

Laparoscopic proximal sleeve gastrectomy as an alternative for management of giant hiatal hernias

Abstract

Background and aim: Large anatomic defects of the diaphragmatic hiatus known as giant hiatal hernias could be associated with reflux esophagitis disease (GERD) and other life-threatening complications such as gastric volvulus, ischemia and perforation, thus surgical repair is warranted. Although usually the key steps to surgical repair are reduction of the herniated stomach, complete excision of the sac, hiatus repair, and an antireflux procedure, surgery in these cases is associated with a great rate of anatomic and functional failure, therefore different techniques have been described since the original description of Collis gastroplasty designed to lengthen the short esophagus.

Methods: We report here the technique and results performing proximal vertical gastrectomy or proximal sleeve gastrectomy (PSG) as an alternative in cases in which the possibility of recurrence of the hiatal hernia (HH) is high.

Results: After years of follow-up after surgery, all the case patients presented here are free of gastroesophageal reflux or dysphagia symptoms, with no necessity for acid suppression medication, and no side effects of the surgery.

Conclusion: The treatment of giant HH is a complex and challenging disorder to treat. PSG seems to be a good surgical alternative for the treatment of some special cases of giant HH minimizing the GERD symptoms and possible recurrences.

Keywords: giant hiatal hernia, laparoscopic, hiatal plasty, sleeve gastrectomy, gastroesophageal reflux

Volume 15 Issue 1 - 2024

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Received: February 12, 2024 | **Published:** February 21, 2024

Introduction

Large anatomic defects of the diaphragmatic hiatus known as giant hiatal hernias could be associated with reflux esophagitis disease (GERD) and other life-threatening complications such as gastric volvulus, ischemia and perforation, which warrant surgical repair, but recurrence is very high as reported with a wide range between 12 to 65%.¹ Although the key steps to surgical repair are reduction of the herniated stomach, excision of the sac, hiatus repair and an antireflux procedure, surgery in these cases is associated with a high rate of anatomic and functional failure.² Prediction factors for recurrence such as large hernia size, a big hiatal defect, short esophagus or weak diaphragmatic crura need an experienced surgeon to evaluate each case and tailor the adequate procedure.^{3,4} Therefore, different techniques have been described since the original description of Collis's gastroplasty designed to lengthen the short esophagus.⁵ We report here the technique and results of performing proximal vertical gastrectomy or proximal sleeve gastrectomy (PSG) as an alternative in cases in which the possibility of recurrence of the hiatal hernia (HH) is high.

Methods and patients

Surgical technique

The laparoscopic procedure was similar in all these patients. Pneumoperitoneum was performed with the Veress needle, and two 10mm and three 5mm trocars were used. The diaphragmatic crura were dissected using a harmonic scalpel to reduce and excise the mediastinal hernia sac completely and reduce the herniated stomach. Starting from the gastroesophageal junction, the esophagus is mobilized circumferentially as high as possible in the mediastinum. The omentum was released and ligated from the greater curvature in the

middle gastric body with the harmonic device, continuing proximally to the esophagus, dividing the short gastric vessels, cleaning the fat pad to expose the angle of His, and dividing the gastro-splenic and gastro-phrenic ligaments. The crura were approximated with nonabsorbable polyester 2-0 sutures (Ethibond®; J&J) posteriorly and anteriorly as needed. In the case in which previous fundoplication had failed, as in the cases described in this series, it was dismantled to free the gastric fundus and body. When mesh was considered necessary to reinforce the hiatus, a Proceed® (15x15cm) Surgical Mesh (Ethicon J&J) was prepared forming a square sufficiently large to exceed approximately three cm. at each side of the esophageal hiatus. The corners of the square were rounded, and a vertical opening was made in the center to make a keyhole approximately 2 cm. in diameter for the passage of the esophagus or stomach. The prosthesis was fixed with sutures on the crura, to avoid direct contact with the viscera.³ A 36-French bougie was passed down the esophagus close to the lesser curve of the stomach. Starting at the middle of the gastric body, three 60mm blue or green load cartridges of the Endo GIA Reticulator stapler[□] (Covidien) were used to divide the greater curve down toward the angle of His parallel to the bougie, avoiding strictures and ensuring a straight line. A burying running suture was then placed with 2-0 Stratafix® (Ethicon J&J), creating a gastric tube 8 to 10 cm in length.

