



VIDEO SUBMISSION

# Treating Severe GERD and Obesity with a Sleeve Gastrectomy with Cardioplication and a Transit Bipartition

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## Abstract

**Introduction** Epidemiological data have demonstrated that obesity is an important risk factor for the development of gastroesophageal reflux disease (GERD). The proportion of subjects with GERD symptoms can be as high as 50% for BMI > 30. Although still controversial in the literature, there are several studies associating sleeve gastrectomy (SG) with an increase in GERD prevalence. The current video shows the technique of a SG with cardioplication associated with transit bipartition (TB) for the treatment of an obese patient with severe GERD.

**Case Report and Management** A 46-year-old male presented with obesity and GERD symptoms for several years. His BMI was 37.8 kg/m<sup>2</sup> with mainly central obesity and several obesity-related comorbidities, including hypertension, dyslipidemia, severe insulin resistance, and obstructive sleep apnea. After a diagnostic evaluation, the patient was submitted to a sleeve gastrectomy with a transit bipartition. He presented satisfactory weight loss, reaching a BMI of 26 and remission of all comorbidities and complete remission of GERD symptoms. The current follow-up period is 2.5 years and the patient did not present any weight regain or return of the GERD symptoms.

**Conclusion** We presented a surgical alternative that is effective in both weight loss and remission of GERD. SG + TB is a potent intervention for metabolic syndrome and obesity. Furthermore, this alternative is capable of treating both obesity and GERD, in a simple way, avoiding mechanical restriction and the significant malabsorption related to excluded segments.

**Keywords** Morbidity obesity · GERD · Bariatric surgery · Sleeve gastrectomy · Transit bipartition

## Introduction

Obesity is an important risk factor for the development of gastroesophageal reflux disease (GERD) [1]. The proportion of subjects with GERD symptoms can be as high as 50% for BMI > 30 [2]. Several physiologic abnormalities link these two disorders, as hypotensive lower esophageal sphincter (LES) pressure [3], higher frequency of transient relaxations of the lower esophageal sphincter (TRLES) [4], higher prevalence of hiatal hernia [5], and an increased intra-abdominal pressure [6].

Although still controversial in the literature, there are studies associating sleeve gastrectomy (SG) with an increase in GERD prevalence. The hypotension of the LES after the disruption of the sling fibers [7] and the increased gastric pressure [8] after the SG are some of the proposed mechanisms for increased GERD after SG.

In 2007, we published the first experiences with SG and anti-reflux gastroesophageal plications [9, 10]. The current video shows the technique of a SG with cardioplication associated with transit bipartition (TB) [11] for the treatment of an obese patient with severe GERD.

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## Case Report and Management

A 46-year-old male presented with obesity and GERD symptoms for several years. His main complaints were heartburn after eating and regurgitation of food when lying down after a meal. His BMI was 37.8 kg/m<sup>2</sup> with mainly central obesity and several obesity-related comorbidities, including

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hypertension, dyslipidemia, severe insulin resistance, and obstructive sleep apnea. He was in chronic use of PPI, with a positive but not complete response.

Although his upper endoscopy did not reveal signs of esophagitis, he had a contrast radiography of the upper gastrointestinal tract with massive reflux reaching the upper part of the esophagus and an esophageal manometry with a hypotension of the LES (peak resting pressure = 4.25 mmHg). As the patient had typical GERD symptoms with positive response to PPI and a contrast radiography with unequivocal signs of GERD, a pHmetry was not realized.

Due to bad results in his family, the patient completely refused a Roux-en-Y gastric bypass. Indeed, he came to us searching for an anti-reflux sleeve gastrectomy [10].

The patient was submitted to surgery in November of 2015. In summary, this technique starts with the removal of the fat pads around the distal esophagus, a hiato-plasty, and a partial plication of the very proximal cardia over the very distal esophagus, which does not involve much of the fundus, that allows the sleeve gastrectomy. Then, SG is performed starting at the gastric greater curvature at a point located 5 cm from the pylorus, with a 32-French intragastric bougie and sparing the cardioplication. After the SG, we select a point in the ileum 260 cm away from the ileocecal valve and create a 3-cm-wide latero-lateral gastroileal anastomosis. Finally, we interrupt the proximal gut and reconstruct the transit with a latero-latero anastomosis between the proximal gut and the ileum 50 cm away from the gastroileal anastomosis, in a Roux-en-Y mode to avoid the return of the chime to the gastric remnant [11].

He presented satisfactory weight loss, reaching a BMI of 26 and remission of all comorbidities and complete remission of GERD symptoms 2 years after the surgery. A new evaluation with tests was performed. The upper endoscopy showed no sign of GERD. The upper gastrointestinal series showed a complete remission of the massive reflux preprocedure. Interestingly, the esophageal manometry still revealed a hypotensive LES (peak resting pressure = 4 mmHg), however with an elevated pressure zone below the sphincter.

The current follow-up period is 2.5 years and the patient did not present any weight regain or return of the GERD symptoms.

