MORGAGNI CONGENITAL DIAPHRAGMATIC HERNIA IN A 7-MONTHS-OLD BOY. A CASE REPORT

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MORGAGNI CONGENITAL DIAPHRAGMATIC HERNIA IN A 7-MONTHS-OLD BOY. A CASE REPORT. (Abstract): Congenital diaphragmatic abnormalities occur in 1/2000 to 1/4000 births. Congenital diaphragmatic hernias are relatively common, with a majority forming posterolaterally through the foramen of Bochdalek. The incidence of Morgagni hernia is about 2% from all the others diaphragmatic hernias. Patients are usually asymptomatic and cases are discovered incidentally from a chest or an abdominal radiograph undertaken for unrelated reasons. Surgical correction is recommended in all cases to avoid the risk of complications, especially bowel strangulation. We present a rare case of a 7 months-old male, initially seen by the Emergency Department for respiratory symptoms; a chest X-ray was therefore ordered, which showed a right paracardiac mass (intestinal loops of bowel with gas pattern and air-fluid level). The lateral view thoracic X-ray demonstrated the presence of bowel loops in the anterior mediastinum. A Morgagni diaphragmatic congenital hernia was then diagnosed. Given the risk for hemorrhage and obstruction we performed surgical repair by an open transabdominal approach.

KEY WORDS: MORGAGNI HERNIA; DIAPHRAGMATIC CONGENITAL HERNIA; SHORT TITLE: Morgagni hernia


INTRODUCTION

Congenital diaphragmatic hernias occur in 1/2000 to 1/4000 births [1]. Through the advancement of fetal ultrasound, the diagnosis of congenital diaphragmatic hernia typically occurs prior to delivery [2]. However, 5-25% of cases are diagnosed later after the neonatal period.

The most common type of congenital diaphragmatic hernia reported is through the posterolateral foramen of Bochdalek with 80% occurring on the left side. Only 1-5% of congenital diaphragmatic hernias occur through the anterior foramen of Morgagni, which is retrosternal at the sternocostal triangle, known as the Larey space.

Bochdalek-type hernias typically occur on the left, whereas Morgagni-type are primarily right-sided in the anterior mediastinum [2].

For Morgagni hernias, the defect is thought to be a result of incomplete closure of the space through which the superficial epigastric vessels pass prior to entering the rectus muscle due to a disorder in diaphragmatic differentiation [3].

Patients are usually asymptomatic and are discovered incidentally from a chest or abdominal X-ray exam performed for unrelated reasons. More rarely patients may present respiratory symptoms or complications such as strangulation or perforation of abdominal viscera, gastric volvulus or cardiac tamponade [4,5]. Several imagery exams are used to establish the diagnosis: barium meal, CT scan and MRI.
A Morgagni hernia can be misdiagnosed as congenital lobar emphysema, cystic adenomatoid malformation of the lung, pneumo-hemo-thorax, anterior mediastinal mass or lung abscess secondary to a staphylococcal pneumonia [5].

Surgical correction is recommended in all cases of Morgagni hernia to avoid the risk of complications, especially bowel strangulation.

Traditionally, surgical repair is performed by an open transabdominal or transthoracic approach, suturing the diaphragm to the retrosternal and retrocostal endo thoracic fascia and/or posterior rectus sheath [6]. The laparoscopic approach is also possible [6]. Typically patients have an uncomplicated recovery. The success rate is 97-100% [2].

**CASE PRESENTATION**

A 7 months old male boy was presented to the Emergency Department for respiratory distress; a chest X-ray exam revealed a slightly elevated right hemidiaphragm associated with a large right paracardiac mass - intestinal loops with gas pattern and air-fluid levels into the right hemithorax mimicking a cystic structure (Fig. 1). The lateral view thoracic X-ray exam revealed the presence of bowel loops in the anterior mediastinum (Fig. 2). So, a right diaphragmatic congenital hernia was diagnosed and the patient was admitted to our department for surgical repair.

Chest examination showed normal shape and symmetry. The respiratory movements were equal on both sides and the thoracic expansion was 5 cm on maximum inspiration. On percussion there was dullness in the lower part of the chest. Auscultation revealed gurgling sounds

![Fig. 1 Thoracic X-ray exam: antero-posterior view](image1)
![Fig. 2 Thoracic X-ray: lateral view](image2)
![Fig. 3 Intraoperative view: diaphragmatic defect site](image3)
![Fig. 4 Intraoperative view: primary closure of the diaphragmatic defect](image4)
suggestive for bowel sounds, on the right hemithorax.

Blood tests were normal.

As diagnose was established, other imagery exams were considered unnecessary.

The patient was operated under general anesthesia. An upper midline laparotomy was performed; we confirmed a large congenital anterior diaphragmatic defect (8 x 10 cm). The liver left lobe, omentum, right and transverse colon, and small bowel were located in the anterior mediastinum associated with a partial malrotation but without any adherences. We easily reduced the hernia contents into the abdominal cavity. No hernia sac was present; the right side of the diaphragm was thinned out with a dorsal muscular rim (Fig. 3). We performed a primary closure, repairing the diaphragmatic defect by interrupted 2-0 non absorbable silk stitch using the thin aspect of diaphragm (Fig. 4).

The postoperative course was uneventful. The follow-up revealed no recurrence after 6 months.

