EXPERIENCE OF LAPAROSCOPIC SURGICAL TREATMENT OF PARAESOPHAGEAL HIATAL HERNIAS

Ismailov U.S., Yakhubov I.Y., Ismailov M.U., Atajanov T.Sh.
Department of General Surgery, Tashkent State Medical University, Tashkent, Uzbekistan.
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Objective: To present our experience with laparoscopic surgical treatment of paraesophageal hernias of the diaphragmatic hiatus.

Materials and Methods: Between 2023 and 2025, nine patients with paraesophageal hernias containing at least 50% of the stomach were operated laparoscopically at Twins Medical Center. During the preoperative examination, a set of generally accepted methods included magnetic resonance imaging of the diaphragm and lower esophageal sphincter manometry.

Results. Laparoscopic surgical treatment consisted of complete excision of the hernia sac, cruroraphy, prosthetic repair of the diaphragmatic crura for hernia defects in the diaphragm greater than 4 cm2, followed by peritonization of the mesh with a fragment of the hernia sac, and fundoplication. Fundoplication was not performed in the patient with a colonic paraesophageal hernia. The average operative time was 110 minutes. There were no intraoperative, early, or late postoperative complications.

Conclusions. Laparoscopic surgical treatment of paraesophageal hernias is a safe method, but some details and surgical technique remain a subject of debate.

Keywords: Paraesophageal hernia, mesh, fundoplication, laparoscopic surgery.

Introduction

Despite more than twenty years of laparoscopic interventions in the surgery of hernias of the esophageal orifice of the diaphragm, many issues remain relevant to this day [4, 5].

Currently, there is no doubt that the optimal method for correcting a hernia defect is suturing the crura of the diaphragm behind the esophagus with the formation of a Nissen-type cuff from the previously mobilized fundus of the stomach [5]. If, in the case of sliding hernias, the adequacy of defect closure is determined primarily by the quality of the cuff formation and the sutures between the crura of the diaphragm, then in the case of paraesophageal hernias, the implementation of these conditions is often insufficient. This type of hernia, characterized by a large number of complications and high mortality [15], also causes significant difficulties in isolating the hernial sac, one of the walls of which, As a rule, the proximal part of the stomach is the most important [18]. The most important task remains the closure of a significant hernia defect, the majority of which is located anterior to the esophagus. Plastic surgery with local tissues is fraught with fraying of the diaphragmatic crura and failure of the applied sutures [11]. Thus, surgical treatment of paraesophageal hernias is accompanied by a significantly higher recurrence rate compared to sliding hernias [6]. It is curious that the first hernia of the esophageal opening of the diaphragm, described in autopsy material by the Italian anatomist Giovanni Battista Morgagni, was paraesophageal [16], which is probably due to the clear clinical and pathological picture of this disease.

Materials and Methods

At Twins Medical Center in 2023–2025. Nine laparoscopic surgeries were performed on patients with paraesophageal hernias of the diaphragmatic orifice. Among the patients, there were 6 women and 3 men, with an average age of 61 years and an average weight of 67.5 kg. Two patients were admitted to the abdominal surgery department on an emergency basis with symptoms of intestinal obstruction; in one of them, strangulation of the contents of the hernial sac was detected during laparoscopy. The remaining patients underwent elective surgery for paraesophageal hernia. During the preoperative examination, a thorough collection of anamnesis and complaints was performed. Only 6 patients had complaints of heartburn and sour belching for several years prior to admission. The patient with a strangulated paraesophageal The patient had a history of hernia and had previously experienced periodic attacks of chest pain. Complaints of dysphagia, cough, or hoarseness were not observed in any patient. Patients admitted to the department urgently had similar symptoms upon admission: repeated profuse vomiting and moderate abdominal pain. In two patients, a paraesophageal hernia was discovered incidentally during a routine examination and was asymptomatic. Instrumental examination methods before surgery included a plain radiograph of the abdominal cavity and chest, radiocontrast examination of the esophagogastric junction, water perfusion manometry of the esophagus with measurement of lower esophageal sphincter pressure, fibrogastroscopy, and magnetic resonance imaging of the diaphragm (Fig. 1, 2).
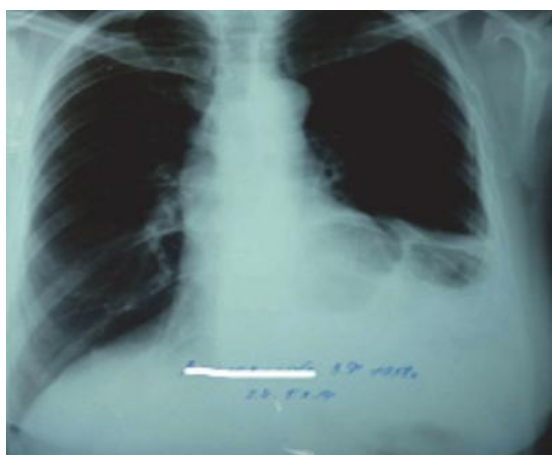

