Laparoscopic mesh repair of giant hiatal hernia. Case report

Carlos Tadeo Perzabal Avilez M.D.
Cesar Alberto Lopez Jaime M.D.
Raul Alberto Jimenez Soto M.D.
Veronica Michaus Salais M.D.
Brian Benito Dominguez Gonzalez M.D.
Chihuahua, Mexico.

Case Report

GENERAL SURGERY

OPEN ACCESS

Abstract: In 1853, Bowditch published the description of a hiatal hernia for the first time. A giant hiatal hernia is defined as the protrusion of the abdominal contents through the diaphragmatic hiatus that is ≥30% of the stomach or ≥ 5 cm, usually type III or IV that is accompanied by a hernia sac.
A 77-year-old female presented to the emergency room with chest pain of an oppressive type, accompanied by mild dyspnea. The laboratories showed a mild anemia. A chest X-ray with evidence of an air-fluid level in the basal region of the left hemithorax, for which the study was complemented with a thoracoabdominal computed tomography, which confirms a suspected diagnosis, grade IV hiatal hernia.
She is taken to the operating room, where under general anesthesia, the hernia content reduction is performed (stomach, omentum and small intestine), an expanded polytetrafluoroethylene mesh is introduced, which is fixed with suture and a 360 ° Nissen fundoplication is performed.
Symptoms can be classified as obstructive and non-obstructive. Epigastric pain, postprandial fullness, early satiety, nausea, regurgitation, emesis, and swelling correspond to an obstructive cause, while gastroesophageal reflux, erosive esophagitis, and anemia due to ulcerations correspond to non-obstructive ones.
The points to be taken into consideration are hernia repair consisting of complete reduction of the same, evaluation of esophageal length and appropriate use of lengthening, and management of gastroesophageal reflux disease with an antireflux procedure.

Keywords: Hiatal hernia, gastroesophageal reflux, laparoscopy, fundoplication, mesh.

Introduction

Hiatal hernia is a common disorder that involves protrusion of the abdominal viscera from the same cavity into the thoracic cavity, this through the esophageal hiatus.[1, 2]

In 1853, Bowditch published the description of a hiatal hernia for the first time, later Soresi, in 1919 he was the first to achieve the reduction and approximate the crura of a hiatal hernia through a surgical act. During the 1960s, Skinner emphasized the functionality of the abdominal esophagus, which provides the functionality for the antireflux mechanism, in addition to establishing the concept for the current hiatal hernia. Almost at the end of the century, in 1998 Maziak et al, published a detailed report on the treatment of giant hiatal hernia, in addition to describing the surgery using the Collis technique and a Nissen fundoplication, this laparoscopically.[3]

Although the incidence of giant hiatal hernia remains imprecise,[4] it tends to be around 10 to 50%. Of all the hiatal hernias, the giants correspond to 5 to 10% of all.[5] Among the four types of hernias, type IV is little forehead.[6] Likewise, a prevalence of 0.3 to 15% has been found in patients who underwent Nissen fundoplication.

Case report

This is a 77-year-old female who went to the emergency department after presenting sudden moderate chest pain of an oppressive type, accompanied by mild dyspnea. The laboratories with evidence of mild anemia. The patient only with a history of hospitalization for surveillance for a car crash 30 years ago.

A diagnostic protocol for probable acute myocardial infarction was initiated, performing an electrocardiogram and cardiac enzymes, without alterations, as well as a chest X-ray with evidence of an air-fluid level in the basal region of the left hemithorax, (**Figure 1**) for which the study was complemented with a thoraco-abdominal computed tomography, which confirms a suspected diagnosis, grade IV hiatal hernia (**Figure 2**).

In the directed interrogation, the patient reports symptoms of mild cough intermittently, as well

From the Division of General surgery and Laparoscopy at Hospital General de Ciudad Juarez, Chihuahua, Mexico. Received on December 1, 2020. Accepted on December 9, 2020. Published on December 15, 2020.

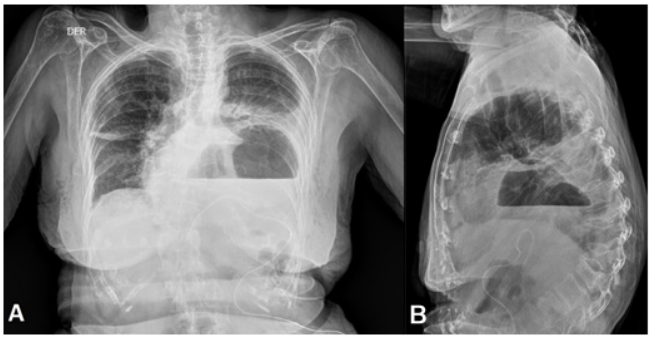

Figure 1. A. Anteroposterior chest X-ray with air-fluid level in the left hemithorax in the basal region. **B.** Lateral chest X-ray in which the air-fluid level of the anteroposterior X-ray persists, of sub diaphragmatic topology.

as heartburn and mild epigastric pain, all related after the car crash 30 years ago.

