CASE REPORT

Diaphragmatic rupture during labor

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SUMMARY. Diaphragmatic rupture during labor is uncommon and generally occurs in patients with a history of congenital diaphragmatic hernia or traumatic abdominal or chest injury. We present a case of a 41-year-old woman who presented with abdominal pain, vomiting and hypoventilation four days after a full-term home delivery. Chest radiography suggested the presence of a ruptured diaphragm, and laparotomy revealed a congenital left Bochdalek defect with herniation of the stomach, transverse colon and spleen into the left pleural cavity. Diaphragmatic hernia rupture during labor is a serious but rare complication that requires emergency surgery to prevent visceral perforation and cardio-respiratory failure.

INTRODUCTION

Diaphragmatic hernias may be congenital or acquired. Regardless of the cause, the diaphragmatic defect may go undetected for many years. Women with such a defect may not have symptoms until pregnancy or labor, when they may have potentially fatal complications. Radiological procedures, serial chest X-ray studies, computed tomography (CT) or magnetic resonance imaging (MRI) are mandatory to confirm the diagnosis. The insertion of a naso-gastric tube is a helpful method to diagnose the presence of an air-fluid level in the chest. We report a case of diaphragmatic hernia occurring during the peripartum period in which an initially confusing clinical presentation was clarified by unexpected findings on chest radiography.

CASE REPORT

A 41-year-old woman, gravida 4, para 4 was admitted to hospital four days after a normal full-term home delivery with an uncomplicated course of labor, assisted by a traditional birth attendant. The size of the baby at birth was not reported but a week later the neonate’s weight was 3600 g. Her previous pregnancy had an uncomplicated prenatal course and ended with vaginal delivery. She had had a normal antenatal course and denied any previous trauma or symptoms referable to gastrointestinal, respiratory, or cardiac disease. On the second postpartum day the patient developed nausea and vomiting, accompanied by abdominal pain and confusion. On admission, she appeared lethargic, she was hypotensive (80/45 mmHg), her temperature was normal, her respiratory rate was 12 breaths/min and her heart rate was 102 beats/min. Physical examination revealed that the abdomen was soft but mildly tender in the epigastric area, intestinal sounds were present, and the heart had a regular rhythm. Chest expansion was reduced and breath sounds were decreased at the left base. The neck was supple; the jugular veins were not distended. The mucous membranes were dry. Our initial clinical impression was that the patient was in septic shock from peripartum infection, but the uterus was small and firm. Sterile speculum examination revealed a soft cervix and no evidence of vaginal infection. Cultures of blood and urine were obtained and broad-spectrum antibiotics were administered. Cultures were negative after 48 h and antibiotics were discontinued.

Laboratory findings were: white blood cell count $18.3 \times 10^9/L$ with 78% neutrophils, red blood cells $5.1 \times 10^{12}/L$, hemoglobin 14.8 g/dL, platelet count $370 \times 10^9/L$, total protein 62 g/L, creatinine 583 μmol/L (6.6 mg/dL), blood urea nitrogen 44.15 mmol/L, sodium 158 mmol/L, potassium 2.8 mmol/L, glucose...
8.4 mmol/L (150 mg/dL), chloride 85 mmol/L. Arterial blood gas values on room air were: pH 7.58; PO2 12.8 kPa, PO2 7.4 kPa, bicarbonate 34.6 mmol/L.

The ECG was normal but a chest radiograph showed two large bullae in the left hemithorax (Fig. 1). A nasogastric tube was passed and about 2 L of fluid was aspirated, affording some relief to the patient. The patient was given Gastrografin, which demonstrated herniation of the stomach in the left hemithorax (Fig. 2). She received intravenous fluids supplemented with potassium and chloride. After 48 h of therapy, her electrolyte concentrations normalized. Her mental status and alkalosis rapidly improved with hydration. In the absence of any previous history of illness or trauma, spontaneous rupture of the diaphragm during labor was presumed. A laparotomy found a large portion of the stomach, transverse colon and spleen herniated in the left hemithorax through a defect of about 7 cm in the left hemidiaphragm.

