

Pericardial rupture with cardiac herniation

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Blunt traumatic rupture of the pericardium (BTRP) is usually discovered at autopsy.¹ The principal danger associated with this entity is cardiac herniation. Despite the high mortality, patients may survive BTRP, which should always be suspected in cases of severe blunt chest trauma.² We report a recent case in which BTRP was diagnosed early after chest trauma, necessitating urgent surgical treatment.

Case report

A 25-year-old man was involved in a high-speed motor vehicle collision. In the trauma resuscitation room, he was tachycardic and had profound oxygen desaturation (70% on 100% inspired oxygen). Mechanical ventilation was started, and chest tubes were inserted bilaterally.

There was no major blood loss from the chest tubes; his oxygen saturation improved to 90%. The initial chest film revealed bilateral lung contusions and significant pneumopericardium (Fig. 1a). Bronchoscopy revealed no evidence of tracheobronchial injury. A postbronchoscopy chest film (1 h after the initial film) is shown in Figure 1b. Supportive ventilatory strategies were started in the intensive care unit. A follow-up chest radiograph obtained 2 hours later (6 h after the collision) demonstrated an empty pericardial sac with displacement of the heart into the right hemithorax, indicating cardiac herniation through a pericardial defect and possible torsion (Fig. 1c). Given the patient's hemodynamic stability, he was placed in the left lateral decubitus position in an attempt to return the heart to its normal anatomic position. A

postmanipulation radiograph, however, did not demonstrate any change. About 12 hours after the trauma, the patient suffered episodes of hypotension.

At this point, we decided to perform a median sternotomy and found a large tear in the right posterolateral pericardium (Fig. 2). The heart was in its normal anatomic position, but the right ventricle appeared contused and hypokinetic. The pericardium was excised so as to open the defect completely. Over the next few days, the patient required inotropic support for right ventricular dysfunction and had progressive difficulty in breathing due to worsening pulmonary contusion. He had persistent hypoxemia and then became septic secondary to ventilator-associated pneumonia. He also had renal failure.

Eight days after his initial trauma,

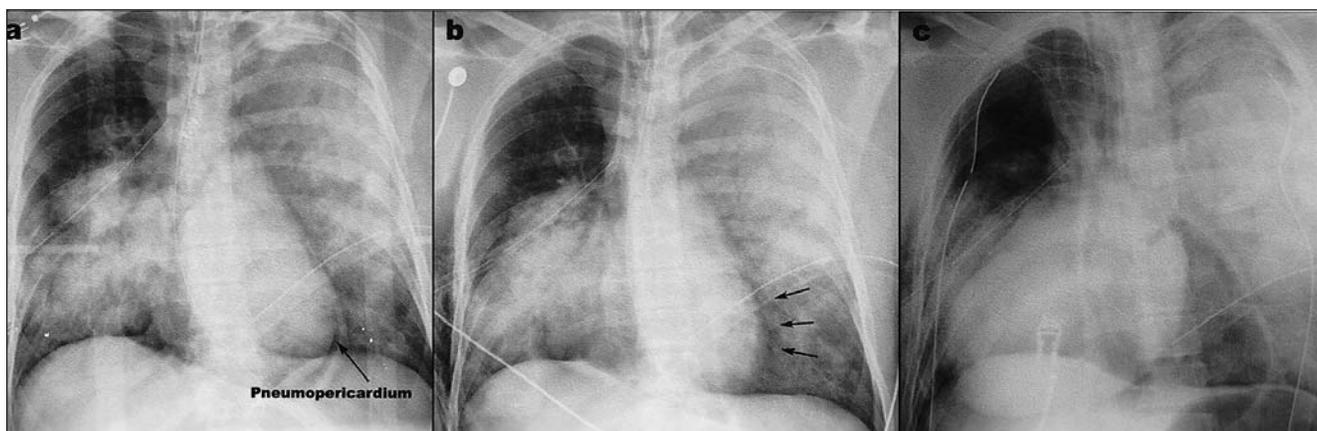


FIG. 1. (a) Initial trauma room radiograph showing pneumopericardium; (b) view 1 hour later showing original location of the left heart border (arrows); (c) view at 6 hours demonstrates cardiac herniation into the right chest.