Surgical Technique:

She is taken to the operating room, where under general anesthesia and in a french position, pneumoperitoneum is performed at 15 mmHg, working ports are introduced under direct vision, a giant hiatal hernia >10 cm is identified, hernia content reduction is performed (stomach, omentum and small intestine), electrofulguration of adhesions of the stomach and esophagus to the hernial sac is performed, an expanded polytetrafluoroethylene mesh is introduced, which is fixed with 2-0 ethibon, running suture and with an endoscopic stapler to diaphragmatic abutments. A retroesophageal window is performed in the intra-abdominal portion of the esophagus, short gastric vessels are released with electrofulguration and 360 ° nissen fundoplication is performed, which is fixed with 2-0 ethibon, simple points and finally, fundoplication is fixed to the diaphragmatic abutment with the same suture. Procedure is terminated without incidents or accidents. (**Figure 3**)

In the immediate postoperative period the patient with good tolerance to diet, slight dysphagia, with mild surgical site pain. She was discharged with analgesic and antibiotic management. In the outpatient follow-up, with remission of dysphagia at week 6 and without other added symptoms, a gastroduodenal esophagus series was performed, with evidence of adequate passage of contrast medium and without evidence of recurrence of the hiatal hernia.

Discussion

Although there is no consensus among the authors on the definition of a giant hiatal hernia, it is necessary to include the definition of an abdominal hernia, which is the protrusion of the abdominal viscera through a natural or acquired orifice and with a hernial sac.[7] The percentage of the stomach that

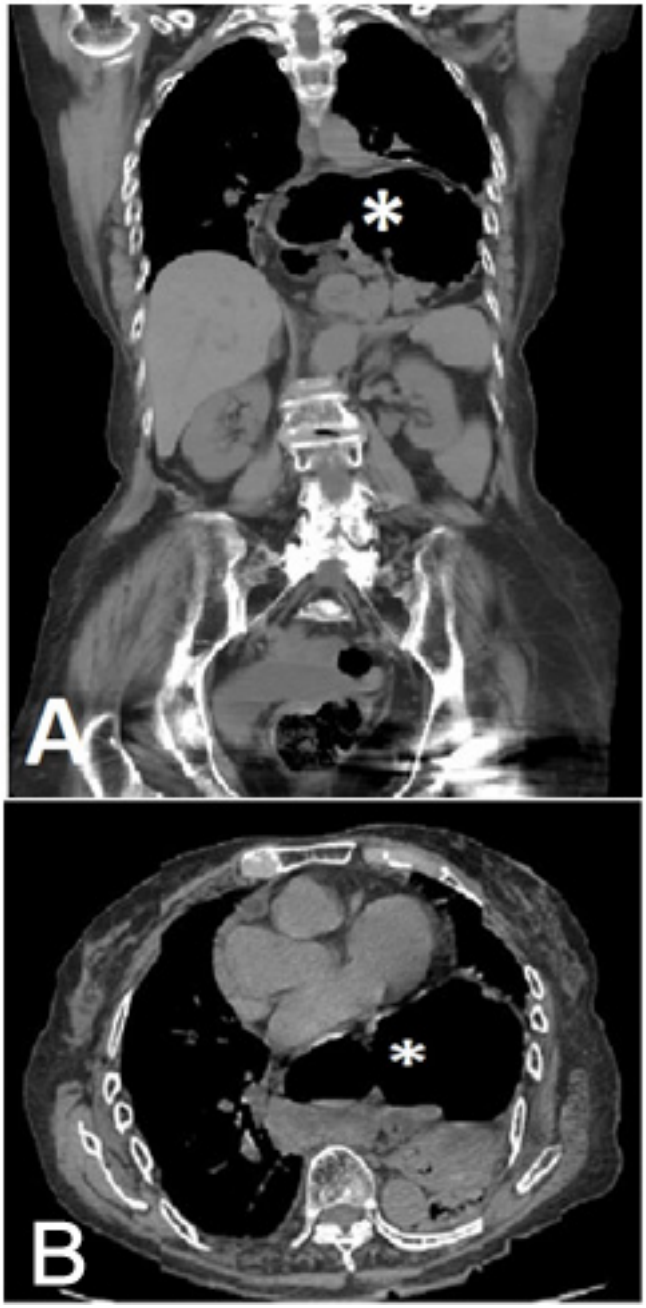

Figure 2. A. Simple thoracoabdominal tomography in coronal section, with evidence of gastric chamber in the precordial region. **B.** Simple chest tomography in axial section, with an air-fluid level in the region of the precordium corresponding to the stomach

