Case Report

Journal of Emergency Medicine Case Reports

A Case of Pneumopericardium after Pericardiocentesis Conservatively Managed with Multimodality Imaging Methods

Ahmet Seyfeddin Gürbüz[1], Serhat Kesriklioğlu[1], Ahmet Taha Şahin[2]
[1]Necmettin Erbakan University, Faculty of Medicine, Department of Cardiology, Konya, Türkiye
[2]Beyhekim Training and Research Hospital, Department of Cardiology, Konya, Türkiye

Abstract

Pneumopericardium is characterized by the presence of air or gas in the pericardial sac, which can occur spontaneously, due to trauma, underlying disease, or iatrogenically. Following pericardiocentesis, pneumopericardium is a rare but notable complication, and management depends on the hemodynamic status of the patient. A 57-year-old male with lung adenocarcinoma underwent pericardiocentesis for cardiac tamponade. After the procedure, pneumopericardium was diagnosed using multimodal imaging, including chest X-ray, CT scan, and echocardiography. The patient remained hemodynamically stable and was managed conservatively with close follow-up. In stable patients, a conservative approach to pneumopericardium may be appropriate. Multimodal imaging is crucial for diagnosis and management, and timely intervention is necessary in cases of hemodynamic instability.

Keywords: Pericardial disease, pericardial effusion, pericardiocentesis, pneumopericardium

Introduction

Pneumopericardium is defined by the presence of air or gas in the pericardial sac. It can occur spontaneously, following trauma, as a result of an underlying disease, or iatrogenically (1). In most cases, pneumopericardium is asymptomatic and resolves spontaneously without the need for invasive treatment. However, in some cases, especially when complications like cardiac tamponade arise, immediate intervention may be required (1). The management of pneumopericardium is largely dependent on the patient's hemodynamic status and the presence of any accompanying conditions such as pneumothorax (2). Pneumopericardium after pericardiocentesis is an uncommon yet significant complication. In this case report, we describe the diagnosis of pneumopericardium after pericardiocentesis using multimodal imaging techniques and discuss the management approach, emphasizing the conservative treatment approach due to the patient's stable hemodynamics.

Case Report

A 57-year-old male patient who received carboplatin and paclitaxel chemotherapy for lung adenocarcinoma underwent pericardiocentesis due to cardiac tamponade. A 6-FR sheath and a pigtail catheter were used and approximately 250 cc of fluid was drained immediately. A total of 1200 cc of fluid was drained in 36 hours.

Then we removed the pericardiocentesis system and the patient was in a stable condition both clinically and in terms of vital signs. On a follow-up chest X-ray (Figure-A) taken on the same day after pericardiocentesis, the pericardial layer was distinguishable (red arrow) and a radiolucent area is noted between the heart and the pericardial layer. On the thorax CT (Figure-B) taken with the suspicion of pneumopericardium, it was observed that the pericardial space is filled with air (blue arrow), and accumulation is particularly observed in the anterior region, probably due to the low density of air. Accompanying pneumothorax was not observed on CT. In echocardiography (echo) (Figure-C), air bubbles are observed in the pericardial space and they are seen to change location from beat to beat.

The patient was taken back to the ICU for observation and daily echo monitoring. We discharged the patient after 6 days because there was no deterioration in the patient's clinical condition and the echo appearance was stable on follow-ups.

In this case, a conservative approach was preferred because the patient was hemodynamically stable and diastolic collapse of the right ventricle was not detected. During follow-up, it was observed that the air appearance disappeared. On the thorax CT (Figure-D) taken 4 months after pericardiocentesis, no air is seen between the pericardial

Corresponding Author: Serhat Kesriklioğlu
e-mail: drserhatk@gmail.com
Received: 01.11.2024 • **Revision:** 21.12.2024 • **Accepted:** 29.12.2024
DOI: 10.33706/jemcr.1577878

Cite this article as: Gürbüz AS, Kesriklioğlu S, Şahin AT. A Case of Pneumopericardium after Pericardiocentesis Conservatively Managed with Multimodality Imaging Methods. Journal of Emergency Medicine Case Reports. 2025;16(1): 12-13

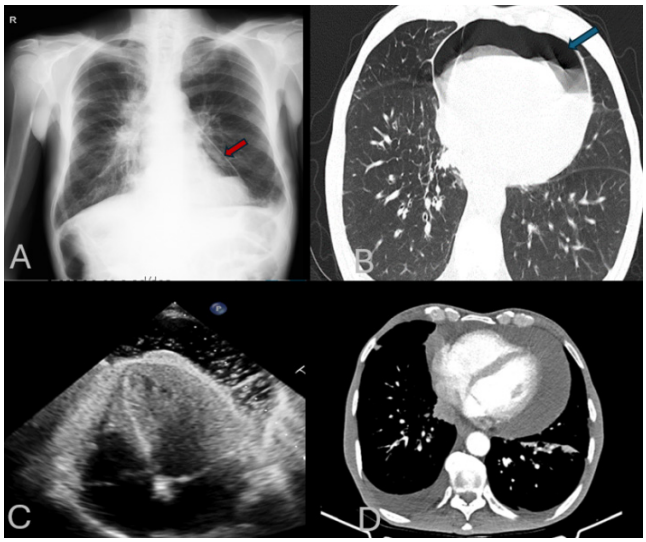

Figure 1 A-B-C-D. A: After pericardiocentesis, the pericardial layer can be distinguished (red arrow), B: The pericardial space is filled with air (blue arrow), C: In echocardiography, air bubbles are observed in the pericardial space, D: On thoracic CT four months after pericardiocentesis, no residual air was seen between the pericardial layers but the effusion recurred.

layers. Despite this, the effusion recurred and the patient was referred for pericardioperitoneal window surgery.

