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Case report

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Pneumopericardium due to blunt trauma

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The authors stated that the written consent was obtained from the patient presented with images in the study.

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Abstract

Pneumopericardium is the presence of gas in the pericardial sac. Its etiology includes chest trauma, iatrogenic causes, thoracic surgery, and mechanical ventilation, and it is mostly asymptomatic. However, pneumopericardium can also be fatal because it can cause cardiac tamponade. All surgeons dealing with thoracic trauma should be aware of this pathology. A case of a 30-year-old patient presenting with pneumopericardium due to blunt trauma who was evaluated in the emergency department at our hospital is presented.

Keywords: Pneumopericardium, Blunt chest trauma, Cardiac tamponade

Introduction

Pneumopericardium is the presence of gas in the pericardial sac. The main etiology is often blunt chest trauma [1]. Pneumopericardium is divided into simple and tension forms [2]. Simple pneumopericardium is usually asymptomatic. If the pneumopericardium is of the tension form, symptoms related to cardiac tamponade appear [1]. Oxygen therapy is usually sufficient in asymptomatic cases [3]; however; it should be kept in mind that such cases may progress to pericardial tamponade. Therefore, their follow-up should be done carefully [4]. In tension pneumopericardium, pericardial air should be immediately decompressed [2]. A case of pneumopericardium after blunt trauma is presented, and the possible follow-up outcomes are based on other literature studies.

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Case presentation

A 30-year-old male patient was evaluated in the emergency department after a motorcycle accident. The patient's oxygen saturation was 85%, pulse: 105 beats/min, and blood pressure 110/60 mmHg. On palpation, extensive subcutaneous emphysema in the thorax and neck was found. Bilateral crepitation in the chest wall and sternum was noted. Respiratory sounds were decreased bilaterally. Laboratory parameters indicated a hemoglobin value of 12 g/dl, platelet: count of 350,000 /mm^3 (reference value: 150,000 - 450,000 /mm^3), and leukocyte count of 12,000 /mm^3 (reference value: 4,000 - 10,000 /mm^3). Fractures on the right spine 1–9, left spine 1–2, sternum, and thorax were seen on computed tomography (thorax CT). Bilateral hemopneumothorax, bilateral lung contusion, and pneumopericardium could also be observed (Figure 1). Bilateral tube thoracostomy was immediately performed because the patient had severe dyspnea. It was observed that dyspnea regressed after performing a tube thoracostomy. Chest radiography was taken after tube thoracostomy (Figure 2). Cardiac compression was not detected during electrocardiography (ECHO), which was performed for detecting a pneumopericardium. It was decided to follow the patient for the occurrence of pneumopericardium. Thoracic drains were removed on the eighth post-operative day. On the control chest radiograph, regression of the pneumopericardium was observed. Written informed consent was obtained from the patient for the study.

Figure 1: Computed tomography (CT) of the thorax (Arrow: shows pneumopericardium)

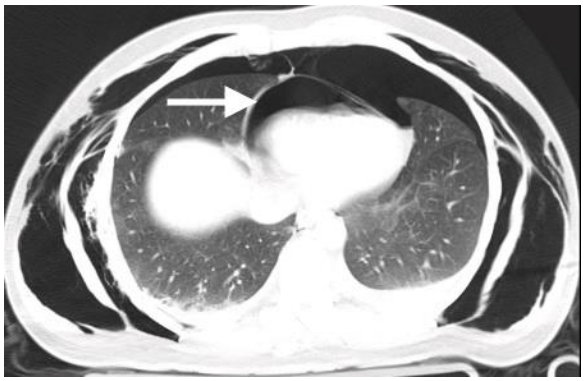
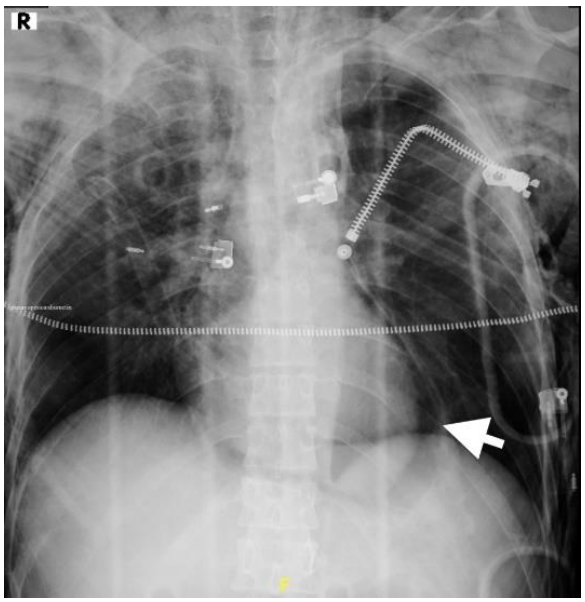