Fig. 1. Plain chest radiograph: heterogeneous darkening of the left lung field with clear areas of clearing with clear contours – a loop of the transverse colon in the posterior mediastinal cavity


Fig. 2. X-ray contrast study of the esophagogastric junction in case of an antral paraesophageal herniacolon in the posterior mediastinal cavity

MRT of the diaphragm was performed in cases where diagnosis was difficult, as well as to measure the hernia defect in the diaphragm and select a cruroplasty method (Fig. 3).

According to FGDS data, patients with intestinal obstruction showed an enlarged stomach with a large amount of stagnant contents. Reflux esophagitis grades 1–2 according to Savary-Miller occurred in 6 patients.

a

б
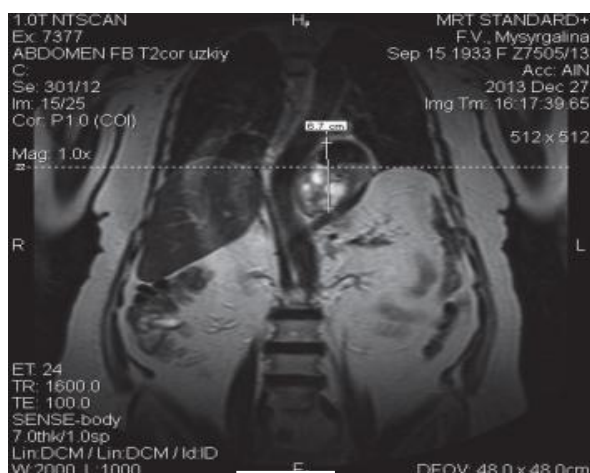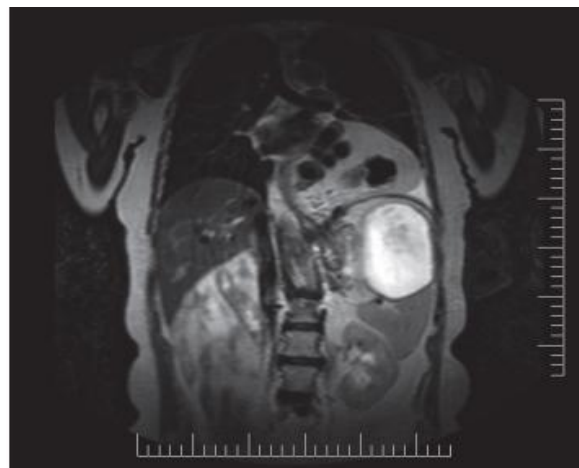
Fig. 3. MRI of the diaphragm and upper abdominal organs: a – a mass lesion in the region of the left costophrenic angle, measuring 11.0 x 11.5 x 10.9 cm, with hypointense, rounded, confluent inclusions – a loop of the transverse colon along with the greater omentum.

Image (b) clearly shows a prolapse of the fundus of the stomach 6.7 cm above the esophageal opening of the diaphragm, diffuse contrast accumulation in the altered gastric wall, measuring 8.0 x 5.8 x 5.6 cm, and the esophageal opening measuring 5.1 x 3.3 cm.

All patients underwent surgical procedures: herniotomy, posterior or anterior cruroraphy, cruroesophagoplasty, and diaphragmocruroplasty. In cases where the area of the hernial defect in the diaphragm exceeded 4 cm2, prosthetic diaphragmocruroplasty with peritonization of the mesh implant was performed. For esophageal opening sizes less than 4 cm2, diaphragmocruroplasty was performed using local tissues. Fundoplication was performed on all patients, regardless of the initial state of esophageal motility, except for the patient with a colonic paraesophageal hernia.

In all cases, the esophagogastric junction was located in the area of the esophageal opening of the diaphragm, and the esophagus was of sufficient length.

Short gastric vessels in the area of the proximal part of the fundus of the stomach were transected using an ultrasonic scalpel.

