Maternal congenital diaphragmatic hernia causing cardiovascular collapse during pregnancy

Introduction

Symptomatic maternal diaphragmatic hernia complicating pregnancy is highly unusual. Delay in diagnosis and definitive management can result in maternal and fetal mortality. This article describes the management of a 31-year-old primigravid woman who presented at 27 weeks' gestation with left-sided abdominal pain. Although systemically well on admission, she became increasingly tachypnoeic, hypoxic and hypotensive shortly after admission. Emergency laparotomy revealed herniation of abdominal contents through a Bochdalek diaphragmatic hernia into the left hemithorax.

Discussion

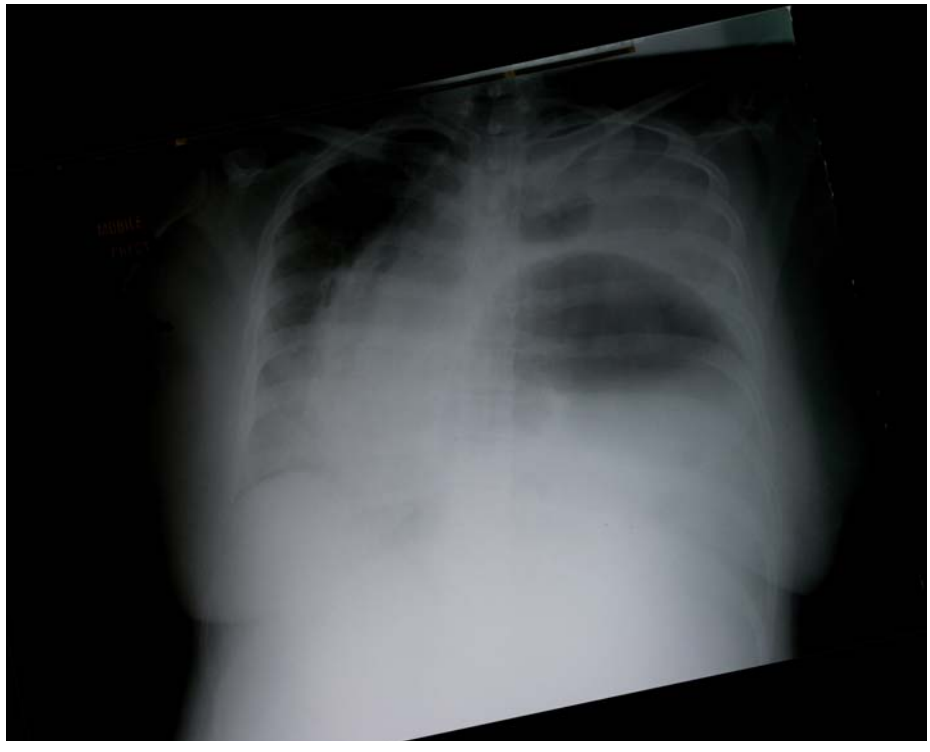
Alternative causes of cardiovascular collapse at this stage in a pregnancy include pulmonary embolism and rupture of a splenic artery aneurysm. The latter is often accompanied by severe left upper quadrant and epigastric abdominal pain, seems to present more commonly in pregnancy than in the normal population, and has been associated with several maternal fatalities (Richardson et al, 2006). However, clinical examination of this patient revealed tracheal shift and decreased air entry on the left which prompted urgent chest X-ray examination. This revealed the cause of the collapse and averted the need for further investigation.

Although hiatal hernias are commonplace in late pregnancy diaphragmatic herniae complicating pregnancy is extremely rare, with only 36 previous cases published in the literature (Eglinton

Dr John D Hunter *is Consultant in Anaesthetics and Intensive Care and* **Dr Jyothi Nimmagadda** *is Senior House Officer in Anaesthetics in the Department of Anaesthetics and* **Mr Anthony Quayle** *is Consultant Surgeon in the Department of Surgery, Macclesfield District General Hospital, Macclesfield SK10 3BL*

Correspondence to: Dr JD Hunter

Figure 1. Chest X-ray demonstrating mediastinal shift secondary to herniation of the stomach into the chest.



Case Report

A 31-year-old primigravid female presented to the obstetric department with severe left flank pain at 27 weeks' gestation. Her pregnancy had otherwise been straightforward and there was no significant past medical history. Physical examination was unremarkable apart from some vague tenderness and fullness in the left upper quadrant, and routine blood tests and urinalysis revealed no abnormalities. Obstetric ultrasound confirmed a 27-week gravid uterus with a single live fetus.

Analgesia was administered and an ultrasound scan of her abdomen requested for the next morning. Over the next few hours her abdominal pain got progressively more severe and the patient became increasingly distressed. Further examination revealed her to be hypotensive (blood pressure 85/40 mmHg), tachycardic and tachypnoeic with obvious central cyanosis (SpO2 88% on room air). Auscultation of her chest revealed decreased air entry over the left lung and tracheal shift to the right. An urgent chest X-ray suggested left diaphragmatic herniation of abdominal contents (*Figure 1*). Insertion of a nasogastric tube was attempted without success. Owing to increasing hypoxia and respiratory distress a decision was made to intubate and ventilate the patient before transfer to theatre.

Emergency laparotomy revealed at least 3.5 litres of blood within the peritoneal cavity and a large congenital defect in the postero-lateral portion of the left hemi-diaphragm (Bochdalek hernia). Most of the small bowel, the whole of the transverse colon and the stomach with the attached spleen had herniated through the defect causing the left lung to collapse. The abdominal contents were reduced back into the abdominal cavity, and the diaphragmatic defect repaired. A dead fetus was removed by caesarean section.

