have shown that laparoscopic re-SG is feasible but carries the risk of fistula development, which is difficult to treat. Laparoscopic DS was also shown to be feasible at a cost of not negligible complications, which are easier to manage than with re-SG. The efficacy seemed greater after DS than after re-SG. (Surg Obes Relat Dis 2011;7:38–44.)

Keywords: Sleeve gastrectomy; Insufficient weight loss; Weight regain; Repeat sleeve; Duodenal switch

Morbid obesity can be treated by different procedures, currently usually performed with a laparoscopic approach. Since the first description of sleeve gastrectomy (SG) as an isolated procedure [1] or as a part of a duodenal switch (DS) procedure [2,3], laparoscopic SG has been introduced as one of the procedures for the treatment of obesity. Owing to the 2 International Consensus Summits for SG, held in 2007 [4] and 2009 [5], this procedure has been recognized as an established bariatric procedure [6] and is rapidly becoming accepted as a common procedure for morbid obesity.

As with other procedures, isolated SG (ISG) can result in various postoperative complications, such as leak [7,8], stricture [9], new-onset gastroesophageal reflux disease (GERD) [10], insufficient weight loss, and weight regain [11]. The early results of the efficacy of SG have shown a percent-

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age of excess weight loss (%EWL) of 64.7 ± 12.9% at 2 years and 48.5 ± 8.7% after the first 4 years [5].

The problem of insufficient weight loss and weight regain after bariatric surgery has also been an issue after ISG, just as with adjustable gastric banding and Roux-en-Y gastric bypass (RYGB). Multidisciplinary counseling is indicated for patients presenting with insufficient weight loss to determine the contributive factors. The psychologist must evaluate the patient for the presence of mental disorders as binge eating disorder (BED), the nutritionist for possible new dietary behavior (including volume eating to grazing), the gastroenterologist for the appearance of GERD, and, finally, the radiologist for possible gastric dilation of the ISG. The treatment will depend on the findings of the different evaluations.

The present retrospective study was done to determine the feasibility, safety, and outcomes of laparoscopic repeat SG (re-SG) versus DS in patients presenting with insufficient weight loss or weight regain after ISG.

Methods

From November 2003 to December 2009, 7 patients (3 women and 4 men) underwent laparoscopic re-SG and 19 patients (16 women and 3 men) underwent DS after ISG. Their mean age was 44 ± 11.7 years (range 30–61) in the re-SG group and 47.2 ± 9.2 years (range 29–60) in the DS group. All 26 patients had undergone ISG, using a 34F orogastric bougie.

The indication for revision in our treatment strategy was mainly determined by the patients' new dietary habits: volume eating (hyperphagia) was treated by re-SG and eating meals too frequently (polyphagia) by DS. In both groups, psychological disorders had been ruled out. Evident ISG dilation and de novo GERD had also been ruled out, the former using a barium swallow test and the latter by gastroscopy.

Because of the retrospective nature of the present study, the statistical analysis should only be considered descriptive because the treatment groups were not comparable and the sample size of the 2 groups was small. Our co-primary endpoint was the %EWL, calculated from the initial weight before ISG, and the ideal weight set at a BMI of 22 kg/m^2. We have reported the distributions of continuous variables using the observed mean and standard deviation. For categorical variables, we calculated the frequencies of the categories of interest. Thus, we did not attempt to determine statistical inferences.

Surgical Technique

The procedure was started with the insertion in the abdomen of the first 12-mm trocar using the Hasson technique in the left upper quadrant mid-clavicular line. Additional trocars (4 for re-SG and 5 for DS) were placed under direct view, usually at the same position as for the original ISG.

Repeat SG

Re-SG started with complete adhesiolysis using the Ligasure device (Covidien, New Haven, CT). The greater omentum was freed from the abdominal wall, and the left liver lobe was dissected off the gastric sleeve until the entire stomach was freed from the antrum up to the left crus. The stomach tube was freed from the greater omentum along the previous staple line. The anatomy of the stomach was checked using insufflation of compressed air. To repeat the stapling of the SG, the anesthesiologist inserted a 34F orogastric bougie to reach the pylorus, and different applications of linear stapler green loads (Covidien) were fired (Fig. 1). Resorbable serosal-serosal running sutures were used to oversew the staple line, and the leak test was performed. The specimen was extracted from the abdomen by enlarging the 12-mm left upper quadrant trocar incision, which was later closed in layers. A drain was left in place along the staple line. No nasogastric tube was left in place. A methylene blue test was performed on the first postoperative day. If the test findings were negative, the patient started a liquid diet on the second postoperative day. The patient was discharged from the hospital on the fifth postoperative day, with the dietary restrictions of a strict pureed diet.

