

Late traumatic diaphragmatic rupture complicated by haemothorax and strangulation of the stomach: A case report

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Abstract

Traumatic diaphragmatic rupture (TDR) is an uncommon but life-threatening condition often caused by blunt or penetrating trauma. Symptoms may appear late resulting in delayed or missed diagnosis. We report here a case of a 28-year-old man who presented with left subcostal pain and vomiting after recently binge drinking alcohol. He had experienced bilateral rib fractures two years previously. Computed tomography (CT) showed massive left pleural effusion and pleural fluid drained by thoracentesis had a bloody appearance. The patient developed septic shock but emergency surgery showed no active bleeding. Enhanced-CT showed herniated stomach with ischemic necrosis in the left thoracic cavity. Total gastrectomy and diaphragmatic repair were successful and the patient had an uneventful recovery. A high index of suspicion is necessary when evaluating haemothorax, especially in patients with recent or previous thoraco-abdominal injury.

Keywords

Haemothorax, diaphragmatic hernia, rupture, thoraco-abdominal injury, trauma

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Introduction

Traumatic diaphragmatic rupture (TDR) is an uncommon but life-threatening condition that occurs secondary to blunt or penetrating trauma and occurs in approximately 0.4% of all trauma cases.¹ Of the two

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causes of TDR, penetrating trauma (63%) is more common than blunt trauma (37%).¹ Most diaphragmatic ruptures (88%–95%) occur on the left side, possibly due to congenital weakness of the left diaphragm and protection of the right diaphragm by the liver.² The diaphragmatic rupture process can be divided into three phases, acute, latent and obstructive.^{1,2} The acute phase is the time at which the trauma is inflicted on the diaphragm; during this phase, symptoms of a TDR may be absent or masked by co-existing injuries. The latent phase can range from days to decades, with absent or non-specific symptoms resulting from the development of visceral herniation. The obstruction phase results from complications due to long term abdominal visceral obstruction or pulmonary compression.^{1–3} Importantly, up to 30% cases of blunt diaphragmatic rupture present late.⁴ Therefore, TDR can be easily missed in the acute phase and delayed diagnosis is common.² The risk of missed diagnosis and subsequent missed opportunity to repair the diaphragm can lead to visceral strangulation, which can be life-threatening.³

We describe an unusual case of TDR complicated by haemothorax and strangulation of the stomach that had been undiscovered for two years following blunt trauma to the chest.

Case report

A 28-year-old man presented to our hospital's emergency department with persistent left subcostal pain accompanied by shortness of breath, dark mucus, nausea and vomiting. He reported that the symptoms had started one day after binge drinking alcohol. A review of his medical history showed that the patient had been involved in a road traffic accident two years previously which had caused bilateral multiple rib fractures due to blunt trauma to his chest. At that time, he underwent internal

fixation of the fractured ribs and had made an uneventful recovery.

Physical examination showed dull percussion and diminished breathing sounds in the left lung and tenderness over the left upper quadrant region. Laboratory test results showed leucocytosis ($30.2 \times 10^9/l$; normal range: $3.5-9.5 \times 10^9/l$) and occult blood in the vomitus. Initial imaging of the chest and abdomen using computed tomography (CT) showed massive pleural effusion on the left with the mediastinum shifting slightly to the right (Figure 1). Based on these clinical findings, a hydrothorax was suspected and so a left thoracic puncture was made and approximately 500 ml pleural fluid was removed via a catheter.

Results of pleural fluid examination were as follows: bloody turbid appearance; total cell count $2.3 \times 10^6/l$; white blood cell count, $7.7 \times 10^6/l$; mononuclear cells, 49%; Rivalta test, (+ve); specific gravity, 1.06. The patient received oxygen inhalation (continuous 2 l/min), intravenous fluids (1600 ml/12 hr) and antibiotics (intravenous ertapenem 1g/day) but his symptoms did not improve. He quickly developed septic shock, possibly related to active bleeding, and so underwent emergency video-assisted thoracic surgery for left thoracic exploration to establish haemostasis. Approximately 2000 ml bloody pleural effusion was found in the left chest and severe adhesions were observed, some of which were old and dense and others were new and loose. Following aspiration of the pleural effusion and lysis of the partial adhesions, no active bleeding was apparent. A thoracic drainage tube was placed and the operation was completed.

