

# Clinical presentation and operative repair of Morgagni hernia

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## Abstract

**OBJECTIVES:** Morgagni hernia (MH) is an uncommon type of diaphragmatic hernia. This study aimed to summarize clinically relevant data with respect to MHs in adults.

**METHODS:** We performed a retrospective chart review of patients who underwent surgical repair of foramen due to MH at our hospitals between 1996 and 2010. Data were collected on patient demographics, presenting symptoms, modes of diagnosis, surgical procedures, surgery outcomes, recurrence of hernia and follow-up of the patients.

**RESULTS:** We included 36 patients with the mean age of 50.2 years. Of these 66.7% ( $n = 24$ ) were female. Thirty-one patients had MH on the right side and 1 patient had bilateral MH. Most of the patients experienced abdominal symptoms. 72.2% of patients underwent laparotomy ( $n = 26$ , 72.2%), ( $n = 6$ , 16.7%) thoracotomy ( $n = 6$ , 16.7%), and a thoraco-abdominal approach ( $n = 4$ , 11.1%). Resection of the hernia sac and insertion of a mesh were not done in any patients. No recurrence occurred.

**CONCLUSIONS:** We conclude that preoperative diagnosis and early diagnosis of MH by using laparotomy and thoracotomy is useful for safe and effective repair. Also we suggest that resection of the hernia sac and insertion of a mesh are not necessary.

**Keywords:** Morgagni hernia • Surgical treatment • Diaphragmatic hernia

## INTRODUCTION

Foramen of Morgagni hernia (MH) is a triangular anterior diaphragmatic defect located between the muscle fibres of the xiphisternum and the costal margin [1]. The incidence of MH in congenital diaphragmatic hernia is low (3%) [1–3]. This defect can result in direct herniation of abdominal contents into the thoracic cavity [4]. MH in adults usually is asymptomatic and most commonly diagnosed incidentally on a chest X-ray obtained for other reasons, but some patients may have dyspnea, cough, chest pain and obstruction symptoms [5–7]. The diagnosis of MH is generally obtained with a lateral chest X-ray and confirmed by a barium enema or computed tomography (CT) scan. But MH diagnosis rarely becomes complicated and may lead to severe disturbances [6–8]. Missed or late diagnosis of MH can cause serious complications and considerable morbidity [1, 9]. The defect is usually repaired by a transabdominal or a transthoracic approach [7]. In recent years, less invasive surgical techniques have decreased the morbidity associated with thoracic surgery [4]. Pfannschmidt *et al.* reported seven cases of MH and concluded that for repairing the MH, different surgical approaches can be effective and safe [1]. Karamustafaoglu *et al.* also repaired MH in 13 patients with a transabdominal subcostal approach and recommended this approach in patients with MH

for reasons such as surgical exposure, easy repair of the hernia sac, and low morbidity [2].

In this study, we aimed to study symptoms, signs, diagnostic methods and surgical intervention of MH. In fact, our aim is to discuss the clinical presentation and management of these rare cases in adults and compare the results with previous literature.

## MATERIALS AND METHODS

This retrospective descriptive study was carried out in the surgical department of all referral hospitals of Rasht in the Guilan province of Iran. It included all patients with diaphragmatic hernia, diagnosed MH from autumn 1996 until autumn 2010. The approval was obtained from the deputy of research of Guilan University of Medical Sciences for access to records of patients. Of the 240 patients with diaphragmatic hernia, only 36 patients had a MH and were included in this study. The medical records of the patients were reviewed for demographic data, signs of the hernia, signs and symptoms, predisposing factors (pregnancy, trauma, chronic cough, chronic constipation and obesity), diagnostic methods, hernia sac content, type of surgery (laparotomy, thoracotomy, a thoraco-abdominal approach) and the approach performed for resection of the hernia sac, duration

of hospitalization, surgery outcomes and recurrence of hernia. In this study, signs and symptoms were categorized into four groups: (1) Abdominal symptoms consisting of abdominal pain, abdominal cramps, epigastric tenderness and obstructive signs. (2) Respiratory manifestation including cough, dyspnea and pneumonia. (3) Both of them. (4) No symptoms. All patients underwent spirometry and blood gas analysis before and after operation. Frequency distributions of data were reported as mean  $\pm$  SD.

## SURGICAL REPAIR

Repair of MHs in our patients was performed through the abdomen and chest. Open transabdominal repair was performed through a subcostal incision. Adhesions were taken down and the contents of the hernia were reduced into the peritoneal cavity. The margins of the hernial sac were identified and the sac was not resected. All defects were closed primarily with 1-gauge interrupted, nonabsorbable mattress sutures. It was usually necessary to pull the diaphragm up to the posterior part of the sternum and to the posterior rectus sheath. For repair of defects, we did not use prosthetic material in our patients. For prevention of symptomatic fluid collection in sac, we placed a Redon drain in the sac space. In our patients, thoracotomy was performed for an undiagnosed mediastinal mass and preoperative diagnosis was not just MH. A thoraco-abdominal approach was performed in patients with huge and undiagnosed MHs preoperatively.

