Diagnostic Challenge

A telltale heart: an unusual chest radiograph in a trauma patient

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ANSWER

The correct answer is b) cardiac torsion. The patient sustained severe blunt thoracic trauma from a high-speed motor vehicle crash. The radiograph demonstrates an abnormal location of the heart toward the right mediastinum and hemithorax. Although this could be due to an anatomic variant, in the context of ongoing cardiovascular instability, an urgent thoracotomy was indicated.

Intraoperatively, a pericardial sac rupture was found through which the patient's heart had herniated and torted. This resulted in torsion of the great vessels. The empty pericardial sac mimicked a pneumothorax radiologically and accounted for the patient's cardiogenic shock. On reduction of the herniated heart and relocation to to its correct anatomic position, the inotropic support was able to be rapidly weaned and then discontinued.

Blunt traumatic rupture of the heart or pericardium is a rare and life-threatening condition that occurs in 0.4 to 3% of patients with significant thoracic trauma.[1,2] There have been several reports of patients presenting with such injuries.[2–6] The common factors in all of the previous reports are a high-speed mechanism, polytrauma, and, typically, a delay in diagnosis. In the largest review to date, Fulda and colleagues highlighted the gravity of the condition; over a 10-year period, only half of the patients had vital signs present on arrival at the hospital.[1]

Pericardial rupture can occur at two sites: the diaphragmatic pericardium and the pleuropericardium. If the diaphragmatic pericardium is ruptured, the abdominal contents may herniate into the pericardial sac, causing tamponade with resultant cardiogenic shock. If the pleural pericardium is ruptured, the heart itself may herniate into one of the pleural spaces, resulting in heart constriction, strangulation, or torsion of a great vessel, as in the case presented.[7]

The diagnosis of pericardial rupture is difficult, and it is critical that it is made promptly so that operative treatment can be instigated. After standard Advanced Trauma Life Support interventions, signs of instability tend to persist in cases of pericardial rupture. Common findings include cardiac tamponade, arrhythmias, a displaced apex beat, and a "bruit de Moulin," which is a murmur due to the heart beating in a hemopneumopericardium described in 1864 and said to sound like a splashing mill wheel.[3–5] It is understandable, given the uncommon nature of these features, that the diagnosis may be missed.

Although an abnormality in the cardiac location may be seen on initial chest radiography, as in our case, radiographs may be normal or show nonspecific or subtle findings. These include rib fracture(s), pneumothorax, pneumopericardium, or a prominent cardiac silhouette.[2,5] Computed tomography is the most sensitive imaging method to identify pericardial rupture with or without cardiac herniation.

Definitive diagnosis and treatment are made during surgery. A subxiphoid pericardial window approach has been described[1]; however, formal thoracotomy is typically necessary. Correction of the anatomy tends to restore cardiac output; however, even with surgery, the mortality rate remains high.[1]

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