

Laparoscopic Seromyotomy for Long Stenosis After Sleeve Gastrectomy with or Without Duodenal Switch

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Abstract

Background Sleeve gastrectomy (SG) can be performed either as isolated (ISG), or with the malabsorptive procedure of duodenal switch (SG/DS). Among the postoperative complications, stenosis of the SG is relatively rare and only scarcely mentioned in literature. We report our experience in nine patients presenting a long stenosis, not eligible for endoscopic balloon dilation, and treated by laparoscopic seromyotomy after ISG or SG/DS.

Methods From March 2006 to January 2008, four patients after ISG (0.7%) and five patients after SG/DS (0.8%) were consecutively submitted to laparoscopic seromyotomy for long stenosis, not eligible for endoscopic balloon dilation. Dysphagia appeared after a mean time of 9.2 ± 2.6 months (ISG) and of 18.6 ± 13.2 months (SG/DS). Preoperative mean dysphagia frequency was 4 ± 0 (ISG) and 4 ± 0 (SG/DS). Gastroesophageal reflux disease (GERD) symptoms appeared as de novo in two patients of both groups. Barium swallow showed a stenosis at the upper part of the SG (2) and at the level of the incisura angularis (7). Gastroscopy evidenced a mean length of the stricture of 4.7 ± 0.9 cm (ISG) and of 5.2 ± 1.3 cm (SG/DS). The primary outcomes measure was stricture healing rate. Secondary outcomes measures included procedure time, perioperative, and postoperative complications, performance of barium swallow check, and GERD symptoms improvement.

Results There were no conversions to open surgery and no mortality. There was no perioperative gastric perforation, but one patient was converted into Roux-en-Y gastric bypass (ISG). Mean operative time was 153.7 ± 39.4 min (ISG) and 110 ± 6.1 min (SG/DS). One gastric leak was recorded postoperatively (ISG). Mean hospital stay was 7.6 ± 5.8 days (ISG) and 3.4 ± 0.8 days (SG/DS). Barium swallow check after 1 month was satisfied in all patients, and they were able to tolerate a regular diet. After a mean follow-up of 21 ± 5.6 months (ISG), the mean dysphagia score was reduced to 0.6 ± 0.9 , and after a mean follow-up of 17.6 ± 10.5 months (SG/DS) to 0.8 ± 0.8 . De novo GERD symptoms improved in two patients of both groups.

Conclusion Laparoscopic seromyotomy after SG for long stenosis is feasible, and efficient for the treatment of symptomatic dysphagia. It has a beneficiary influence on de novo GERD symptoms improvement. There is, however, the risk of postoperative leak.

Keywords Stenosis · Myotomy · Sleeve gastrectomy · Duodenal switch · Endoscopic dilation

Introduction

Sleeve gastrectomy (SG) or longitudinal vertical gastrectomy, usually performed by laparoscopy, recently gained popularity as a feasible technique for morbid obesity [1]. This procedure can be performed either as a isolated (ISG), inspired by the Magenstrasse–Mill operation (“street of the stomach”) [2] or it can represent the restrictive portion of the malabsorptive procedure of duodenal switch (SG/DS) [3, 4].

In an attempt to reduce morbidity and mortality, and facilitating the laparoscopic approach, SG was recommen-

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ded as a first step of a staged procedure in the super super-obese patients or in those with high operative risk because of excessive comorbidities [5–9]. The more definitive procedure of DS or Roux-en-Y gastric bypass was deferred to allow an initial weight loss [10, 11].

Inadequate weight loss or absence of improvement or resolution of obesity related comorbidities are common complications after all bariatric surgery. Specific possible complications for SG are: persistence of a postoperative gastric fistula [12–15], weight regain [16–18], dilation of the SG [19], appearance of gastroesophageal reflux disease (GERD) [20], and, in our experience, appearance of dysphagia due to a stricture along the vertical SG.

Stenosis both after ISG or SG/DS is only scarcely mentioned as postoperative complication [5, 6, 15, 21, 22], reported with an incidence between 0.7% and 4%. Traditionally, the treatment of stenosis of the gastrointestinal tract is endoscopic balloon dilation [23]. This option is, however, not suitable in some cases because of the length of the stenosis; hence, a technique similar to Heller cardiomyotomy [24] for the treatment of this condition has been adopted.

We report our experience in nine patients presenting a long stenosis, not eligible for endoscopic balloon dilation, and treated by laparoscopic seromyotomy after ISG or SG/DS.

