

Traumatic diaphragmatic hernia masquerading as left-sided hydropneumothorax: a case report

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(Accepted November 2009)

Abstract Traumatic diaphragmatic rupture (TDR) is rare in children and can be easily overlooked because of lack of awareness of late presentation and concomitant injuries. A 4-year-old girl presented with respiratory distress 2 months after a road traffic accident. The initial differential diagnosis was pneumonia or pulmonary tuberculosis with associated pleural effusion. On further assessment, a diaphragmatic hernia was suspected. The initial radiograph showed left hydropneumothorax. Fluoroscopy, follow-up chest radiographs and barium swallow confirmed the diagnosis of left TDR. Surgery was undertaken but unfortunately she did not survive. Awareness of delayed presentation of TDR is essential for prompt management.

Introduction

Rupture of the diaphragm following blunt trauma is rare in children.^{1,2} Late presentation is well recognised; the diagnosis is often delayed for months or years because of its rarity, concomitant injuries and lack of awareness of late presentations.^{1,3–5} Conditions such as pneumonia with pleural effusion, haemothorax and pneumothorax may mimic traumatic diaphragmatic rupture (TDR), thereby delaying the diagnosis with a resultant increase in mortality.^{4–7}

A 4-year-old child who died following delayed diagnosis of TDR is described.

Case Report

A 4-year-old girl was referred to the paediatric emergency unit of Ilorin

Teaching Hospital with a history of left-sided chest swelling for 1 month, recurrent episodes of difficulty in breathing for 3 weeks and weight loss and fever for 1 week. The chest swelling was slowly increasing in size but was not associated with pain. The most recent episode of difficulty in breathing occurred 2 days prior to admission. Despite weight loss, she retained a normal appetite. The fever was low and continuous and was temporarily relieved by paracetamol but had subsided 2 days before admission. She had been involved in a road traffic accident about 2 months before onset of the illness in which she sustained bruises to the face. No other injuries were noted.

On examination, she was conscious and playful, underweight for age (10.2 kg, below the 10th centile), in mild respiratory distress but not pale or cyanosed, well hydrated and her temperature was normal. Respiratory rate was 54 breaths/min and there was intercostal recession and mild flaring of the alae nasi. The chest was asymmetrical with bulging of the left hemithorax anteriorly but

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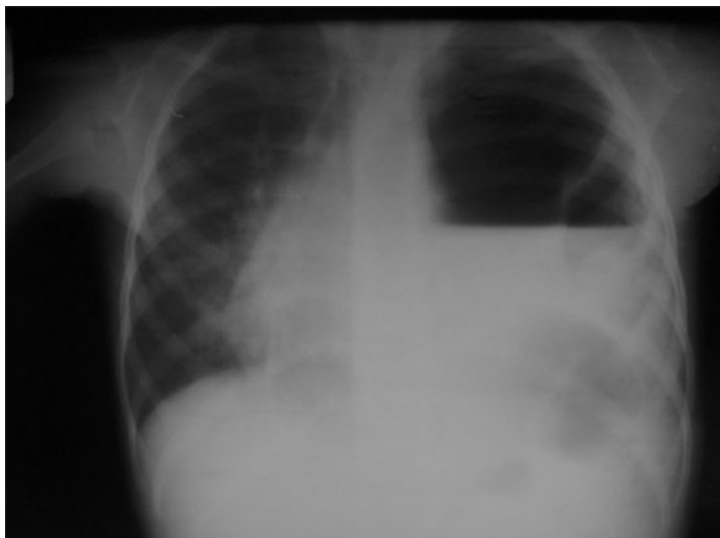


FIG. 1. Chest radiograph on the 1st day of admission showing a left-sided hydropneumothorax with mediastinal shift to the right.

no signs of local inflammation. The trachea was deviated to the right. There was reduced chest expansion on the left side. Percussion note was stony dull in the left lower zone anteriorly and posteriorly with absent breath sounds. Breath sounds on the right were normal. In the cardiovascular system, pulse rate was 100 beats/min, regular with full volume. Radial pulses were synchronous with other peripheral pulses. Blood pressure was 90/50 mmHg. The apex beat was not well defined. Heart sounds were normal but heard on the left praecordium closer to the midline than normal. Abdominal and central nervous systems were normal. The initial diagnosis was pneumonia with left pleural effusion with a differential diagnosis of pulmonary tuberculosis with pleural effusion. A chest radiograph showed features of left-sided hydropneumothorax with mediastinal shift to the right. No bowel loops were seen (Fig. 1). Full blood count, malaria parasite smear and erythrocyte sedimentation rate were essentially normal. Blood culture showed no growth after 7 days and gastric washings were negative for acid-fast bacilli on three occasions. Thoracocentesis was undertaken and only about 1.5 ml of serous

fluid was obtained but culture yielded a moderate growth of *Enterococcus faecalis* sensitive to ceftriaxone and ceftazidime.

