Leading Article

Diaphragmatic hernia – a diagnostic challenge

Harold Ellis

Surgical Unit, Westminster Hospital, London SW1, UK.

Introduction

Hernias through the diaphragm are a fascinating group of conditions – some extremely common, others exquisitely rare – whose wide spectrum of clinical manifestations, diagnostic difficulties and problems of treatment render them of great interest to gastroenterological physicians, radiologists, endoscopists, clinical physiologists and surgeons, as well as to the general practitioner.

Classification

The commonest situation is when the cardia slides through the oesophageal hiatus into the mediastinum (the sliding hernia); less commonly, the gastro-oesophageal junction remains in its correct position with the gastric fundus rolling alongside it through the hernia into the thoracic cavity (the rolling or para-oesophageal hernia) while in some cases the two conditions co-exist. A number of rare congenital hernias may occur; through the foramen of Morgagni, situated anteriorly between the xiphoid and costal origins of the diaphragm, through the foramen of Bochdalek, representing the embryological pleuro-peritoneal canal, lying posteriorly in the diaphragm, and occasionally through a congenital deficiency of the whole central tendon of the diaphragm. Rarely, trauma may rupture the diaphragm and this may lead to a traumatic diaphragmatic hernia.

Hiatus hernia is extremely common in the Western world with a prevalence some 50 to 100 times greater than exists in Africa and Asia. Although equally distributed between the two sexes, symptomatic hiatus hernia is at least twice as frequent in the female. All ages may be affected, but the incidence rises with each decade until, in the elderly, it is present radiologically in some 60% of the population.

Reviews of large series of cases show that the sliding hernia occurs in the order of 75% of cases, the para-oesophageal hernia in 20% and the mixed variety in 5% (Hollender & Meyer, 1984).

Clinical syndromes and their aetiology

The great majority of sliding hiatus hernias are entirely symptomless. This important statement cannot be over-emphasized. It has already been noted that more than half the elderly population in the Western world would have some degree of hiatus hernia if submitted to a barium meal examination. It is a serious mistake to attribute symptoms such as chest pain, epigastric discomfort, dysphagia etc. to a sliding hiatus hernia demonstrated radiologically without excluding other causes – functional as well as organic.

Reflux oesophagitis, which is the cause of the heart-burn especially associated with bending and lying, is due not so much to the hernia as to incompetence of the sphincter at the oesophago-gastric junction. This sphincter is a physiological barrier which can be demonstrated by manometric measurements, which reveal the existence of a zone of high pressure whose function is modified by nervous and hormonal stimuli. At this level there is no definite anatomical sphincter. It is true that 60 to 90% of patients with reflux oesophagitis have a concomitant hiatus hernia (Bombeck, 1978) but reflux can occur in the presence of an entirely normal hiatus. The physiopathology of reflux oesophagitis is still only incompletely understood and may be due to multiple and often complex causes, including incompetence of the inferior oesophageal sphincter, incomplete oesophageal clearance, diminution in the mucosal defences of the oesophagus and the aggressive nature of the refluxing material. It is important to note that the size of the sliding hiatus hernia is also not related to the symptoms. The symptoms of reflux are aggravated not only by posture but by obesity, wearing tight garments, ingestion of alcohol or acid foods; frank regurgitation of bitter gastric contents into the mouth may occur.

As inflammation becomes more severe, ulceration of the lower oesophagus may occur with painful dysphagia and there may be progression to fibrous stricturing of the lower oesophagus. Here, of course, the differential diagnosis must be made from other causes of dysphagia in adults – achalasia and, particularly, carcinoma of the lower oesophagus or of the cardia; this is achieved by careful barium meal studies and by endoscopy with biopsy of the stricture.

Reflux oesophagitis as a cause of a frank gastroin-

Correspondence: Professor H. Ellis, D.M., M.Ch., F.R.C.S.
Received: 2 December 1985

testinal haemorrhage is rare and great caution should be observed before attributing the one to the other without carefully excluding other possible causes of the haemorrhage.

The lack of correlation between the anatomical defect of the sliding hiatus hernia and the symptoms of reflux oesophagitis is well illustrated by the fact that today surgical correction of the defect concentrates on anti-reflux measures, such as the Nissen (1956) fundoplication operation, since mere repair of the hiatus hernia itself so often proved unsatisfactory in the past (Battle & Bombeck, 1973).

