ISSN: 2753-7919
British Journal of Healthcare and Medical Research; Vol. 13 No. 01 (2026) (288-299)
https://doi.org/10.14738/bjhr.1301.19955

Initial Experience with Robot-Assisted Hiatal Hernioplasty: A Case Series

Claudia Viviana Jaimes González, Andrés Hanssen, Gonzalo Andrés Domínguez Alvarado , & Mariana Lucía López Rodríguez

Abstract: Introduction: Hiatal hernia is a common pathology whose prevalence increases with age and obesity. Although laparoscopy has been the standard in its surgical treatment, the robotic approach has emerged as a promising alternative, offering greater precision, better ergonomics, and three-dimensional visualization. This study aims to present our initial experience with robot-assisted hiatal hernioplasty through a specific surgical technique and the analysis of a series of clinical cases operated with this approach. Clinical Cases: Four patients with symptomatic hiatal hernias refractory to medical treatment were operated on. All procedures were performed using Nissen-type fundoplication technique, utilizing three robotic arms. Surgical time ranged between 127 and 224 minutes, with no intraoperative or postoperative complications. All patients had good tolerance to the postoperative nutritional plan, adequate reflux control, and hospital discharge between 24 and 48 hours. No recurrences or symptoms were reported at one-month follow-up. Results: Patients who underwent minimally invasive and robotic surgery, despite not being exempt from complications, demonstrated benefits such as shorter hospital stay (48 hours), minimal bleeding, and efficient docking times. The use of three robotic arms reduced costs by 30%. Although meshes were not used for hiatal hernias, their potential benefits are recognized. Conclusion: Robot-assisted hiatal hernioplasty is a safe, reproducible technique with excellent postoperative results. Standardization of the procedure and training of the multidisciplinary team are fundamental to optimizing clinical outcomes. This approach represents an evolution in minimally invasive surgery and should be considered as a valid option in centers with experience in robotic surgery.

Keywords: Robotic Surgical Procedures, Minimally Invasive Surgical Procedures, Hiatal Hernia, Latin America.

INTRODUCTION

Hiatal hernia is a common condition in the general population, with a global prevalence that varies widely in the medical literature, ranging from 10% to 50% of the adult population. Prevalence increases with age and obesity. (1) In populations with morbid obesity, the prevalence of hiatal hernia has been reported at approximately 37%, while in patients undergoing bariatric surgery it has been identified in 18.92% (2,3)With respect to age, one study reported a prevalence of 48.44% in individuals older than 60 years, compared with 17.09% in those younger than 60 years. (4)

A hiatal hernia occurs when the stomach protrudes from the abdominal cavity into the thoracic cavity through the esophageal hiatus of the diaphragm, affecting the lower esophageal sphincter (LES). This alteration facilitates the reflux of gastric contents into the esophagus and promotes the development of gastroesophageal reflux disease (GERD) (1) The most frequent symptoms include regurgitation, heartburn, and dysphagia, and less

commonly epigastric or chest pain, early satiety, and chronic iron-deficiency anemia when complications occur (5,6). Extraesophageal manifestations such as chronic cough, laryngitis, or asthma may also be present. However, a significant proportion of patients remain asymptomatic, making timely diagnosis challenging.

The diagnosis of hiatal hernia may be difficult, particularly in asymptomatic patients. Diagnostic tools include upper gastrointestinal endoscopy, which allows direct visualization of the esophageal, gastric, and duodenal mucosa and facilitates detection of associated conditions such as erosive esophagitis or Barrett's esophagus. (7) According to the American College of Gastroenterology guidelines for GERD, 24-hour esophageal pH monitoring is the gold standard for documenting acid exposure, using the DeMeester score, where a value >14.7 indicates pathological reflux. Esophageal manometry is used to evaluate esophageal motility and LES function and is essential for surgical planning. Finally, barium swallow radiography, recommended by SAGES guidelines, is used to measure the size of the herniated stomach and the position of the gastroesophageal junction, and is particularly useful in large hernias. (8,9)

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) classifies hiatal hernias into four types. Type I occurs when the gastroesophageal junction migrates above the diaphragmatic hiatus. Type II is characterized by herniation of the gastric fundus through the hiatus while the gastroesophageal junction remains in its anatomical position. Type III is a combination of the previous two, with both the fundus and the gastroesophageal junction herniating into the mediastinum. Type IV involves herniation of the stomach along with other abdominal organs, such as the colon or spleen, through the hiatus. (9)

Management of hiatal hernia depends on the type, size, and presence of symptoms. Non-surgical management is indicated in asymptomatic patients or those with mild symptoms and includes proton pump inhibitors (PPIs), prokinetics, antacids, H2 receptor antagonists, and lifestyle modifications such as weight loss. (10)