Case I

A 73-year-old male patient with a history of laparoscopic bilateral inguinal hernia repair twenty years before, and laparoscopic antireflux surgery 18 years before. Eleven years later he presented episodes of belching, heartburn, and continuous fermented food smell which were progressive. Endoscopy at that time revealed a large paraesophageal hiatal hernia which was treated with proton pump inhibitors, prokinetic medication, and dietary restrictions. His symptoms progressed until he was almost unable to eat, and came to

the clinic due to intense continuous postprandial substernal pain and dysphagia. An endoscopy and an upper gastrointestinal (GI) series were performed, which showed a giant HH with a complete thoracic gastric volvulus. He underwent a laparoscopic procedure, performing hiatal repair with mesh placement and a Nissen fundoplication, which corrected the symptoms. Five months later, he presented again an acute intense substernal pain, significant upper abdominal distention, profuse salivation, and severe dysphagia. The upper GI series revealed a giant recurrent HH and a mesenteroaxial gastric (Figure 1) volvulus with complete obstruction to distal pass of contrast media. Due to his medical history, evident weakness of the hiatal tissues, and the possibility of a new recurrence, it was discussed with the patient to perform a PSG of the gastric body and fundus to lengthen the esophagus, which was accepted by the patient and his family. By laparoscopy, the herniated gastric volvulus (Figure 2) was reduced and a PSG was performed leaving the hiatus open (Figure 3). The mesh was left in situ as it was completely epithelized. His postoperative recovery was adequate, the postoperative upper GI series showed adequate transit of the contrast medium (Figure 4). Two years after this surgery he is well, does not report any symptoms related to reflux or dysphagia, doesn't take any medications, his diet is normal and he carries out his daily activities normally.

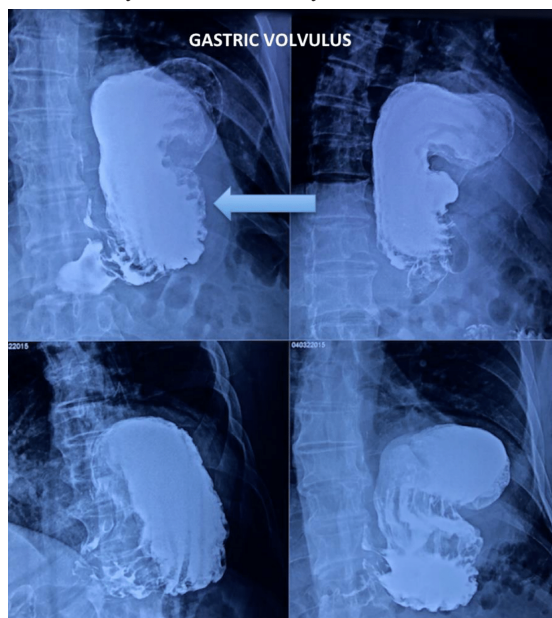


Figure 1 Upper GI series revealed a giant hiatal hernia with mesenteroaxial gastric volvulus recurrence.

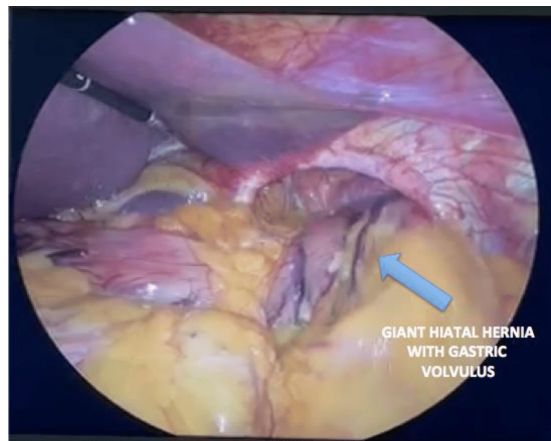


Figure 2 Giant hiatal hernia with gastric volvulus.

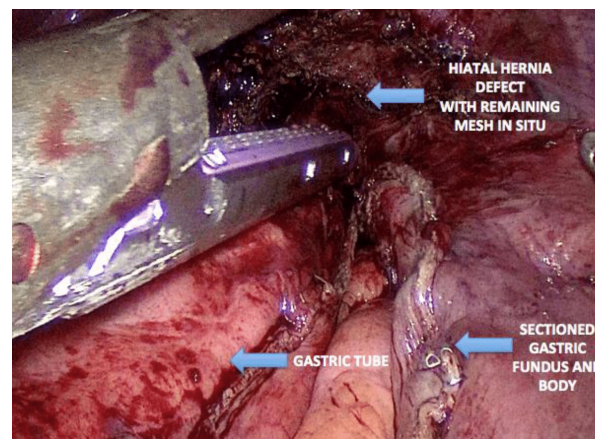


Figure 3 Constructing the proximal sleeve gastrectomy with open hiatus.



