



LAPAROSCOPIC REPAIR OF MORGAGNI HERNIA – A PROSPECTIVE SINGLE-CENTER EXPERIENCE

General Surgery

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ABSTRACT

Morgagni hernia occurs after a congenital retrosternal diaphragmatic defect; it is a rare form of diaphragmatic hernia (1-3% of cases). In general, this pathology is diagnosed in children; in adults it is frequently discovered in emergency or incidentally.

Methods: We prospectively evaluated a series of 6 patients admitted to department of surgery IGIMS.

Results: Out of 6 patients the laparoscopic approach was used in all cases: one conversion was recorded due to the tight adherences of the herniated viscera (gastric, colon, epiploon). In 4 cases, the surgical cure of hernia was performed by suture and in 2 cases with prosthesis: dual mesh in one case and polypropylene mesh in another case. We did not register morbidity and the mean postoperative stay was 4 days (range 2-6 days).

Conclusions: Hernia Morgagni betrays a rare pathology. The most common is asymptomatic but in complicated cases it is a cause of acute surgical abdomen. Surgical treatment is indicated even for asymptomatic cases due to serious complications Morgagni hernia may develop. The laparoscopic approach is ideal, as reduction of viscera in the abdomen is easy and the defect will be repaired by suturing or using a prosthesis, depending on its size.

KEYWORDS

Morgagni hernia, diaphragmatic hernia, laparoscopic approach

INTRODUCTION

Congenital diaphragmatic hernias (CDH) are rare congenital defects. There are some different types; Bochdalek hernia, Morgagni hernia, and esophageal hiatus hernia, described with case presentations. Bochdalek hernia is the most common type of congenital diaphragmatic hernia. Antero-medial or Morgagni hernia is the least common variety, accounting for only 1–3% of all diaphragmatic hernias [1–3]. It is caused by a defect in the retrosternal region of the diaphragm and is considered to occur due to failure of fusion in the anterior part of the pleuro-peritoneal membrane and deficiency in the process of muscularization [4].

Morgagni hernia is congenital. However, there were some patients that had previous normal radiography suggesting that these hernias may be acquired through a congenital diaphragmatic defect [5]. Morgagni hernia is more common on the right side, at the level of the seventh rib on either side of the xiphoid, in a space where the superior epigastric vessels pass; defects may also occur on the left, at the midline, or bilaterally; that on the left side is referred to as Larrey hernia [6].

From one-third to more than half of patients are asymptomatic. These patients may be found incidentally when a chest X-ray undertaken for investigating unrelated problems. Although MLH is most frequently diagnosed in neonates and children, the hernia can remain undiagnosed until adulthood, due to unspecific symptoms or if the patients are not compromised [1, 4]. Nevertheless, diagnosis and treatment of MLH in adult patients are relatively uncommon and rare. In the current literature, the frequency of right-sided (Morgagni) retro-costoxiphoid hernias in children is the highest with approximately 90%, followed by bilateral MLH (8%) and left-sided (Larrey) retrocosto-xiphoid hernias (2%), respectively [2, 3].

MATERIALS AND METHOD

Patients And Study Design

We prospectively studied the patients diagnosed with Morgagni hernia, admitted to the IGIMS department of Surgery, between August 2019–January 2021. The patients who accepted the surgical intervention and signed informed consent and had no major contraindications of surgical treatment were treated as a first intention by laparoscopic approach. Immediate and late results were analyzed to verify the safety of the laparoscopic approach. All further patients admitted in our department with confirmed Morgagni hernia were included in the study.

Exclusion Criteria-

1. Patients who underwent isolated hiatal hernia repair, posterior, lumbo- costal diaphragmatic (Bochdalek) hernia repair as well as posttraumatic hernia repair with trauma being the underlying cause for hernia development.

2. Patients who didn't give consent.

Statistical Analysis-

Mean outcome parameters we focused on were symptoms of the patients, indication for surgery, the surgical technique, use of mesh devices for augmentation, operation time and postoperative stay on intensive care unit (ICU) as well as total postoperative in-hospital stay. Patient data and patient characteristics were evaluated retrospectively from the prospectively maintained institutional database.

Statistical analysis was performed using GraphPad Prism (Version 5.00 for Windows, GraphPad Software, San Diego California USA, www.graphpad.com). Data was analyzed using Fisher's exact or Pearson's χ^2 test for categorical data in cross-tabulation. Data are given as median and range; p values ≤ 0.05 were considered to indicate statistical significance.

Surgical Technique

The patient was placed in a reverse Trendelenburg position with the legs apart and the operating surgeon seated between the legs. A Foley's catheter was inserted after general anesthesia.