Surgical management is indicated in patients with symptoms refractory to medical therapy or in the presence of giant hiatal hernias (greater than five centimeters). It is also considered in symptomatic paraesophageal hernias or when complications such as gastric volvulus, Barrett's esophagus, or increased risk of adenocarcinoma are present. (10,11)

According to SAGES guidelines, in patients requiring long-term PPI therapy, robotic surgery may be preferred over laparoscopy when adequate expertise and resources are available. Additionally, in patients who prioritize reflux symptom control over the risk of postoperative dysphagia, complete fundoplication may be the preferred option, highlighting the importance of individualized surgical decisionmaking. (9)

Among surgical options, laparoscopic fundoplication has become the standard procedure. (12,13) Nissen fundoplication (360°) is the most commonly used technique, although Toupet fundoplication (270°) is often preferred in patients with esophageal dysmotility due to a lower risk of postoperative dysphagia. (14)

Minimally invasive laparoscopic surgery remains the most widely used approach for hiatal hernia repair, offering faster recovery, reduced postoperative pain, and shorter hospital stays. However, robotic surgery represents a promising alternative in settings with available resources and experience, allowing greater precision and improved surgeon ergonomics. (15)

In recent years, robotic systems such as the Da Vinci platform have gained prominence as an alternative to conventional minimally invasive surgery, providing enhanced precision, improved ergonomics, and three-dimensional visualization of the surgical field. (16)

The objective of this study is to describe a robot-assisted hiatal hernioplasty technique and to present our initial experience through a case series, in comparison with existing literature.

MATERIALS AND METHODS

This study presents a step-by-step description of a robot-assisted hiatal hernioplasty technique, along with a case series in which this approach was applied. Patients with symptomatic hiatal hernia were included when surgical correction was indicated due to giant hiatal hernia, symptoms refractory to medical treatment, or the presence of complications such as gastric volvulus, Barrett's esophagus, or chronic iron-deficiency anemia.

Clinical Case 1

A 70-year-old male with a history of coronary artery disease with myocardial revascularization, chronic kidney disease, hydronephrosis with functional absence (solitary kidney), and chronic gastroesophageal reflux disease (GERD) symptoms. Upper endoscopy revealed a sliding hiatal hernia. pH monitoring demonstrated pathological acid reflux with elevated DeMeester score. Esophageal manometry showed ineffective esophageal motility, inadequate peristaltic reserve test, and ineffective peristalsis greater than 70%.

During the procedure, an 8 cm hiatal hernia sac was confirmed with 80% of gastric content in the mediastinum; the crura were in adequate condition. The hernia defect was identified and reduced, with lysis of adhesions from the short vessels of the greater curvature. The sac was dissected and released from the left and right crura, the gastric fundus was identified and subsequently released. Crural repair was performed with 0/0 Ethibond sutures using a double-pulley technique with adequate closure, followed by Nissen fundoplication.

The patient had adequate postoperative control with pain score of 2/10 on the visual analog scale (VAS), tolerance to the prescribed nutritional plan, and upper gastrointestinal series at 24 hours showing no evidence of reflux, adequate contrast medium passage without leaks. Given the adequate evolution, hospital discharge was granted at 48 hours. Follow-up upper gastrointestinal series at one month showed no leaks, no reflux, and no reproducible hernia.

Clinical Case 2

A 41-year-old female with a history of gastroesophageal reflux disease without response to pharmacological treatment. Upper endoscopy revealed a sliding hiatal hernia with ulcerated grade B peptic esophagitis according to the Los Angeles classification, Barrett's esophagus, and chronic gastritis. Upper gastrointestinal series showed no peristaltic alterations;

supracarinal gastroesophageal reflux of slow clearance was observed without contrast medium passage into the tracheobronchial tree. Esophageal manometry demonstrated type I gastroesophageal junction, normal esophageal motility, incomplete bolus clearance, altered peristaltic reserve test with inadequate deglutitive inhibition, and pH-impedance positive for acid reflux.

During the procedure, a 4 cm diameter hiatal hernia with gastric content in the defect was confirmed. The hernia defect was identified and reduced, with lysis of adhesions from the short vessels of the greater curvature. The sac was dissected and released from the left and right crura, the gastric fundus was identified and subsequently released. Crural repair was performed with 0/0 Ethibond sutures using a double-pulley technique with adequate closure, followed by Nissen fundoplication.

The patient had adequate postoperative control with pain score of 3/10 on VAS, tolerance to the prescribed nutritional plan, and upper gastrointestinal series at 24 hours showing no evidence of reflux, adequate contrast medium passage without leaks. Given the adequate evolution, hospital discharge was granted at 48 hours. Follow-up upper gastrointestinal series at one month showed no leaks, no reflux, and no reproducible hernia.

