To cite this article: Şahiner E, Yıldıran H, Can A, Şahinoğlu T. Traumatic pneumopericardium: a rare clinical condition developing on the fifth day after trauma. Curr Thorac Surg 2026;11(1): 89-91

Case Report

Traumatic pneumopericardium: a rare clinical condition developing on the fifth day after trauma

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ABSTRACT

Pneumopericardium is a rare pathology that may occur following blunt or penetrating thoracic trauma, iatrogenically after certain medical interventions, or due to specific infections. It is most commonly observed after trauma and presents with a wide spectrum of clinical manifestations. The presented case is noteworthy as it involves pneumopericardium that developed on the fifth day of follow-up for a rib fracture sustained after a fall from height. This case highlights the diagnosis, monitoring, and treatment approach to traumatic pneumopericardium.

Keywords: trauma, pneumopericardium, rib fracture

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Doi: 10.26663/cts.2026.010
Received 30.09.2025 accepted 03.02.2026

Introduction

Pneumopericardium is defined as the presence of air in the pericardial cavity. Its cause is mostly trauma; it may be seen in conjunction with severe blunt chest trauma, pneumothorax, pneumoperitoneum, or other causes of pneumomediastinum. Although spontaneous resolution is often observed, tension pneumopericardium is life-threatening and requires urgent, life-saving intervention. It can lead to severe cardiovascular complications and may require emergency drainage. Diagnosis is made using thoracic computed tomography (CT), which also helps identify accompanying injuries [1].

Close monitoring of vital signs is required in its treatment. In patients who do not develop tension pneumopericardium, spontaneous regression may be observed. The early detection of tamponade development in pneumopericardium treatment is of vital importance [2].

Case Report

A 55-year-old male patient was admitted to the emergency department with a history of falling from a height of approximately 4 meters. On physical examination, the patient's general condition was good, he was conscious, oriented, and cooperative. Oxygen saturation was measured as 95% with a finger probe, blood pressure was 130/75 mmHg, and pulse rate was 86 beats per minute (bpm). On palpation, tenderness was present on the lateral wall of the left hemithorax. On auscultation, breath sounds were diminished in the lower zone of the left hemithorax. Thoracic CT was performed. Thoracic CT revealed displaced fractures in the lateral aspects of the 5th, 6th, and 7th ribs on the left hemithorax, with subcutaneous emphysema adjacent to the fractures. Additionally, pleural effusion measuring 2 cm at its thickest point and minimal pneumothorax were present in the left hemithorax. (Figure 1). The patient's blood test results were as follows on the first day: WBC: 14.79 K/μL, Hb: 16.7 g/dL, and CRP: 3.28 mg/L. The patient was admitted to the thoracic surgery clinic for trauma follow-up. The patient was started on systemic analgesia with intravenous paracetamol and a nonsteroidal anti-inflammatory drug (tenoxicam). The patient continued respiratory exercises and mobilization. On the fifth day after the trauma, the patient developed a burning-type left-sided chest pain accompanied by cold sweating. At this time, his vital signs were assessed: oxygen saturation at the fingertip was measured as 85%, the pulse was tachycardic (110 bpm), normotensive (120/70 mmHg), and body temperature was recorded as 37°C. The patient was monitored closely. An echocardiography (ECHO) was performed on the patient, who was actively mobile and exhibited no respiratory symptoms, due to the description of angina-like chest pain. Echocardiography revealed minimal pericardial effusion without compression or presence of air. No acute pathology was detected in the bedside chest X-ray or blood tests. Pulmonary CT angiography was performed with a preliminary diagnosis of pulmonary embolism, which was not detected. However, diffuse infiltrative areas suspicious of pneumonia in both lungs and pneumopericardium were observed (Figure 2). Infection markers were evaluated, and the results were as follows: CRP: 147 mg/L, WBC: 7.63 K/μL, and procalcitonin: 0.19 μg/L. Respiratory tract swab and sputum culture samples were collected. The patient was started on antibiotic therapy with moxifloxacin 400 mg once daily and piperacillin-tazobactam 3.5 g four times daily. No growth was detected in the collected sputum culture or respiratory tract swab samples. Nasal oxygen support was provided to the patient, and analgesic therapy was continued. It was observed that the patient's existing symptoms had regressed. Follow-up imaging demonstrated a reduction in the areas of infiltration. The patient was clinically followed for the resolution of pneumopericardium, and improvement was observed without the need for invasive intervention. The patient was discharged on the 13th day after the trauma. Informed consent was obtained from the patient for publication of this case report and accompanying images.