## RESULTS

The mean age of all 36 patients was  $50.27 \pm 17.9$  years (range from 8–83 years). Most of the patients were in the range of 30–60 years. Two third of the patients were female (24 cases).

Sixteen patients had only abdominal, 12 patients had respiratory symptoms, and six patients had both symptoms. Two patients were incidentally diagnosed by radiological findings for other problems and had no symptom.

About 50% of patients had no predisposing factors. 16.7% of patients had chronic cough and 13.8% of them had chronic constipation. 8.4% of them were obese and 11.1% of patients had delivered more than 3 times. In a 65-year old woman, MH presented with a hiatal hernia.

In the present study, the most paraclinical methods of diagnosis were both CT and radiography (83.3%). However, all of the patients had chest radiography and 12 patients underwent a sonography. Barium enema was performed in 10 patients and oesophagogastroduodenography in 6 patients. Preoperative definite diagnosis was performed in 30 patients. About 84% (31 cases) of cases had a hernia on the right side and one patient had hernia on both sides. Right- and left-sided diaphragmatic involvement were seen in 66.7 and 25% of patients with respiratory symptoms, respectively and 8.3% of patients had a herniation in both sides.

In six patients, diagnosis of MH was performed intraoperatively. For 30 elective surgeries, preoperative spirometry was performed and 70% (21 cases) of patients were found to have obstructive lung disease. The others were normal.

Laparotomy was performed in 72.2% of patients, thoracotomy was used in 16.7% and four patients (11.1%) underwent a

thoraco-abdominal approach. Laparotomy was done initially because of adhesion and the impossibility of visceral herniated reduction through the abdomen and laparotomy incision extended to the intercostal space. Nineteen patients (73.1%) treated with a laparotomy approach and 3 patients (50%) with a thoracotomy approach were women. The hernia sac was not resected in any of the patients and no complications were seen. For repair of defects, we did not use any type of synthetic material and we have not had any recurrences in 36 patients.

In 52.8% of patients, contents of hernia sac were omentum and transverse colon. Omentum in 27.8%, left lobe of liver in 5.5% and stomach in 5.5% of patients were observed in the hernia.

Colon, stomach and small intestine were found together in hernia sac in 8.4% of patients. Table 1 summarizes the clinical data of all the patients.

Incarceration occurred in one case where the omentum and colon were found in hernia sac. This case was presented with chest pain and mimicked myocardial infarction.

Gangrene of the small intestine due to intrathoracic volvulus happened in one case because the diagnosis was performed with delay. The contents of this MH sac were stomach, colon and intestine and about 20 cm of small intestine was resected.

Also in two cases, partial omentectomy was performed because the omentum had a fibrotic appearance.

In the majority of patients (17) that had both respiratory and abdominal symptoms and signs, the contents of hernia sac were small intestine, colon and stomach. The contents of sac in asymptomatic patients (2 cases) was omentum.

Postsurgical complications were atelectasia (2 cases) and incisional hernia (2 cases). In this study, there was no mortality. Thirty-day postoperative spirometry showed a 30% increase in

**Table 1:** Clinical data of all the patients ( $n = 36$ )

Female sex	66.7%
Age (years)	$50.2 \pm 17.9$
Symptomatic	94.4%
Abdominal	44.5%
Respiratory	33.3%
Abdominal, respiratory	16.7%
Predisposing factors	50.0%
Chronic cough	16.7%
Chronic constipation	13.8%
Obesity	8.4%
Frequent delivery	11.1%
Right-sided hernia	84.0%
Presence of hernia sac	100%
Contents of hernia	
Omentum	27.8%
Colon, omentum	52.8%
Stomach	5.5%
Left lobe of liver	5.5%
Colon, omentum, small intestine	8.4%
Diagnostic studies performed preoperatively	
Chest radiography	100%
Computed tomography	83.3%
Sonography	8.4%
Barium Enema	27.7%
Method of surgery	
Laparotomy	72.2%
Thoracotomy	16.7%
Thoraco-abdominal approach	11.1%

FEV1. In addition, during 15 years of follow-up, there were no recurrences.

## DISCUSSION

Lack of fusion or muscularization of the pleuroperitoneal membrane anteriorly leads to a defect in the costosternal trigones known as the foramen of Morgagni. A MH is located just posterolateral to the sternum at the level of the seventh rib on either side of the xiphoid. A hernia through the right sternocostal hiatus is referred as a MH, whereas a hernia through the left hiatus is called a Larrey hernia [8]. The ligamentum teres defines the medial border of the hernia on either side. There is usually a true hernial sac in MH [8].