Clinical Case 3

A 58-year-old male with a history of arterial hypertension, dyslipidemia, and gastroesophageal reflux disease without response to pharmacological treatment. Upper endoscopy revealed a 2 cm sliding hiatal hernia with grade D peptic esophagitis according to the Los Angeles classification. Manometry demonstrated normal esophageal motility and adequate peristaltic reserve.

During the procedure, a 3 cm diameter hiatal hernia with gastric content in the defect, abdominal wall herniosis, and fibrosis were confirmed. The hernia defect was identified with reduction and lysis of adhesions. Crural repair was performed with two 0/0 Ethibond sutures using a double-pulley technique with adequate closure, followed by Nissen fundoplication.

The patient had adequate postoperative control with a pain score of 0/10 on VAS, tolerance to the prescribed nutritional plan, and upper gastrointestinal series at 24 hours showing no evidence of reflux, adequate contrast medium passage without leaks. Given the adequate evolution, hospital discharge was granted at 24 hours.

Clinical Case 4

A 70-year-old female with a history of severe lumbar scoliosis, upper gastrointestinal bleeding, gastritis, esophagitis, and gastroesophageal reflux disease without response to pharmacological treatment. Upper endoscopy revealed a 7 cm sliding hiatal hernia with ulcerated grade D peptic esophagitis according to the Los Angeles classification, multiple Cameron erosions between 5 mm and 8 mm without active bleeding, glandular-appearing polyps in the proximal gastric body between 3 mm and 6 mm, mild distal peptic stricture, antral erythematous gastritis, and pH-impedance positive for acid reflux.

During the procedure, a giant 8 cm hiatal hernia with sac adherent to the crura and pleura was confirmed, with stomach contained in the hernia, abdominal wall herniosis, and

thoracolumbar kyphoscoliosis deformity. The hernia defect was identified with reduction and lysis of adhesions from the short vessels of the greater curvature. The sac was dissected and released from the left and right crura, the gastric fundus was identified and subsequently released. Crural repair was performed with 0/0 Ethibond sutures using a double-pulley technique with adequate closure, followed by Nissen fundoplication.

The patient had adequate postoperative control with a pain score of 4/10 on VAS, tolerance to the prescribed nutritional plan, and upper gastrointestinal series at 24 hours showing no evidence of reflux, adequate contrast medium passage without leaks. Given the adequate evolution, hospital discharge was granted at 48 hours.

Clinical Case 5

A 56-year-old male with a history of arterial hypertension under pharmacological management, previous hemorrhoidectomy, and severe GERD. For the past 15 years, he has presented with epigastric pain, heartburn, nocturnal regurgitation, cough, and episodes of bronchoaspiration, dependent on proton pump inhibitors (dexlansoprazole) with side effects of gastric polyposis. Upper endoscopy revealed a sliding hiatal hernia and grade B esophagitis (Los Angeles classification).

During the surgical procedure, a 3 cm hiatal hernia was confirmed with elevation of the gastroesophageal junction and abundant visceral fat, in addition to an 8 mm umbilical hernia. Devascularization of the gastric fundus was performed with vessel sealing, dissection of the right and left diaphragmatic crura, retroesophageal dissection obtaining 8 cm of intra-abdominal esophagus, anterior and posterior hiatoplasty with separate Ethibond 2 sutures, and Nissen fundoplication anchored to the anterior aspect of the esophagus. Adequate passage of the orogastric tube and hemostasis were confirmed without complications. Blood loss was 50 mL.

The patient had adequate postoperative control with pain score of 8/10 on VAS, tolerance to the prescribed nutritional plan, and upper gastrointestinal series at 24 hours showing no evidence of reflux, adequate contrast medium passage without leaks. Given the adequate evolution, hospital discharge was granted at 48 hours.

Clinical Case 6

An 80-year-old female with a history of arterial hypertension, hypothyroidism, autoimmune diseases (Sjögren's syndrome, rheumatoid arthritis), osteoporosis, osteoarthritis, insomnia, diverticulosis, and allergic rhinitis. Surgical history included resection of cutaneous lesions, left knee replacement, and bilateral phacoemulsification with intraocular lens implantation. She was on multiple medications including antihypertensives, statins, deflazacort, methotrexate, pregabalin, sertraline, aspirin, levothyroxine, and anxiolytics. She presented with dysphagia and progressive reflux associated with uncontrollable cough.

Diagnostic studies revealed a giant hiatal hernia with a large portion of the gastric chamber intrathoracic, esophageal candidiasis, and mass effect on the left lower lobe with atelectasis. Chest CT scan showed residual calcified granulomas. Esophagogram confirmed hiatal hernia without evident reflux. Echocardiogram revealed severe mitral insufficiency and diastolic dysfunction; spirometry was within normal limits.

