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Contents

Thrice Monthly Volume 9 Number 16 June 6, 2021

REVIEW

MINIREVIEWS

ORIGINAL ARTICLE

Case Control Study

Retrospective Study

Observational Study

Randomized Clinical Trial

World Journal of Clinical Cases

Thrice Monthly Volume 9 Number 16 June 6, 2021

Contents

CASE REPORT

World Journal of Clinical Cases

Thrice Monthly Volume 9 Number 16 June 6, 2021

Contents

World Journal of Clinical Cases

Thrice Monthly Volume 9 Number 16 June 6, 2021

Contents

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CASE REPORT

Thoracoscopic diagnosis of traumatic pericardial rupture with cardiac hernia: A case report

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Abstract

BACKGROUND

Pericardial rupture caused by blunt chest trauma is rare in clinical practice. Because of its atypical clinical symptoms, and because surgeons are often unfamiliar with the clinical and radiological manifestations of the injury, preoperative diagnosis is difficult; it is easily misdiagnosed and causes serious consequences.

CASE SUMMARY

A 60-year-old man, previously healthy, was transported to the emergency room after falling from a great height. Upon arrival, his vital signs were stable. Electrocardiography and echocardiography were performed, and there was no sign of cardiac injury or ischemia. Chest and abdomen computerized tomography revealed pneumopericardium, hemopneumothorax, lung contusion, multiple rib fractures on the right side (Figure 1), and right scapula and clavicle fractures. He was admitted to the inpatient department for further observation after tube thoracostomy. The next day, the patient suddenly experienced rapid arrhythmia (the ventricular rate reached 150-180 beats/min) when turning onto his right side, accompanied by a blood pressure drop to 70/45 mm Hg and a chief complaint of palpitation. Thoracoscopy was performed urgently, and a large vertical tear (8 cm × 6 cm) was found in the pericardium. The defect was successfully repaired using a heart Dacron patch. His postoperative condition was uneventful without any fluctuations in vital signs, and he was transferred to the orthopedics department for further surgery on postoperative day 8.

CONCLUSION

Although the possibility of pericardial rupture combined with cardiac hernia is extremely low, it is one of the causes of cardiogenic shock following blunt trauma. Therefore, clinicians need to be more familiar with its characteristic manifestations

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and maintain a high degree of vigilance against such injuries to avoid disastrous consequences.

Key Words: Pericardial rupture; Cardiac hernia; Blunt chest trauma; Thoracoscope; Case report

Core Tip: This case report describes a patient with multiple trauma following a fall from a height, who developed pericardial rupture combined with cardiac hernia. The diagnosis was not made accurately and timely before operation despite suggestive clinical and radiological findings. Therefore, clinicians need to be aware of the presentation of this potentially fatal injury so that the diagnosis can be made and thoracoscopic or thoracotomy exploration should be instituted at an earlier stage.

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INTRODUCTION

Blunt traumatic rupture of the pericardium is uncommon, with an estimated incidence of 0.4%-2% among blunt trauma cases. Cardiac herniation, with a mortality rate of 67%-75%, is the most serious complication related to pericardium rupture[1]. High-velocity deceleration injuries, particularly motor vehicle accidents or falls from a height, are characteristic. However, it is usually not an isolated injury and is difficult to diagnose in the setting of acute multiple traumas.

CASE PRESENTATION

Chief complaints

A 60-year-old man was admitted to the emergency department after falling from a height of 3 m with complaints of whole body aches and dyspnea.

History of present illness

The patient was transported to the emergency room with symptoms of whole body aches and dyspnea after falling from a great height 3 h previously. Chest and abdomen computed tomography (CT) revealed pneumopericardium, hemopneumothorax, lung contusion, multiple rib fractures on the right side, and right scapula and clavicle fractures. He was admitted to the inpatient department for further observation and treatment after tube thoracostomy.

History of past illness

The patient had no notable previous medical history.

Personal and family history

The patient denied any family history and had no notable past history.

Physical examination

The patient was conscious, and his answers were smooth and accurate. His vital signs were as follows: Body temperature, 37.2 °C; pulse, 106/min; respiration rate, 25/min; blood pressure, 110/72 mm Hg; and oxygen saturation, 98%. The heart sounds were regular, and there were no murmurs, rubs, or gallops. The breath sound on the right hemithorax was markedly decreased. Abdominal findings were unremarkable. The pelvic separation and compression tests were positive.