DS

For the DS, no effort was made to dissect the stomach itself, and the procedure was started with cholecystectomy. The first duodenum was encircled, just lateral to the gastroduodenal artery, and sectioned with a linear stapler blue load. The right colon was widely freed to provide more slack to the distal ileum because of the duodenoileostomy. The common and alimentary limbs were fashioned, measuring 100 and 150 cm, respectively. Precise measurements were obtained by stretching the bowel along a 25-cm tape.

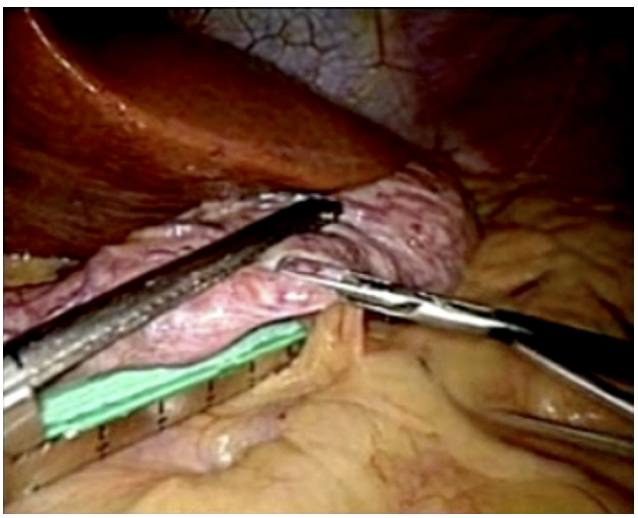

Fig. 1. Re-SG, firing of linear stapler (green load) along 34F orogastric bougie.

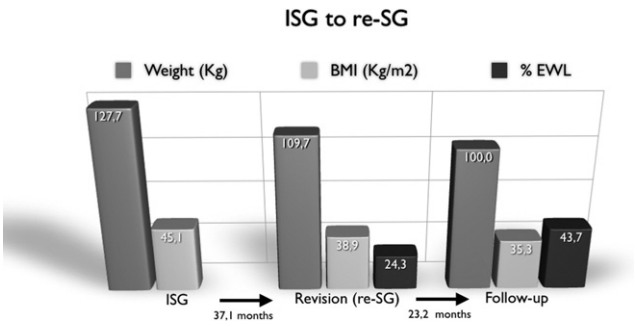

Fig. 2. ISG to re-SG: comparison of weight, BMI, and %EWL at ISG, at revision to re-SG, and during follow-up.

A semimechanical side-to-side ileoileostomy was performed between the alimentary and biliopancreatic limbs, with a final section of the alimentary loop close to this anastomosis. The alimentary limb was advanced in the direction of the sectioned duodenum. The duodenoileostomy was performed with manual running sutures in 1-layer of absorbable material. The mesenteric defect and Petersen's defect were closed with nonabsorbable sutures, and the leak test was performed. The gallbladder was extracted by enlarging the 12-mm left upper quadrant trocar incision, which was subsequently closed in layers. A drain was left in place near the duodenoileostomy. No nasogastric tube was left in place. A methylene blue test was performed on the first postoperative day. If the test findings were negative, the patient was allowed to start a liquid diet on the second postoperative day. Typically, the patient was discharged from the hospital on the fifth postoperative day, with no particular dietary restrictions.