Unlike a sliding hiatus hernia, where the symptoms are primarily the result of deranged physiology at the oesophago-gastric junction, the symptoms of the para-oesophageal hernia result from its anatomy. The herniated stomach passes through a markedly widened hiatus and lies in a peritoneal sac between the oesophagus behind and the pericardium in front. Most patients, surprisingly, are asymptomatic, the diagnosis only being made when a routine chest radiograph demonstrates a large gas bubble in the mediastinum. Others present with vague discomfort after food, substernal fullness, nausea, vomiting and sometimes dyspnoea due, presumably, to the presence of a large intra-thoracic 'space occupying lesion'. Symptoms of reflux and regurgitation do not occur unless there is an associated gastro-oesophageal sphincter defect.

Other symptoms are related to complications of the rolling hernia. Chronic blood loss with the development of a microcytic anaemia may occur due either to an erosive gastritis as a result of venous stasis in the herniated portion of the stomach or, less commonly, to an ulcer at the neck of the hernia. Acute complications include a massive haemorrhage due to this peptic ulceration and, very exceptionally, perforation of such an ulcer may occur into the mediastinum or into the pleural or pericardial cavity (Monro *et al.*, 1974). Strangulation of the herniated part of the stomach with gangrene is an extremely rare complication (Hill, 1973).

Gastric volvulus

An interesting but relatively unusual complication of diaphragmatic hernia, usually of the rolling type but also complicating traumatic or congenital defects, is volvulus of the stomach (Ellis, 1984). In this condition, volvulus occurs usually along a line from the pylorus to the oesophago-gastric junction (organo-axial volvulus) while less often it occurs around the axis that runs from the centre of the greater curvature of the stomach to the porta hepatis (mesentero-axial volvulus). In our review of over 200 cases of this condition, organo-axial volvulus occurred in 59%, mesentero-axial in 29%, 2% were combined and the remaining 10% were not classified (Wastell & Ellis,

1971). The volvulus may be acute, when it presents as an abdominal emergency with either obstruction or actual strangulation of the stomach. Gangrene may occur but is uncommon because of the particularly rich blood supply to the stomach. Much more commonly, the volvulus is chronic or recurrent and indeed may present as an incidental radiological finding on a barium meal or chest X-ray. When symptoms occur, they are frequently those of mild, continuous or intermittent upper abdominal discomfort which may be impossible to differentiate from a peptic ulcer or cholecystitis. The patient may complain of distress or bloating during or shortly after meals, which may be followed by retching or vomiting. If a good deal of air or fluid has been swallowed, the distended and volved stomach may prevent belching of the air or vomiting and the patient may simply bring up white frothy swallowed saliva.

Acute volvulus presents a striking clinical picture with severe epigastric pain and distension, vomiting followed by violent retching with an inability to vomit and difficulty or inability to pass a nasogastric tube. There may be minimal abdominal signs when the volved stomach is in the chest but a gas filled viscus in the lower chest or upper abdomen is shown by chest radiography, especially when associated with a para-oesophageal hiatus hernia. Carter and his colleagues (1980) give an important review of acute gastric volvulus and found that gangrene occurred in seven of their 25 cases. Hooper & Lawson (1986) have recently reported a unique case of pulsus paradoxus associated with a strangulated volvulus through a previous traumatic tear of the diaphragm.

When symptoms of recurrent volvulus are disabling, operative repair may be indicated. Acute volvulus can sometimes be reduced by the passage of a nasogastric tube but more frequently a tube cannot be passed and immediate surgery is mandatory. The volvulus is reduced surgically if possible and if gastric necrosis has taken place, local excision, sub-total gastrectomy or even total resection may be required.

Traumatic hiatus hernia

Rupture of the diaphragm may follow penetrating or crush injuries but may also occur following heavy physical effort, sudden twisting movements, childbirth or a coughing fit (Bisgaard *et al.*, 1985). These all probably cause a sudden increase in abdominal pressure resulting in a pressure gradient across the diaphragm. Because of the protective effect of the liver, it is nearly always the left hemi-diaphragm which is implicated. The tear may be undetected for many years and then be complicated by herniation of abdominal contents into the left hemi-thorax with subsequent strangulation; the stomach, greater omentum and colon are most particularly at risk. McIndoe &

Hopkins (1986) have recently reviewed this interesting topic and present an example of spontaneous rupture of the left diaphragm in a young man following heavy digging. The herniated stomach underwent necrosis and perforation but recovery followed partial gastrectomy and repair of the diaphragmatic tear.

Conclusion

Hernias through the diaphragm constitute a varied

and interesting group of conditions, ranging from the extremely common sliding hernias to rare congenital and traumatic cases. The clinical features also vary from incidental findings at radiology, laparotomy or autopsy to life-threatening emergencies. They enter into the differential diagnosis of the other acute and chronic upper gastrointestinal pathologies, intrathoracic diseases and functional conditions.

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