Figure 2: Lung X-ray (Arrow: shows pneumopericardium)



Discussion

Pneumopericardium was first described by Bricheteau in 1844 [2]. Pneumopericardium is defined as a collection of air in the pericardial space. Its etiology includes chest trauma, cardiothoracic surgery, mechanical ventilation (especially in children), infection, and pericardiocentesis [5]. Pneumopericardium is usually asymptomatic. It is found incidentally in trauma patients. Symptoms, such as dyspnea and pericardial chest pain, may present; however, these are not necessarily specific symptoms [6]. In our case, pneumothorax was considered during the preliminary diagnosis. Pneumopericardium was diagnosed incidentally on thoracic CT.

Hamman's sign is typical on physical examination. In addition, a murmur in the form of "bruit de moulin" could be heard on auscultation [4]. It is mandatory to evaluate hemodynamic stability at the first examination. In a hemodynamically unstable patient, the clinical staff should be alerted to cardiac tamponade. Cardiac tamponade can be diagnosed using ECHO [7]. Loss of a systolic echo signal in pneumopericardium was first shown in 1983 and termed as air gap sign. Air bubbles can be seen in the pericardial cavity (swirling bubbles sign) [8]. Radiological findings are diagnostic. An air image surrounding the heart could be seen on the chest radiograph. Pericardial air seen on thorax CT is diagnostic [4]. Severe dyspnea was noted in our case. Bilateral tube thoracostomy was performed on the patient after which the dyspnea regressed. An ECHO was then performed for pneumopericardium. It was observed that there was no cardiac compression in ECHO. Pneumopericardium was treated medically (Nasal oxygen therapy).

The presence of pneumopericardium indicates that a significant force is transferred during injury [9]. In the pathophysiology of pneumopericardium, several factors should be considered:

(1) With an increase in intra-alveolar pressure, alveoli rupture occurs. However, rupture in the pericardium also occurs. Thus, air enters the pericardial sac.

(2) With the increase in intra-alveolar pressure, alveolar wall rupture occurs. Infiltrated air flows through the peribronchial and vascular sheaths into the pericardial sac.

(3) This passage of air into the pericardial sac occurs with congenital pleuro-pericardial defect [9, 10].

The clinical signs of pneumopericardium are variable. The main determinants of clinical severity are the rate of occurrence of pneumopericardium and the underlying etiology. This situation guides the treatment strategy [11]. Pneumopericardium is often asymptomatic. However, it can cause serious events, such as cardiac tamponade and can sometimes be confused with hemorrhagic shock in trauma patients [10]. Cardiac tamponade caused by pneumopericardium is reported to be associated with mechanical ventilation [12]. In another study, it was reported that 37% of simple pneumopericardium can progress to tension pneumopericardium. In these cases, the mortality rate is 57% [2]. Our case was hemodynamically stable. Cardiac tamponade was not found during the ECHO process. Therefore, no surgical procedure was performed for pneumopericardium. It regressed spontaneously during follow-up.

Conclusion

Pneumopericardium should be suspected in a patient presenting with chest trauma if there is hypotension without bleeding, and the patient does not improve even with fluid support. Diagnosis and treatment procedures should be started immediately. Pneumopericardium usually regresses spontaneously, and it rarely causes cardiac tamponade and endangers a patient's life.

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