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EXPERIENCE IN SURGICAL TREATMENT OF ESOPHAGEAL HIATAL HERNIAS USING LAPAROSCOPIC ACCESS

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Abstract: Relevance. Diagnosis and treatment of patients with hiatal hernia (HH) are among the most pressing issues in modern medicine. The aim of this study is to present experience in the surgical treatment of hiatal hernias using a laparoscopic approach.
Materials and Methods. In the Department of Surgery at Twins Medical Center, laparoscopic interventions for hiatal hernia and GERD were performed in 67 patients between 2023 and 2025. Results: Of the operated patients, 64 (95.6%) had axial hiatal hernia (type I), 2 (2.9%) had paraesophageal hiatal hernia (type II), and 1 (1.5%) had mixed hiatal hernia with a shortened esophagus. Crurorrhea was performed in 100% of patients: posterior in 60 (89.6%), anterior in 2 (2.9%), combined in 5 (7.5%), and alloplasty in 6 (8.9%) patients. Laparoscopic fundoplications were performed: Nissen in 46 (68.7%), Dor in 7 (10.4%) patients underwent laparoscopic fundoplication, and 14 (20.9%) patients underwent Toupet's method. Fundodiphragmopexy was performed in 61 (91.0%) patients. Simultaneous surgical interventions were performed in 5 (7.4%) patients, and conversion occurred in 1 (1.4%). There were no deaths after surgery.
Conclusions. The study results demonstrate the high efficacy of the laparoscopic approach in the surgical treatment of patients with hiatal hernia.

Keywords: hiatal hernia; gastroesophageal reflux disease; laparoscopic fundoplication

Introduction

Hiatal hernias (HH) and gastroesophageal reflux disease (GERD) are among the most common conditions in modern gastroenterology, ranking second or third among gastrointestinal diseases and competing with such conditions as chronic cholecystitis and gastric ulcers and duodenal ulcers [1]. HH play a leading role in the development of lower esophageal sphincter (LES) failure and pathological gastroesophageal reflux [2]. The incidence of HH ranges from 3 to 33%, reaching 50% in the elderly. HH account for 98% of all diaphragmatic hernias, and in 50% of cases, they cause no clinical manifestations and, therefore, go undiagnosed [3]. Despite advances in esophageal surgery, this area remains one of the most challenging [4, 5].

Conservative antireflux therapy (proton pump inhibitors, prokinetics, antacids) is symptomatic, improves the patient's quality of life, and does not address the underlying causes of the disease—hiatal hernia and esophagocardial insufficiency [1, 6].

Drug therapy provides a good response in 90–95% of patients, but after drug therapy, relapse occurs in 80–100% of cases [7]. This circumstance leads to chronic gastroesophageal reflux, as well as the development of severe complications (Barrett's esophagus, peptic ulcer, esophageal adenocarcinoma, esophageal strictures, and esophageal perforations). Since one of the causes of this disease is LES failure with prolapse of the gastric mucosa through the esophageal hiatus of the diaphragm, and sometimes the fundus and body of the stomach, the only radical method to eliminate gastroesophageal reflux and restore LES function is surgical intervention [1, 8, 9].

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The American Association of Endoscopic Surgeons (SAGES) guidelines regarding the surgical treatment of GERD demonstrate the positive effect of laparoscopic fundoplications in 85–93% of patients in whom drug therapy has proven ineffective [10].

The main goal of antireflux surgical interventions is the correction of anatomical and physiological abnormalities, relocation of the LES to its normal anatomical location in the abdominal cavity, and mechanical improvement of the cardia through fundoplication and crurorraphy [1, 2]. Surgical correction of hiatal hernia with reflux esophagitis is aimed at eliminating the diaphragmatic hernia, restoring the lower esophageal sphincter, restoring the angle of His, ensuring free antegrade passage of food, preserving an intra-abdominal portion of the esophagus of 2 cm or more in length, and maintaining physiological esophageal tension [2].

Many methods have been proposed for performing these surgical procedures, including both open and laparoscopic approaches. A priority worldwide is the use of minimally invasive procedures, which significantly reduce surgical trauma, surgical duration, and the incidence of surgical complications [11, 12].

The low morbidity of the procedures, the possibility of performing simultaneous surgeries, and short rehabilitation periods make minimally invasive antireflux procedures the treatment of choice for virtually all hiatal hernias. Endosurgical technologies such as laparoscopic fundoplication and laparoscopic hiatoplasty are rapidly replacing traumatic laparotomy techniques and are rightfully becoming the gold standard for the surgical treatment of hiatal hernia and gastroesophageal reflux disease (GERD) [1]. The widespread use of laparoscopic surgical interventions for GERD and hiatal hernia allows us to evaluate their effectiveness, taking into account the results of numerous studies over the past 20 years [2, 13]. One option for improving treatment outcomes is to consider the functional characteristics of the esophagogastric junction and the mechanisms of LES function during antireflux surgery [4, 14]. However, despite the accumulated experience of laparoscopic interventions on the esophagus and stomach, many publications have appeared on serious intra- and postoperative complications. The most severe of these include esophageal pressure ulcers, prosthesis migration, esophageal and gastric perforations, disease recurrence, etc. [1, 15–17]. Therefore, the development of the most effective and safe techniques for laparoscopic surgical interventions on the esophagus and stomach remains highly relevant.

The aim of the work: to present the experience of surgical treatment of esophageal hernias of the diaphragm using a laparoscopic approach.

Materials and Methods

In the Department of Surgery at TWINS MEDICAL CENTER, between 2023 and 2025, laparoscopic interventions for hiatal hernia and GERD were performed on 67 patients, including 39 (58.2%) women and 27 (41.8%) men. The average age was 43.2 ± 12.6 years and the average weight was 67.5 ± 9.4 kg.