Figure 4 postop upper GI series with adequate transit through the proximal sleeve gastrectomy.

Case 2

A 55-year-old male patient with a history of duodenal ulcer, pulmonary thromboembolism due to thrombophilic condition after knee surgery, gastric band surgery for morbid obesity which was removed due to dysfunction, and laparoscopic cholecystectomy ten years before his consult with us, came to the clinic due to heartburn and progressive reflux, nocturnal aspiration and persistent vomiting that did not improve with medical treatment. The endoscopy reported a giant HH with an ulcerated esophagus. The upper GI series showed a dilated esophagus confirming the presence of a giant HH in addition to gastroparesis crura were found (Figure 5). Due to the findings and the possibility of recurrence, reconstruction of the hiatus with mesh and a PSG was performed as described before. His recovery was uneventful, six years after surgery he is out of any acid-suppressing medication and has not reported any symptoms related to reflux or HH.

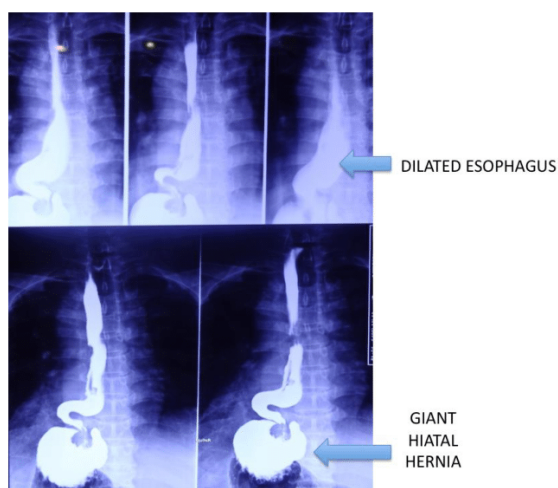


Figure 5 Upper GI series with dilated esophagus and presence of a giant hiatal hernia.

Case 3

A 61-year-old female three years before consultation with us, reported GERD and subsequently severe progressive dysphagia that did not improve with medication. Endoscopy showed giant HH and reflux esophagitis. Upper GI series showed sigmoid esophagus and giant hiatal hernia with gastroparesis (Figure 6). Due to the large size of the HH, it was decided to repair the hiatus with mesh and perform a PSG as described. The patient had an adequate postoperative course and was able to adequately tolerate the oral route. Five years after surgery, she is currently carrying out his daily activities and eating properly without GERD symptoms.

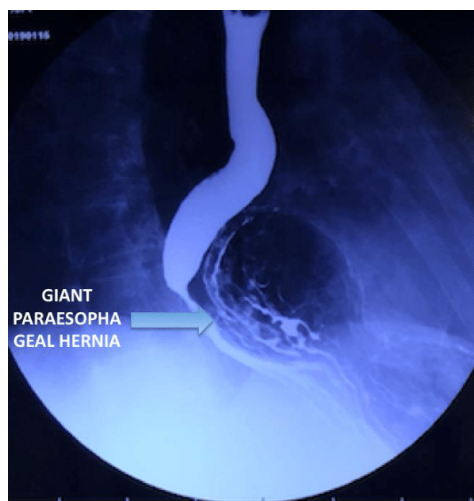


Figure 6 Upper GI series with sigmoid esophagus obstructed by the paraesophageal giant hiatal hernia.

Case 4

A 48-year-old female with a history of previous fundoplication for GERD presented to the emergency room due to lipothymia, severe thoracic pain, bloody stools, and a descent of 5g/dl of her hemoglobin levels. An upper GI series showed a giant recurrent HH with a mesenteroaxial gastric volvulus. She was taken to the operating room where an initial endoscopy was performed for gastric tube placement and decompression. After laparoscopic de-volvulation the gastric

fundus was found to be ischemic and severely congested. The previous fundoplication was dismantled, a new hiatal plasty was performed and a PSG was tailored as described earlier. The patient had an uneventful recovery and has been five years without recurrence or symptoms.