occupies the cavity must also be considered, with the percentage managed by some authors greater than 30% [8,9] and the size, which is managed as greater than 5 cm. In addition to considering the type of hernias, being type III and IV the most representative of this type. Therefore, a giant hiatal hernia is defined as the protrusion of the abdominal contents through the diaphragmatic hiatus that is ≥30% of the stomach or ≥ 5 cm, usually type III or IV that is accompanied by a hernial sac.

This pathology should be considered as a disease of the diaphragm since it occurs due to the distortion and enlargement of the hiatus.[4] This allows

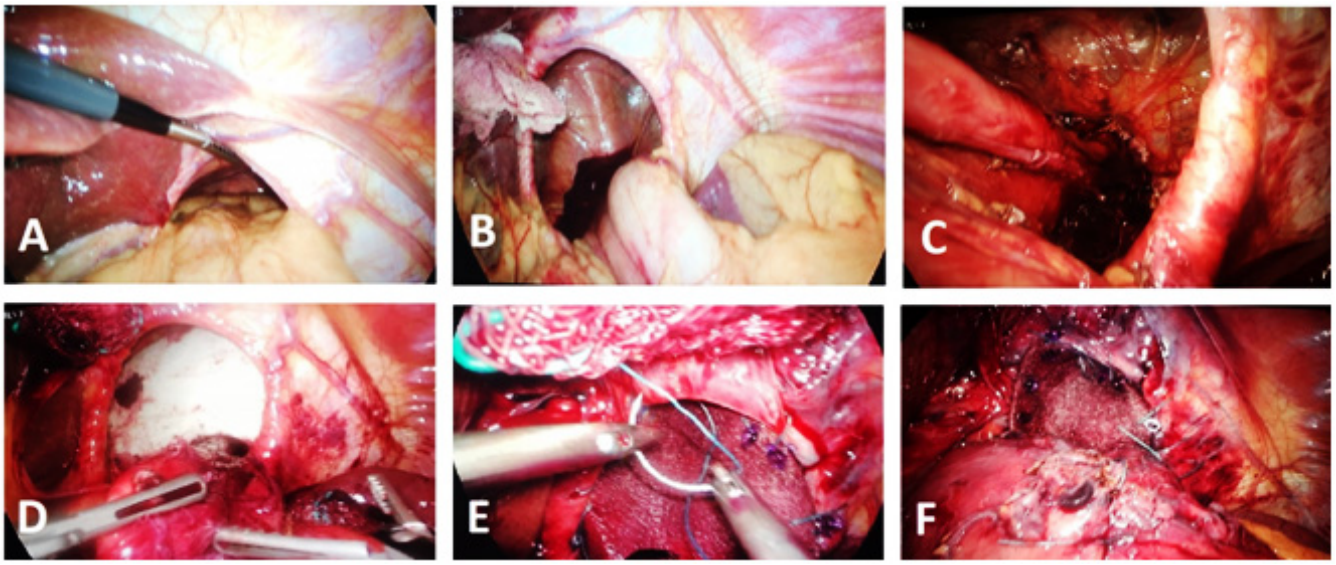

Figure 3. A. Giant hiatal hernia with most of the stomach, omentum and small intestine inside. **B.** Hiatal hernia content reduced in its entirety, showing esophagus in its intra-thoracic and intra-abdominal portion. **C.** Release of adhesions between the esophagus and stomach to the wall of the hernial sac, with evidence of the esophagus completely free of adhesions. **D.** Placement of the expanded polytetrafluoroethylene mesh in a U-shaped hernial defect. **E.** Mesh fixation with laparoscopic stapler and ethibon 2-0 running suture. **F.** Hiatal hernia repaired by mesh with 360 ° nissen fundoplication.

the gastroesophageal junction to lose its external sphincter, which is why the abdominal contents migrate into the thoracic space. There are two theories that allow this migration. The first is that the esophageal mucosa is damaged by acid (as in reflux disease), causing scars that shorten and pull the gastroesophageal junction towards cephalic. The second proposes about a chronic stimulus, adding the repetitive stress of swallowing or vomiting with an increase in intra-abdominal pressure (obesity, pregnancy) causes the weakness of the phrenic esophageal membrane and later the hiatus widening.[1, 6] This process may also be due to a previous surgical event.[10]