If hiatal hernia was suspected, patients underwent a fibrogastroduodenoscopy (FGDS) with a visual assessment of the mucosa of the esophagus, stomach, and duodenum, with biopsy specimens and gastric juice sampling for analysis (pH, ssessment of defense and aggression factors). FGDS was performed using Olympus HQ-190 HD and Olympus XQ-40 (Japan) gastroscopes. The condition of the epithelium and the degree of esophagitis were determined according to the Los Angeles classification (1996):

— Grade A — one (or more) mucosal lesions less than 5 mm, limited to a mucosal fold;

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— Grade B — one (or more) mucosal lesions greater than 5 mm, limited to a mucosal fold;
— Grade C — one or more mucosal lesions extending over two or more mucosal folds but occupying less than 75% of the esophageal circumference;
— Grade D — one or more mucosal lesions extending over 75% or more of the esophageal circumference.
If pathological changes were detected, biopsies were taken to clarify the diagnosis, and macroscopic signs of mucosal inflammation and their severity were assessed. Inflammation (hyperemia, edema) was graded according to its severity:
0 — no signs, 1 — minimal,
2 — moderate, 3 — severe.
X-ray examination of the esophagus, stomach, and duodenum was performed using contrast, which allowed for evaluation of esophageal peristalsis, changes at the esophagogastric junction, and detection of hiatal hernia (additional multipositional examination was used). Esophageal manometry was used to study the motor function of the esophagus and its sphincters. The studies were performed using the original MNH-01 device for studying gastrointestinal motility (patent No. 923521, "Device for Studying the Motility of a Biological Object," published April 30, 1982, Bulletin No. 16 and Design Certificate No. 12575), manufactured by Ukrainian Medical Systems.
Patients for laparoscopic surgery were selected based on the following indications and contraindications. Indications for laparoscopic surgical interventions for hiatal hernia:
— Hill types I, II, and III hiatal hernia, including GERD;
— patients capable of undergoing elective laparoscopic esophageal hiatus repair of the diaphragm (American Society of Anesthesiologists surgical risk grades I–III);
— age 20 to 70 years;
— body mass index (BMI) 17–38 kg/m²;
— esophageal motor impairment (a visual analog scale (VAS) score of more than 4 points for dysphagia and a fluoroscopy contrast transit time of more than 10 seconds for the esophageal transit time);
— without concomitant esophageal pathology, such as
peptic esophageal strictures, esophageal diverticula, non-reflux chronic esophagitis, connective tissue diseases (systemic scleroderma), previous ablation of Barrett's esophagus, recurrent peptic ulcer disease with impaired gastric emptying, significant shortening of the esophagus (intraoperative criterion).
Contraindications to laparoscopic surgery for hiatal hernia:
— age over 70 years;
— severe somatic diseases that significantly increase the risk of surgery (heart failure of functional class III-IV, liver cirrhosis, liver or kidney failure, etc.);
— pregnancy;
— severe coagulation disorders;
— oncological diseases

Results and Discussion

Among the operated patients, 60 (88.1%) were diagnosed with axial hiatal hernia (type I), 7 (10.4%) with paraesophageal hiatal hernia (type II), and 1 (1.5%) with mixed hiatal hernia with a shortened esophagus.
According to the method of Granderath et al. [18], which is based on measuring the area of the esophageal orifice of the diaphragm (EOHD), we were guided by the principle of

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dividing hiatal hernias into small (EOHD less than 10 cm2), large (EOHD 10–20 cm2), and giant (EOHD greater than 20 cm2). The principles of surgical correction that guided us in antireflux surgical interventions are as follows:

1. Mobilization and lowering of the abdominal esophagus, eliminating its shortening and excision of the hernial sac. Mobilization of the cardiac portion and fundus of the stomach with division of the gastrodiaphragmatic ligament and, partially, the gastrosplenic ligament with the short gastric arteries, which results in the emergence of a free retroesophageal window.
2. Performing crurorraphy: anterior, posterior, combined (depending on the size of the dilated esophageal opening of the diaphragm) (Fig. 1). This is performed after complete mobilization of the crura of the diaphragm and the abdominal esophagus with correction of its shortening and excision of the hernial sac. Application of 1-3 interrupted sutures with non-absorbable Ethibond 3-0 (Ethicon) material.
3. Performing fundoplication using the Nissen, Toupet-Pocket, and Nissen-Rosetti techniques (Fig. 2).
4. Performing a fundodiaphragmopexy—the fundoplication cuff was fixed to the crura of the diaphragm, preventing it from dislocating into the chest cavity.
5. In cases of large dilation of the esophageal opening of the diaphragm (the area of the esophageal opening of the diaphragm is greater than 10 cm2)—use of a triangular Ultrapro mesh graft (Ethicon), measuring 3 x 4 cm, fixed to the crura of the diaphragm behind the esophagus on both sides with three interrupted sutures using non-absorbable Ethibond 3-0 (Ethicon). Then, 2-3 sutures are placed on the crura of the diaphragm until the graft is completely closed. The graft is completely isolated from the esophagus and placed behind the crura of the diaphragm. Crurorrhea was performed in 100% of patients: posterior in 60 (89.6%), anterior in 2 (2.9%), combined in 5 (7.5%), and alloplasty in 6 (8.9%). Laparoscopic fundoplications were performed:

Conclusions

Laparoscopic antireflux surgeries are highly effective in the treatment of hiatal hernia, are well tolerated by patients, and have a low complication rate, making them the surgical option of choice for this condition. This is due to the restoration of the anatomical antireflux mechanisms that ensure the closure of the gastroesophageal junction. The choice of surgical intervention for hiatal hernia is determined by the anatomical relationships and the goal of restoring the gastroesophageal junction and diaphragm.

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