Rare disease

Surgical treatment of a Morgagni hernia causing intermittent gastric outlet obstruction

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Summary

A Morgagni hernia is a rare diaphragmatic hernia which develops through a congenital defect in the retrosternal area, usually on the right hand side. Because of its congenital aetiology, Morgagni hernias are rarely considered in the differential diagnosis of gastric outlet obstruction symptoms in adults. We present a patient with an incarcerated Morgagni hernia who presented with gastric outlet obstruction.

A 77-year-old woman presented with symptoms and signs of gastric outlet obstruction, dehydration and acute renal impairment. She was treated by fluid resuscitation and nasogastric tube insertion. Radiological imaging showed a Morgagni hernia containing stomach, omentum and colon. This was treated surgically via an abdominal approach and the defect was closed with mesh. The patient recovered well from this procedure and was discharged.

We discuss the anatomy, clinical presentation and surgical treatment of this rare diaphragmatic hernia to raise awareness among surgeons and surgical trainees.

BACKGROUND

A Morgagni hernia is a rare diaphragmatic hernia which develops through a congenital defect in the retrosternal area.^{1 2} In adults, the majority of these hernias are asymptomatic and are detected incidentally on radiological investigations for other reasons. Other presenting symptoms include shortness of breath or breathing difficulties, gastric outlet obstruction or acute strangulation and peritonitis. Because of its congenital aetiology, Morgagni hernias are rarely considered in the differential diagnosis of these symptoms in adults. Delayed diagnosis appears to be fairly common in adult patients. Surgical treatment either by an abdominal or thoracic approach is usually required for these acute presentations.

We present a patient with a delayed diagnosis of Morgagni hernia who presented with intermittent gastric outlet obstruction. She was treated by open abdominal surgical repair. We will review the anatomy, clinical presentation and surgical treatment of this rare diaphragmatic hernia to raise awareness among surgeons and surgical trainees.

CASE PRESENTATION

A 77-year-old woman presented to the emergency department in November 2008 with a 3-day history of persistent vomiting which had occurred up to eight times each day. This was associated with constipation for 6 days and abdominal distension. Minimal abdominal pain was described and there was no preceding weight loss or suspicious symptoms.

She had previously presented in April 2008 and July 2008 under the care of physicians with similar symptoms which resolved spontaneously. Her diagnosis at that time was of oesophagitis on the basis of findings from an oesophago-gastro-duodenoscopy and led to her discharge with a proton pump inhibitor. A raised right hemi-diaphragm was described on a plain chest radiograph on these admissions.

The medical history was of hypertension and depression. There was no history of malignancy, peptic ulceration or abdominal surgery. She was taking atenolol and citalopram.

On examination, she was dehydrated with upper abdominal distension and a succussion splash was found. Her abdomen was otherwise soft and non-tender with normal bowel sounds. A digital rectal examination was normal. She was afebrile and haemodynamically stable but oliguric. Blood investigations showed acute renal failure with normal electrolytes and full blood count. Arterial blood gas sampling showed no acid-base abnormality.

Plain chest radiographs showed a raised right hemi-diaphragm and a gas shadow in the lower part of the right thorax and upper abdomen (figure 1). No free air was noted under the diaphragm and the lung fields otherwise appeared normal. Plain abdominal film showed features consistent with gastric outlet obstruction.

The immediate management was of fluid resuscitation, nasogastric tube drainage and monitoring while CT imaging of the thorax and abdomen was arranged. The CT revealed evidence of a right-sided diaphragmatic hernia and gastric outlet obstruction (figure 2). The hernia also contained gas filled colon. After discussion with the patient and her family, consent was given for laparotomy and surgical treatment.

An upper midline laparotomy was performed. Findings at surgery were of a hernia defect measuring approximately 5×5 cm in the diaphragm to the right side of the xiphisternum (figure 3A,B). The hernia contained distal stomach, duodenum, transverse colon and a small portion of ischaemic omentum. A hypoplastic left liver lobe and a collapsed right lung base with atelectasis were also identified. The contents of the hernial sac were reduced into the abdomen from the chest. The ischaemic omentum was excised and the luminal organs carefully inspected for signs of ischaemia. The colon, stomach and duodenum were viable

Figure 1 Plain film radiology. (A) Posteroanterior chest radiograph showing the raised hemi-diaphragm and air fluid level in the right lower thorax. This abnormality is typical of a Morgagni hernia in its commonest location. In a standard hiatus hernia, the air fluid level is retro-cardiac nearer the midline. (B) Lateral chest radiograph confirms the Morgagni hernia with an air fluid level posterior to the sternum, indicating the hernia defect occurs in the retrosternal area rather than in the mediastinal area typical of a hiatus hernia. (C) Postoperative anteroposterior chest radiograph shows full expansion of the right lung field with a minor pleural effusion and postoperative basal lung changes. This film is included to allow a comparison with the preoperative image (A).

with no ischaemic areas. The hernial sac was excised and the diaphragmatic defect was closed with 2/0 prolene interrupted sutures (figure 3C,D). This was reinforced by suturing a Parietex polyester mesh (autosuture; Covidien, Mansfield, Massachusetts, USA) with a 2 cm overlap around the edges of the defect with 2/0 prolene suture (figure 3E). The peritoneum was sutured closed to cover the mesh (figure 3F). After abdominal washout the wound was closed with a mass closure.

