Delayed diaphragmatic rupture presenting with acute gastric volvulus

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ABSTRACT

Gastric volvulus is a rare complication of diaphragmatic rupture. We report the case of an 82-year-old man who presented following an out-of-hospital cardiac arrest. Chest radiography and thoracic computed tomography revealed an acute gastric volvulus and a chronic diaphragmatic hernia containing transverse colon and abdominal viscera. He had complained of retching and associated epigastric pain prior to collapse, and had sustained a motorcycle accident approximately 60 years earlier. Insertion of a nasogastric tube was unsuccessful (completing Borchardt's diagnostic triad) and his condition prevented both operative and endoscopic reduction of his volvulus. He died soon afterwards.

KEYWORDS

Gastric volvulus – Hiatal hernia

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Case History

An 82-year-old man presented *in extremis* following an out-of-hospital cardiac arrest. His partner had commenced cardiopulmonary resuscitation and return of spontaneous circulation was achieved 25 minutes later. He had complained of non-specific upper abdominal pain for the last two days and had been continually retching although not vomiting. On direct questioning, his partner reported that he had sustained significant left arm injuries after a motorcycle accident approximately 60 years earlier.

On examination, the patient was ventilated and there was no left-sided chest wall movement or breath sounds on auscultation. He was receiving aggressive fluid resuscitation and an adrenaline infusion to maintain blood pressure. The abdominal examination was unremarkable. Arterial blood gases showed a significant metabolic acidosis, with a pH of 6.8 and a lactate of 17. Plain chest radiography showed a gastric bubble and bowel loops in the thoracic cavity (Fig 1). Despite ongoing resuscitation, he did not improve and it was thought that the diaphragmatic herniation could have been the cause for his deterioration. Multiple attempts to pass a nasopharyngeal tube at this point were unsuccessful.

Urgent computed tomography (CT) of the patient's chest and abdomen (Figs 2 and 3) revealed pancreas, large and small bowel in the thoracic cavity, suggesting a chronic diaphragmatic hernia. There was marked gastric dilatation and volvulus, with the pylorus remaining in the abdomen. There was uniform enhancement of the gastrointestinal tract with no ischaemic component. The left lung was entirely collapsed and there was some collapse of the right

lung; in addition, there was midline shift of the heart. Operative intervention was considered at this point but the likely longstanding nature of his diaphragmatic herniation and his significant cardiac arrest precluded further intervention. Cardiorespiratory support was withdrawn and the patient died soon after.

Discussion

This case is unusual in that a previously unrecognised and asymptomatic diaphragmatic hernia caused an acute gastric volvulus. Left-sided traumatic diaphragmatic ruptures are more common than on the right and tend to be associated with a significant injury.¹ The resultant raised intra-abdominal pressure has been postulated as the cause of rupture following blunt trauma, which tends to involve road traffic accidents. Three distinct phases of presentation of diaphragmatic rupture occur: the acute phase (immediately after injury), the latent phase (some hours to weeks after injury) and the obstructive phase (occurring some months to years after injury).^{1,2} In the latent phase, abdominal contents move into the thoracic cavity and subsequently become obstructed; 85% of strangulations occur within three years of injury.²

Acute gastric volvulus (torsion of the stomach causing complete luminal obstruction that accompanies intrathoracic herniation) is an uncommon surgical emergency with a mortality rate of 15–20%.^{3,4} Gastric volvulus associated with a diaphragmatic hernia, as in our case, is rare with only 15 cases reported previously.^{5,6} It is classically associated with Borchardt's triad: epigastric pain, retching without vomiting

Figure 1 Plain chest radiography showing large gastric bubble and multiple loops of bowel in the thoracic cavity

and inability to pass a nasogastric tube.^{3,4} Complications of acute volvulus include ischaemia and infarction, perforation, peritonitis, shock and death. Examination of patients may reveal little except for some upper abdominal distension and signs of shock, either secondary to hypovolaemia or cardiac compromise.⁵⁻⁶ Investigations are dependent on the stability of the patient and include plain radiography

Figure 2 Thoracic sagittal computed tomography showing dilated fluid filled stomach, colonic loops in the left thoracic cavity and left lung collapse. Abdominal contents in the right thoracic cavity are seen causing associated right lung collapse.

Figure 3 Thoracoabdominal sagittal computed tomography showing large hiatal hernia defect, stomach and colon (with associated mesentery) in the left thoracic cavity. Note midline tracheal deviation and cardiac deviation (right-sided) with some lung collapse. Spleen in correct anatomical position.

(revealing a gastric air bubble in the thoracic cavity), CT, barium studies and endoscopy.³⁻⁷

Gastric volvulus should be managed by prompt reduction. Both operative (open or laparoscopic) and endoscopic techniques have been used to treat acute volvulus, the latter without the use of general anaesthesia.^{3,4,6} Operative intervention can identify and repair any of the secondary predisposing factors for volvulus formation while also managing any associated perforation and subsequent peritonitis.⁵ Unfortunately, our patient's out-of-hospital cardiac arrest, his unstable condition and the chronicity of the diaphragmatic herniation with both colon and pancreas in the thoracic cavity prevented surgical reduction of the volvulus.

Conclusions

This case is unusual as the patient had an undiagnosed traumatic diaphragmatic injury approximately 60 years earlier. Despite almost total left-sided lung collapse as well as some right-sided compromise, he had no respiratory compromise. Although there was gastrointestinal enhancement on CT, it is likely that his metabolic compromise was secondary to an ischaemic stomach with possible direct

cardiac compression and compromise to venous return.⁴ The case illustrates the need to consider previous unrecognised traumatic injury and to consider abdominal causes of poor respiratory ventilation.

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