MH as a type of diaphragmatic hernias is uncommon at any age. Despite their congenital etiology, they are detected less often in children than in adults [9]. Overall, the incidence of MH among all diaphragmatic defects in adults and children is 3 to 4%; it is the rarest type of diaphragmatic hernia [9]. In our study, we surveyed 36 patients with MH over 15 years.

MHs are detected more often in females and obese people [9]. 66.7% of our patients were female as with other studies [4, 10, 11]. But in the study by Alsalam *et al.*, 80% of patients were male [12].

About 90% of the hernias occur on the right, 8% are bilateral and only 2% are limited to the left [9]. In this study, 81.6% of hernias were on the right side and one case (2.8%) presented with bilateral hernia. In Horton's study, 91% of patients had a hernia on the right side [10].

Berardi and associates reported that one third of patients are asymptomatic. The most frequent complaints of patients were chronic gastrointestinal symptoms such as pain or constipation [13]. Patients often complain only of vague epigastric or substernal fullness or dull right subcostal discomfort [9]. Complete obstruction, incarceration or strangulation with necrosis of a hollow viscus contained in a foramen of MH is rare [9]. In the series by Berardi *et al.*, 12 patients had complete bowel obstruction and 1 had gangrenous intestine [13]. In the series of Loong and Kocher, 7 of 47 children and 12 of 93 adults presented acutely. Forty percent of children presented subacutely [3]. The gastrointestinal symptoms and signs relative to the frequency of MH in our patients were 44.5%. Cardiopulmonary symptoms usually are dyspnea and palpitations, but are less common than gastrointestinal complaints [9]. In our study, 5.5% of cases did not have any signs and symptoms.

Conditions that produce prolonged or sudden severe increased intra-abdominal pressure can precipitate the onset of symptoms of MH [9]. Other predisposing events include trauma, pregnancy and exercise [9]. Predisposing factors in our patients were chronic cough and constipation, obesity and multiparity that were seen in 18 patients (50%). In Horton's study, 21 patients (41%) had predisposing factors [10].

The diagnosis of a MH is made by imaging. A standard chest radiograph shows right, left, or bilateral pericardiophrenic angle density. The opacification is generally due to omentum rising through the hernia defect. When the transverse colon, small intestine or stomach is herniated through the defect, an air-fluid level may be seen on chest films [9]. A diagnosis can sometimes be difficult and a missed diagnosis can lead to life-threatening complications such as obstruction and strangulation [3].

Computed tomography (CT) is a diagnostic method in cases with MH. The usual CT finding is a retrosternal or parasternal mass or fat density representing omentum or a combination of omentum and an air-containing viscus [9]. We recommend CT scan for diagnosis of MH and we used it with radiography. In the study by Kilicservey *et al.*, [11] as with our study, diagnostic methods were CT scan, radiography and contrast radiography.

Magnetic resonance imaging (MRI) can provide similar information but it is not usually needed [9]. We did not use MRI for our patients. Barium enema of the colon or upper gastrointestinal tract contrast studies can confirm the diagnosis in patients with visceral herniation [9]. We used gastrointestinal tract contrast studies only in one case.

The treatment of foramen of MH in symptomatic and asymptomatic patients is surgical, because intestinal obstruction and incarceration, strangulation, or both may ensue [9].

Foramen of MH repaired through the abdomen and chest has been described. Open transabdominal repair can be performed through an upper, subcostal incision [9]. We used transabdominal repair in 26 cases and transthoracic repair was performed in six patients. We performed the transthoracic approach for an undiagnosed mediastinal mass. Thoraco-abdominal approach was used after laparotomy, in four patients in whom an adhesive reduction of the hernia was impossible. When the preoperative diagnosis is MH, transabdominal repair is the choice of treatment. After laparotomy, adhesions are taken down, and the content of the hernia are reduced into the peritoneal cavity. The margins of the hernial sac are identified, and the sac is generally resected [9]. In our patient, we did not resect hernial sac and we did not have any complications such as seroma or recurrences. Sac excision has considerable controversies. Disadvantages of sac excision may include massive pneumomediastinum and potential injury to the lung, pericardium, or mediastinal structures [9].

Prosthetic material has been used in 65% of cases [9]. We did not use any type of synthetic material for repair of MH and we did not have any complications such as difficulty for repair and recurrences.

Minimally invasive approaches such as laparoscopic and thoracoscopic approaches for treatment of MH were reported by Kuster *et al.*, and Hussong *et al.* [9, 14, 15] but we did not use them.

The results of surgical repair of foramen of MH are excellent. Operative mortality and morbidity are low, especially for elective repairs. In a new report of Berardi *et al.*, there was no mortality [13].

In conclusion, thoracic and upper abdominal CT scans are the best imaging techniques for diagnosis. Since laparotomy has low mortality and morbidity therefore it seems that the preoperative diagnosis is very important for surgical approaches with laparotomy or thoracotomy. Early surgical intervention should be required in all cases to prevent life-threatening complications such as obstruction or strangulation.

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