Of the three types of non-traumatic diaphragmatic hernias, the most common is hiatal hernia, which corresponds to herniation mainly of the stomach, but not limited to it. The two remaining hernias correspond to congenital, Bochdalek and Morgagni hernias, these being less frequent than the previous one. For hiatal hernias there is a classification that divides it into 4 types: Type 1: This is a sliding hernia, due to the weakness and widening of the phrenicoesophageal membrane. 95% of all hiatal hernias are attributed to this type. It is the most common among adults, Type 2: Pure paraesophageal hiatal hernia, a problem in the anterolateral aspect of the phrenic esophageal membrane. The cardia and the gastroesophageal junction remain below the diaphragm; however, the gastric fundus migrates towards the thoracic cavity, allowing the mobility of all this towards the thorax. It represents less than 5%, Type 3: It is the mixture of the previous two; it is characterized by sliding and paraesophageal elements. It is associated with gastric rotation, Type 4: Corresponds to the anterior hernia, which also has other elements of the abdominal cavity, such as the colon, small intestine, pancreas, liver, etc. [1, 3, 8, 11] Currently, the giant hiatal hernia is classified as type II, III or IV.[4] Giant hernias were previously thought to be the result of a congenital anomaly where a peritoneal sac existed anterior to the esophagus. The stomach rolled into this sac so that the greater curvature became superior; and the partial torsion predisposed to acute obstruction and strangulation of the viscus. They were also thought to be the result of an enlarged hiatus from birth, in which the elements of the diaphragmatic hiatus remained inoperative around the esophagus.[4] Although it is estimated that 50% of patients are asymptomatic, they can develop mild symptoms and present spontaneous gastric volvulus and strangulation as the first symptom.[4] Symptoms can be classified as obstructive and non-obstructive.[1] Epigastric pain, postprandial fullness, early satiety, nausea, regurgitation, emesis, and swelling correspond to an obstructive cause, while gastroesophageal reflux, erosive esophagitis, and anemia due to ulcerations correspond to non-obstructive ones.[1, 6]

Among the most common symptoms are heartburn (59%), early satiety (54%), and shortness of breath (53%), dysphagia (47%) postprandial chest pain (40%) and anemia (37%).[12]

Based on the patient's clinic, it is necessary to complement with an imaging study to make the diagnosis. This leads to a chest X-ray and subsequently the barium study of the esophagus-stomach-duodenum,[8] this being the test of choice in most cases because it is the most accurate to determine

its existence, its size and to be able to classify it.[7]. The diagnosis can also be made by identifying the gastroesophageal junction in relation to the diaphragmatic pinch, which is the cleft in the stomach of the diaphragmatic hiatus.[1] In addition, a computed tomography of the abdomen can be performed that helps to delineate the exact relationship of the cardia and gastric cavity with the diaphragmatic hiatus. It can also document the presence of additional organs within the hernial sac, 4-hour gastric emptying study in patients without esophageal obstruction, high-resolution manometry, and cardiopulmonary testing.[1] Upper gastrointestinal endoscopy is useful in the diagnosis and for the classification of patients with paraesophageal hernias.[4]

Although most patients are managed conservatively, some require surgery due to the progression of symptoms such as reflux, pain, bleeding, aspiration, and obstruction.[13] This is usually indicated when clinical treatment in minor hernias fails, patients with large hernias and patients who remain asymptomatic, but has a high risk of complications, some of these as with reflux disease, lung, pancreatic and splenic problems.[4] The symptoms of the patients give the guideline to operate electively, being those who have a poor quality of life who must undergo a definitive surgical repair, if the comorbidities allow it.[1] The points to be taken into consideration are hernia repair consisting of complete reduction of the same, evaluation of esophageal length and appropriate use of lengthening, and management of gastroesophageal reflux disease with an antireflux procedure.[3] The long-term benefits of treating these hernias are primarily controlling blood loss and anemia and eliminating the risk of unpredictable catastrophic complications.[4] Laparoscopy is currently the standard technique for hiatal hernia repair.[5, 11] It begins with complete dissection of the hernial sac, reduction of its contents, complete removal of the mediastinum, followed by mobilization of the distal esophagus to reposition the gastric esophageal junction with an adequate length of the intra-abdominal esophagus. The crural defect is repaired using only the primary suture or the associated mesh reinforcement.[5] This choice is based on the fact that the operation should have low morbidity and low recurrence rates, without mortality and without the need for the use of mesh, with elimination of the risk of strangulation and dysphagia and, most importantly, a sustained improvement in quality of life patient.[14]

Conclusion

The giant hiatal hernia is a diaphragmatic pathology that involves the gastro-esophagic junction, which doesn't count with a well established definition, with a variable clinic presentation and with a high risk of complication, requiring surgical management for its resolution.

