

Coexistence of Late Diagnosed Pericardial and Diaphragmatic Ruptures Caused by Rib Fracture

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Abstract

While rib fractures due to blunt traumas are common, pericardial and diaphragmatic injuries caused by rib fractures are rarely seen. Diagnosis is challenging due to the difference in clinical symptoms which may have severe clinical consequences. A 58-year-old female patient who had a traffic accident was referred to our center due to left pericardial effusion while being followed up for tibial fracture. Left diaphragmatic rupture was detected in the radiographs taken. Intraoperative pericardial rupture was observed in the operated patient. The defects were repaired primarily and the patient was discharged in good health. Although the diagnosis is difficult in multitraumas including thoracic trauma, especially in cases with multiple rib fractures, one should be more attentive considering the possibility of diaphragmic and pericardial ruptures.

Keywords: rib fracture, pericardial rupture, diaphragmatic rupture

Introduction

Pericardial and diaphragmatic ruptures, which may lead to serious complications, may be asymptomatic in multi-trauma patients with rib fractures. Diagnosis of these clinical conditions is difficult and can be missed due to the hasty, and acute approach to the multi-trauma patient.

Cardiac herniation is the most common complication and cause of death in pericardial injury, which constitutes 0.4%-2% of blunt trauma cases (1). Rib fractures have been shown to be the most common cause of pericardial rupture (2). Depending on the size of the pericardial defect, patients may present with symptoms of pericardial tamponade, but may also progress asymptotically.

The most common cause of diaphragmatic injuries, which constitute less than 1% of traumatic injuries, is rib fractures (3). Small diaphragmatic defects are asymptomatic, while large defects may present with symptoms and respiratory distress due to intrathoracic organ herniation.

Case Report

A 58-year-old female patient was operated by the orthopedics department for multiple rib fractures in the left hemithorax

and comminuted fractures of the left tibia due to an in-vehicle traffic accident. The patient, who was followed up in the ward for 15 days, was consulted to our clinic after detection of left pleural effusion in her radiographs. Her general condition was good, and her physical examination revealed swelling due to a possible subcutaneous hematoma on the lateral left hemithorax, and tenderness on palpation. Thoracic computed tomography of the hemodynamically stable patient performed in our center displayed multiple, displaced and non-displaced rib fractures in the left hemithorax (left 2nd-8th ribs), and spleen herniated into the thorax. Surgery was decided in the same session organized with the department of orthopedics. After the orthopedic surgery, the thorax was entered by performing left uniportal video-assisted thoracoscopic surgery (VATS).

On exploration, the lung, intrathoracic spleen and stomach firmly adhered to the thoracic wall were observed (Figure 1a). When the adhesions of the anterior surface of the lung were removed, ruptured pericardium was seen (Figure 1b). Thoracotomy was decided due to restricted exposure and double lumen intubation problem. The heart was evaluated and any sign of trauma was not found. The pericardium was primarily repaired by intermittently suturing the ruptured ends with a 2/0 silk suture (Figure 2). The spleen, stomach and omental tissue in the thorax were tried to be pushed towards the abdomen without success, thus laparotomy was

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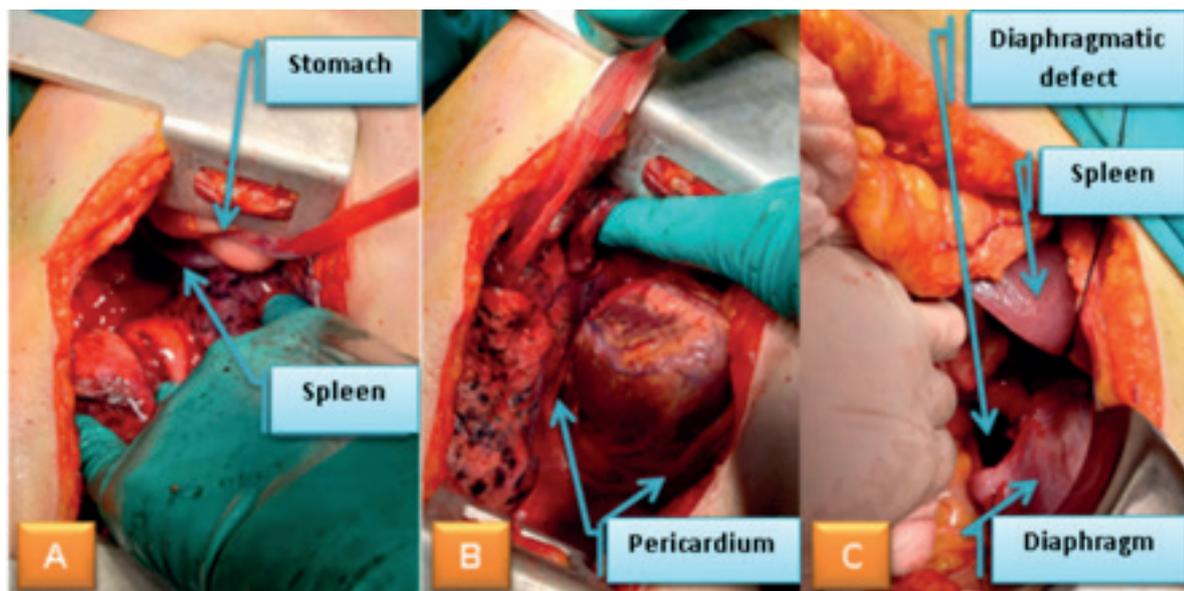


Figure 1. Intrathoracic stomach and spleen [A], pericardium [B] and diaphragm rupture [C].

performed on the patient due to the size of the defect and exposure problem. By laparotomy, intrathoracic structures were retracted into the abdomen and diaphragmatic rupture was observed (Figure 1c). The resulting diaphragmatic defect was primarily repaired with 1/0 silk sutures and the operation was terminated. The patient, who was extubated after the operation, was followed up in the intensive care unit for one day, and then she was then transferred to the service. On the 4th day, the chest tube of the patient was removed when sufficient pulmonary expansion without any air leakage and fluid drainage from the chest drain was observed on PA AC radiographs. The patient was discharged after orthopedic follow-ups.