Da Vinci X robot-assisted minimally invasive correction with anti-reflux surgery and 7x10 cm Phasix mesh placement was scheduled due to high risk of complications (incarceration, obstruction, respiratory compromise). Robot-assisted laparoscopic hiatal hernia repair was performed with reduction of intrathoracic gastric content, dissection of the hernia sac, and closure of the crura. Additionally, anti-reflux surgery (Nissen fundoplication) was performed with mesh placement for reinforcement.

In the immediate postoperative period, the patient had adequate evolution with controlled pain, progressive oral tolerance, and no radiographic evidence of leak or reflux. Hospital discharge was granted at 48 hours with outpatient follow-up instructions.

Clinical Case 7

A 74-year-old female patient with a history of arterial hypertension, hypothyroidism, type 2 diabetes mellitus, dyslipidemia, obesity, chronic obstructive pulmonary disease (COPD), obstructive sleep apnea managed with CPAP, gouty arthritis, and multiple previous abdominal surgeries (hysterectomy, appendectomy, abdominal wall hernia repair with mesh placement, cystopexy, among others). She presented with chronic gastroesophageal reflux disease symptoms with long-standing heartburn and epigastric pain, partially controlled with proton pump inhibitors.

Preoperative studies included upper endoscopy, which revealed a large hiatal hernia of approximately 6 cm with Cameron erosions and antral erythematous gastritis, confirming Helicobacter pylori infection, which was previously treated. Contrast-enhanced abdominal CT scan showed a sliding hiatal hernia with approximately 30% of gastric volume passing into the mediastinum, without signs of acute complication. Colonoscopy showed no relevant findings other than uncomplicated diverticular disease.

Given the persistence of GERD symptoms and the size of the hiatal hernia, surgical management was decided. During the procedure, a large hiatal hernia with extensive hernia sac and significant migration of the stomach toward the mediastinum was confirmed. Complete reduction of hernia contents was performed, with dissection and resection of the sac, adequate identification and release of the distal esophagus and gastric fundus. The diaphragmatic crura were found in adequate condition and subsequently closed. Nissen anti-reflux surgery was then performed via laparoscopy, reinforced with biological mesh placement (Phasix®), achieving adequate reconstruction of the esophageal hiatus without tension.

The patient had favorable postoperative evolution with adequate pain control, progressive oral tolerance, and no respiratory or gastrointestinal complications. Follow-up upper gastrointestinal series demonstrated adequate contrast medium passage without evidence of leak or reflux. She was discharged without incident. In subsequent follow-ups, the patient remains asymptomatic without recurrence of reflux symptoms or clinical or radiological evidence of recurrent hiatal hernia.

Table 1: Comparison of Clinical and Surgical Data of Robot-Assisted Hiatal Hernioplasties in Seven Patients Operated at Our Center

Characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
Age (Years)	**70**	**41**	**58**	**70**	**56**	**80**	**74**
Medical history	Coronary artery disease with myocardial revascularization, chronic kidney disease, solitary kidney	Gastroesophageal reflux	Arterial hypertension dyslipidemia and gastroesophageal reflux	Severe lumbar scoliosis, upper GI bleeding, gastritis, esophagitis, and gastroesophageal reflux	Arterial hypertension and gastroesophageal reflux	Arterial hypertension, hypothyroidism, Sjögren's syndrome, rheumatoid arthritis, osteoporosis, osteoarthritis, insomnia, diverticulosis	Arterial hypertension, hypothyroidism, type 2 diabetes mellitus, dyslipidemia, obesity, COPD, obstructive sleep apnea with CPAP, gouty arthritis. Multiple abdominal surgeries, vertical gastroplasty
Upper Endoscopy Findings	Sliding hiatal hernia	Sliding hiatal hernia, grade B peptic esophagitis (Los Angeles Scale), chronic gastritis	2 cm sliding hiatal hernia with grade D peptic esophagitis (Los Angeles classification)	7 cm sliding hiatal hernia with ulcerated grade D peptic esophagitis (Los Angeles classification), multiple Cameron erosions (5-8 mm), glandular polyps (3-6 mm), mild distal peptic stricture, and antral erythematous gastritis	Sliding hiatal hernia and grade B esophagitis (Los Angeles classification)	7 cm sliding hiatal hernia with ulcerated grade D peptic esophagitis (Los Angeles classification), multiple Cameron erosions (5-8 mm), glandular polyps (3-6 mm), mild distal peptic stricture, and antral erythematous gastritis	Large hiatal hernia approximately 6 cm by sliding, with Cameron erosions. Antral erythematous gastritis. Biopsies compatible with moderate chronic non-atrophic gastritis with H. pylori infection (previously treated). No dysplastic changes or malignancy
Type of Hernia (intraoperative findings)	Hiatal hernia with 8 cm sac, 80% of stomach in mediastinum	4 cm diameter hiatal hernia, 30% of stomach in the defect	3 cm diameter hiatal hernia with gastric content in defect, abdominal wall herniosis and fibrosis	Giant 8 cm hiatal hernia with sac adherent to crura and pleura, stomach contained in hernia, abdominal wall herniosis, and thoracolumbar kyphoscoliosis deformity	3 cm hiatal hernia with elevation of gastroesophageal junction and abundant visceral fat, plus 8 mm umbilical hernia	Giant 8 cm hiatal hernia with sac adherent to crura and pleura, stomach contained in hernia, abdominal wall herniosis, and thoracolumbar kyphoscoliosis deformity	Large sliding hiatal hernia with extensive hernia sac and approximately 30% migration of gastric content to mediastinum. Hernia sac completely dissected, with adequate esophageal and gastric release. Identifiable diaphragmatic crura without severe structural defect. History of multiple abdominal surgeries with probable perihiatal fibrosis
Total surgery time	224 min	172 min	127min	174 min	148 min	257 min	100 min
Trocar placement time	8 min	7 min	8 min	8 min	5 min	8 min	8 min
Docking time	10 min	7 min	7 min	9 min	6 min	15 min	6 min
Console time	119 min	72 min	70 min	110 min	120 min	120 min	90 min
Complications	No	No	No	No	No	No	No
Immediate Postoperative Pain	2/10 (VAS)	3/10 (VAS)	0/10 (VAS)	4/10 (VAS)	8/10 (VAS)	3/10 (VAS)	2/10 (VAS)
Hospital Discharge	48 hours	48 hours	24 hours	48 hours	48 hours	48 hours	48 horas