Results

At ISG, the mean weight and BMI was 127.7 ± 31.4 kg (range 95–183), and 45.1 ± 11.8 kg/m^2 (range 32.9–68.9) for the re-SG group and 119.8 ± 20.9 kg (range 84–160) and 41.2 ± 5.5 kg/m^2 (range 30–49.7) for the DS group, respectively. At ISG, obesity-related co-morbidities affected 4 patients in the re-SG group, including arterial hypertension in 4 and sleep apnea in 1. Obesity-related co-morbidities affected 5 patients in the DS group, including type 2 diabetes in 3, arterial hypertension in 3, and sleep apnea in 1. The mean interval between ISG and reoperation was 37.1 ± 20.3 months (range 9–53) for the re-SG group and 29.8 ± 24.9 months (range 4–84) for the DS group.

At revision, the mean weight, BMI, and %EWL was 109.7 ± 21 kg (range 88–146), 38.9 ± 8.7 kg/m^2 (range 30.4–55), and 24.3 ± 16.6% (range 3.6–56.9) for the re-SG group and 107.6 ± 19.6 kg (range 83–136), 36.9 ± 4.2 kg/m^2 (range 30.4–45.9), and 19.5 ± 19.9% (range −32.4–50) for the DS group, respectively. Obesity-related co-morbidities affected 3 patients in the re-SG group (all arterial hypertension) and 4 patients in the DS group, including type 2 diabetes in 3, arterial hypertension in 2, and sleep apnea in 1.

The mean operative time was 137.5 ± 75.5 minutes (range 45–270) for the re-SG group and 152.6 ± 54.3 minutes (range 90–270) for the DS group. All the patients in the DS group underwent cholecystectomy. No conversions to open surgery were required, and no mortality occurred. In the re-SG group, 1 patient developed a leak at the angle of His (14.2%). In the DS group, 3 patients presented with early complications (15.7%): abdominal bleeding in 1, duodenoileostomy leak in 1, and duodenoileostomy stenosis in 1.

The mean hospital stay was 11.5 ± 20.5 days (range 3–58) for the re-SG group and 4.7 ± 2.7 days (range 3–14) for the DS group, respectively.

All patients were followed-up with office visits, with exception of 2 patients in the re-SG group who refused follow-up. The mean follow-up was 23.2 ± 11.1 months (range 13–38) for the re-SG group and 24.9 ± 20.1 months (range 1–59) for the DS group. The mean weight, BMI, and %EWL was 100 ± 21.1 kg (range 74–132), 35.3 ± 8.3 kg/m^2 (range 27.8–49.7), and 43.7 ± 24.9% (range 3.1–69.6) for the re-SG group, respectively (Fig. 2). The mean weight, BMI, and %EWL was 80.7 ± 22.5 kg (range 37–120), 27.3 ± 5.2 kg/m^2 (range 15.4–35.1), and 73.7 ± 27.7% (range 32.7–140) for the DS group, respectively (Fig. 3). Obesity-related co-morbidities had resolved in 1 patient (33.3%) in the re-SG group and in 3 patients (75%) in the DS group, including type 2 diabetes in 2, arterial hypertension in 2, and sleep apnea in 1. During the follow-up period, 3 patients in the DS group (18.7%) required surgery for late complications, including hypoproteinemia and diarrhea in 2 and a trocar-site ventral hernia in 1. The first 2 patients were hospitalized at 16 and 17 months postoperatively, and treatment consisted of placement of a feeding jejunostomy tube. Together with adequate pharmacologic therapy after discharge, this approach was successful. The third patient underwent laparoscopic surgery for ventral hernia repair 7 months after the revision, without complications.

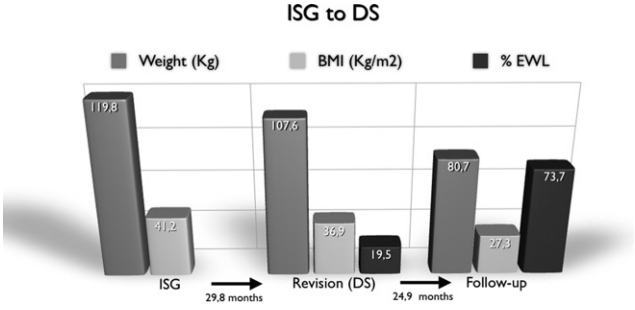

Fig. 3. ISG to DS: comparison of weight, BMI, and %EWL at ISG, at revision to DS, and during follow-up.