Material and Method

From March 2006 to January 2008, nine consecutive patients were submitted to laparoscopic seromyotomy for long stenosis after ISG or SG/DS not suitable for endoscopic balloon dilation because of excessive length of the stricture. Four of them (two females, two males) had benefited from ISG (0.7%) and the remaining five (four females, one male) from SG/DS (0.8%). Mean age at the time of seromyotomy was 45.2 ± 13.4 years (ISG) and 51.4 ± 4 years (SG/DS). Mean weight, BMI, and %EBMIL at the time of seromyotomy were 113.5 ± 23.6 kg, 36 ± 6.2 kg/m², and $50.7 \pm 6.8\%$, respectively (ISG), and 76.8 ± 17.2 kg, 26.6 ± 7.3 kg/m², and $79.6 \pm 29.3\%$, respectively (SG/DS). A preoperative evaluation included for each patient a history and clinical examination, assessment of dysphagia frequency by a five-point questionnaire administered to all patients (0 = “no symptoms”, 1 = “once per month”, 2 = “once per week”, 3 = “daily”, 4 = “multiple times per day”), performance of barium swallow to evaluate the anatomy of the previous ISG or SG/DS, and performance of gastroscopy with estimation of stenosis length. The patients in this series mentioned the appearance of dysphagia after a mean time of 9.2 ± 2.6 months (ISG) and of 18.6 ± 13.2 months (SG/DS). Mean dysphagia frequency assessed preoperatively was 4 ± 0 (ISG) and 4 ± 0 (SG/DS). Symp-

tomatic GERD appeared as de novo before the seromyotomy in two patients of both groups. Barium swallow showed a stenosis at the upper part of the SG in two patients (patients with a previous gastric banding removed at the time of the SG) and at the level of the incisura angularis in the remaining seven (Fig. 1). Preoperative gastroscopy evidenced a mean length of the stricture of 4.7 ± 0.9 cm (ISG) and of 5.2 ± 1.3 cm (SG/DS).

The primary outcomes measure was stricture healing rate, defined by the improvement of the dysphagia score, and ability to tolerate a regular diet after seromyotomy. Secondary outcomes measures included procedure time, peroperative, and postoperative complications, barium swallow 1 month after the procedure, estimation of GERD symptoms improvement.

Statistical analysis was mainly descriptive; observed distributions are reported using summary parameters: mean and standard deviation for each variable analyzed (all variables being continuous).

Surgical Technique

Abdominal insufflation was set at 15 mm Hg. After the placement of five abdominal trocars, adhesiolysis between the left liver lobe and the stomach was performed, and the gastric tube was freed from the greater omentum. The level of the SG stricture was identified by insufflation of the stomach with pressurized air. The seromyotomy was performed with the coagulating hook, from 1 cm proximal to the stenosis going caudad, extending the incision for at least 1 cm beyond the

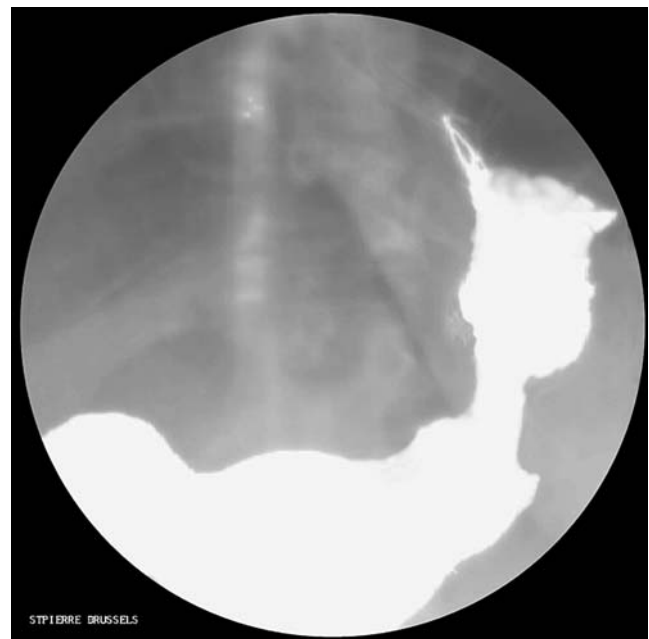


Fig. 1 Preoperative barium swallow: stricture of the SG at the incisura angularis

stenosis. The magnified vision of the laparoscope allowed for safe layer by layer transection of the gastric wall down to the mucosal tissue, including a careful division of the muscular fibers. A leak test with air insufflation down the tube under saline solution, at the end of the procedure, confirmed the absence of gastric mucosa perforation (Fig. 2). The myotomy was covered by an omentoplasty performed with interrupted resorbable sutures. A drain was left in the abdominal cavity along the SG.

Results

There were no conversions to open surgery and no mortality. There was no perioperative gastric perforation, but one patient of ISG group was converted into Roux-en-Y gastric bypass because of SG asymmetry diagnosed by air insufflation at the conclusion of the seromyotomy. Mean operative time was 153.7 ± 39.4 min (ISG) and 110 ± 6.1 min (SG/DS).

Postoperatively, one gastric leak was recorded in the ISG group. Treatment consisted in the placement of an endoscopic stent, which resulted in complete fistula healing at 4 weeks.

Mean hospital stay was 7.6 ± 5.8 days (ISG) and 3.4 ± 0.8 days (SG/DS).

One month after the procedure, all patients performed a barium swallow check that appeared satisfied (Fig. 3), and they were able to pass from a liquid to a regular diet.

