

Video-Laparoscopic Treatment of Intrathoracic Gastric Volvulus

Luiz Roberto Lopes, MD, PhD, Fabio Henrique Mendonça Chaim, MD, Isabella Gusson Galdino Santos, MD, João de Souza Coelho Neto, MD, Valdir Terciotti Jr, MD, José Antonio Possato Ferrer, MD, Nelson Adami Andreollo, MD, PhD

ABSTRACT

Background: Gastric volvulus is a rare condition, characterized by abnormal rotation of the stomach, causing obstruction with risk of ischemia, necrosis, and perforation. It is associated with high morbidity and mortality rates and, as it is life threatening, early diagnosis and treatment are crucial.

Methods: Retrospective study of medical records of intrathoracic gastric volvulus patients treated by video-laparoscopy from January 2000 to December 2018, in a University Hospital.

Results: Thirty patients (34 surgical procedures – 4 re-operations), 9 (30%) male and 21 (70%) female. The mean age was 57.65 ± 32.65 and the mean body mass index was 27.11 ± 3.5 kg/m². The most prevalent symptoms were epigastric pain and dysphagia. In 41.17% of the cases, the contrast X-ray confirmed the diagnosis. All 34 cases were intrathoracic volvulus, 24 of which were organo-axial (70.58%). The surgical technique used was hiatoplasty, without mesh (25 cases; 73.52%) and with reinforcement mesh (9 cases; 26.47%), mostly associated with Nissen fundoplication (52.94%). The mean surgical time was 215.7 ± 62.9 minutes, with conversion in 5

cases (15.62%). Hospitalization ranged from 4 ± 2 days. There was no record of operative mortality, and symptom improvement occurred in 100% of patients. The mean follow-up time for patients was 41.8 ± 32.6 months.

Conclusions: Surgical treatment should be indicated to reduce morbidity and mortality, and associated with improved symptoms and patient prognosis. Video-laparoscopic surgery on intrathoracic gastric volvulus proved to be safe and effective and should be the option of choice in the management of this disease.

Key Words: Stomach Volvulus, Laparoscopy, Hernia, Hiatal, Video-Laparoscopic Treatment, Intrathoracic Gastric Volvulus.

University Clinical Hospital, School of Medical Sciences, Digestive Diseases Surgical Unit and Gastrocentro, State University of Campinas, Sao Paulo, Brazil. (all authors)

Acknowledgements: The authors thank Espaço da Escrita – Pró-Reitoria de Pesquisa – UNICAMP – for the language services provided.

Disclosure: none.

Funding/Financial Support: none.

Conflicts of Interest: none.

Informed consent: Dr. Luiz Roberto Lopes declares that written informed consent was obtained from the patient/s for publication of this study/report and any accompanying images.

Address correspondence to Luiz Roberto Lopes, MD, PhD, School of Medical Science, UNICAMP. Rua Tessalia Vieira de Camargo, 126 – Cidade Universitaria, Campinas, Sao Paulo, Brazil, 13083-887, Telephone: 55-19-351.9450, E-mail: lopes@unicamp.br

DOI: 10.4293/JLS.2020.00061

© 2020 by JLS, *Journal of the Society of Laparoscopic & Robotic Surgeons*. Published by the Society of Laparoendoscopic & Robotic Surgeons, Inc.

INTRODUCTION

Gastric volvulus consists of a twist of at least 180 degrees of the stomach, or one of its portions, around one of its axes, causing variable levels of ischemia, migration into the chest cavity, and obstruction to food transit.¹

It was first described by Berti in 1866, based on the necropsy of a 61-year-old woman who had died from a high obstructive acute abdomen in a closed loop. The first successful reduction case reported was attributed to Berg in 1897. The classic triad of gastric volvulus clinical presentation (association of pain with distention in the upper abdomen, intense non-productive nausea, and impossibility of progression during an attempt to insert nasogastric tube) was described by Borchardt in 1904. Whereas in 1920, Rosselet was responsible for the detailed radiological description of this disease.¹

The incidence is not well defined in the literature because it is associated with gastric volvulus secondary to hiatal hernia.² The primary volvulus is described as those with flaccidity of stomach ligaments and secondary ones related to the presence of large hiatal hernias.³⁻⁵

The high morbidity and mortality associated with gastric volvulus requires immediate diagnosis and treatment, especially in acute cases, in which the reported mortality is up to 56%.⁶ In chronic forms, the mortality rate varies from 0 to 13%.⁷ Gastric perforation resulting from parietal ischemia can occur in 5 – 28% of patients with organo-axial volvulus.⁸

Prior to 1993, there was no report of gastric volvulus laparoscopic treatment in the literature.⁹ The laparoscopic approach had its first report in 2003, with increasing relevance due to the comorbidities inherent to older patients and the operative risk.^{3,10}

This study aimed to report the experience acquired in the evaluation, treatment, and results of the surgical treatment of gastric volvulus by video-laparoscopy.