Discussion

One of the greatest challenges of bariatric surgery is insufficient weight loss or weight regain, testifying to the failure of the chosen procedure. The reason for the failure must be thoroughly investigated. Because bariatric surgery candidates are at an increased risk of psychological difficulties, evidence has been growing that psychological issues play an essential role [12–14]. New dietary habits and patient adaptation to the new anatomic circuit are other frequent causes of insufficient weight loss and weight regain. Some investigators have advocated that failed ISG should be treated with RYGB [15,16]. However, in our department, RYGB has not been the treatment of choice as the corrective procedure for ISG, because, our experience with the latter treatment has shown the weight loss to be deceiving, with bloating a frequent and disturbing side effect. Therefore, we only perform RYGB after ISG in patients who complain of medication-resistant GERD. Only in the case of unsuccessful results with a proton pump inhibitor, together with poor weight loss, has conversion to RYGB been performed. Crookes [17] recently reported on 11 patients (100%) who had undergone RYGB and were able to discontinue use of the proton pump inhibitor after conversion. In contrast, 3 (42.8%) of 7 patients who had undergone DS were still dependent on the proton pump inhibitor after the revision [17]. Similarly, Langer et al. [18] reported a profound and immediate relief of reflux symptoms in 3 patients who had undergone ISG, with subsequent conversion to RYGB.

However, when GERD is not present, psychological disorders, such as BED must be ruled out. Changes in BED have been correlated with changes in body weight, independent of the reported dietary intake and physical activity [19]. Because additional volume restriction might jeopardize the patient's psychological balance, the performance of a malabsorptive procedure (in our practice, DS) appears to be the only viable surgical option.

In the absence of GERD and BED, changes in eating behavior should be evaluated. These changes are likely to have occurred at any point in the years after ISG. In the patients in the present series, our multidisciplinary obesity counseling focused on new alimentary habits (i.e., hyperphagia and polyphagia). Hyperphagia means volume eating (basically eating volumes that are too large) and polyphagia means eating meals too frequently. Alimentary behavior plays a significant role in the decision making for the primary procedure [20,21]. It is also our conviction that knowledge of this behavior is essential in the choice of the reoperative procedure. In the case of hyperphagia linked with a gastric volume issue, we have offered patients re-SG or another option is the placement of an adjustable gastric band [22]. If volume eating is not an issue, a new restrictive procedure would seem less appropriate, and a new approach is preferable. In addition to restriction, malabsorption is a proven effective method for achieving weight loss. It is for professionals such as nutritionists and bariatric dieticians, who are acquainted with the subject, to detect the subtle differences between the 2 eating behavior patterns (volume and frequency).

The radiologist's evaluation in the multidisciplinary evaluation for insufficient weight loss or weight regain after ISG should focus on possible gastric dilation. When dilation is present, re-SG again would appear to be the logical option. Baltasar et al. [11], in 2006, first reported on 2 patients who had undergone re-SG for dilation of ISG, with subsequent increased successive weight loss. In our series, we did not find an evident preoperative dilation of the ISG on barium swallow testing; however, during surgical exploration, we did find sufficient space to place the linear staple next to the orogastric bougie. After placement of the orogastric bougie, in some patients, excessive redundancy was still found toward the antrum and, in some patients, in the upper part of the stomach tube. Thus, the barium swallow test does not seem completely appropriate to evaluate the status after ISG. The orogastric bougie used was the same for the primary and revisional procedure (34F).

Our operative times were similar for re-SG and DS. This unexpected finding resulted because the addition of DS, in contrast to ISG, does not demand the time-consuming freeing of the ISG from adhesions. In the case of re-SG, the gastric tube must be completely freed and checked well before stapling. Moreover, because we usually oversewed the staple line during re-SG, to both decrease operative bleeding and avoid postoperative leak development, the resulting operative time was quite similar to that for DS.

In the present selected series of obese patients, we recorded 1 early gastric leak in the re-SG group. This complication has also been reported after ISG, with or without DS [23,24]. Logically, during ISG revisions, the risk factor would be greater and even more difficult to treat. This was demonstrated by our patient who required treatment for 58 days and >1 endoscopic stent placement. Recent data have shown that more conservative treatment of leak provides better results than reoperation, with no mortality overall [25]. Furthermore, it appears that very early placement of a covered metallic stent will substantially reduce the hospital length of stay, because patients are fed directly into the gut rather than intravenously, improving morbidity and allowing earlier hospital discharge without the need for an intravenous line [26].

