

CASE REPORT

Traumatic intrapericardial diaphragmatic hernia

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Abstract Herniation of abdominal viscera into the pericardial space is a rare occurrence involving a sacless entry through a rent in the pericardial portion of the diaphragm's central tendon. Intrapericardial diaphragmatic hernia is often overlooked both clinically and radiologically and more pressing cardiorespiratory and orthopaedic abnormalities are addressed. The traumatic patient presented here had air shadows above the diaphragm on his chest radiograph. Chest computed tomography showed displacement of heart and air-filled mass, suspicious of a bowel loop, in the pericardial sac. A diagnosis of intrapericardial hernia was made in this patient who was haemodynamically unstable. The diaphragmatic tear was surgically repaired and the patient's postoperative course was uncomplicated.

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Herniation of abdominal viscera into the pericardial space is a rare occurrence^{1–3} involving a sacless entry through a rent in the pericardial portion of the diaphragm's central tendon. Intrapericardial diaphragmatic hernia (IDH) is a diagnostic challenge for emergency physicians and trauma surgeons.⁴ Intrapericardial diaphragmatic hernia is often overlooked both clinically and radiologically and more pressing cardiorespiratory and orthopaedic abnormalities are addressed.⁵ Despite its rarity, this condition is potentially fatal in the absence of prompt recognition and treatment.⁶ We present a case of diaphragmatic rupture in which the abdominal viscera herniated into the pericardial sac, displacing the heart and causing severe haemodynamic instability.

Case report

A 22-year-old man presented with progressive shortness of breath and severe back pain following an occupational accident. He had a major back trauma. A concrete water pipe without operator control struck the patient. Physical examination revealed diffuse ecchymosis on his back. The abdominal examination was normal except epigastric tenderness. The patient's vital signs were: heart rate, 102 beats/min, arterial blood pressure, 90/55 mm Hg, and respiratory rate, 28 breaths/min. Initial laboratory testing revealed: haematocrit 30% and white blood cell count 13200/mm³. A chest X-ray showed multiple rib fractures (ribs 5 through 8) on the right side and a burst fracture of the L5 vertebra. A supradiaphragmatic air collection was noted between the left side of the heart and the pericardium (Fig. 1).

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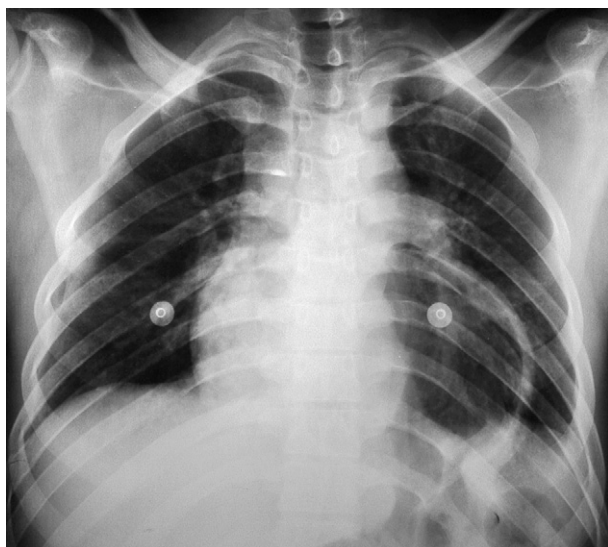


Figure 1 The left hemidiaphragm is not well seen. There is a supradiaphragmatic air collection between the left heart border and the pericardium. The left costophrenic sinus is obliterated.

Initially, diaphragmatic rupture with herniation into the pleural cavity was suspected, and surgical intervention was suspended until a complete evaluation could be done. However, over the next few hours, the patient had multiple episodes of hypotension and periods of tachycardia and bradycardia. Computed tomography (CT) of the chest demonstrated a contusion in the posterobasal segment of the left lower lobe, mild bilateral haemothorax, and displacement of the heart to the right. CT also showed air-fluid level on the left side of the heart resembling intrapericardial bowel located where the heart is normally positioned (Fig. 2).