For the study of intraluminal diseases of the upper digestive tract it is necessary to perform a superior endoscopy, which is a study that helps to determinate the hiatal hernia grade; however the election study is the barium study of the esophagus-stomach-duodenum.

The surgical management is indicated being the laparoscopic approach of choice, however there is not a preferred surgical technique for the management of the giant hiatal hernia, several authors agree that the reduction of the sac and its contents, closure of the crura, and the performance of an antireflux surgery are necessarily required.

Conflicts of interests

The authors have no conflicts of interest to declare

Acknowledgements

We thank the staff of the "Centro Medico de Especialidades" for their support and constant drive to learn.

References

1. Choi S, Tang A, Murthy S, Raja S. Preoperative evaluation and clinical decision making for giant paraesophageal hernias: Who gets an operation? Thorac Surg Clin. 2019;29(4):415–9.
2. Berselli M, Livraghi L, Latham L, Farassino L, Rota Bacchetta GL, Pasqua N, et al. Laparoscopic repair of voluminous symptomatic hiatal hernia using absorbable synthetic mesh. Minim Invasive Ther Allied Technol. 2015;24(6):372–6.
3. Mitiek MO, Andrade RS. Giant hiatal hernia. Ann Thorac Surg. 2010;89(6):S2168-73.
4. Farrell M, Dhume M, Fisher CL, Reeves R. Massive right-sided hiatal hernia variation. International Journal of Anatomical Variations [Internet]. 2019 [cited 2020 Nov 15];12(1).
5. Campos V, Palacio DS, Glina F, Tustumi F, Bernardo WM, Sousa AV. Laparoscopic treatment of giant hiatal hernia with or without mesh reinforcement: A systematic review and meta-analysis. Int J Surg. 2020;77:97–104.
6. Krause W, Roberts J, Garcia-Montilla RJ. Bowel in chest: Type IV hiatal hernia. Clin Med Res. 2016;14(2):93–6.
7. Csendes J A, Braghetto M I, Burgos L AM, Henríquez D A. Síntomas, hallazgos radiológicos, endoscópicos y estudios funcionales del esófago en pacientes con hernia hiatal mayor a 5 cm. Rev chil cir. 2013;65(5):402–8.
8. de Grazia K JA, Godoy Z M, Cavallo B Í, Cortés A C. Hernia hiatal gigante con estómago intratorácico: Reporte de un caso y revisión de la literatura. Rev chil radiol. 2012;18(4):179–83.

9. Khoma O, Mugino M, Falk GL. Is repairing giant hiatal hernia in patients over 80 worth the risk? Surgeon. 2020;18(4):197–201.
10. Zilberstein B, Ferreira JA, Carvalho MH de, Bussons C, Silveira-Filho AS, Joaquim H, et al. Uso de próteses na correção cirúrgica das hérnias hiatais. Arq Bras Cir Dig. 2010;23(4):250–3
11. Prassas D, Rolfs T-M, Schumacher F-J. Laparoscopic repair of giant hiatal hernia. A single center experience. Int J Surg. 2015;20:149–52.
12. El Lakis MA, Kaplan SJ, Hubka M, Mohiuddin K, Low DE. The importance of age on short-term outcomes associated with repair of giant paraesophageal hernias. Ann Thorac Surg. 2017;103(6):1700–9.
13. Sasse KC, Warner DL, Ackerman E, Brandt J. Hiatal hernia repair with novel biological graft reinforcement. JSLS. 2016;20(2):e2016.00016.
14. Chabert LH, Fraind JJ, Quintero NL. Prolene suture web-shoelace-like pattern: An alternative to avoid the use of mesh in the repair of a large hiatus hernia. J Laparoendosc Adv Surg Tech A. 2015;25(12):1019–24.
15. Chang CG, Thackeray L. Laparoscopic hiatal hernia repair in 221 patients: Outcomes and experience. JSLS. 2016;20(1):e2015.00104.

Cesar Alberto Lopez Jaime
General Surgery/Laparoscopy
Hospital General de Ciudad Juarez
Chihuahua, Mexico
cesarlopezj91@gmail.com