In the DS group, 1 patient presented with bleeding from the greater omentum. This complication after ISG has been previously reported, with an incidence of 1.0–1.6% [27]. Treatment should be laparoscopic lavage and drainage, such as for our patient, or blood transfusions, in the case of the hemodynamically stable patient.

Two other patients presented with a complication at the duodenoileostomy. One developed a leak and one, stenosis. The incidence of leak at the duodenoileostomy has been

reported to be 1.5–1.7% after a 1-stage primary procedure [28,29] and 33.3% after revisional procedures [30]. Conservative treatment can be attempted if the drain is well in place. In our patient, drainage appeared insufficient, and the patient was returned to the operating room for laparoscopic lavage and drainage. The complication of stenosis has previously been reported in 4 of 27 patients who had undergone second-stage DS [31]. Treatment should be endoscopic dilation, such as in our patient, who successfully benefited from a single endoscopic dilation at 1 month after the revision.

During follow-up, we recorded greater weight loss after the DS procedure than after re-SG, with an achieved %EWL of 73.7%, similar to that reported after primary DS during the same follow-up period [29]. This obviously resulted from the addition of malabsorption, although sometimes at the cost of hypoproteinemia and diarrhea, which was experienced by 2 of our patients. Another patient in the DS group developed an occlusion owing to a trocar site ventral hernia. Although this is a nonspecific postlaparoscopic complication, in bariatric patients, this can become a critical issue because bowel resection of some length, especially if it involves the alimentary or common loop [32], can have morbid consequences.

In terms of the obesity-related co-morbidities, for our patients who had undergone ISG, we achieved resolution in 1 patient in both groups before revision. After revision, more patients in the DS group than in the re-SG group had resolution of their co-morbidities, probably because of the greater weight loss achieved with DS.

Conclusion

The results of the present study have shown that laparoscopic re-SG is feasible but carries the risk of fistula development, which is difficult to treat. Laparoscopic DS was also shown to be feasible but at the cost of not negligible complications, which are easier to manage than with re-SG. The efficacy appeared greater after DS than after re-SG.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

References

[1] Johnston D, Dachtler J, Sue-Ling HM, King RF, Martin G. The Magenstrasse and Mill operation for morbid obesity. Obes Surg 2003;13:10–6.

[2] Marceau P, Hould FS, Simard S, et al. Biliopancreatic diversion with duodenal switch. World J Surg 1998;22:947–54.

[3] Hess DS, Hess DW. Biliopancreatic diversion with a duodenal switch. Obes Surg 1998;8:267–82.

[4] Deitel M, Crosby RD, Gagner M. The First International Consensus Summit for Sleeve Gastrectomy (SG), New York City, October 25–27, 2007. Obes Surg 2008;18:487–96.

[5] Gagner M, Deitel M, Kalberer TL, Erickson AL, Crosby RD. The Second International Consensus Summit for Sleeve Gastrectomy, March 19–21, 2009. Surg Obes Relat Dis 2009;5:476–85.

[6] Clinical Issues Committee of the ASMBS. Updated position statement on sleeve gastrectomy as a bariatric procedure. Surg Obes Relat Dis 2010;6:1–5.

[7] Burgos AM, Braghetto I, Csendes A, et al. Gastric leak after laparoscopic sleeve gastrectomy for obesity. Obes Surg 2009;19:1672–7.

[8] Dapri G, Cadière GB, Himpens J. Reinforcing the staple line during laparoscopic sleeve gastrectomy: prospective randomized clinical study comparing three different techniques. Obes Surg 2010;20:462–7.

[9] Dapri G, Cadière GB, Himpens J. Laparoscopic seromyotomy for long stenosis after sleeve gastrectomy with or without duodenal switch. Obes Surg 2009;19:495–9.

[10] Keidar A, Appelbaum L, Schweiger C, Elazary R, Baltasar A. Dilated upper sleeve can be associated with severe postoperative gastroesophageal dysmotility and reflux. Obes Surg 2010;20:140–7.