Source: Prepared by the authors

Surgical Technique

The technique of choice was Nissen fundoplication via transabdominal approach. The patient was prepared in supine position with the head elevated 45 degrees. The Da Vinci X patient cart was positioned at the head of the bed.

Five trocars were used for this procedure: 3 robotic and 2 laparoscopic. For the placement of robotic trocars, a measurement was made from the anatomical target (hiatus), establishing a distance of 20 cm, making an incision with a cold scalpel using open technique, allowing passage of the first 8 mm trocar; pneumoperitoneum was insufflated and the robotic lens was inserted through this port. On a straight line over this port, at a distance of 8 cm on each side, the two remaining robotic ports were positioned. For the first laparoscopic port, the assistant trocar, a 12 mm accessory trocar was inserted 7 cm lateral to the left robotic trocar; for the second port, a 5 mm trocar was used at the subxiphoid epigastrium level to insert the liver retractor.

Subsequently, docking and coupling of the robotic arms were performed, placing the bipolar forceps in Arm 1, the robotic camera in Arm 2, and the Harmonic scalpel in Arm 3. To perform the Nissen fundoplication, the Harmonic scalpel was exchanged for a needle holder with scissors.

After instrument insertion, the hernia defect was identified, achieving complete reduction. Adhesion lysis was performed from the short vessels of the greater curvature and dissection of the hernia sac, with release of the left crus. The gastric fundus was identified, performing its release of adhesions on the left crus and upper pole of the spleen using Harmonic scalpel (Image 1).

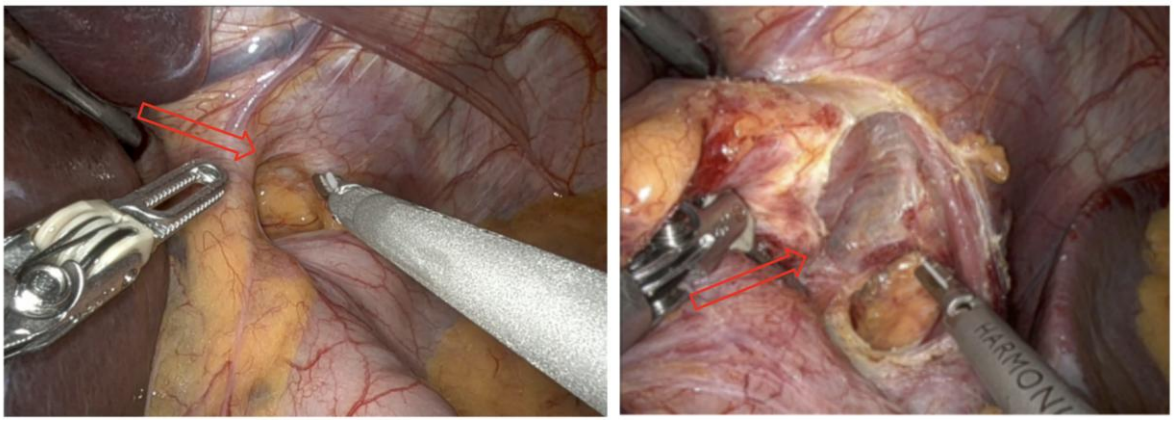

Image 1: (A) Hernia defect, (B) Hernia sac dissection and left crus release. Source: Authors' photographic registry

In the right phrenoesophageal membrane and hepatogastric omentum, dissection was performed with Harmonic scalpel, identifying the right crus while preserving the integrity of the vagus nerve. A window was created toward the lesser curvature, exposing the convergence of the diaphragmatic crura through blunt dissection and Harmonic scalpel (Image 2).