## Conclusion

We presented a possible surgical option for patients presenting obesity and GERD. SG + TB [11] with the technical aspects described previously [10] is a potent intervention for metabolic syndrome and obesity. This proposal aims to modulate the intestinal neuroendocrine response by shifting food from the proximal gut toward the distal gut, without exclusion, avoiding mechanical restriction and malabsorption. The TB enhances SG results [11] as it enables the prompt nutritive

ileal stimulation as it occurs in a biliopancreatic diversion (BPD). However, the absence of complete exclusion of the proximal bowel allows endoscopic access, prevents bacterial proliferation, and minimizes nutritional problems.

SG + TB was originally designed to be functionally restrictive. The concept of a functional restriction means a metabolically driven reduction in the rate of gastric emptying and intestinal transit, rather than a physical restriction. Altogether, this rationale supports the concept of a primarily metabolic surgery [12]. In a prospective study with 1020 patients, the SG + TB presents an EBMI of  $74\% \pm 22.5\%$  in the fifth year of follow-up and 86% of complete remission of diabetes [11]. In a recent randomized controlled trial comparing SG + TB with standard medical therapy in the mildly obese with severe diabetes, the surgical procedure achieves 90% diabetes remission with 2 years of follow-up [13]. Other studies also showed good SG + TB results regarding weight loss and diabetes remission [14, 15].

In relation to GERD, some technical aspects are noteworthy. First, the cardioplication prevents the disruption of the sling fibers and creates a high-pressure zone in the gastroesophageal transition that helps to prevent the gastroesophageal reflux. Second, the gastroileal anastomosis creates a new route of exit from the stomach without a regulating sphincter. We believe that these new route relieves the high intragastric pressure imposed by the SG, although we do not have objective functional studies to state this. Third, TB generates potent weight loss, similar to BPDs, which is positive in terms of treating GERD. Finally, the SG removes most of the gastric fundus that is the source of TLESR, the main element in the genesis of GERD [4], and this may help to ameliorate the GERD, although there is no evidence relating the gastric fundus removal and a lower rate of TLESR.

In conclusion, this alternative was capable of treating both obesity and GERD, in a simple way, avoiding mechanical restriction and the significant malabsorption related to exclude segments.

**Author Contribution** Authors SS, CGA, and FCM were responsible for conception and design, and also performed drafting and critical revision of the manuscript.

All authors contributed to and have approved the final manuscript. All authors take public responsibility for its content.

## Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

**Conflict of Interest** The authors declare that they have no conflict of interest.

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## References

- Jacobson BC, Somers SC, Fuchs CS, et al. Body-mass index and symptoms of gastroesophageal reflux in women. *N Engl J Med*. 2006;354(22):2340–8.
- El-Serag HB, Graham DY, Satia JA, et al. Obesity is an independent risk factor for GERD symptoms and erosive esophagitis. *Am J Gastroenterol*. 2005;100(6):1243–50.
- Kouklakis G, Moschos J, Kountouras J, et al. Relationship between obesity and gastroesophageal reflux disease as recorded by 3-hour esophageal pH monitoring. *Rom J Gastroenterol*. 2005;14(2):117–21.
- Wu JC, Mui LM, Cheung CM, et al. Obesity is associated with increased transient lower esophageal sphincter relaxation. *Gastroenterology*. 2007;132(3):883–9.
- Suter M, Dorta G, Giusti V, et al. Gastro-esophageal reflux and esophageal motility disorders in morbidly obese patients. *Obes Surg*. 2004;14(7):959–66.
- Lambert DM, Marceau S, Forse RA. Intra-abdominal pressure in the morbidly obese. *Obes Surg*. 2005;15(9):1225–32.
- Braghetto I, Lanzarini E, Korn O, et al. Manometric changes of the lower esophageal sphincter after sleeve gastrectomy in obese patients. *Obes Surg*. 2010;20(3):357–62.
- Yehoshua RT, Eidelman LA, Stein M, et al. Laparoscopic sleeve gastrectomy—volume and pressure assessment. *Obes Surg*. 2008;18(9):1083–8.
- Santoro S. Technical aspects in sleeve gastrectomies. *Obes Surg*. 2007;17(11):1534–5.
- Santoro S, Lacombe A, Aquino CGA, et al. Sleeve gastrectomy with anti-reflux procedures. *Einstein*. 2014;12(3):287–94.
- Santoro S, Castro LC, Velhote MC, et al. Sleeve gastrectomy with transit bipartition: a potent intervention for metabolic syndrome and obesity. *Ann Surg*. 2012 Jul;256(1):104–10.
- Santoro S. From bariatric to pure metabolic surgery: new concepts on the rise. *Ann Surg*. 2015;262:79–80.
- Azevedo FR, Santoro S, Correa-Giannella ML, et al. A prospective randomized controlled trial of the metabolic effects of sleeve gastrectomy with transit bipartition. *Obes Surg*. 2018 Oct;28(10):3012–9.
- Yormaz S, Yilmaz H, Ece I, et al. Laparoscopic ileal interposition with diverted sleeve gastrectomy versus laparoscopic transit bipartition with sleeve gastrectomy for better glycemic outcomes in T2DM patients. *Obes Surg*. 2018 Jan;28(1):77–86.
- Bilecik T. Metabolic effects of sleeve gastrectomy with transit bipartition in obese females with type 2 diabetes mellitus: results after 1-year follow-up. *Obes Surg*. 2018 Nov 17;