A 12-mm trocar was placed above the umbilicus with pneumoperitoneum established by Hasson's technique using carbon dioxide (CO₂). One 5 mm trocar was placed in the right upper quadrant with another 5-mm trocar inserted into the left upper quadrant. A 12-mm working trocar was positioned in the epigastrium. The falciform ligament was divided for the access to the diaphragmatic defect. Hernia sacs were excised and resected as the standard in all patients. The diaphragmatic defect was closed primarily with thick, non-absorbable, interrupted sutures. We used mesh reinforcement after the primary suture hernia repair in all patients reported in this retrospective study (although, in hiatal hernia repair we use mesh augmentation depending on the size of the hernia). The size of the mesh was considered to overlap the repair site approximately at 3–5 cm beyond the edge of the defect. Single sutures or endo-staplers are used for fixation of the mesh.

RESULTS

Between Aug 2019 and Jan 2021, 6 patients were admitted to our hospital, mainly women (5 women and one male), aged between 50–70 years old, with an average age of 65.87 years (Table 1).

All 6 patients were operated on laparoscopically. In 1 case the colon in the hernia sac was severely adherent requiring conversion. Obesity (present in 4 patients) was a contributing factor to the pre-existing parietal defect. Clinical signs were predominantly abdominal (pains, nausea, vomiting, transit disorders) present in 4 patients, plus chest signs (dyspnea, cough) in the case of 2 patients. Significant changes

found on chest X-ray (Fig. 1), front and profile (3 out of 6 cases), abdominal ultrasound (4 out of 6 cases), and all CT cases (Fig. 2). The hernia was located in 5 of 6 cases at the right of the xiphoid appendix (Fig. 3). The size of the hernial defect was between 5 and 10 cm, averaging 7 cm. The most common herniated organ was the greater omentum (5 cases) associated with the transverse colon (4 cases), and the stomach (1 case). The defect was sutured with separate non-absorbable threads in 4 cases with a defect below 8 cm and prosthesis with dual prosthesis in 2 cases where the diameter of the diaphragmatic defect was over 8 cm (Fig. 4 and 5). The sac was resected in 4 of the 6 cases that were operated on. The duration of the intervention was on average 65 minutes. Postoperative stay was on average 3 days for laparoscopically completed cases and 7 days for those who were converted to open surgery.

Sex Age	Morgagni hernia site	Complications	Main symptoms/signs			Imaging suggestive for Morgagni hernias			
							Ultrasound scan	CT scan	Radio logic features suggestive for MH
			Asymptomatic	Thoracic symptoms	Abdominal symptoms	Associate diseases		Size cm	Size cm
1 F	50	Right	-			Pain, nausea	Obesity	Y+/13/9	Y+/11/8
2 M	59	Right	irreducible			Pain, nausea	Obesity, HTA	Y/+	N-/8/4
3 F	69	Right	irreducible	Incidental finding (cholecystectomy)	+	Pain, nausea	Obesity, FA,CC	Y/-	N-/Y/--
4 F	59	Left	-			Pain, Dyspepsia	Obesity, CC	Y/+	Y/+Y/-+
5 F	70	Right	-		+	Pain, nausea		Y/+	Y+/10/9Y+/13/7
6 F	65	Right	-			Pain, nausea	Obesity	Y/+	N-/Y/--



Figure 1. Morgagni hernia - chest radiography: paracardiac right, opacity of medium intensity projected anterior in the costo-diaphragmatic sinus, large, homogeneous, 90/80 mm

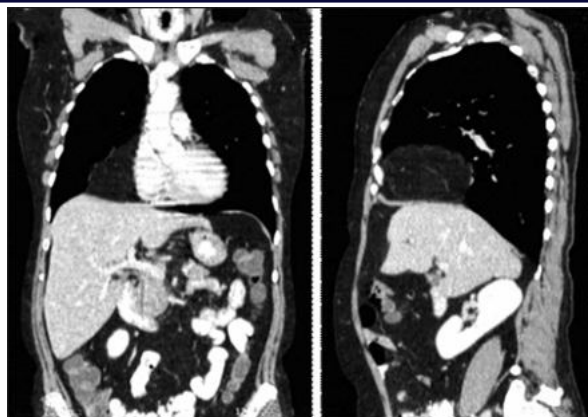


Figure 2. Morgagni hernia – CT: mass 110 x 80 mm, precisely defined, homogeneous, containing the falciform ligament and gastro-colonic epiploon, anterior located in the lower and middle mediastinum, compressing the adjacent pulmonary parenchyma



Figure 3. Morgagni hernia - intraoperative view after repair.