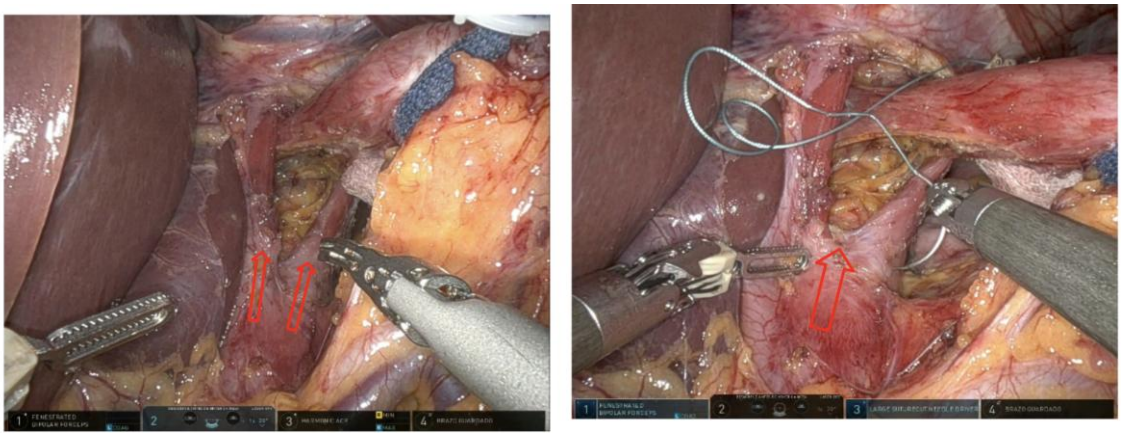

Image 2: (A) Visualization of right and left crura, (B) Diaphragmatic hiatus repair with 0/0 Ethibond. Source: Authors' photographic registry

An esophageal calibration bougie was introduced, confirming its free passage and correct calibration. For repair of the diaphragmatic hiatus, two inferior and two superior sutures with 0 Ethibond were applied using the double-pulley technique, obtaining secure closure without tension (Image 2). The shoe-shine test for passage behind the esophagus was performed with adequate results (Image 3A). Subsequently, a Nissen-type fundoplication (360°) was performed, fixing the gastric fundus to the esophagus with separate 2-0 Ethibond sutures (Image 3B). The repair was reinforced with additional suture, anchoring the stomach to the crura and diaphragmatic crus, ensuring stability of the reconstruction.

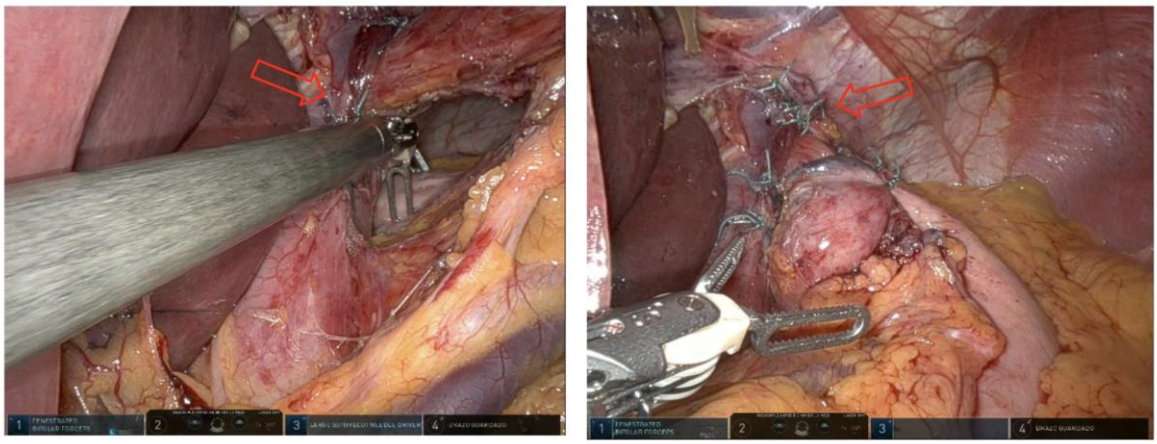

Image 3: (A) Shoe-shine, (B) Nissen-type fundoplication. Source: Authors' photographic registry

The esophageal calibrator was removed without complications, confirming adequate position of the fundoplication and absence of obstruction.