On the day after the surgery, there was no obvious improvement in the patient's condition. Dark red gastric juice positive for occult blood was draining continuously from his gastric tube. On the third day post-surgery, the patient underwent an emergency gastroscopy, which uncovered a large ulcer on the greater curvature side of the

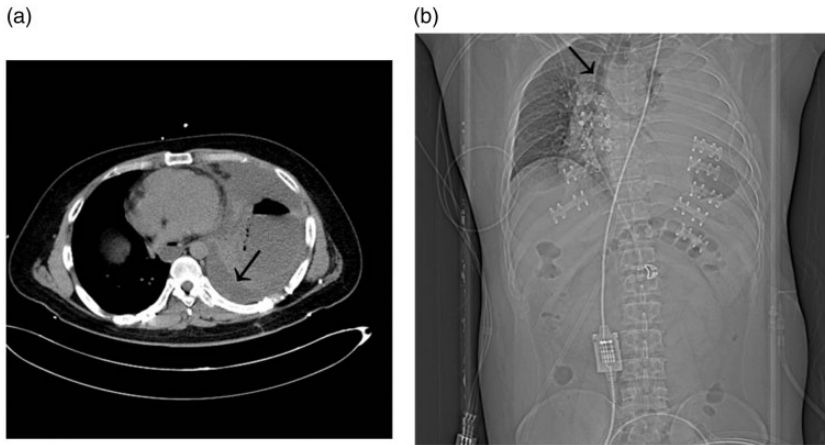


Figure 1. Initial computed tomography (CT) scan of chest and abdomen
(a): Massive pleural effusion on the left (arrow); (b): Mediastinum shifting slightly to the right (arrow).

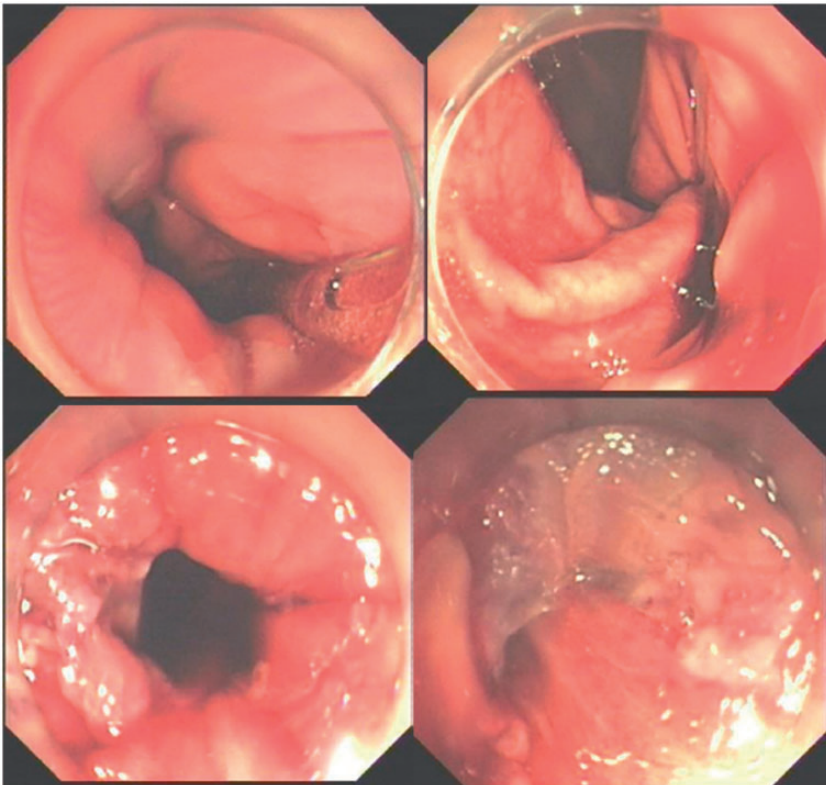


Figure 2. Gastroscopy showed a huge ulcer on the greater curvature side of the cardia.

cardia (Figure 2). Contrast-enhanced CT scans showed the left diaphragm to be partially discontinuous and the stomach to be partially herniated into the left thoracic



Figure 3. Contrast enhanced computed tomography (CT) scans showed that the left diaphragm was partially discontinuous, and the stomach partially herniated into the left thoracic cavity. The black arrows indicate the hernia ring; the dashed arrow indicates the thickened and swollen gastric wall; the white arrow shows enhancement of the mucosa, indicating ischemic necrosis.

cavity. The wall of the hernia sac showed mild enhancement and the gastric wall around the hernia ring was thickened and swollen. The mucosa showed enhancement, indicating ischemic necrosis (Figure 3). A retrospective review of the images from the first CT scan taken on hospital admission, showed a dilated thoracic oesophagus and multiple punctate foci in the gastric submucosa indicating pneumatosis (Figure 4). The patient was diagnosed with TDR complicated by haemothorax.