On the 3rd day of admission, a thoracostomy tube with underwater seal was inserted but there was no air or water drainage. On the 4th day, bowel sounds were audible in the left hemithorax. Other systems were normal and a left-sided post-traumatic diaphragmatic hernia was considered. A chest radiograph under fluoroscopy (Fig. 2) showed bowel loops with peristaltic activity and a barium swallow examination immediately afterwards showed the outline of the stomach in the left hemithorax (Fig. 3). The trachea and mediastinum were shifted to the right. A diagnosis of left traumatic diaphragmatic hernia was confirmed.

Exploratory laparotomy was undertaken and a left hemi-diaphragmatic defect, about 5×6 cm, was found. The transverse colon, small intestine and stomach were completely in the left hemithorax. The left lung was collapsed but there was good re-expansion immediately after the stomach and bowel were returned to the abdomen. The defect was repaired and her immediate post-operative condition was satisfactory. However, she had inadequate saturation



FIG. 2. Chest radiograph on the 4th day of admission showing bowel loops in the left hemithorax with the chest tube *in situ*.

despite manual ventilation with 100% oxygen. Unfortunately, she had a cardiac arrest 5 hours after surgery and cardio-pulmonary resuscitation failed to revive her.

Discussion

The incidence of TDR has increased along with the number of motor vehicle

accidents.⁴ Diaphragmatic rupture is commoner on the left than on the right.⁸⁻¹⁰ A mortality rate of 20–40% for TDR following road traffic accidents has been reported.¹¹

Factors which contribute to increased mortality from TDR are the associated severe injuries and delayed diagnosis. A number of factors cause delayed diagnosis including serious concurrent injuries and a



FIG. 3. Barium swallow on the 4th day of admission showing the stomach in the left hemithorax.

paucity of pathognomonic clinical signs and simultaneous lung injuries which may mask or mimic the diagnosis.¹⁰

Clinical examination findings are usually masked by the presence of more life-threatening injuries and thus the initial diagnosis of TDR is missed in about 7–66% of cases.¹² Conditions such as pneumonia with pleural effusion, haemothorax and pneumothorax have all been known to mimic TDR.^{4–7} Clinical diagnosis of a ruptured hemi-diaphragm is difficult but may be suggested by the presence of audible bowel sounds, absent breath sounds on the affected side and respiratory distress.¹²

On chest radiograph, diagnostic criteria suggestive of a ruptured diaphragm are the presence of bowel loops in the chest, a nasogastric tube above the diaphragm and a markedly elevated hemi-diaphragm.¹² Because the liver serves to block herniation of abdominal contents into the lower right side of the chest, initial radiographs allow diagnosis of 27–60% of left-sided injuries but only 17% of right-sided injuries.¹³ Furthermore, penetration of a herniated liver through a diaphragmatic tear has to be differentiated from other causes of elevated diaphragm such as atelectasis, pleural effusion, pulmonary contusion or laceration.¹²

Delayed progressive visceral herniation through a diaphragmatic tear may also result from the constant negative intrapleural pressure pulling on mobile abdominal viscera.¹² As a result, evidence of visceral herniation may not be visible on initial chest radiograph, as in this case.

Diagnosis of TDR is greatly enhanced by repeated chest radiographs.^{7,12} In this patient, a repeat chest radiograph after demonstration of bowel peristalsis on fluoroscopy 3 days after the initial radiograph confirmed the presence of bowel loops in the left hemithorax. Other imaging modalities reported to be of value in evaluating diaphragmatic rupture include barium studies, computed tomography and magnetic resonance imaging.¹⁴

Delayed presentation of TDR probably contributed significantly to the fatal outcome in this patient. Clinicians should be aware of the possibility of delayed presentation of TDR, especially in children with chest symptoms even some time after trauma.

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