The patient was ventilated for a few hours on the intensive care unit before extubation later the same day. She recovered well on the ward. A postoperative chest x-ray showed a small right-sided pleural effusion that did not require any intervention (figure 1). She was discharged on the 9th postoperative day. She was reviewed in the outpatient clinic 2 months after surgery, found to be well and discharged back to her general practitioner.

DISCUSSION

We present this interesting case of an acute Morgagni hernia to raise awareness among surgical trainees and other

doctors. The patient in our case had two previous admissions with similar symptoms, but the diagnosis was delayed until the features of gastric outlet obstruction due to incarcerated stomach within the hernial sac supervened.

The foramina of Morgagni (figure 4) are small zones lying between the costal and sternal attachments of the thoracic diaphragm and were first described in 1761.³ This site for potential herniation is also known as the sternocostal hiatus or Larrey's triangle. There is some confusion in the surgical literature and some authors use the names Larrey and Morgagni interchangeably, while others use Morgagni for a right-sided hernia and Larrey's for a left. However, it would appear that although Larrey, who was Napoleon's surgeon, did describe the space in 1829 he did not describe a hernia. He described the space as the approach through which pericardial tamponade could be treated.⁴

The incidence of Morgagni hernia among all diaphragmatic defects in adults and children is approximately 3% and it is the rarest of all diaphragmatic hernias. Morgagni hernia defects usually occur on the right hand side (91%). In 5% of cases the defect is on the left hand side of the sterno-

Figure 2 CT images. (A) Axial view of the lower thoracic cage and diaphragm showing herniated colon (marked with 'C') and stomach (marked with 'S'). (B) Axial view showing the diaphragmatic defect (marked with 'D') at the medial side of the right diaphragmatic area. (C) Sagittal view showing the diaphragmatic defect (marked with 'D'). (D) Sagittal view showing herniated colon (marked with 'C').

costal hiatus and the remaining 4% are bilateral.¹ Although the defect is congenital in origin, presentation is rare in children. Possible presentations of a Morgagni hernia in children are with repeated chest infections or respiratory symptoms. Rarely, it may present in the neonatal period with acute respiratory distress. However, it more commonly presents in adulthood because the congenital weakness in the diaphragm is usually small and it is only with increasing age that the defect enlarges and stretches secondary to raised intra-abdominal pressure. The average age of presentation is 58 years in females and 50 years in males.¹ The overall rate of emergency presentation is between 12% and 14%.⁵

Common predisposing features include pregnancy, obesity, chronic constipation and chronic cough. Overall, 61% of cases appear to occur in females.¹ Adult patients are often asymptomatic and the hernia is detected during radiological investigations performed for other reasons. Delayed diagnosis is common and symptoms if present are often non-specific respiratory or gastrointestinal complaints, such as shortness of breath, abdominal discomfort or vomiting. Emergency presentation can be with acute respiratory distress,⁶ gastric outlet obstruction,⁷ or strangulation and ischaemia of hernial sac contents. Very late presentation can rarely occur with perforation of the entrapped gastrointestinal organs (stomach or colon) and subsequent peritonitis or mediastinitis. The hernial sac can contain a wide variety

of contents, including omentum, colon, stomach, duodenum, small intestine or occasionally liver.

The diagnosis of a Morgagni hernia may be suggested on plain chest radiography by the features of a raised hemidiaphragm, a mass at the cardiophrenic angle or an abnormal fluid level in the thorax. In patients who undergo barium investigations, the diagnosis can be revealed by contrast within the colon or stomach herniating through to the chest. CT is now a highly accurate way to confirm the diagnosis and help plan appropriate surgical repair.⁸⁻⁹ CT may show a para-cardiac fat density with linear densities consistent with omental blood vessels. Transverse colon, stomach or small bowel loops may be visible in the chest.

Surgical treatment is required for patients with symptoms if they are fit enough to undergo general anaesthesia and major surgery. Patients who are asymptomatic should also be considered for surgical repair as the risks of future incarceration and emergency presentation are significant.² The precise surgical treatment is controversial and several aspects including the approach used, the requirement to excise the hernial sac and whether or not to close the defect with mesh, are a matter of debate. Because of the rarity of these hernias there are no current guidelines to help clinicians treat patients with this condition.