Discussion

Diagnosis of pericardial injury is quite challenging due to the fact that the entities are often caused by multitraumas, and few cases are diagnosed at their first presentation. While only 18% of patients are correctly diagnosed preoperative, the diagnosis is made intraoperatively or in autopsy series in most cases (4). In our patient, the diagnosis could not be made in the acute period, and she was sent to our center on suspicion after 15 days of follow-up.

Patients may manifest symptoms consistent with cardiac tamponade, but if the defect is large, clinical deterioration may not be observed. Pericardial tears occur in the diaphragmatic or

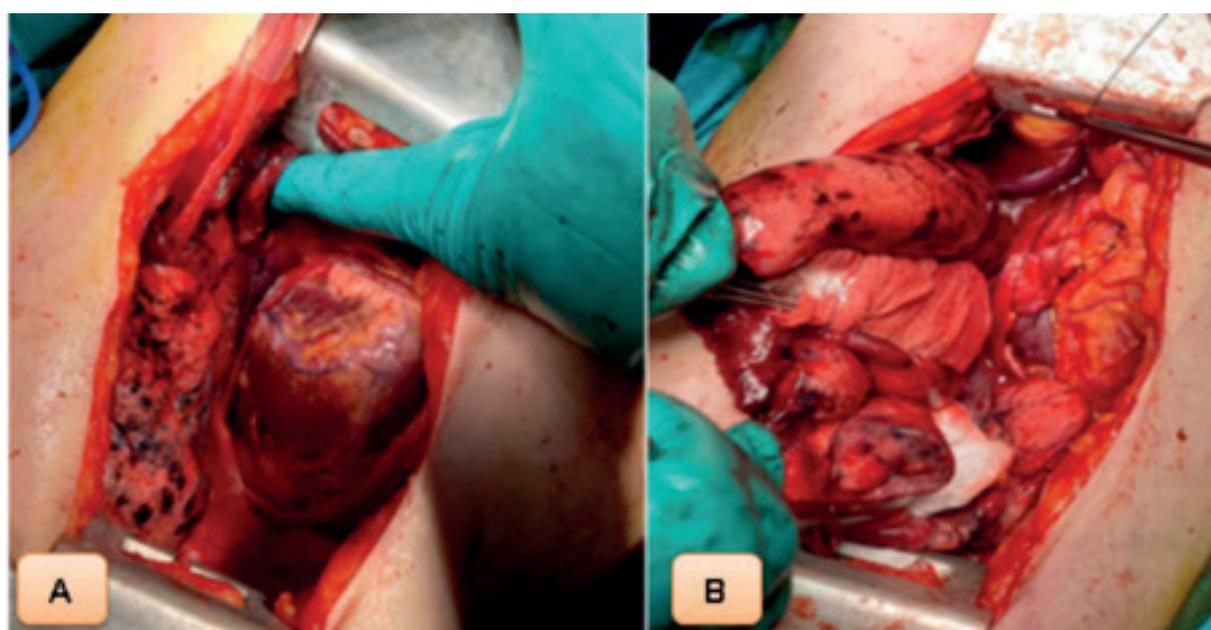


Figure 2. Ruptured pericardium [A] and its primary repair [B]

pleural pericardium. Pericardial tears are seen most commonly in the left pleural pericardium, followed by diaphragmatic and right pleural pericardium in decreasing frequency (5).

Chest X-rays, ECG cardiac biomarkers, echocardiography, computed tomography and MR (magnetic resonance) imaging are being used as diagnostic tools. Surgical exploration should be performed immediately when pericardial rupture occurs. Because of the risk of cardiac herniation, primary repair of 8-12 cm-long ruptures is recommended (6). Posterolateral thoracotomy, including median sternotomy, and minimally invasive thoracoscopic approaches are being used in the treatment.

In the literature review conducted by Hongbin W. et al. the cause of rupture was found to be rib fractures in 21 of 42 patients with blunt trauma (2). Torah O. et al. detected pericardial rupture in 3 of 10 patients with diaphragmatic rupture due to blunt trauma (7).

Diaphragmatic injuries represent less than 1% of traumatic injuries. Penetrating diaphragmatic injuries are more common than blunt injuries. Although acute large diaphragmatic injuries manifest themselves both clinically and radiologically, diaphragmatic injuries are usually asymptomatic and diagnosed at a late stage (8). The clinical manifestations vary according to the size of the defect. While small defects are asymptomatic, large defects may cause severe respiratory distress. Our patient was asymptomatic during the follow-up period and did not show any clinical symptoms.

Diaphragmatic injuries occur most frequently on the left side, and the most common cause of injury is rib fractures (9). Surgical repair of the defect is performed in the patient with diaphragmatic injury. The defect can be repaired through laparotomy or thoracotomy. Laparoscopic or thoracoscopic methods can be tried in patients with small defects. Beng Leong L. et al. found diaphragmatic ruptures in 46 of more than 13 thousand trauma patients (10).

Conclusion

Although the coexistence of pericardial and diaphragmatic ruptures is a rare condition that poses a diagnostic challenge

in multitrauma patients, it can lead to serious clinical consequences. These two entities should be kept in mind and should be treated more attentively, especially in patients with multitrauma, including those with rib fractures.

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