Discussion

Only 5 to 10 percent of HH are classified as giant. Although there is no uniform agreement to define them, some consider giant hernia if 30% or more of the stomach is contained in the thoracic hernial sac, usually with a large paraesophageal component. Others define it as such if during surgery the hiatal defect is wider than 8cm. It may have a primary or secondary shortened esophagus, but today most surgeons doubt its real existence, therefore treatment of HH associated with a short esophagus is still a matter of controversy.⁶⁻⁹ The symptoms are usually chronic, associated with GERD, heartburn, chest pain, lack of gastric emptying, early satiety, and dysphagia as one of the most common complaints, but in the case of gastric volvulus, they may have an acute and life-threatening condition if ischemia or necrosis develop as the fourth case presented here. Therefore, surgical repair is recommended, but recurrence is very high as reported with a wide range between 12 to 65%.¹

Many recurrence risk prediction factors have been described, mainly hernia size, a big hiatal defect, or weak diaphragmatic crura. Still, surgeon's experience in evaluating these particular cases is of paramount importance.³ The main components of the technique include hernia reduction, complete dissection, and excision of the hernia sac, esophageal mobilization, crural approximation, fundoplication in selected cases, or the use of prosthetic mesh to reinforce the hiatal crura, although there is no consensus about this matter. But the fact is that management of these complex cases of HH should be treated by a team capable of planning and modify the surgical technique according to each case, including the findings during surgery, tailoring the best possible surgical procedure to correct the problem and avoid recurrences.¹⁰⁻¹³ Sixty years ago, John L. Collis proposed a gastropasty through a thoracoabdominal incision creating a gastric tube segment along the lesser curvature to lengthen the foreshortened esophagus. These complicated cases caused by severe reflux esophagitis, were frequently associated with HH. Collis designed this technique for cases when esophageal mobilization was inadequate to satisfactorily reduce the gastroesophageal junction below the crural repair without tension. Since its introduction in 1957, many modifications were published.¹⁴ Cameron accumulated experience with the technique in pediatric patients with excellent results, adding the Nissen-type antireflux mechanism.¹⁵

Later, the operation was generally carried out through a trans-thoracic approach. Subdiaphragmatic exposure was obtained if needed by a peripheral circumferential opening of the diaphragm. The Ann Arbor group reported good results with the Collis-Nissen procedure comparable with the Toronto Collis-Belsey series.^{16,17} Twenty years later, Demos et al. modified Collis surgery gastropasty simplifying the procedure.^{18,19} Since the development of minimally invasive surgery, currently, the standard of care for symptomatic HH is laparoscopy.^{20,21} The first minimally invasive Collis gastropasty was described in 1993 using a combination of a right-sided thoracoscopic gastropasty with a laparoscopic fundoplication.²² Afterward, a totally abdominal minimally invasive approach was performed using an endoscopic circular stapler to create a gastric window below the angle of His for the insertion of a linear cutting stapler to create the neo-esophagus.²³ Later with the articulated staplers, the technique was simplified making it possible to create a stapled wedge gastropasty cutting the gastric fundus and making a complete or partial fundoplication wrap around

the tube.^{24,25} It is known that both HH repair in giant hernias and redo antireflux surgery may lead to vagal nerve damage and deteriorating the physiologic function of the stomach in 8–10 % of patients causing delayed gastric emptying (DGE), eventually requiring gastrectomy in a subset of patients as a remedial operation.^{26–30}

Although the presence of a giant HH can make radiographic gastric emptying studies difficult to interpret, in three of the cases presented here, gastroparesis was diagnosed by the upper GI series. Gastroparesis worsens the problem of HH and adds a negative impact on the patient's outcome. Adjustments for the surgical repair plan have to be taken into account for adequate results. According to the severity of the patient's symptoms, recently, Robertson et al. reported subtotal gastrectomy with Roux-en-Y reconstruction as an effective salvage option for selected patients with failed fundoplication and delayed gastric emptying.⁴ Bakhos et al.³¹ also proposed a gastrectomy and Roux-en-Y anastomosis for the management of paraesophageal hernias with GERD in the morbidly obese patient. A less aggressive option given that no standard technique exists, Le Page and Martin reported partial sleeve gastrectomy and anterior fundoplication to target the DGE and HH. Others have also reported good results with primary SG and hiatal repair improving GERD symptoms.^{32,33} Likewise, Davies et al. reported the positive effect of combining laparoscopic longitudinal partial gastrectomy and paraesophageal hernia repair suggesting that it is a safe, and feasible approach to the management of large or recurrent paraesophageal hernia in well-selected obese and morbidly obese patients. SG results regarding weight loss and associated co-morbidities are well known and its advantages have been reported considering it to be an effective and safe surgery. It is less technically demanding than other bariatric procedures with relatively low morbidity and thus, has become the most common bariatric surgical procedure in recent years.³⁴ But there are concerns about the development of de novo GERD or worsening the preexisting reflux after this bariatric surgery. SG may improve or aggravate existing GERD. Currently, there is no consensus on the effects of SG in lower esophageal function, on the mechanisms responsible for the outcome of preexisting GERD, or the development of de novo GERD.