Fortunately, all of the herniated viscera were viable and were reduced into the abdominal cavity. The diaphragmatic defect was repaired with interrupted sutures. The postoperative course was uneventful. A chest radiograph showed no abnormalities. The patient was discharged on the seventh postoperative day.

**DISCUSSION**

Diaphragmatic rupture complicating pregnancy or the peripartum period is very rare and results in a high mortality rate if early surgical intervention is not undertaken. The main complications described include visceral obstruction, respiratory distress and maternal death.1–5 Silent diaphragmatic ruptures due to previous injuries or congenital defects of the diaphragm have been known to become symptomatic during pregnancy or in the immediate post-partum period. In the present case there was no history of previous injury.

Diaphragmatic hernias may be congenital or acquired. In congenital hernias, the most common is the hernia of Bochdalek. This postero-lateral defect occurs in the left hemi-diaphragm in 80% of cases because the right diaphragmatic space is stronger and further protected from a sudden increase in abdominal pressure by the presence of the liver.6 In adults, spontaneous rupture of the diaphragm is rare and is at the very end of the differential diagnosis list. Ross et al.7 reported one case. Strangulation of abdominal viscera in a pre-existing congenital or traumatic diaphragmatic defect is more common; 21 such cases have been reported during pregnancy (16 congenital, four acquired, one spontaneous).2,8,9

Hill et al.3 reported a patient with history of a repaired congenital diaphragmatic defect who became symptomatic after early post-partum discharge. She had undergone four previous uncomplicated vaginal deliveries. “Spontaneous” rupture of the diaphragm probably results from a sudden sharp rise in the intra-abdominal pressure, pushing the diaphragm up and tearing its fibers at the least supported part. We think that increased intra-abdominal pressure during the second stage of labor and application of external pressure to the uterine fundus or the upper abdomen by a traditional birth attendant may have exacerbated a preexistent asymptomatic hernia or, perhaps, caused a spontaneous rupture of the diaphragm. It is also possible that repeated pregnancy caused enlargement of a defect with rupture of the diaphragm which, during her fifth pregnancy, resulted in herniation of stomach, colon and spleen. It is
easy to see how these factors might predispose an occult defect to incarceration or strangulation.

Clinical findings vary. Bisgaard et al.\textsuperscript{10} reported an adult case with four months’ delay in diagnosis. The signs and symptoms in the acute stage of rupture are due to the effects of abdominal viscera within the pleural cavity; the most common early symptoms are chest pain and dyspnea.\textsuperscript{11} Diminished breath sounds on the ipsilateral side are the most common physical finding. There may be signs of high or low mechanical ileus depending on which part of the gastrointestinal tract is herniated. The chest radiograph seems to be the most useful investigation in such cases.\textsuperscript{12,13} Thoracic ultrasonography and CT are other methods that could establish the diagnosis.

In our patient the rupture occurred after a normal delivery and was followed by abdominal pain and symptoms of high intestinal obstruction. Her laboratory abnormalities (hypokalemia, increased serum bicarbonate and hypochloremia) were due to the recurrent vomiting. She under-ventilated to compensate for her metabolic alkalosis. The correct diagnosis was established when chest radiographs showed the herniated stomach.

Once the diagnosis is made immediate surgery is needed, as there is danger of incarceration and gangrene of the herniated viscera. The first procedure of this type was described in 1902.\textsuperscript{14} The transabdominal approach enables good access to herniated parenchymal organs such as liver and spleen.\textsuperscript{15,16} However, some authors prefer the transthoracic approach in longer lasting hernias to treat pleuroperitoneal adhesions. It is possible to perform a laparoscopic procedure.

The diagnosis of diaphragmatic rupture requires a high index of suspicion. Symptoms compatible with rupture, particularly abdominal pain, dyspnea and vomiting should be thoroughly investigated. Diaphragmatic hernia in a pregnant patient should be diagnosed and repaired before the onset of labor. In patients with Bochdalek hernia diagnosed in the first or the second trimester of pregnancy, surgical intervention is advisable regardless of symptoms. Asymptomatic patients in the third trimester of pregnancy require elective cesarean section once the fetus reaches maturity. In the symptomatic patient, immediate repair should be undertaken in order to avoid cardiorespiratory failure or visceral obstruction, which could occur at any time.

REFERENCES