The patient required several weeks of intensive therapy, and her recovery was complicated by pancreatitis which required laparotomy for desloughing of necrotic pancreatic tissue. She eventually went on to make a full recovery, and has subsequently had a healthy baby.

et al, 2006). These hernias can be classified as either traumatic or congenital. Traumatic diaphragmatic rupture may occur after blunt or penetrating thoracoabdominal injuries, usually occurs on the left because of the protection offered by the liver and it may be many months or years between the initial injury and the onset of symptoms.

Faulty embryological development of the diaphragm may result in a congenital diaphragmatic hernia. The diaphragm is formed by fusion in the embryo of the septum transversum (mesodermal tissue), the dorsal oesophageal mesentery and the pleuro-peritoneal membranes. These membranes close the pleuro-peritoneal canal after the development of the lungs. The hernia reported in this case is the commonest diaphragmatic defect and occurs posterolaterally (foramen of Bochdalek). It is located on the left in 90% of cases and is caused by failure of the pleuroperitoneal membrane to close adequately. Anterolateral defects (foramen of Morgagni) are much less common and usually small. The majority of these hernias occur on the right side and are asymptomatic, although occasionally the patient has non-specific epigastric discomfort.

The incidence of asymptomatic Bochdalek hernia in the adult population has been estimated at 0.17%, with a female to male ratio of greater than 3:1 (Mullins et al, 2001). A number of factors in pregnancy increase the likelihood of abdominal contents herniating through any pre-existing defects within the diaphragm. The gravid uterus increases intra-abdominal pressure, which may be exacerbated by persistent emesis. Hormonal changes also cause smooth muscle relaxation and softening of ligaments. The expulsive forces associated with labour may also cause extreme rises in intra-abdominal pressure forcing abdominal viscera through small defects.

Several mechanisms are responsible for the profound physiological changes associated with symptomatic diaphragmatic herniae. Sudden entry of abdominal contents into the chest causes rapid mediastinal shift with a resultant decrease in venous return and cardiac output (Ortega-Carnicer et al, 1998). The lung may be compressed leading to ventilation–perfusion mismatch and hypoxia. The blood supply to the viscera may also be compromised, with subsequent ischaemia and necrosis.

A chest X-ray alone is usually sufficient to diagnose a significant diaphragmatic hernia. If there is uncertainty, computed tomography scanning of the chest is indicated.

Those presenting with life-threatening complications as described above require immediate surgery. Before operative intervention, decompression of the stomach should be attempted as this may lead to an immediate improvement in cardiorespiratory status. This is commonly achieved using a nasogastric tube, although flexible endoscopy or intercostal drainage of the stomach has been described (Eglinton et al, 2006). Unfortunately, mortality rates of up to 80% have been reported when incarceration of viscera occurs (Fleyfel et al, 1998). **BJHM**

Eglinton TW, Coulter GN, Bagshaw PF, Cross LA (2006) Diaphragmatic hernias complicating pregnancy. *Aust N Z J Surg* **76:** 553–7

Fleyfel M, Provost N, Ferreira J, Porte H, Bourzoufi K (1998) Management of diaphragmatic hernia during pregnancy. *Anesth Analg* **86:** 501–3

Mullins ME, Stein J, Saini SS, Muellller PR (2001) Prevalence of incidental Bochdalek's hernia in a large adult population. *Am J Roentgenol* **177:** 363–6

Ortega-Carnicer J, Ambros A, Alcazar R (1998) Obstructive shock due to labor related diaphragmatic hernia. *Crit Care Med* **26:** 616–18

Richardson AJ, Bahlool S, Knight J (2006) Ruptured splenic artery aneurysm in pregnancy presenting in a manner similar to pulmonary embolus. *Anaesthesia* **61:** 187–9

Choledocholithiasis

A 79-year-old man with a previous cholecystectomy re-presented with right upper quadrant pain. His liver function tests showed a cholestatic picture. Ultrasound showed dilated intrahepatic ducts and a dilated common bile duct. No gallstones were identified.

Magnetic resonance cholangiopancreatography demonstrated a 1 cm filling defect in the distal common bile duct in addition to the dilated intra- and extrahepatic ducts (*Figure 1*). A gallstone was extracted from the common bile duct following sphincterotomy at endoscopic retrograde cholangiopancreatography.

Dr Steve Amerasekera *is Specialist Registrar in Radiology, Good Hope Hospital, Sutton Coldfield, Birmingham B75 7RR*

The distal common bile duct is a notorious 'blind spot' for ultrasound, because of overlying bowel gas, whereas magnetic resonance cholangiopancreatography is both sensitive and specific for the presence of gallstones in this location. Heavily T2-weighted sequences are used, with fluid, including bile, providing a white background upon which gallstones appear as filling defects. **BJHM**

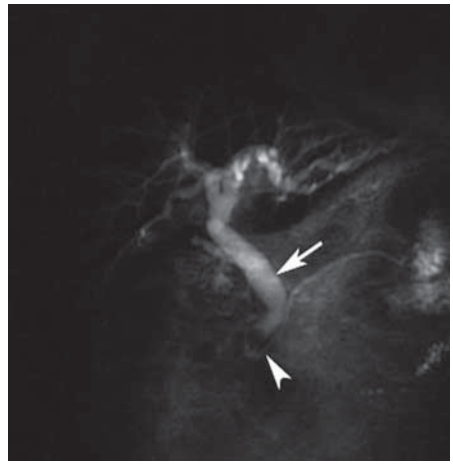


Figure 1. Thick slab T2-weighted magnetic resonance cholangiopancreatography. Arrow indicates dilated common bile duct. Arrowhead indicates filling defect, confirmed to be gallstone at endoscopic retrograde cholangiopancreatography.