METHODS

This is a retrospective study based on the evaluation of the medical records of 30 patients operated on at the University Hospital of the School of Medical Sciences of the State University of Campinas, from January 2000 to December 2018. This study (3.662.235) was approved by the Ethics and Research Committee on October 25, 2019.

All patients were informed about the need for surgery and signed a free and informed consent form to perform the procedure. The surgery of choice was video-laparoscopy with the patient in a modified lithotomy position, with the surgeon located between the patient's legs, the first assistant on his right, and the camera operator on his left. The five portals, two of 10 mm and three of 5 mm, were placed to approach the diaphragmatic hiatus. After dissection and reduction of the hiatal hernia sac and contents into the abdominal cavity, identification, and repair of the esophagus; then hiatoplasty was performed with selective use of mesh for reinforcement of the diaphragmatic hiatus and partial or total fundoplication. In most of patients, a PortoVac-type aspiration drain was left in the mediastinum. The diet was released in the first postoperative period, and hospital discharge occurred as soon as the conditions improved. All patients were followed up in the postoperative period with clinical evaluations and supplementary exams when necessary.

The data were obtained from the application of a collection instrument in the investigation of medical records and were presented statistically by categories, calculating the means and standard deviations. The specific points covered included the patient's demographic characteristics,

incidence, etiology, presentation, investigation, and treatment.

RESULTS

During the follow-up period, 34 elective surgeries related to the gastric volvulus were performed. Among the 30 patients, 9 were male (30%) and 21 female (70%); their mean age was 53 years old (53.1 ± 17.0); the youngest was 22 years old and the oldest, 83 years old. Their mean body mass index was $27.11 \pm 3.5 \text{ kg/m}^2$. The majority of cases were organo-axial (24 cases, 70.58%).

Regarding the clinical presentation, the most prevalent symptoms were epigastric pain and distension, difficulty in eating solid foods, dysphagia, regurgitation, chest pain and discomfort, inappetence, and weight loss. Only one patient, 72 years old was asymptomatic; however, they presented an episode of severe chest pain, vomiting, and hematemesis.

Most patients (24 cases, 70.58%) had chronic symptoms, ranging from 6 months to 10 years, without seeking medical help or without diagnosis. However, 10 cases (29.42%) had acute presentation, and patients went to emergency rooms due to severe chest and epigastric pain, vomiting, regurgitation, and inability to ingest food orally. These cases were initially submitted to cardiac and pulmonary examinations to exclude angina and acute myocardial infarction, aneurysms, pneumothorax, thromboembolisms, and acute intestinal ischemia.

The complementary exam most used to confirm the diagnosis was the contrast X-ray in 14 patients (41.17%), followed by upper endoscopy in 12 patients (35.29%). The diagnosis also emerged from simple chest X-rays in 5 patients and computed tomography (CT) in 8 patients.

The duration of surgical treatment was on average 215.7 ± 62.9 min and 27 of them had the surgery completed by video surgery (80.37%), with the need for conversion in 5 patients (15.62%). Two patients were re-operated through the open route, totaling 34 surgeries. In 9 cases (26.47%), a mesh-reinforced hiatal hernia repair was employed selectively (5 polypropylene mesh protected with large epiplons and 4 biodegradable meshes), due to large diaphragmatic hiatus and weakened muscle fibers of the pillars crura, preventing its adequate closure. Fundoplication was performed in 94.12% of patients, Nissen's surgery in 52.94%, modified Nissen in 26.47%, partial fundoplication in 14.70%, and 2 cases without fundoplication (5.88%).

On average, patients remained hospitalized for 4 ± 2 days. There were no major intra-operative complications and there was no record of mortality. The average postoperative follow-up time was 41.8 ± 32.6 months.

The most frequent postoperative symptoms reported in the follow-up were mild dysphagia in 4 patients. The fundoplication migration was recorded in 2 cases and esophageal achalasia in 1 case.

DISCUSSION

A gastric volvulus may be chronic and intermittent, with symptoms of partial obstruction, or can present acutely without prior symptoms.¹¹ The most prevalent clinical symptoms found in surveys of medical records were epigastric and chest pain, regurgitation, and dysphagia. In only 10% of cases the so-called complete Borchartd triad was present, contrasting with data from the literature that establish its occurrence in 50 to 70% of cases.^{6,7,12} The lesser occurrence of the signs and symptoms of the triad can be attributed to this series, as they are mostly chronic cases (24 of 34 cases; 70.58%), which tend to present themselves with less exuberant symptoms. They also suggest other prevalent clinical characteristics that can lead to diagnosis, such as abdominal examination without abnormalities when the stomach is intrathoracic. This study, therefore, does not diminish the importance of the Borchartd triad, but reaffirms the need for a high level of suspicion in the gastric volvulus diagnosis, since unspecific signs and symptoms were the most prevalent reported.