The rationale for our strategy in the series presented here to perform a PSG besides HH repair when possible as an alternative in cases of giant HH relies on the surgical experience derived from the Collis technique to lengthen the esophagus constructing a gastric tube from the upper stomach avoiding hernia recurrence. Additionally, resection of the gastric fundus is supposed to be responsible for GERD symptoms to reduce acid secretion and add a benefit to patients with GERD. Furthermore, as stated by Melissas and others, any regurgitation due to stasis of the bolus into the residual fundus is also eliminated with SG.³⁵ Usually the main complaint in these patients with giant HH is dysphagia due to mechanical obstruction caused by the herniated stomach and not the typical GERD symptoms. As the bariatric effect in these patients isn't necessary, the gastric tube doesn't need to be long so, the patients don't feel any restriction or difficulties in passing regular food. SG has been associated with complications including leaks, abscesses, and fistulas, so we always reinforce the staple line with a running suture. Obstruction is unlikely because the vertical gastrectomy is constructed over a boogie and not close to the incisura angularis. A thorough assessment of preoperative symptoms is important as an initial screening for the causes of the patient's reflux. In these cases of giant HH, dysphagia is one of the main complaints and therefore an important outcome to evaluate of this procedure as in the cases presented. This report has the limitations of a case-series report with few cases, and although all the patient's

symptoms subsided, and the clinical follow-up has been for two to six years, we don't have radiological or endoscopic control to determine if there was hernia recurrence accurately. Considering that there is no standard surgical procedure for these complicated cases, the clinical results over the years in this small series suggest that in selected cases this approach could be beneficial, but the risk needs to be balanced against the potential benefits.

Conclusion

The treatment of giant HH is a complex and challenging disorder to treat. Proximal sleeve gastrectomy seems to be a good surgical alternative for the treatment in some special cases of giant HH, reducing GERD symptoms and possible recurrences. Further studies should be conducted to confirm our findings, and additional research is required to define the optimal approach to repair these giant HH and allow definitive conclusions.

Acknowledgments

None.

Conflicts of interest

The author declares that there are no conflicts of interest.

References

1. Zaman JA, Lidor AO. The optimal approach to symptomatic paraesophageal hernia repair: important technical considerations. *Curr Gastroenterol Rep.* 2016;18(10):53.
2. Smith RE, Shahjehan RD. *Hiatal hernia*. Stat Pearls Publishing; 2023.
3. El Magd EA, Elgeidie A, Elmahdy Y, et al. Impact of laparoscopic repair on type III/IV giant paraesophageal hernias: a single-center experience. *Hernia.* 2023;27(6):1555–1570.
4. Weber SA, Garteiz MD, Carbó RR, et al. More than a decade of experience with prosthetic repair in large or recurrent hiatal hernia. *Cir Endosc.* 2017;18(2):66–72.
5. Collis JL. An operation for hiatus hernia for short esophagus. *J Thorac Surg.* 1957;34(6):768–778.
6. Mitiek MO, Andrade RS. Giant hiatal hernia. *Ann of Thorac Surg.* 2010;89(6):S2168–S2173.
7. Morino M, Giaccone C, Pellegrino L, et al. Laparoscopic management of giant hiatal hernia: factors influencing long-term outcome. *Surg Endosc.* 2006;20(7):1011–1016.
8. Guan L, Nie Y, Yuan X, et al. Laparoscopic repair of giant hiatal hernia for elderly patients. *Ann Transl Med.* 2021;9(8):704.
9. Madan AK, Frantzides CT, Patsavas KL. The myth of the short esophagus. *Surg Endosc.* 2004;18(1):31–34.
10. Correa J, Morales CH, Toro JP. Laparoscopic repair of giant hiatal hernia: surgical technique and clinical, endoscopic and radiological follow-up. *Rev Colomb Cir.* 2020;35(1):32–42.
11. Vidal PL, Beniamino P, Azagra SJS. Robotic approach for collis gastropasty. *Cir Esp.* 2020;98(5):288–291.
12. Campos V, Palacio DS, Glina F, et al. Laparoscopic treatment of giant hiatal hernia with or without mesh reinforcement: a systematic review and meta-analysis. *Int J Surg.* 2020;77:97–104.
13. Watson DI. Evolution and development of surgery for large paraesophageal hiatus hernia. *World J Surg.* 2011;35(7):1436–1441.
14. Collis JL. An operation for hiatus hernia for short esophagus. *J Thorac Surg.* 1957;34(6):768–778.