[11] Baltasar A, Serra C, Perez N, Bou R, Bengochea M. Re-sleeve gastrectomy. Obes Surg 2006;16:1535–8.

[12] Sarwer DB, Wadden TA, Fabricatore AN. Psychological and behavioral aspects of bariatric surgery. Obes Res 2005;13:639–48.

[13] Hsu LKG, Benotti PN, Dwyer J, et al. Nonsurgical factors that influence the outcome of bariatric surgery. Psychosom Med 1998;60:338–46.

[14] Sholtz S, Bidlake L, Morgan J, et al. Long-term outcomes following laparoscopic adjustable gastric banding: postoperative psychological sequelae predict outcome at 5 year follow-up. Obes Surg 2007;17:1220–5.

[15] Cottam D, Qureshi FG, Mattar SG, et al. Laparoscopic sleeve gastrectomy as an initial weight-loss procedure for high-risk patients with morbid obesity. Surg Endosc 2006;20:859–63.

[16] Han SM, Kim WW, Oh JH. Results of laparoscopic sleeve gastrectomy (LSG) at 1 year in morbidly obese Korean patients. Obes Surg 2005;15:1469–75.

[17] Crookes PF. Management of severe reflux after sleeve gastrectomy (abstract). Presented at the Second International Consensus Summit for Sleeve Gastrectomy, Miami Beach (FL), March 19–21, 2009.

[18] Langer FB, Bohdjalian A, Shakeri-Leidenmuhler S, Schoppmann SF, Zacherl J, Prager G. Conversion from sleeve gastrectomy to Roux-en-Y gastric bypass—indications and outcome. Obes Surg 2010;20:835–40.

[19] Sherwood NE, Jeffery RW, Wing RR. Binge status as a predictor of weight loss treatment outcome. Int J Obes 1999;23:485–93.

[20] Busetto L, Segato G, De Marchi F, et al. Outcome predictors in morbidly obese recipients of an adjustable gastric band. Obes Surg 2002;12:83–92.

[21] Chevallier JM, Paita M, Rodde-Dunet MH, et al. Predictive factors of outcome after gastric banding: a nationwide survey on the role of center activity and patients' behavior. Ann Surg 2007;246:1034–9.

[22] Greenstein AJ, Vine AJ, Jacob PP. Video: when sleeve gastrectomy fails: adding a laparoscopic adjustable gastric band to increase restriction. Surg Endosc 2009;23:884.

[23] Stroh C, Birk D, Flade-Kuthe R, et al. Results of sleeve gastrectomy-data from a nationwide survey on bariatric surgery in Germany. Obes Surg 2009;19:632–40.

[24] Chen B, Kiriakopoulos A, Tsakayannis D, Wachtel MS, Linos D, Frezza EE. Reinforcement does not necessarily reduce the rate of staple line leaks after sleeve gastrectomy: a review of the literature and clinical experiences. Obes Surg 2009;19:166–72.

[25] Casella G, Soricelli E, Rizzello M, et al. Nonsurgical treatment of staple line leaks after laparoscopic sleeve gastrectomy. Obes Surg 2009;19:821–6.

[26] Kotzampassi K, Kolios G, Manousou P, et al. Oxidative stress due to anesthesia and surgical trauma: importance of early enteral nutrition. Mol Nutr Food Res 2009,53:770–9.
[27] Brethauer SA, Hammel JP, Schauer PR. Systematic review of sleeve gastrectomy as staging and primary bariatric procedure. Surg Obes Relat Dis 2009;5:469–75.
[28] Marceau P, Biron S, Hould FS, et al. Duodenal switch: long-term results. Obes Surg 2007;17:1421–30.
[29] Hess DS, Hess DW, Oakley RS. The biliopancreatic diversion with the duodenal switch: results beyond 10 years. Obes Surg 2005;15: 408–416.
[30] Dapri G, Cadière GB, Himpens J. Laparoscopic conversion of adjustable gastric banding and vertical banded gastroplasty to duodenal switch. Surg Obes Relat Dis 2009;5:678–83.
[31] Silecchia G, Rizzello M, Casella G, Fioriti M, Soricelli E, Basso N. Two-stage laparoscopic biliopancreatic diversion with duodenal switch as treatment if high-risk super-obese patients: analysis of complications. Surg Endosc 2009;23:1032–7.
[32] Mitchell MT, Carabetta JM, Shah RN, O'Riordan MA, Gasparaitis AE, Alverdy JC. Duodenal switch gastric bypass surgery for morbid obesity: imaging of postsurgical anatomy and postoperative gastrointestinal complications. AJR Am J Roentgenol 2009;6:1576–80.