Surgical treatment can be either by open laparotomy or thoracotomy, or minimal access approaches (thoroscopic or laparoscopic). The most common surgical approach for

Figure 3 Intra-operative views of the Morgagni hernia repair. (A) View of the Morgagni hernia defect after the contents have been reduced into the abdomen. (B) Closer view of the hernia defect showing that the sternum was the anterior boundary. (C) Surgical dissection and excision of the hernial sac (this step is believed to reduce potential hernia recurrence). (D) The defect in the diaphragm was closed with several interrupted permanent (prolene) sutures. (E) The closure was reinforced by the placement of a Parietex polyester prosthetic mesh to reduce further the risk of recurrence. (F) The peritoneum was closed over the mesh to prevent other organs, such as the small bowel or stomach, potentially sticking to the mesh in the future.

acute surgical presentation is by open laparotomy.¹ The abdominal approach appears to offer several advantages, including easier reduction of hernial contents, inspection of the contra-lateral diaphragm for other hernia defects and easier evaluation and surgical treatment of the acute complications, such as strangulation and ischaemia of luminal abdominal organs.¹⁰ Thoracotomy appears to be the most commonly used approach in the literature and has the advantage of allowing easier dissection of the hernial sac from the mediastinal and pleural cavity. Disadvantages to thoracotomy include a more painful incision with longer postoperative recovery. The minimal access approach, via abdominal laparoscopy, has been well described in the literature.^{1 11 12} Laparoscopy provides excellent views of the diaphragmatic defect and abdominal contents, and the hernial contents can be reduced and systematically inspected for signs of ischaemia. The laparoscopic approach has the

benefits of less postoperative pain and earlier return to activities and work, but is less suited to emergency presentations where surgical resection or treatment of necrotic or ischaemic contents may be required. The presentation with gastric outlet obstruction in our case meant that the open laparotomy approach was the most appropriate.

The defect can be closed with or without the use of prosthetic mesh. A wide variety of techniques have been described in the surgical literature. Simple suture repair may be suitable for small defects, however prosthetic mesh is generally recommended if the defect is larger than 3 cm.¹³ The use of mesh is usually contraindicated in peritonitis or extensive contamination. We used a prosthetic mesh in our case as the defect was fairly large and the operative site was clean and it was also felt this would reduce the risk of potential recurrence. In addition a 2 cm overlap was used to prevent recurrence if the mesh were to shrink over time. We

Figure 4 Anatomical locations of the two common types of congenital diaphragmatic hernia: the foramen of Morgagni and the foramen of Bochdalek. The foramina of Morgagni are small zones lying between the costal and sternal attachments of the diaphragm. The foramen of Bochdalek is a posterolateral opening in the fetal diaphragm in the pleuroperitoneal hiatus or costochondral triangle.

also chose to cover the mesh with peritoneum to prevent the risk of adhesions to abdominal organs.

In summary, Morgagni hernia is a rare congenital hernia which can present in adult life. Although it is commonly asymptomatic, presentation may be with acute gastric outlet obstruction, respiratory distress or peritonitis. Surgical treatment is required and should be considered even if the patient is asymptomatic.

Learning points

- ▶ Morgagni hernias develop through a defect between the diaphragm's attachments to the sternum and costal cartilages.
- ▶ They are usually right-sided.
- ▶ They constitute 3% of diaphragmatic hernias.
- ▶ The majority are asymptomatic, but such patients should still be considered for surgical repair.
- ▶ Acute presentation can be with either gastric outlet obstruction, peritonitis from infarcted contents or acute respiratory distress.

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Competing interests None.

Patient consent Obtained.

REFERENCES

1. Horton JD, Hofmann LJ, Hetz SP. Presentation and management of Morgagni hernias in adults: a review of 298 cases. *Surg Endosc* 2008;**22**:1413–20.
2. Minneci PC, Deans KJ, Kim P, et al. Foramen of Morgagni hernia: changes in diagnosis and treatment. *Ann Thorac Surg* 2004;**77**:1956–9.
3. McBride CA, Beasley SW. Morgagni's hernia: believing is seeing. *ANZ J Surg* 2008;**78**:739–44.
4. Parús F, Tarazona V, Casillas M, et al. Hernia of Morgagni. *Thorax* 1973;**28**:631–6.
5. Loong TP, Kocher HM. Clinical presentation and operative repair of hernia of Morgagni. *Postgrad Med J* 2005;**81**:41–4.
6. Wong NA, Dayan CM, Virjee J, et al. Acute respiratory distress secondary to Morgagni diaphragmatic herniation in an adult. *Postgrad Med J* 1995;**71**:39–41.
7. Xie M, Stockwell D, Carr-Locke DL. Gastroduodenal obstruction from Morgagni hernia in an elderly patient. *MedGenMed* 2005;**7**:70.
8. Fagelman D, Caridi JG. CT diagnosis of hernia of Morgagni. *Gastrointest Radiol* 1984;**9**:153–5.
9. Anthes TB, Thoongsuwan N, Karmy-Jones R. Morgagni hernia: CT findings. *Curr Probl Diagn Radiol* 2003;**32**:135–6.
10. Yilmaz M, Isik B, Coban S, et al. Transabdominal approach in the surgical management of Morgagni hernia. *Surg Today* 2007;**37**:9–13.
11. Kelly MD. Laparoscopic repair of strangulated Morgagni hernia. *World J Emerg Surg* 2007;**2**:27.
12. Ackroyd R, Watson DI. Laparoscopic repair of a hernia of Morgagni using a suture technique. *J R Coll Surg Edinb* 2000;**45**:400–2.
13. Thoman DS, Hui T, Phillips EH. Laparoscopic diaphragmatic hernia repair. *Surg Endosc* 2002;**16**:1345–9.

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