Finally, hemostasis was verified, drying the surgical field with sterile gauze, without evidence of active bleeding. The 12 mm port was closed with 0 Vicryl without incidents.

Lavage with saline solution and hydrogen peroxide was performed, followed by hemostasis review and skin closure with 4-0 Monocryl in intradermal suture, without complications.

Instruments

Three robotic arms and four robotic instruments were used: a fenestrated bipolar forceps, a needle holder with scissors, a Harmonic scalpel, and a 30° robotic lens.

RESULTS

In accordance with the literature, our patients support the benefits of minimally invasive and robotic surgery in terms of safety and postoperative recovery.

Regarding postoperative complications, various studies have reported lower rates in minimally invasive approaches (3.7% in laparoscopic surgery and 2.0% in robotic surgery vs. 8.8% in open surgery) (17,18), a finding corroborated in our series where none of our patients presented postoperative complications.

Concerning hospital stay, the evidence shows a reduced average in minimally invasive surgery (3.9 days in laparoscopic surgery, 3.44 days in robotic surgery, and 9.41 days in open surgery) (17,18), which is reflected in our patients who required a 48-hour hospital stay. Additionally, studies have demonstrated a significant decrease in intraoperative bleeding in robotic surgery (20 mL) compared to conventional laparoscopy (50 mL) (19,20), consistent with our results where no significant major intraoperative bleeding occurred in any of the procedures performed.

Various studies have reported an average docking time (coupling of the robotic cart to robotic trocars) between 24.8 and 33.2 minutes in general surgery procedures (21), which demonstrates optimal time in our patients, attributed to the training and experience of the surgical team, highlighting the importance of training in optimizing surgical times and improving these procedures.

Cost reduction is a key aspect in its viability and adoption. In our patients, we used three robotic arms responsible for dissection and repair. Studies have demonstrated that this technique not only maintains safety but also reduces costs by minimizing the use of disposable robotic instruments, representing a significant reduction in surgical expenditure of approximately 30% (22).

The use of mesh in hiatal hernia repair remains a topic of debate. While its implementation has shown a reduction in recurrence rate, the meta-analysis by Müller-Stich et al. reported a decrease in recurrences from 28.6% in simple repairs to 12.1% in mesh repairs (OR 0.32, 95% CI 0.13-0.77) (23). Despite these findings, it has not yet been established as a universal standard. In our experience, we opted not to use them in our patients.

It is important to highlight the multidisciplinary approach in the success of our patients both intraoperatively and in postoperative recovery. Specialties such as radiology and anesthesiology are equally trained to accompany us in the procedure, while disciplines such as nutrition and speech therapy contribute to optimal recovery, addressing essential aspects such as swallowing and the patient's nutritional status.

CONCLUSION

Robot-assisted hiatal hernioplasty is established as a safe, effective, and reproducible alternative for the surgical management of complex symptomatic hiatal hernias. Our initial experience demonstrates that step-by-step standardization of the surgical technique, combined with training of the multidisciplinary team, allows obtaining excellent clinical results with minimal morbidity, rapid recovery, and competitive surgical times.

Ethical Considerations: The clinical cases have informed consent from the patients, who expressly authorized the publication of clinical information and corresponding images, respecting their privacy and confidentiality at all times.

Author Contributions

Conceptualization: C.V.J.G., M.L.L.R.;

Methodology: C.V.J.G., M.L.L.R.;

Data analysis: G.A.D.A.;

Writing-original draft: G.A.D.A., M.L.L.R.;

Writing-review and editing: A.H., C.V.J.G.

Funding Source: There were no funding sources.

Conflict of Interest: None of the authors have conflicts of interest.

Informed Consent: Informed consent was obtained from patients for publication of clinical information and images.

Use of AI-Assisted Technology: A specialized language model for dialogue was used for spelling verification.

REFERENCES

[1]. Richter JE, Rubenstein JH. Presentation and Epidemiology of Gastroesophageal Reflux Disease. Gastroenterology. 2018;154(2):267-276. doi:10.1053/j.gastro.2017.07.045

[2]. Surgery for Obesity and Related Diseases: Official Journal of the American Society for Bariatric Surgery. 2013;9(6):920-924. doi:10.1016/j.soard.2013.03.013

[3]. Surgical and Radiologic Anatomy: SRA. 2012;34(4):291-299. doi:10.1007/s00276-011-0904-9

[4]. Surgery for Obesity and Related Diseases: Official Journal of the American Society for Bariatric Surgery. 2019;15(11):1949-1955. doi:10.1016/j.soard.2019.08.553

[5]. Stein J, Connor S, Virgin G, Ong DE, Pereyra L. Anemia y deficiencia de hierro en afecciones gastrointestinales y hepáticas. World J Gastroenterol. 2016;22(35):7908-7925. doi:10.3748/wjg.v22.i35.7908

[6]. Daly, S., Kumar, S.S., Collings, A.T. et al. SAGES guidelines for the surgical treatment of hiatal hernias. Surg Endosc 38, 4765–4775 (2024). https://doi.org/10.1007/s00464-024-11092-3

[7]. Katz PO, Dunbar KB, Schnoll-Sussman FH, Greer KB, Yadlapati R, Spechler SJ. ACG Clinical Guideline: Clinical Use of Esophageal pH Monitoring for Gastroesophageal Reflux Disease. Am J Gastroenterol. 2022;117(1):27–56.