No significant increase in effusion was observed after the successful surgical procedure. However, eight months after the first contact, metastatic foci were detected in the brain and the patient passed away due to non cardiac reasons.

Discussion

In the treatment of malignant pericardial effusions, options such as pericardiocentesis, percutaneous balloon pericardiotomy, catheter drainage or surgical pericardial window opening can be chosen (3).

In the pericardial fluid sample taken from the patient, the fluid was found to be exudative in nature, but no evidence of metastasis was observed. It should be noted that in cancer patients, pericardial fluid may be related to direct metastatic tumor spread, obstruction of lymphatic channels, or treatment-related factors (4).

Recurrence of malignant effusions varies depending on the type of primary cancer (5). Considering that the risk of recurrence is higher, especially in lung adenocarcinoma, pericardial window surgery may be considered at the first stage.

Pneumopericardium may develop due to trauma, mechanical ventilation, infection, invasive intervention, or may occur spontaneously (6). Pneumopericardium is an uncommon occurrence following pericardiocentesis. Pneumopericardium after pericardiocentesis may result from excessive dilation of the skin orifice, air leakage due to a defect in the drainage system, or a pleuropericardial fistula (7).

Pneumopericardium may be asymptomatic, or it may cause symptoms such as chest discomfort, difficulty breathing, syncope, or even cause cardiac tamponade. It is diagnosed by the presence of air in the pericardial space. Detecting pneumopericardium can be achieved through Standard chest X-rays, CT scans, or echocardiography (1).

In the management of the patient, the hemodynamic status, possible association of accompanying pathologies such as pneumothorax and self-limitation of pneumopericardium should be taken into consideration. The process of differentiate between diagnosis should involve pneumomediastinum, where air is generally not present around the base of the heart and is not restricted solely to the heart, but may extend into the upper mediastinum and neck (8). We preferred a conservative approach because our patient's hemodynamics were stable, no pneumothorax was detected, and we saw that pneumopericardium was self-limiting during the follow-up during his stay (2).

Conclusion

In patients with stable hemodynamics, a conservative approach can be considered at the first stage. Being familiar with these images of pneumopericardium is important to prevent unnecessary interventions.

References

1. Choi WH, Hwang YM, Park MY, Lee SJ, Lee HY, Kim SW, et al. Pneumopericardium as a complication of pericardiocentesis. Korean Circ J 2011;41(5):280-2. doi: 10.4070/kcj.2011.41.5.280.
2. Triantafyllis AS, Zamfir T, Kontogiannis N. Pneumopericardium as a complication of pericardiocentesis. CMAJ 2023; 195(5): E193-E194. doi: 10.1503/cmaj.221137.
3. Mudra SE, Rayes D, Kumar AK, Li JZ, Njus M, McGowan K, et al. Malignant pericardial effusion: A systematic review. CJC Open 2024; 6(8): 967-972. doi: 10.1016/j.cjco.2024.05.003.
4. Ekmekçi C, Ekmekçi S, Dere Y, Adalı Y, Ekinci S, Çabuk AK, et al. Could the cytological evaluation of pericardial effusions illuminate our path? *İzmir Tepecik Eğitim Hastanesi Dergisi* 2018; 28(2): 99-103. doi: 10.5222/terh.2018.099.
5. Kim SH, Kwak MH, Park S, Kim HJ, Lee HS, Kim MS, et al. Clinical characteristics of malignant pericardial effusion associated with recurrence and survival. Cancer Res Treat 2010; 42(4): 210-216. doi: 10.4143/crt.2010.42.4.210.
6. Polistina GE, Lanza M, DiSomma C, Annunziata A, Fiorentino G. A rare evolution to pneumopericardium in a patient with COVID-19 pneumonia treated with high flow nasal cannula. Medicina (Kaunas) 2021; 57(10): 1122. doi: 10.3390/medicina57101122.
7. Palma A, Henriques C, Silva PV, Pires A. Pneumopericardium and pleural effusion: a rare complication of pediatric pericardiocentesis. BMJ Case Rep 2020; 13(11): e236308. doi: 10.1136/bcr-2020-236308.
8. Brander L, Ramsay D, Dreier D, Peter M, Graeni R. Continuous left hemidiaphragm sign revisited: a case of spontaneous pneumopericardium and literature review. Heart (BrCardSoc) 2002; 88(4): e5. doi: 10.1136/heart.88.4.e5.