**DISCUSSION**

Morgagni hernia was first described by Italian anatomist and pathologist Giovanni Morgagni in 1769 [7]. In 1828, Larrey described a surgical approach to the pericardial cavity through an anterior diaphragmatic defect [8]. The diaphragm develops during the 8th and 12th weeks of gestation [9], but the development begins at week 4 of human gestation with the formation of the septum transversum, which separates the thoracic and abdominal cavities of the embryonic coelom leaving two pleuroperitoneal canals dorsolaterally. The pleuroperitoneal folds extend from the lateral body wall and grow medial and ventral until week 7, when they fuse with septum transversum and the mesentery of the esophagus [10]. The space of Larrey or foramen Morgagni is a defect in the diaphragmatic musculature usually caused by the failure of the anterolateral component to fuse with septum transversum. It occurs at the level of the seventh rib on either side of the xifoid in a space usually filled with fat, through which the superior epigastric arteries and veins pass. A congenital disorder of the embryologic fusion of fibrotendinous elements of the costal and sternal parts of the diaphragm muscles is a possible cause for the development of this rare herniation. Larrey hernias result from a weak area in the anterior retrosternal muscle at the minor apertures, where the superior epigastric artery, vein and associated lymphatic vessels pass from the thorax into the rectus sheath. The location is parasternal rather than midline. A hernia through the right sternocostal hiatus is referred to as Morgagni hernia, while a hernia through the left hiatus is termed a Larrey hernia and a bilateral hernia is a Morgagni-Larrey hernia.

While patients with these hernias may present with chest pain or obstructive symptoms including vomiting, many of them remain asymptomatic and their hernias are discovered incidentally during chest radiograms or other studies [11].

Morgagni hernia (anteriorly located) represents 3% to 5% of all of these hernias and there is a clear predominance of the right parasternal position (at a ratio of 10:1), as the left side is protected by the pericardium [12]. So, most Morgagni hernias are right sided (90%), 8% are on the left and 2% are bilateral [13].

Though this type of hernias is congenital hernia, it is rarely diagnosed during the early years of life, because most of them are asymptomatic [14] and discovered in adult life because of acquired conditions (obesity, pregnancy, constipation or trauma) that increase abdominal pressure enlarging the hernia with age.

About 30% of cases are asymptomatic and diagnosed incidentally by routine examinations. While dyspnea caused by a herniated sac increasing in size is common in early childhood, retrosternal and chest pain is more likely in elderly patients [11]. Symptoms are usually related to abdominal pain, intestinal obstruction, chest pain or obstruction of the herniated organs. Infants
and young children present respiratory distress or pulmonary infections or both, and less frequently gastrointestinal symptoms such as constipation, diarrhea, post-prandial distension, vomiting after feeding [11,13].

Morgagni hernia is well known to be associated with other congenital anomalies particularly congenital heart disease, which is reported in up to 80% of patients and malrotation in up to 26% of the patients [15]. The most commonly herniated viscera are the liver, spleen, omentum, large and small bowels and, in rare occasions the stomach [16,17].

Differential diagnosis include epicardial fat pads, eventrations of the diaphragm, hiatal hernia, Bochdalek hernia, traumatic diaphragm rupture, diaphragmatic tumour, large anterior mediastinal mass, right middle hepatic lobe collapse, pneumonic consolidations, mediastinal lymphoma or pericardial cyst [14,18].

During imaging diagnosis, the most appropriate and least invasive imaging modalities are routine upright chest radiography and CT. Most Morgagni hernias appear as a gas-fluid level in bowel loops or a soft tissue mass above the right dome of the diaphragm. The lateral plain radiograph may be helpful in identifying the location of the hernia. Diagnosis is usually made by frontolateral chest radiographs and a barium enema or a barium swallow test. Radionuclide liver scans may be required to exclude liver herniations. CT scan is the best imaging method for demonstrating omental fatty tissue and intestinal air out of their location, without the need for contrast studies.

Surgical repair of these hernias is indicated for both symptomatic and asymptomatic cases in order to prevent possible complications of strangulation and enlargement of the herniated sac and to avoid unnecessary morbidity [11,19]. The classic repair of diaphragmatic hernias is described using a transabdominal or transthoracic approach [19]. The advent of endoscopic surgery has enabled the closure of these defects laparoscopically, first described in 1994 [20]. Many centers are currently performing laparoscopic repair of diaphragmatic hernias with equivalent success and recurrence rates comparable to those of open techniques [21].

Uncomplicated endoscopic surgery with primary suturing or mesh repair has been described as a safe and effective method for treating Morgagni hernias. The developments in minimally invasive thoracoscopic and laparoscopic techniques have decreased the incidence of morbidity.

A controversial issue is the management of the hernial sac, some authors recommend the excision of the sac, whereas others leave the sac in situ with good outcome [22].

The debate continues regarding the modality of hernia defect closure, whether to use only primary repair with continuous suture or interrupted non-absorbable sutures, or to add prosthetic mesh material, but the transabdominal approach with interrupted nonabsorbable sutures remains the preferred method of repair [23].

**CONCLUSIONS**

Morgagni hernia is a rare clinical entity, usually diagnosed in older children, following multiple episodes of respiratory infections, the diagnosis being established on a chest X-ray performed routinely, after a traumatic event or following a complication (strangulation, occlusion and perforation).

Surgery will be performed immediately after diagnosis and will address all cases of Morgagni hernia, whether they are symptomatic or not, thus avoiding the risk of complications.

Although a laparoscopic approach is preferred in present practice with increasing frequency for pediatric cases, the open transabdominal approach remains the preferred technique, with excellent short and long term results, as shown in the presented.

**CONFLICT OF INTERESTS**

None to declare
REFERENCES