Four days after the exploratory surgery, the patient underwent further surgery. After freeing major adhesions between the left lower lobe and diaphragmatic surface, a defect of 4-cm diameter in the posterior medial region of the left diaphragm was observed. The rupture contained the fundus and body portions of the stomach and small part of the omentum. The herniated stomach was ischemic, necrotic, dark purple in colour with a thin gastric wall, twisted body and there was high tension in the cavity; only the distal portion (approximately 3 cm) near the pyloric ring appeared normal (Figure 5). As a result of these findings, the patient underwent a total gastrectomy with

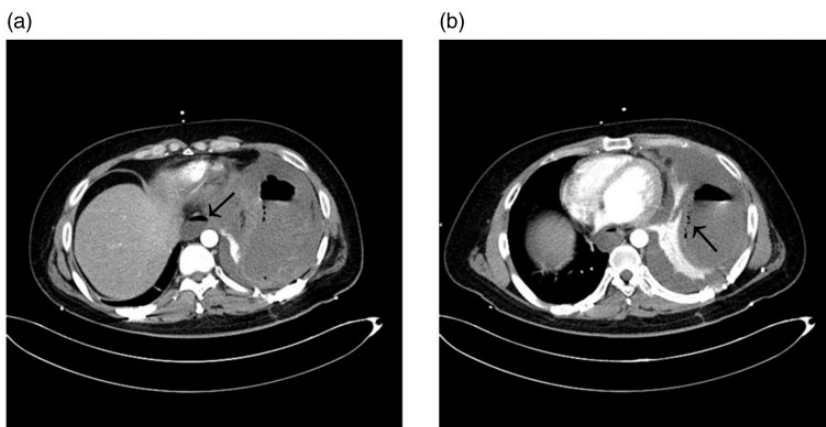


Figure 4. Re-examination of the initial computed tomography (CT) scan of chest and abdomen. (a): Dilated thoracic oesophagus (arrow). (b): Multiple punctate foci in the gastric submucosa indicating pneumatosis (arrow).



Figure 5. Exploratory laparotomy showed a large part of the proximal stomach was necrotic (dark purple); only the distal portion (approximately 3 cm) near the pyloric ring appeared normal.

accompanying diaphragmatic repair. The patient recovered well and was fully ambulatory two weeks post-surgery.

Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Discussion

In this report, we describe a delayed presentation of TDR complicated by haemothorax that had occurred following multiple rib fractures as a result of a blunt trauma to the chest two years previously. The injury

had caused ischemia and necrosis of the incarcerated stomach in the left thoracic cavity. As this case report illustrates, TDR can be asymptomatic or produce only mild symptoms and if undiscovered can lead to serious complications and be life-threatening. Indeed, the size of the initial rupture may be so small that patients may be without symptoms and imaging investigations may fail to observe the diaphragmatic injury. Moreover, it has been suggested that chronic TDR are smaller than those of acute ruptures.⁵In this present case, the event of severe vomiting following binge drinking of

alcohol may have led to late rupture of the diaphragm or an abrupt enlargement of a previous small herniation. The haemothorax may have arisen because of rupture of the intrathoracic vessels, damage to intrathoracic organs or damage to herniated organs.⁶ However, no active bleeding, either in the thoracic cavity or in the lung were found during a thoracotomy. A large stomach ulcer was detected during gastroscopy and we suggest that the most probable origin of the bloody fluid in the thoracic cavity was the strangulated stomach.

A delayed presentation of TDR causing lesion of the right superior phrenic artery resulting in haemothorax has been reported previously.⁷ In addition, a case of TDR with gastric incarceration and perforation causing empyema in the left hemithorax following a blunt abdominal trauma has also been reported.⁸ However, of all the previously published reports of stomach herniation as late presentation of TDR, none was complicated by haemothorax.^{9–13} To our knowledge, this is the first report of late TDR complicated by both haemothorax and strangulation of the stomach.

In summary, because of the likelihood of missed diagnosis at the time of injury and potential for delayed presentation of TDR, a high index of clinical suspicion is necessary for the recognition of this rare aetiology when evaluating a haemothorax, especially in patients with recent or previous thoraco-abdominal trauma history.

Declaration of conflicting interest

The authors declare that there are no conflicts of interest.

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