DISCUSSION

The congenital defect of the diaphragm leading to MLH is most commonly a condition in pediatric patients [4]. Only a minority of diaphragmatic hernias in adults are congenitally originated MLHs, thus surgery for MLH is rarely performed even in high volume centers. The whole evidence regarding incidence, clinical symptoms, diagnosis and treatment is only based on single case reports and small retrospective case series as well as single surgeon's or single institutional experiences. In their literature review Horton et al. summarized 298 adult patients suffering from MLH published in 135 articles during a period of 55 years [4]. HM is produced by a defect resulting in the anterior diaphragm, between the transverse septum and its costal insertion. The diaphragmatic defect is more often on the right between the xiphoid and the 7th rib, where the upper epigastric vessels pass (90%); but it may also be on the left. This happens rarely (2%) because the pericardial sac covers the defect (Larey hernia), or bilaterally (8%) (8). In the case of children, Morgagni hernia is more common in boys. In the case of adults, women are more predisposed, as in our group. In adults, even the elderly, HM is incidentally discovered (81 asymptomatic cases published), imagistically or intraoperatively; or in the case of complications (2%) (intestinal or colon intestinal occlusion, gastric volvulus, large epiploon incarceration) (9, 10). In 50% of cases, predisposing factors are encountered: obesity, multiparity, chronic obstructive pulmonary disease, constipation (11). Symptomatic cases were found in patients with non-specific gastrointestinal and respiratory signs after CT (gold standard) investigation. Adult clinical signs are more common (dyspepsia)(12) than in our cases.

The signs, also in the case of children, are respiratory (56.5%), gastrointestinal (19%), or combined (6.8%); The diagnosis is determined by chest x-ray, ultrasound, CT (6). Diagnosis can also be performed prenatally. In adults, the diagnosis is late because most of the symptoms are gastrointestinal (gastric pain, nausea, vomiting) and cardiopulmonary (palpitations, cough, dyspnea). In an emergency, the clinical picture suggests an occlusive syndrome (the herniated organ is usually the transverse colon) or very rarely peritoneal (through the bowel perforation following necrosis) or the incarceration of the large epiploon. Rarely the clinical picture suggests pyloric stenosis (13).

Differential diagnosis includes pneumonia, pulmonary atelectasis, diaphragmatic eventration, mediastinal lipoma, liposarcoma, abscess, pleuropericardial cyst, thymoma, pleural mesothelioma, diaphragmatic tumors or cysts, anterior thoracic wall tumors (14).

In 50% of adult cases a number of predisposing factors were identified: obesity, multi-parity, chronic obstructive pulmonary disease, constipation. In our series, obesity was encountered in six out of eight patients. Morgagni hernia usually has a sac. The preexistence of a congenital diaphragmatic defect, in the conditions of abdominal hyperpression, forces the viscera to penetrate into the sac: large epiploon, colon, stomach, liver (in child), or other viscera. Treatment of Morgagni hernia, once diagnosed, is surgical to prevent complications (15,16). Until 1980 only the symptomatic forms were operated on. Anesthetic problems occur in the case of children and the elderly (17,18).

The approach can be abdominal (classic or laparoscopic) or thoracic (classic or thoracoscopy). The abdominal approach is preferred because: easy reduction of herniated viscera allows diagnosis of bilateral forms and treatment of associated diseases. It is indicated in complicated forms. The thoracic approach, can not evaluate bilateral forms and requires pleural drainage. Laparoscopy is today preferred (19,20). The first laparoscopic intervention was reported in 1992 by Kuster.

G.G.R. (21), while the first laparoscopic repair was performed by St. Georgescu in Iasi (16). Laparoscopy allows a very clear assessment of the defect, allowing the wall to be restored by suture (in the case of a defect that is less than 6 cm) or the use of a prosthesis (defect over 7 cm) (21, 22). Dual meshes are recommended. The sac may be excised or may be left in place (23). Excision of the sac can cause pneumothorax and circulatory and respiratory complications and can damage the pericardial or other mediastinal structures.

The laparoscopic approach becomes a gold standard, even in the case of children. An alternative solution to standard laparoscopic treatment is percutaneous suture of the diaphragmatic defect using a single umbilical trocar (24,25). The first case operated with the Da Vinci robot was reported (26). Advantages of laparoscopy are well-known: short operative time, fewer postoperative analgesics, rapid recovery, short hospitalization and positive cosmetic aspect. The relapse rate is below 2%, especially in the case of large defects, when is not tension free (27,28).

CONCLUSION

Morgagni hernia is a rare adult pathology. The most common form is asymptomatic, but in complicated cases it can even be the cause of acute surgical abdomen. Diagnosis is based on imaging methods (chest X-ray, CT, MRI). Surgical treatment is indicated even for asymptomatic cases due to serious complications to which it may evolve otherwise. The laparoscopic approach is ideal due to its benefits as it is a minimally invasive approach. Reducing the viscera in the abdomen is easy; the hernial sac is generally excised if there are no risks, and the defect will be repaired, depending on size, by suture or using dual prosthesis.

Conflicts of interest

No conflict of interest.

Author's contributions

All have equal contributions.

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