Laboratory examinations

Laboratory data were unremarkable except for a decreased hemoglobin level at 10.3 g/dL. Electrocardiography and echocardiography were performed, and there was no sign of cardiac injury or ischemia.

Imaging examinations

Chest and abdomen CT revealed multiple rib fractures on the right side, hemopneumo-thorax, lung contusion, pneumopericardium (Figure 1), and right scapula and clavicle fractures. After tube thoracostomy, re-examination of chest CT showed that the hemopneumothorax and pneumopericardium were obviously absorbed (Figure 2).

FINAL DIAGNOSIS

Pericardium rupture; heart hernia; hemopneumothorax; multiple rib fractures; right scapula fracture; and pelvic fracture.

TREATMENT

Thoracoscopy was performed on November 19, 2019. The patient was intubated with a double-lumen endotracheal tube and was positioned in the left lateral decubitus position. During the operation, there was a large vertical tear (8 cm × 6 cm) in the pericardium, and the right atrial appendage, right atrium, and superior vena cava were visualized. There was no evidence of apparent injury to the heart (Figure 3), and the right phrenic nerve was intact. The tissue edge appeared friable because of the acute inflammation and edema, and the phrenic nerve was running along the right edge. Taking the findings into consideration, we thought that a heart Dacron patch would provide a safer protection than direct suturing. Then, posterolateral thoracotomy was performed from the fifth intercostal space, and the pericardium defect was repaired using a heart Dacron patch (Figure 4). After placing the pericardial and mediastinal drainage tubes, the surgical incision was closed. His postoperative condition was uneventful without any fluctuations in vital signs, and he was transferred to the orthopedics department for further surgery on postoperative day 8.

OUTCOME AND FOLLOW-UP

The patient was discharged 5 wk post-injury. A follow-up CT scan 3 mo later showed no pneumothorax or pneumopericardium.

DISCUSSION

Pericardial rupture is often secondary to severe traffic accident trauma or falling from a height; because these patients have multiorgan traumatic injury, and the symptoms of pericardial rupture are sometimes atypical, it is easy to misdiagnose, which can result in serious consequences. Cook *et al*[3] reported that only 18% of patients had a correct diagnosis preoperatively, with most of the cases diagnosed intraoperatively. Cardiac hernia secondary to pericardial rupture is the most serious complication; if not diagnosed in time, the mortality rate can be very high[2].

Pericardial rupture can occur in two different locations: The diaphragmatic pericardium and pleural pericardium. If the diaphragmatic pericardium is damaged, the contents of the abdomen may herniate into the pericardial space, causing cardiac compression and cardiogenic shock. If the pleural pericardium ruptures, the heart may herniate into one of the pleural cavities, causing contraction, strangulation, or torsion of large blood vessels. The most common is left pleural pericardium tears, followed by diaphragm and right pleural pericardium tears[4,5]. The early diagnosis of pericardial rupture mainly relies on imaging examinations, including chest CT and transthoracic or esophageal echocardiography. If there are imaging manifestations suspicious for pericardial defects, cardiac displacement, and pneumopericardium, clinicians should be highly alert. When pericardial rupture occurs, surgical exploration should be performed immediately[6].

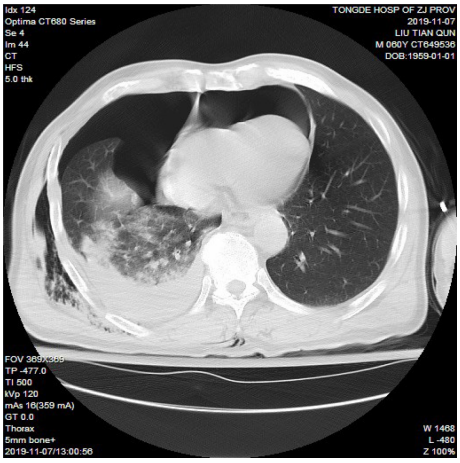

Figure 1 Chest computed tomography showed pneumopericardium, right hemopneumothorax, and lung contusion.