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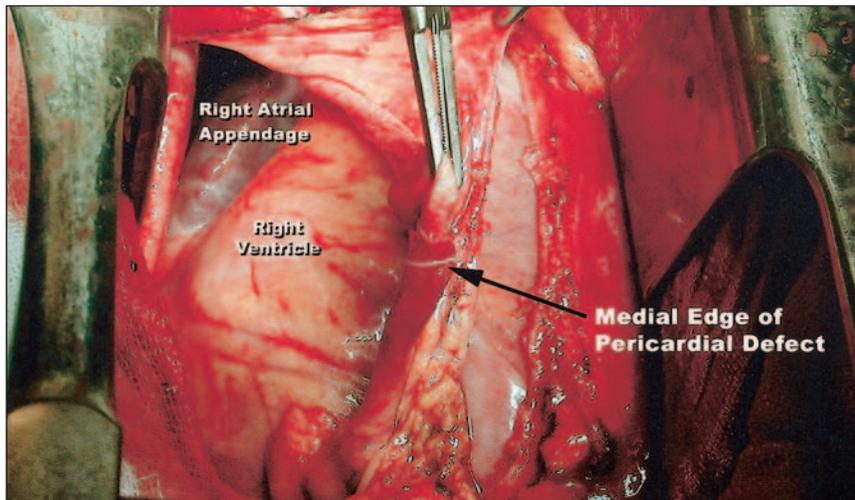


FIG. 2. Operative photograph shows a large tear (arrow) in the right lateral pericardium.

care was withdrawn at the request of the family.

Discussion

BTRP occurs in less than 0.5% of blunt trauma victims. It may involve the left or right pleuropericardium, as well as the diaphragmatic pericardium.² Clark and colleagues¹ showed that motor vehicle collisions were the most common mechanism, with the left side involved in 50% of cases. Associated injuries included cardiac (28%), neurologic (32%) and abdominal injuries (27%), and pelvic and extremity fractures (49%). Large tears in the left side may be asymptomatic. Small- or intermediate-sized tears may lead to strangulation of the left heart with resultant hypotension. Right-sided tears may allow herniation of the heart into the right hemithorax and torsion of the heart around the great vessels (including the vena cava) with often fatal

hemodynamic effects, including arrhythmias and hypotension. Diaphragmatic tears can lead to cardiac herniation into the abdomen or, more likely, hernation of abdominal contents into the pericardial sac.^{1,3}

Diagnosis may be difficult because clinical signs are nonspecific. They include shock, arrhythmias, shortness of breath and “splash” murmurs secondary to the heart beating in a hemopneumopericardium.¹ The 2 most consistent findings on chest radiography are a shift of the pericardial silhouette to the right or the left and evidence of pneumopericardium.⁴ Diagnosis is occasionally made incidentally at the time of exploratory laparotomy or thoracotomy.³ Ultimately, the diagnosis of BTRP requires acute awareness of the condition. Once diagnosed, it is important to rule out any concomitant cardiac injury (with echocardiography) and aortic injury (with computed tomography).²

When BTRP is recognized, the treatment is usually simple. Suture repair of the pericardium is the treatment of choice. This can be accomplished with interrupted nonabsorbable sutures or use of a mesh prosthesis for larger defects.^{1,2} Small defects may be left alone, especially on the left side.¹ Right-sided and diaphragmatic tears are preferentially repaired; sternotomy gives adequate exposure in most cases.^{1,2} If the heart is displaced, it should be replaced into the pericardial sac before repair.³

Outcome in BTRP is generally poor (25% mortality) owing to associated severe injuries or cardiac contusion.¹ In Clark’s series, 3% of patients died secondary to cardiac herniation.¹ However, in 37% of those presenting with complications of pericardial rupture, BTRP was diagnosed and treated successfully.

Competing interests: None declared.

References

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