This is important for the medical professional responsible for the first care in emergency units because, despite its low prevalence, when a patient presents one or more of the described symptoms, it is necessary to consider gastric volvulus as a possibility and adopt early measures to investigate and implement the therapy to minimize the high morbidity and mortality associated with the condition, particularly in elderly patients with lordosis and other comorbidities.¹⁰

The complementary exams most frequently used for diagnostic confirmation was the contrast X-ray and upper digestive endoscopy. Chest radiography may also indicate the presence of massive hiatal hernia and the need to investigate with contrast X-ray and upper digestive endoscopy.^{4, 5} However, there are case reports that advocate the use of CT of the chest and abdomen for diagnosis, since this imaging exam can provide information about the topography and anatomy, which can help in planning the surgical

intervention. Still, CT can be performed on a critical patient as long as they are hemodynamically stable.¹⁰

As for classification, there was a predominance of organo-axial volvulus in 70% of cases, 14.7% of mesenteroaxial and 14.7% of combined, and the literature reports a predominance of organo-axial volvulus in 59% of patients, 29% mesenteroaxial, and 12% combined.^{6,7} This may be because they were all intrathoracic volvulus cases, whereas the literature also reports the abdominals.

Many controversies still exist with regard to the management of gastric volvulus. For some authors, it is possible to do only clinical follow-up without any approach, especially in patients at higher risk or when they do not agree with the treatment.^{10,13} In cases associated with eventration by the diaphragmatic hiatus, the correction of the defect is recommended, except in those with higher operative risk.^{5,13} This was the case in all of our patients who were approached by laparoscopic surgery. The approach is not yet a consensus, and the surgeon's experience must be the predominant factor in this choice. Jacob et al.¹⁴ analyzed 38 cases between 1968 and 2001, but only 5 cases underwent surgical correction by laparoscopy, showing that until then minimally invasive access was still not the indication of choice. The rate of complications reported for treatment via gastric volvulus laparotomy is 38%, with an average hospital stay of 12 days. As it is a reference center with great experience in the use of video-laparoscopy for the treatment of other benign and malignant gastrointestinal tract diseases, this was the route of choice in this study. Total excision of the hernial sac and contents reduction into the abdominal cavity is also controversial. Some authors argue that total excision of the hernial sac and complete contents reduction into abdominal cavity reduces recurrence rates, improves gastrointestinal symptoms, and avoids late complications such as ischemia, necrosis, and perforation.¹⁶ Conversely, those who defend only partial excision, emphasize the possibility of injuries of the pleura, vagus nerve, esophagus, stomach, and other viscera.⁷

Despite the lack of consensus, the use of prostheses (mesh) is attributed to a significant reduction in the risk of volvulus recurrence. The use of inert material in this study, however, occurred selectively since it is a procedure with possible complications, and erosion of viscera is particularly concerning.² Zhang et al. performed a systematic review and meta-analysis analyzing 11 studies (4 randomized, 9 non-randomized), comparing patients after surgical repair to reduce risk of recurrence and gastroesophageal reflux, employing mesh (n = 719) vs. suture (n = 755). They concluded that mesh repair of hiatus

hernia compared to a suture repair alone, might be associated with less recurrences, and biological mesh improved quality of life.¹⁵

Long-term studies are still needed to determine the place of mesh in repairing hiatus hernia. Toydemir et al. recorded 14 cases of totally intra-thoracic stomach with chronic volvulus that underwent to video laparoscopic repair. All cases had reduction of the stomach into the abdomen, total sac excision, and construction of a partial fundoplication. The authors routinely emphasized the importance of reinforced hiatoplasty with prosthetic grafts, and they prefer to use U-shaped monofilament polypropylene mesh. Postoperatively, 1 patient presented gastroesophageal reflux and a wrap herniation.²

Gastropexy relieves symptoms and is considered by some authors to be a definitive treatment option in populations that benefit from the use of minimally invasive accesses, such as advanced age and high surgical risk. Gastric fixation can be performed on the anterior abdominal wall or after displacement of the colon, in the liver (Tanner's procedure). These associated procedures are also recommended by some authors in cases of primary volvulus, although there are also reports of recurrence or primary occurrence of gastric volvulus due to gastropexy or gastrostomy (gastric fixation at a single point would determine the formation of a new axis for twist).^{7,10,12,14,15}

The mean age of gastric volvulus presentation in this study (53 years) is in agreement with the data reported by the literature, which describe a peak incidence in the fifth decade of life. Only in the review carried out by Teague et al.¹¹ involving 36 patients had a considerably higher mean age (75 years), which is in disagreement with the other case series.

