International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

A Rare Case of Isolated Pneumopericardium Developed Following a Penetrating Thoracic Trauma

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Abstract: ***Pneumopericardium indicates the free air in the pericardium. It can develop secondary to many different reasons and the most common cause in etiology is trauma. Other pathologies are usually accompanied in cases of pneumopericardium developed secondary to penetrating thoracic traumas, and isolated pneumopericardium is a very rare condition. In this article, a rare case of isolated pneumopericardium developed in a 82-year-old male patient without any additional pathological lesion secondary to a penetrating chest trauma is presented in the light of the literature.***

Keywords: Pneumopericardium, isolated, thoracic, trauma

1. Introduction

Pneumopericardium is an air accumulation between the pericardial leaves. The most common cause in etiology is obtuse and penetrating thoracic traumas **(1).** When developed secondary to traumas, it is usually accompanied by additional pathologies such as pneumomediastinum, pneumothorax, hemothorax, pericardial effusion, subcutaneous emphysema and cardiac laceration. Isolated pneumopericardium without additional pathology after a penetrating thoracic trauma is a very rare condition. In this article, it is aimed to present a rare case of isolated pneumopericardium developed secondary to a penetrating thoracic trauma.

2. Case Report

A 82-year-old male patient who had been known to have schizophrenia since about 20 years and was under anti-psychotic treatment was brought to the emergency department after a suicide attempt with a sharp object.

On physical examination, arterial blood pressure was measured as 120/70 mm Hg, while electrocardiography (ECG) showed normal sinus rhythm with a pulse rate of 65/min. Heart sounds were normal and rhythmic in the auscultation, and no additional sound or bruit was determined. It was found that the patient's respiratory sounds were normal and there was no significant pathological finding in the other systemic examinations. Hemogram (WBC: 8400/mm^3, hemoglobin: 15.2 g/dl, platelet count: 230x10^9/L) and main biochemical parameters (AST: 30 U/L, ALT: 20 U/L, urea: 68 mg/dl, creatinine: 0.88 mg/dl) were also within the normal limits. In the inspection, it was found that there were cuts in 4x4 cm^2 area located between the 5th and 6th intercostal spaces in the lateral side of the sternum, and small air bubbles were noticed on these cuts together with a heart beat **(Figure 1).** In addition, although almost all of these cuts were superficial only a cut of about 1 cm in length was preponderant to the thoracic cavity.

On the chest radiography of the patient, free air around the heart attracted notice (**Figure 2**), and isolated pneumopericardium was detected in the Thorax-Computed Tomography (CT) **(Figure 3).** No accompanying pneumothorax, hemothorax, pericardial effusion or subcutaneous emphysema was observed. In addition, although there was an airflow in and out of the pericardial space, no significant accompanying cardiac injury was determined. Patient was interned for follow-up purpose since transthoracic echocardiography revealed no sign of a cardiac tamponade and hemodynamics were stable. No obvious deterioration was observed during the hospitalization period and the patient was discharged without any problem on the 7th day of treatment.

3. Discussion

The pericardial sac consists of two layers called fibrous pericardium and serous pericardium. Fibrous pericardium acts as a protective membrane around the heart, while serous pericardium is divided into two separate layers; parietal pericardium and visceral pericardium.

Pneumopericardium is the free air found between parietal and visceral pericardium. Although it may develop idiopathically, as a result of fistulization of the air-filled or hollowed organs, secondary to the pericardial infections due to microorganisms that produce gas, after medical procedures such as endomyocardial biopsy and cardiac pacemaking, the most common cause in etiology is trauma **(1-4).** In obtuse traumas, pneumopericardium is caused by the progressive alveolar injury spreading through the bronchovascular sheath resulting from sudden increase in

the intrathoracic pressure. However, the causative agent of penetrating thoracic trauma causes the loss of pericardial integrity **(1).** Therefore, pneumopericardium developed after a high-energy trauma is usually associated with pathologies such as pneumomediastinum, pneumothorax, hemothorax, pericardial effusion, subcutaneous emphysema and cardiac laceration **(2).** As presented in our case, it is quite rare to detect it alone when it develops secondary to a penetrating thoracic trauma.

Patients may be asymptomatic, but they can also present with chest pain, shortness of breath, shoulder pain, and fainting. Hamman's sign, the creaking sound heard with every heart beat, is a typical but rare finding on physical examination **(3).** Also, a bruit can be heard in the auscultation in the form of 'bruit de moulin' **(3).** Although no obvious symptom was determined on the physical examination of our patient, there were air bubbles on the skin caused by airflow between the pericardial space and atmosphere.

Even though plain radiographs can be used in the diagnosis of pneumopericardium, the diagnostic value of these radiographs for pericardial and cardiac injuries is limited. On the other hand, Thorax-CT is a highly-sensitive imaging method for assessing pneumopericardium and associated pathologies, which is therefore routinely recommended for all patients with penetrating and obtuse chest traumas **(4).** In Thorax-CT, fluid-free or air-liquid level is observed surrounding the heart **(4).** In our case, plain chest radiograpy and Thorax-CT scans demonstrated free air density around the heart without pericardial effusion.

Although pneumopericardium is usually a self-limiting condition, it is important to follow patients closely because it can cause cardiac tamponade which can be fatal **(5).** As a result of pericardial space becomes associated with the atmosphere, free air accumulating in the pericardium can lead to a cardiac tamponade. Hemodynamic parameters should be followed closely, and chest radiography and transthoracic echocardiography should be repeated during the hospitalization period **(3).** Isolated pneumopericardium usually limits itself if it is not complicated with a cardiac tamponade and does not require additional treatment. However, cardiac tamponade should be considered in cases developing paradoxical pulse, hypotension, tachycardia, decreased heart sounds, low voltage ECG, elevated central venous pressure, and emergency pericardiocentesis should be performed. In addition, it is certainly recommended to be prepared for the necessity of surgical pericardial decompression and pericardial window attempts **(6).**

As a result, isolated pneumopericardium may rarely occur following penetrating thoracic traumas without an accompanying pathology. In addition, although isolated pneumopericardium is a self-limited condition, physicians should carefully follow such cases, and be ready for the advanced surgical procedures in the situations of deterioration.

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Figure 1: Air bubbles on the surface of the skin

Figure 2: Chest radiograph of patient on admission

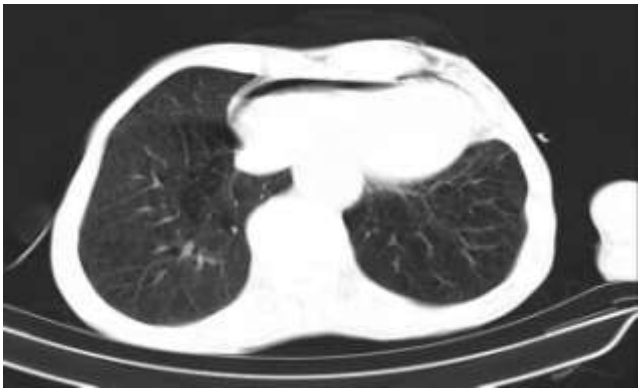

Figure 3: Thorax-CT section of the patient