After a mean follow-up of 21 ± 5.6 months (ISG), the mean dysphagia score was reduced to 0.6 ± 0.9 and after a mean follow-up of 17.6 ± 10.5 months (SG/DS) to 0.8 ± 0.8 . De novo GERD symptoms improved in two patients of both groups. The mean weight loss, BMI, and %EBMIL was 97.3 ± 3.77 kg, 31.1 ± 0.1 kg/m², and $64.6 \pm 5.6\%$,

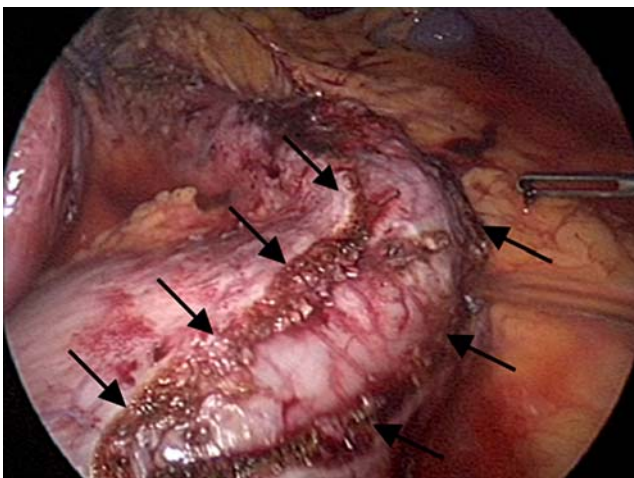


Fig. 2 Final view of laparoscopic seromyotomy



Fig. 3 Postoperative barium swallow: resolution of the stricture

respectively, (ISG) and 73.6 ± 16.4 kg, 26.2 ± 6.6 kg/m², and $80.6 \pm 27.1\%$, respectively (SG/DS).

Discussion

One of the possible complications after ISG or SG/DS is dysphagia accompanied by vomiting and de novo GERD symptoms. Appearance of a mechanical stricture in the gastric tube can be the main contributing cause.

Stricture after SG can be related to the use of a bougie inside the stomach during stapling. It is mandatory to push down and to maintain the bougie beyond the gastric angulus in order to avoid an excessive narrowing at that spot, which will cause dysphagia and vomiting. With the bougie straightening the stomach, the linear stapler can be applied without angulations, which helps a truly linear stapling. Moreover, the bougie size, which is decisive in achieving maximal restriction and, therefore, optimal weight loss [25] is another possible element contributing to a smaller diameter of the SG, which renders any narrowing critical. The size of bougie we used for ISG and SG/DS is 34 Fr.

Another possible cause of stenosis is oversewing the staple line at the time of SG. This is essentially done to reduce the risk of hemorrhage [26]. In our experience and in others' [5, 15, 21], oversewing the gastric tube could be the main cause of stenosis by creating asymmetry of the SG. All of our nine patients, staple line had been oversewn, and the material used was non-resorbable suture (e.g.,

polypropylene). In addition, the delay of appearance of functional stenosis could be explained by ischemia induced by an overly tight-running suture [27].

Treatment of the stenosis depends on the length of the stricture, and a diagnostic barium swallow is routinely followed by gastroscopy with appropriate measurement. Short strictures can be treated by endoscopic balloon dilation in single or multiple sessions [28, 29]. Unfortunately, when stenosis is long, this approach remains merely useless; hence, a different treatment should be attempted for symptom improvement.

Seromyotomy is a difficult procedure but, as our study confirms, it does resolve the problem of symptomatic dysphagia and appearance of de novo GERD symptoms. During this procedure, dissection is performed by hook electrocautery. This instrument has already been reported to be safe, inexpensive, and effective for myotomy in the treatment of esophageal achalasia [30]. Moreover, it allows a meticulous dissection of the successive muscular layers of the stomach, with very short electrical bursts near the submucosa area. Usually, bleeding encountered during dissection can be controlled by applying pressure with a closed blunt grasper. The goal is to achieve a myotomy 1 cm beyond the stenosis both proximally and distally.

If gastric perforation occurs, it should be identified peroperatively and treated accordingly by interrupted intracorporeal absorbable sutures and omentoplasty. Management of postoperative leak is more difficult [13], as demonstrated in one of our patients who experienced a gastric fistula on first postoperative day. Treatment of this condition is firstly the placement of endoscopic stent [31], if needed with successive prosthesis replacements until complete fistula healing [13]. In unsuccessful cases, an intestinal Roux can be placed as a “patch” [14], but in some occasions, total gastrectomy will be the only cure [15].

The efficacy of the treatment should be assessed by peroperative insufflation of air in the stomach. The edges of the myotomized region should easily open up with air insufflation at the end of the procedure [32]. Symmetry of the SG, that means the gastric tube should be cylindrical and not presenting an hourglass deformation, must be checked by peroperative insufflation as well. If the gastric tube appears grossly asymmetrical at the conclusion of the myotomy, conversion into another bariatric procedure should be undertaken, as resulted in one of our patients.

In conclusion, laparoscopic seromyotomy after SG for long stenosis is feasible. It appears to improve dysphagia and is beneficial for de novo GERD symptoms improvement. Because of the risk of postoperative leak, longer series must be awaited before we can include gastric seromyotomy in the armamentarium of the bariatric surgeon.

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