Partial or total fundoplication in a systematic or selective manner is also questionable, and it can be applied only to patients with previous reflux symptoms or in all cases.^{17,18} In this study, fundoplication was performed in 94.12% of cases (preferably using the Nissen technique – 52.94%) considering that the extensive esophageal dissection close to the hiatus, the division of the posterior phrenoesophageal ligament and the break of the esophageal continence mechanism by the large existing hiatal hernia, could result in gastroesophageal reflux. In addition, fundoplication would reduce the mobility of the gastric fundus, reducing the risk of herniation to the chest cavity recurrence.⁴ Conversion to laparotomy was necessary in 5 patients, all due to technical difficulties in performing the surgery by laparoscopic approach. This conversion

rate of 15.62% can be considered low because of the inherent difficulty in the surgical treatment of these large hiatal hernias. As there are few studies with large series for minimally invasive access, conversion rates are rarely reported.

CONCLUSION

The gastric volvulus keeps challenging surgeons, both from diagnostic and therapeutic points of view. Although the laparoscopic procedure is a minimally invasive surgery and technically more rigorous in benign diseases of the gastrointestinal tract, is safe and effective and should be an option in the treatment of this disease, especially when performed by experienced surgeons in referral centers.

References:

1. Katkhouda N, Mavor E, Achanta K, et al. Laparoscopic repair of chronic intrathoracic gastric volvulus. *Surgery*. 2000;128(5):784–790.
2. Toydemir T, Çipe G, Karatepe O, Yerdel MA. Laparoscopic management of totally intra-thoracic stomach with chronic volvulus. *World J Gastroenterol*. 2013;19(35): 5848–5854.
3. Channer LT, Squires GT, Price PD. Laparoscopic repair of gastric volvulus. *JLS*. 2000;4(3):225–230.
4. Chen DP, Walayat S, Balouch IL, Martin DK, Lynch TJ. Abdominal pain with a twist: a rare presentation of acute gastric volvulus. *J Community Hosp Intern Med Perspect*. 2017;7(5):325–328.
5. Lee JS, Park JW, Sohn JW, et al. Organo-axial volvulus of the stomach with diaphragmatic eventration. *Korean J Intern Med*. 2000;15(2):127–130.
6. Chau B, Dufel S. Gastric volvulus. *Emerg Med J*. 2007; 24:446–447.
7. Rashid F, Thangarajah T, Mulvey D, Larvin M, Iftikhar SY. A review article on gastric volvulus: a challenge to diagnosis and management. *Int J Surg*. 2010;8:18–24.
8. Carter R, Brewer LA, Hinshaw DB. Acute gastric volvulus: a study of 25 cases. *Am J Surg*. 1980;140(7):99–106.
9. Milne LW, Hunter JJ, Anshus JS, Rosen P. Gastric volvulus: two cases and a review of the literature. *J of Emerg Med*. 1994;12(3):299–306.
10. Zuiki T, Hosoya Y, Lefor AK, et al. The management of gastric volvulus in elderly patients. *Int J Surg Case Rep*. 2016;29: 88–93.

11. Teague WJ, Ackroyd R, Watson DI, Devitt PG. Changing patterns in the management of gastric volvulus over 14 years. *Br J Surg*. 2000;87:358–361.
12. Reyes-Zamorano J. Vólvulo gástrico agudo: una complicación tardía de la funduplicatura Nissen. Reporte de dos casos y análisis de la bibliografía. *Cir Gen*. 2014;82:541–550.
13. Akhtar A, Siddiqui FS, Sheikh AAE, Sheikh AB, Perisetti A. Gastric volvulus: a rare entity case report and literature review. *Cureus*. 2018;10(3):e2312.
14. Jacob EC, Lopasso PF, Zilberstein B, et al. Gastric volvulus: a review of 38 cases. *Arq Bras Cir Dig*. 2009;22:96–100.
15. Zhang C, Liu D, Li F, et al. Systematic review and meta-analysis of laparoscopic mesh versus suture repair of hiatus hernia: objective and subjective outcomes. *Surg Endosc*. 2017;31(12):4913–4922.
16. Carlson M, Condon RE, Ludwig KA, Shulte WJ. Management of intrathoracic stomach with polypropylene mesh prosthesis reinforced transabdominal hiatus hernia repair. *J Am Coll Surg*. 1998;187:227–30.
17. Braghetto I, Csendes A. Failure after fundoplication: re-fundoplication? Is there a room for gastrectomy? In which clinical scenarios? *Arq Bras Cir Dig*. 2019;32(2):e1440.
18. Higgins RM, Gould JC. The pros and cons of partial versus total fundoplication for gastroesophageal reflux disease. *J Laparoendosc Adv Surg Tech A*. 2020;30(2):117–120.