The patient was believed to have IDH. Since the patient's haemodynamic status was deteriorating, he was referred to immediate laparotomy. At surgery, a 7-cm laceration was detected in the pericardial portion of the central tendon of the diaphragm, and the transverse colon, part of the omentum, and approximately 200 mL of blood was found within the pericardial sac. In addition, there was a retroperitoneal haematoma. The herniated organs



Figure 2 CT reveals mild bilateral haemothorax and displacement of the heart to the right. There is air-fluid level on the left side of the heart resembling bowel.

were gently returned to the abdomen, and replacement of the herniated omentum and colon led to immediate haemodynamic improvement. Careful examination of the heart revealed no myocardial contusions or ruptures. The diaphragmatic tear was repaired and drains were placed into the left and right thoracic cavities, and the abdomen. No drainage tube was placed in the pericardium. The patient became haemodynamically stable immediately after surgery, and his postoperative course was uneventful.

Discussion

IDH results from a posttraumatic and severe compressive injury to the chest and abdomen, usually caused by a motor vehicle crash.⁵ If the pericardial portion of the diaphragm sustains damage, the heart can herniate into the abdominal cavity; however, it is more common for the abdominal viscera to herniate into the pericardial sac. Some authors have reported that 3.3–10.4% of patients with diaphragmatic hernias have pericardial involvement.^{4,7} In contrast, other reports on large series of diaphragmatic hernia cases have revealed no pericardial involvement.^{4,9}

The clinical presentation of patients with IDH varies, and can include gastrointestinal, respiratory and cardiovascular complaints.¹⁰ It has been suggested that diaphragmatic hernia due to blunt trauma is an uncommon cause of haemodynamic instability.⁸ Individuals with IDH tend to show signs and symptoms of cardiac compression. Herniation of visceral contents into the pericardial sac reduces ventricular filling and stroke volume, and thus decreases cardiac output. A review article noted that 10% of patients with IDH had cardiac tamponade as a secondary problem at the time of diagnosis.⁴

It is not always possible to accurately diagnose IDH prior to surgery. In a review of IDH, including 74 patients, the authors noted that almost half of the diagnoses were delayed from 23 days to 33 years after the injury.^{10,11} Delayed identification of this type of injury is relatively common, even when there is significant herniation.⁴ The reason for this is that a patient may be only mildly symptomatic during the latent phase; the problem is only identified when an acute complication, such as visceral strangulation and incarceration or cardiac tamponade, develops.^{12–14}

Diagnosis of any type of diaphragmatic rupture requires a high index of suspicion. A complete history and standard chest radiography are the most useful tools for detecting IDHs. Complete radiological evaluation of such cases involves other imaging techniques: chest CT, magnetic resonance imaging, and oral contrast studies are done if there is any doubt. The diagnosis may be obvious if air-filled viscera are visible above the level of the diaphragm and within the pericardial sac, as was evident on CT in our case. Recently, it has been suggested that echocardiography and ultrasonography may also be valuable for identifying diaphragmatic hernias.¹⁵ The differential diagnosis for intrapericardial diaphragmatic hernia includes Morgagni's hernia and herniation into the pleural cavity without pericardial involvement.^{4,13} IDH is not usually recognized as a mediastinal mass. It has no sac and therefore conforms to the pericardium with non-lobulated margins.⁵

The risk of death in cases of diaphragmatic hernia usually depends on the nature of associated injuries. Deferred

treatment may be appropriate if a patient with diaphragmatic hernia is stable and no other condition mandates surgery.⁸ IDH alone can be fatal if it is not recognized and treated promptly. The observation of a diaphragmatic defect on cross sectional imaging is essential to the diagnosis of IDH. Once it is identified, immediate surgical intervention is required to reduce the hernia and repair the defect.

Physicians need to be vigilant with respect to these uncommon but important injuries. Familiarity with IDH and a high index of suspicion are the best ways to ensure prompt, correct diagnosis and successful management. If the problem is identified quickly, primary repair usually results in a good prognosis.

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