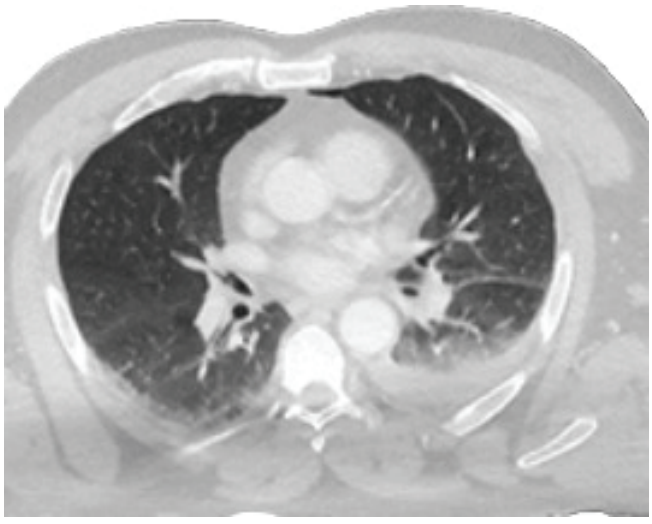


Figure 1. Thoracic CT scan of the patient taken after trauma.

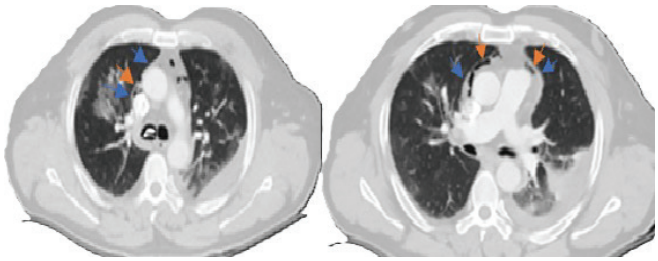


Figure 2. Thoracic CT scan obtained on the 5th day after trauma (Blue arrows: pericardial border, red arrows: pneumopericardium).

Discussion

In the literature, the mechanism of air entry into the pericardial space in blunt trauma was first proposed by Macklin. Macklin suggested that air escaping from ruptured alveoli advances along the sheaths of pulmonary vessels to the hilum, where it spreads into the mediastinum. Mediastinal emphysema can enter the pericardial space through the ostia of the pulmonary veins, leading to pneumopericardium [3].

Pneumopericardium may be self-limited; however, in one-third of cases, tension pneumopericardium develops, leading to a clinical presentation similar to tamponade, which has been shown to be associated with a 60% mortality rate [4].

Pneumopericardium can be asymptomatic, but it may also cause symptoms such as chest pain, dyspnea, syncope, and upper quadrant pain. On physical examination, Hamman's sign is typical on auscultation [2].

Although the diagnosis of pneumopericardium can be made with chest radiographs, their utility in pericardial and cardiac injuries is limited. Differentiating pneumomediastinum and medial pneumothorax from pneumopericardium on direct radiographs is challenging. CT imaging is a highly sensitive modality for evaluating pneumopericardium and associated pathologies [5].

In the presented case, pneumopericardium was detected on thoracic CT on the fifth day post-trauma following the emergence of burning-type chest pain and sweating in a patient with blunt thoracic trauma. This finding demonstrates that pneumopericardium may not develop immediately after trauma but can occur days later. Therefore, long-term and meticulous monitoring of trauma patients is of great importance.

In this case, the patient's elevated WBC level prior to the onset of chest pain was considered secondary to trauma. Following the onset of chest pain, imaging revealed infiltrative areas, which gradually regressed over time as observed through daily follow-up with posteroanterior (PA) chest radiographs.

In the literature, pneumopericardium findings are generally observed during the acute phase of trauma. In contrast to the existing literature, in the presented case, pneumopericardium was not detected on the initial CT scan performed on the first day of trauma but was identified on the fifth day. The occurrence of late-onset chest pain after adequate pain control in a trauma patient, accompanied by the subsequent detection of pneumopericardium in diagnostic studies, is a remarkable and rare finding that contributes to the literature.

The delayed onset of pneumopericardium following trauma is a critical point to consider in clinical follow-up. In patients presenting with mechanisms such as falls from height or blunt thoracic trauma, dynamic assessment of symptoms during follow-up and the use of advanced imaging modalities when necessary are essential.

In conclusion, traumatic pneumopericardium, while rare and potentially fatal, can be successfully managed with early diagnosis and prompt intervention. This case highlights the importance of meticulous clinical monitoring and post-trauma care in trauma patients. Furthermore, a better understanding of the pathophysiological mechanisms of pneumopericardium may facilitate the development of new approaches for preventing and managing this rare complication.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

Authors' contribution

All authors contributed to the conception, data collection, writing, and final approval of the manuscript.

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