A symmetrical cuff was formed on the anterior wall of the esophagus from the anterior and posterior walls of the stomach and secured with three interrupted sutures. The cuff length did not exceed 2 cm. The third suture secured the cuff to the right crus of the diaphragm to prevent cuff slippage and migration into the chest in the postoperative period. In a patient with a colic paraesophageal hernia, taking into account the normal position of the esophagogastric junction, stomach, and the preservation of an acute angle of His, It was decided not to perform a fundoplication. Due to technical difficulties due to tension, interrupted sutures were placed on the crura of the diaphragm anterior and posterior to the esophagus. Then, for a hernial defect in the diaphragm greater than 4 cm2 (7 patients), a rectangular mesh implant measuring 6 x 11 cm was placed on the de-fibered fibers of the diaphragm at some distance from the esophagogastric junction and fixed with a hernia stapler around the perimeter (Fig. 4). In six cases, a lightweight porous composite mesh was used. In the patient with an incarcerated hernia, the surgery was performed in an emergency operating room using an available polypropylene mesh implant, which is not critical due to subsequent peritonization of the mesh.

a   б

Fig. 4. a. Mesh implant over sutured diaphragmatic crura; b. Fixation of the hernia sac to the diaphragm over the mesh.

There were no intraoperative, early, or late postoperative complications. The average operative time was 110 minutes.

The average hospital stay after surgery was 7 days. There were no complaints of heartburn or dysphagia in the early postoperative period. On the 7th postoperative day, a control X-ray contrast study of the esophagogastric junction was performed.

RESULTS AND DISCUSSION

From 3 to 6 months after surgery, patients' quality of life was assessed using the specialized GIQLI questionnaire, which consists of 36 questions and includes sections on gastrointestinal symptoms, emotional status, physical functions, social functions, and the stress factor of medical intervention. On average, the quality of life was 118 points, which corresponds to the healthy person's quality of life index [14].

In 1992, the first laparoscopic surgery for giant paraesophageal hernia was performed, but to date, surgeons have not reached a consensus on the optimal method of laparoscopic treatment [8, 18].

Attempts have been aimed primarily at lowering the stomach into abdominal cavity and did not involve complete isolation of the hernial sac, were accompanied by a high number of complications, with a conversion rate of 50%. Apparently, this is due to the late realization by surgeons that the posterior wall of the hernial sac is the proximal part of the stomach [8, 19].

In the last 10 years, surgical activity in this area has increased significantly [13], the mortality rate is less than 0.5%, and patients are most often often elderly and have concomitant somatic pathology [10].

One of the problems is the plastic surgery of the hernial orifice in giant paraesophageal hernias, when, due to the large area of the hernial defect in the diaphragm, the tension between the crura is aggravated by their dystrophy; in this case, reliable cruroraphy is hardly possible.

Sutures placed on The frayed crura of the diaphragm erupt, which ultimately leads to hernia recurrence. According to the literature, the recurrence of paraesophageal hernia when

performing cruroraphy to eliminate the hernial orifice without implantation of a mesh prosthesis is 42% [11].

However, numerous life-threatening complications have been described with the use of synthetic mesh materials in the esophagogastric junction. Among them: erosion of visceral organs [2], migration of the mesh into the lumen of the esophagus [12], migration of the mesh into the lumen of the aorta with the development of bleeding [17], pseudoachalasia of the esophagus [3], and others. Moreover, according to some foreign authors, scarring processes, which intensify with the reaction of body tissues to foreign material, significantly complicate Repeated intervention in case of hernia recurrence.

Clear criteria for classifying paraesophageal hernias based on the surface area of the esophageal opening of the diaphragm (PEOD) have not been developed. V. V. Grubnik suggests calling hernias with a PEOD of <10 cm2 small hernias and performing only cruroraphy.

With a PEOD of 10 to 20 cm2, hernias are considered large and cruroraphy is performed in combination with prosthetic mesh repair. With a PEOD of more than 20 cm2, hernias are called giant and only alloplasty is performed [1].

In our case, with a hernial defect area in the diaphragm greater than 4 cm2, prosthetic diaphragmocruroplasty was performed. Peritonization of the mesh prosthesis with a fragment of the hernial sac left on the anterior esophageal wall, avoids postoperative complications associated with the interaction of abdominal organs and the mesh, namely: adhesions in the abdominal cavity, erosion of the gastric wall, erosion of the small intestinal wall, and mesh migration into the lumen of the esophagus or stomach.

Considering the absence of reflux symptoms before surgery in a patient with a colonic paraesophageal hernia, fixation of the stomach under the diaphragm, and the preservation of an acute angle of His, it was decided not to perform mobilization of the fundus of the stomach and fundoplication. However, according to some foreign authors, manipulations in the area of the esophagogastric junction can cause reflux symptoms even in the absence of such before surgery [7].

CONCLUSIONS

Laparoscopic surgical treatment of large paraesophageal diaphragmatic hernias is an effective and safe treatment method. For esophageal openings greater than 4 cm2, the optimal method is to reinforce the sutures between the crura of the diaphragm with a rectangular mesh implant and peritonize the latter with a fragment of the hernial sac.

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