Editorial comment

Comment on: Laparoscopic repeat sleeve gastrectomy versus duodenal switch after isolated sleeve gastrectomy for obesity

The authors are to be commended for providing valuable information on reoperative sleeve gastrectomy (SG). They have had substantial experience in the field of SG and biliopancreatic diversion/duodenal switch (BPD/DS) for many years. To date, very little information has been available regarding repeat SG versus adding the DS for inadequate weight loss, mostly as case reports [1–3]. Although these redo-SG procedures have led to additional weight loss, several patients have still required the addition of BPD/DS. SG has gained immense popularity during recent years, mostly because it is a less complex procedure than Roux-en-Y gastric bypass and BPD/DS, from which it was derived. It has now been endorsed as a valid component of the surgical armamentarium.

Although several recent reports [4,5] have brought promising weight loss results, long-term data as a stand-alone procedure to treat severe obesity are still limited. Typically, SG can lead to a 66–77% excess weight loss (EWL) at 3 years [5,6]. However, it is still difficult to establish the rate of poor weight loss results, in part because of patients lost to follow-up. In another of their recent contributions, the authors reported 11 of 53 patients who required an additional malabsorptive procedure within 6 years of SG [6]. This is within range of long-term weight loss failure after Roux-en-Y gastric bypass [7].

Debate is ongoing in bariatric surgery about the causes of weight regain after weight loss procedures in general and SG in particular. Generally, dilation of the gastric pouch/tube has been associated with poor weight loss or weight regain. The authors reported such dilation in the group of patients who failed to lose enough weight and were candidates for reoperative SG. The picture of the redo SG is really self-explanatory, because enough gastric tissue is present to divide the gastric tube in half over a 34F bougie, even though the initial SG was already fashioned over a bougie of that size. Most probably, although it was not mentioned, the same enlargement process would have affected the group of patients who were candidates for second-stage BPD/DS. Not surprisingly, digestive tract enlargement has been observed after bariatric surgery. Whether this might represent a major factor of failure is still unclear, because in the present study, all the patients undergoing revision had had some kind of recurrent or persistent eating behavior disorder. Of note, in every case, gastric dilation has been ruled out by preoperative barium swallow testing.

In addition to pure food intake restriction, many factors have been potentially associated with the weight loss mechanism in SG, including modified ghrelin, leptin and peptide YY serum levels [4,8,9]. The levels of these factors might not be related to the size of the bougie (i.e., of the gastric tube) and might explain why several studies have reported satisfactory weight loss (EWL $\geq$50%) with bougie sizes of $\leq$48F, even in large groups of nonsuperobese patients [10,11]. Although some studies have reported significantly better 2-year weight loss with a 32F bougie compared with no calibration at all [3], no evidence has been reported to confirm the superiority of this smaller bougie size against a 40F or even larger bougie [12]. The rationale of reoperative SG is, therefore, far from established according to the results of the present study. Only a limited increase in weight loss could be achieved, with an endpoint EWL of $<$50%, although the authors based their calculations on a body mass index of 22 kg/m^2. In contrast, the patients who had undergone second-stage BPD/DS after SG achieved a 73% EWL without additional gastric resection, a percentage well in accordance with a single- or 2-stage BPD/DS procedure [13]. Because the patients were selected according to different eating behavior patterns, it would probably be very difficult to compare these groups. In addition, one could wonder whether such a precise distinction between hyperphagia and polyphagia is really meaningful, because eating disorders are so integral to obesity, in general, and poor weight loss after bariatric surgery, in particular.

Another difference between the 2 group was the initial body mass index, with a maximum of 68.9 kg/m^2 in the repeat SG group and no super obese patient in the initial SG to