

A Rare Complication of Pericardiocentesis: Pneumopericardium

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Abstract

Pneumopericardium is the presence of air in the pericardial sac. Pneumopericardium after pericardiocentesis has been rarely reported in the literature. In the present case, we report a patient who presented with tamponade physiology during COVID-19 and developed pneumopericardium after emergency pericardiocentesis. Immediate recognition and treatment are crucial and chest X-ray, thorax computerized tomography and transthoracic echocardiography are used for diagnosis.

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Declaration of interest

The authors report no relationships that could be construed as a conflict of interest.

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ABSTRACT

Pneumopericardium is the presence of air in the pericardial sac. Pneumopericardium after pericardiocentesis has been rarely reported in the literature. In the present case, we report a patient who presented with tamponade physiology during COVID-19 and developed pneumopericardium after emergency pericardiocentesis. Immediate recognition and treatment are crucial and chest X-ray, thorax computerized tomography and transthoracic echocardiography are used for diagnosis.

Key words: COVID-19, pericardiocentesis, pneumopericardium, echocardiography

INTRODUCTION

Pericardiocentesis is a widely used treatment method in the treatment of pericardial effusion and its complication rate is approximately 1-2% (1). Pneumopericardium is known as the accumulation of air in the pericardial sac and is a rare complication of pericardiocentesis (2). In this case report, we present a case of iatrogenic pneumopericardium after pericardiocentesis in a patient with COVID-19.

CASE PRESENTATION

A 56-year-old male patient with active COVID-19 disease presented to the emergency department with worsening general condition and exacerbation of dyspnea. The patient had a history of scleroderma and coronary artery disease. Upon detection of approximately 3 cm of pericardial effusion in thorax computed tomography (CT), cardiology consultation was requested with the preliminary diagnosis of cardiac tamponade. On physical examination, his temperature was 37°C, heart rate was 105 beats/min, blood pressure was 90/60 mm Hg, respiratory rate was 32 per minute, and oxygen saturation was 94% while receiving supplemental oxygen with a high flow of 15 liters per minute through the cannula. An Electrocardiogram (ECG) showed normal sinus rhythm at 100 beats per minute. There were lung crackles and wheezing. S1 and S2 sounds were weak, rhythmic, and there was no murmur. A transthoracic echocardiography (TTE) showed normal biventricular volumes and systolic functions, with a left ventricular ejection fraction of 60%. There was a large pericardial effusion, especially along the lateral wall. There was only a small amount of effusion on the anterior surface of the right ventricle and adjacent to the apical region. Pulse wave Doppler imaging showed >40% tricuspid wave variation. Pericardiocentesis was planned, but it was difficult to drain the fluid with the subxiphoid or apical method. Therefore, pericardiocentesis was performed by an interventional radiologist by placing a drainage catheter with a lateral-apical approach and 750 ml of pericardial fluid was drained. After the procedure, his clinical condition improved and saturation increased. However, the patient started to complain of chest pain three hours after the procedure. ECG was taken and there was no feature. No pericardial effusion was observed on bedside TTE. Also, the echogenicity was found to be much worse than the TTE done before the pericardiocentesis. On TTE, there was a finding of imaging loss during systole, which is called the 'air gap sign' (Video 1, supplementary material). Air in the mediastinum was suspected due to crepitation at the catheter insertion site. Chest radiography showed air in the pericardial cavity surrounding the heart (Figure 1). Severe pneumopericardium, pneumothorax and subcutaneous emphysema were detected on thorax CT (Figure 2). Before underwater drainage, emergency pericardiocentesis was performed to remove pericardial air and 400 cc of air was aspirated. After the procedure, the patient's symptoms alleviated and his clinical condition improved. Four hours after the procedure, while the patient was going to be transferred to a tertiary hospital, respiratory and cardiac arrest developed. Despite prolonged resuscitation, the patient's circulation did not improve and he died.

DISCUSSION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected millions of people and caused enormous morbidity and mortality worldwide, and still continues. With the increasing number of COVID-19 cases, various manifestations of the coronavirus have emerged. A large pericardial effusion has been presented as early or late complication, from isolated form to cases associated with pericarditis, myocarditis, and even respiratory symptoms (3). Our patient was a case of cardiac tamponade caused by large pericardial effusion accompanied by COVID-19-related lung involvement and respiratory symptoms.

Pneumopericardium is the collection of air in the pericardium and is a rare pericardiocentesis complication (2). Pneumopericardium is most commonly caused by trauma, nevertheless it may also emerge following interventional procedures. Although the most common cause of cardiac tamponade is the collection of blood and other fluids in the pericardium, it is known that air accumulation can also cause it (4). Pneumopericardium should be one of the differential diagnoses in patients with chest pain after pericardiocentesis, and chest radiography and thorax CT are the first-line methods in diagnosis (5). Besides CT and chest radiography, the 'air gap sign,' defined as cyclic loss of myocardial imaging during systole on echocardiography, is a useful diagnostic finding (6). Treatment of the etiology and close hemodynamic follow-up is an appropriate option

in patients whose clinical condition is stable. In a patient with pneumopericardium, acute haemodynamic worsening should urge further evaluation, and cardiac tamponade should be actively ruled out (7). In the event of tension pneumopericardium, an emergency pericardiocentesis with echocardiography is required to drain the air surrounding the heart (8).

The main etiology in our patient was thought to be injury to the visceral and mediastinal pleura while reaching the pericardium, and air escaping from the lungs to the pleura was considered to reach the pericardium by passing through the mediastinum. Complications involving the lung and pleura are likely to be more common in pericardiocentesis performed via the apical method than in those performed via the subxiphoid technique (9). As a result, the apical-lateral approach of pericardiocentesis was deemed to be a factor in our patient. In addition, our patient has the 'air gap sign', which is a unique finding of pneumopericardium. Investigation of the presence of this finding will give very valuable information while performing echocardiography in patients with suspected pneumopericardium.

CONCLUSION

In conclusion, it can be noted that the presence of significant pericardial effusion indicates a poorer prognosis in COVID-19 patients. Pneumopericardium is a rare but life-threatening complication of pericardiocentesis and the most common symptom is chest pain. The main diagnostic methods are chest radiography, thorax CT and TTE.

Declaration of interest: The authors report no relationships that could be construed as a conflict of interest.

Informed Consent : Written informed consent has been obtained from the patients' family to publish this paper.

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FIGURE LEGENDS

Figure 1 : Chest radiography shows air around the heart in the pericardial cavity.

Figure 2 : Thorax CT image showing severe pneumopericardium, pneumothorax and subcutaneous emphysema.

VIDEO LEGENDS

Video 1: Echocardiography image showing 'air gap sign'.