[8]. Kohn GP, Price RR, DeMeester SR, Zehetner J, Muensterer OJ, Awad Z, et al.; SAGES Guidelines Committee. Guidelines for the management of hiatal hernia. Surg Endosc. 2013 Dec;27(12):4409-28.

[9]. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Guidelines for the surgical treatment of gastroesophageal reflux (GERD) [Internet]. Los Angeles (CA): SAGES; 2021

[10]. Roman S, Kahrilas PJ. Mecanismos del esófago de Barrett (clínicos): disfunción del LOS, hernia hiatal, defectos peristálticos. Best Pract Res Clin Gastroenterol. 2015;29(1):17-28. doi:10.1016/j.bpg.2014.11.002

[11]. Andolfi C, Jalilvand A, Plana A, Fisichella PM. Tratamiento quirúrgico de las hernias paraesofágicas: una revisión. J Laparoendosc Adv Surg Tech A. 2016;26(10):778-783. doi:10.1089/lap.2016.0332

[12]. Collet D, Luc G, Chiche L. Manejo de grandes hernias de hiato paraesofágicas. J Visc Surg. 2013;150(6):395-402. doi:10.1016/j.jviscsurg.2013.07.002

[13]. Tam V, Winger DG, Nason KS. A systematic review and meta-analysis of mesh vs suture cruroplasty in laparoscopic large hiatal hernia repair. Am J Surg. 2016;211(1):226-238. doi:10.1016/j.amjsurg.2015.07.007

[14]. Vasudevan V, Reusche R, Nelson E, Kaza S. Reparación robótica de hernia paraesofágica: una experiencia de un solo centro y una revisión sistemática. J Robot Surg. 2018;12(1):81-86. doi:10.1007/s11701-017-0697-x

[15]. Correa Restrepo, J. .; Morales Uribe, C. H. .; Toro Vásquez, J. P. Reparación laparoscópica De Hernia Hiatal Gigante: Técnica Quirúrgica Y Seguimiento clínico, endoscópico Y radiológico . Rev Colomb Cir 2020, 35, 32-42. https://doi.org/10.30944/20117582.580

[16]. Karikis I, Pachos N, Mela E, Saliaris K, Kitsou E, Linardoutsos D, et al. Comparative analysis of robotic and laparoscopic techniques in hiatal hernia and crural repair: a review of current evidence and outcomes. Hernia. 2024;28:1559-1569. doi:10.1007/s10029-024-03126-5

[17]. Hosein S, Carlson T, Flores L, Armijo PR, Oleynikov D. Minimally invasive approach to hiatal hernia repair is superior to open, even in the emergent setting: a large national database analysis. Surg Endosc. 2021;35(2):423-428. doi:10.1007/s00464-020-07404-y

[18]. Ma L, Luo H, Kou S, Gao Z, Bai D, Qin X, et al. Robotic versus laparoscopic surgery for hiatal hernia repair: a systematic literature review and meta-analysis. J Robot Surg. 2023;17:1879-1890. doi:10.1007/s11701-023-01636-5

[19]. Hafez J, Wrba F, Lenglinger J, Miholic J. Fundoplication for gastroesophageal reflux and factors associated with the outcome 6 to 10 years after the operation: multivariate analysis of prognostic factors using the propensity score. Surg Endosc. 2008;22(8):1763. doi:10.1007/s00464-007-9768-9

[20]. Hagen ME, Jung MK, Ris F, Morel P, Buchs NC. Early clinical experience with the da Vinci Xi Surgical System in general surgery. J Robot Surg. 2017;11(3):347-353. doi:10.1007/s11701-016-0664-3

[21]. Hagen ME, Jung MK, Ris F, Morel P, Buchs NC. Early clinical experience with the da Vinci Xi Surgical System in general surgery. J Robot Surg. 2017;11(3):347-353. doi:10.1007/s11701-016-0664-3

[22]. Müller-Stich BP, Kenngott HG, Gondan M, Stock C, Linke GR, Fritz F, et al. Use of mesh in laparoscopic paraesophageal hernia repair: a meta-analysis and risk-benefit analysis. PLoS One. 2015;10(10):e0139547. doi:10.1371/journal.pone.0139547