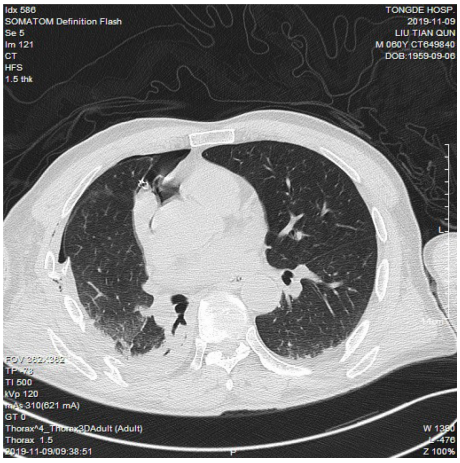

Figure 2 The pneumopericardium and right hemopneumothorax were obviously absorbed after tube thoracostomy was performed.

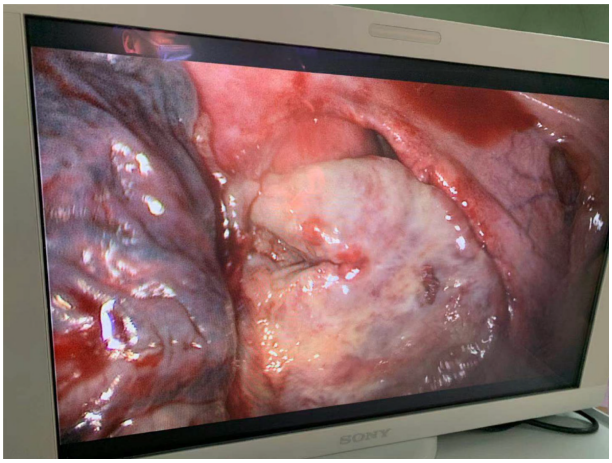

Figure 3 The ruptured pericardium, exposed right atrial appendage, right atrium, and superior vena cava under thoracoscopy.

Cardiac hernia and pericardial rupture do not necessarily coexist at the same time; if the pericardial defect is 8-12 cm, changing the patient's position may cause the heart to herniate through the pericardial defect and partially or completely protrude and twist, forming a heart hernia[7]. The patient may have signs consistent with cardiac tamponade, mainly manifested as hypotension and elevated central venous pressure, but if the defect is too large, the patient may not have characteristic clinical deterio-

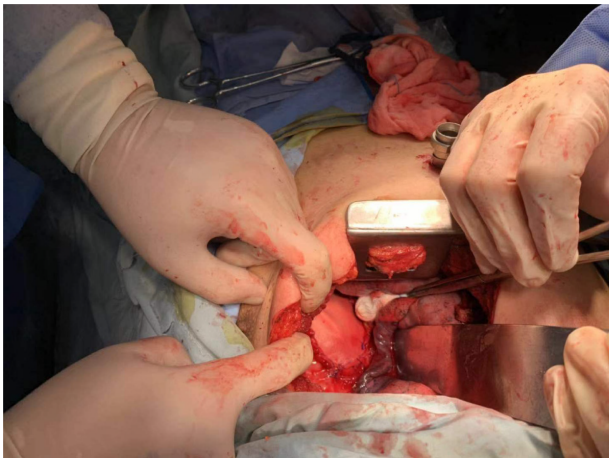

Figure 4 The ruptured pericardium was repaired with a heart Dacron patch.

ration[8-10].

In this case, clinicians did not pay enough attention to the pneumopericardium in the imaging examination. The patient repeatedly experienced pericardial tamponade symptoms such as rapid arrhythmia accompanied by a blood pressure drop during the process of turning over in the lying position. After the relevant physician departments ruled out other causes of vital sign fluctuations, it was considered that there may be pericardial rupture with cardiac hernia, and a thoracoscopic exploration was performed to confirm the preoperative suspicion and prevent disastrous complications. Therefore, it is vital to keep in mind that immediate surgical exploration is warranted if clinical and/or radiographic findings are suspicious for this condition.

CONCLUSION

Traumatic rupture of the pericardium is a difficult diagnosis because pericardial defects, even with cardiac herniation, are not always associated with clinical symptoms. A high index of suspicion, prompt diagnostic protocols, and appropriate surgical management are essential to a better outcome.

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