15. Cameron BH, Cochran WJ, Gill CW. The uncut collis-nissen funduplication: results for 79 consecutively treated high-risk children. *J Pediatr Surg.* 1997;32(6):887–891.
16. Adler RH, Firme CN, Lanigan JM. A valve mechanism to prevent gastroesophageal reflux and esophagitis. *Surgery.* 1958;44(1):63–76.
17. Adler RH. Collis gastroplasty: origin and evolution. *Ann Thorac Surg.* 1990;50(5):839–842.
18. Demos NJ, Smith N, Williams D. New gastroplasty for strictured short esophagus. *New York State J Med.* 1975;75:57.
19. Demos NJ. Stapled, uncut gastroplasty for hiatal herma: 12-year follow up. *Ann Thorac Surg.* 1984;38(4):393–399.
20. Siegal S, Dolan JP, Hunter JG. Modern diagnosis and treatment of hiatal hernias. *Langenbecks Arch Surg.* 2017;402(8):1145–1151.
21. Davis SS. Current controversies in paraesophageal hernia repair. *Surg Clin North Am.* 2008;88(5):959–978.
22. Swanstrom, LL, Marcus DR, Galloway GQ. Laparoscopic collis gastroplasty is the treatment of choice for the shortened esophagus. *Am J Surg.* 1996;171(5):477–481.
23. Johnson AB, Oddsdottir M, Hunter JG. Laparoscopic Collis gastroplasty and Nissen fundoplication. A new technique for the management of esophageal foreshortening. *Surg Endosc.* 1998;12(8):1055–1060.
24. Terry ML, Vernon A, Hunter JG. Stapled-wedge collis gastroplasty for the shortened esophagus. *Am J Surg.* 2004;188(2):195–199.
25. Zehetner J, Meester SR, Ayazi S, et al. Laparoscopic wedge fundectomy for Collis gastroplasty creation in patients with a foreshortened esophagus. *Ann Surg.* 2014;260(6):1030–1033.
26. Gerritsen A, Furnée EJ, Gooszen HG, et al. Evaluation of gastrectomy in patients with delayed gastric emptying after antireflux surgery or large hiatal hernia repair. *World J Surg.* 2013;37(5):1065–1071.
27. Lindeboom MY, Ringers J, Van RPJ et al. Gastric emptying and vagus nerve function after laparoscopic partial fundoplication. *Ann Surg.* 2004;240(5):785–790.
28. Liu DS, Tog C, Lim HK, et al. Delayed gastric emptying following laparoscopic repair of very large hiatus hernias impairs quality of life. *World J Surg.* 2018;42(6):1833–1840.
29. Tog C, Liu DS, Lim HK, et al. Risk factors for delayed gastric emptying following laparoscopic repair of very large hiatus hernias. *BJS Open.* 2017;1(3):75–83.
30. Robertson JP, Wall H, Falk GL. Failed fundoplication with delayed gastric emptying: efficacy of subtotal gastrectomy. *ANZ J Surg.* 2022;92(2):764–768.
31. Bakhos CT, Patel SP, Petrov RV, et al. Management of paraesophageal hernia in the morbidly obese patient. *Thorac Surg Clin.* 2019;29(4):379–386.
32. Le Page PA, Martin D. Laparoscopic partial sleeve gastrectomy with fundoplication for gastroesophageal reflux and delayed gastric emptying. *World J Surg.* 2015;39(6):1460–1464.
33. Chaar M, Ezeji G, Claros L, et al. Short-term results of laparoscopic sleeve gastrectomy in combination with hiatal hernia repair: experience in a single accredited center. *Obes Surg.* 2016;26(1):68–76.
34. Aktokmakyan TV, Gungor O, Sumer A. Technical details of laparoscopic sleeve gastrectomy. *Mini-invasive Surgery.* 2020;4:23.
35. Melissas J, Braghetto I, Molina JC, et al. Gastroesophageal reflux disease and sleeve gastrectomy. *Obes Surg.* 2015;25(12):2430–2435.