Case Report

Traumatic Rupture of Diaphragm: Not an Easy Diagnosis

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ABSTRACT

Traumatic diaphragmatic rupture is an infrequent condition that can result from penetrating or blunt trauma to abdomen or chest. We are presenting a case of traumatic rupture of diaphragm due to blunt trauma abdomen in 10 years old boy without any clinical signs and symptom suggestive of diagnosis. (Rawal Med J 2007;32:85-86)

KEY WORDS: Trauma, diaphragm rupture, chest injury

INTRODUCTION

First documented case of diaphragm rupture was described by Sennertus in 1541 and a fatal outcome was reported in 1579 by Ambroise Pare.\(^1\) First successful repair of diaphragmatic injury was performed by Riolfi in 1986. Blunt injuries to diaphragm occur in approximately 1% of all trauma admissions.\(^2\) Most cases are initially overlooked in acute phase due to the
presence of other major injuries or present with variable clinical and radiological signs. Diagnosis is often difficult or missed and thus a high index of suspicion is vital to early diagnosis as radiological findings may be nonspecific in some cases. Particular trauma mechanisms and associated injuries may suggest the existence of diaphragm rupture. An overlooked diaphragm injury present as a hernia many years later with potentially serious complications. Therefore proper history, clinical examination and selection of most appropriate radiological technique to reach the accurate diagnosis of traumatic rupture of diaphragm on first admission are important.

CASE REPORT

A 10 years old boy was brought in causality with one day history of collision with a slow moving vehicle. After colliding with vehicle he fell on road and front tyre of vehicle had override partially over his right side of abdomen. The boy was fully conscious, walking around, eating normally, with no dyspnea or cyanosis, with stable vital signs with GCS of 15. He had bilateral black eyes, few minor contusions and abrasions over scalp, face and legs. Vehicle tire marks were visible over lumber region extending into umbilical region on right side of the abdomen. Breath sounds are diminished on left lower chest and no gut sounds were heard. X-ray chest showed a huge air fluid level in left hemi thorax indicative of high position of stomach (Fig 1 and 2). Barium meal shows passage of contrast into stomach and collected below air fluid level which is suspicious but not diagnostic of rupture diaphragm (Fig 3). Midline laparotomy reveled a 6-8 cm long rent in postero-lateral aspect of left dome of diaphragm involving the esophageal hiatus. Repair was done with non-absorbable sutures and patient had uneventful post-operative recovery.
Fig. 1. X-ray chest PA view showing a large air fluid level in left hemithorax.

DISCUSSION

The pressure difference between the abdominal peritoneum and pleural cavities is 7-20 cm of water in quite breathing but could be as high as 100 cm of water in forced respiration.¹ When diaphragm ruptures this pressure difference causes the abdominal viscera to herniate through the defect into the chest cavity. The presence of these organs in the pleural cavity reduces the effective respiratory space and may shift the mediastinum to opposite side causing respiratory and vascular embarrassment. Indirect diaphragmatic rupture is defined as acquired complete split of the diaphragm after blunt trauma and occurs in 1-5% of massively traumatized patients.⁵
Trauma is the commonest cause of diaphragm rupture but may rarely occur in isolation and associated injuries to the liver, spleen, pelvis and thoracic aorta are often present\textsuperscript{2,3,5} and may rarely occur without any obvious sign of external injury.\textsuperscript{6} Spontaneous rupture may occur due to heavy lifting, coughing, inflammatory processes like subphrenic abscess and empyema.\textsuperscript{3,7} during delivery\textsuperscript{6}
and due to excessive vomiting.\textsuperscript{5} It is rare in children due to higher compliance of the chest wall.\textsuperscript{1,6} Left sided injury is more common (60\%) presumably due to the relative weakness of the left hemi diaphragm compared with the right (25\%) due to protective effect of liver.\textsuperscript{6} In 3-5\% of cases rupture is bilateral.\textsuperscript{7} The viscera most commonly herniated into the pleural cavity, in order of frequency, are stomach, splenic flexure, small bowel, spleen and omentum and rarely liver and kidney.\textsuperscript{1,2}

\textbf{Fig 3. Barium meal examination showing the thoracic position of stomach}
Clinical presentation depends upon the extent of rupture and the presence of associated injuries. Bowditch in 1853 described five signs of diaphragmatic rupture i.e. prominence and immobility of respective half of chest, opposite shifting of cardiac dullness, tympanitic note on percussion, absent breath sounds and presence of gut sounds on respective side of chest. Diagnosis causes difficulties even in present day and is commonly made during surgical explorations, especially in case of penetrating injuries. A high index of suspicion is vital because the diagnosis of rupture diaphragm is often missed, delayed or over looked especially in the presence of associated injuries. Chest X-ray in erect position has 50% accuracy. Diaphragmatic injury may be detected on ultrasound but 70-80 % sensitivity is seen on CT scan and MRI may be the best non-invasive examination for this injury.

Delay in detecting and repairing diaphragmatic injury increases both morbidity and mortality. Diaphragmatic injuries are usually repaired via Laparotomy and abdominal contents are reduced and diaphragm is repaired with monofilament non-absorbable sutures. In cases where diaphragmatic hernia has been present for a long time, simple closure may be difficult or impossible and non-absorbable mesh may be required. Common complications after operation include pneumonias, atelectasis and postoperative hemothorax. Mortality rate is 15 – 18% but the cause of mortality is other associated injuries in majority of cases, as mortality directly due to diaphragm injury is very rare.

REFERENCES