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### Case Report

# Hemorrhagic shock due to branch injury of the left internal thoracic artery two days after pericardiocentesis

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#### ABSTRACT

Pericardiocentesis is a definitive strategy to remove pericardial effusion. In this report, we present a rare case of a 23-year-old man with sudden delayed hemorrhagic shock due to branch bleeding of the left internal thoracic artery (LITA) two days after undergoing pericardiocentesis. Angiography, embolization, and drainage were effective. As far as we know, this is the first report that shows delayed bleeding due to branch injury of the LITA as a possible complication after pericardiocentesis.

**<Learning objective:** Pericardiocentesis using an apical approach under echocardiography is considered safe; however, in this case, unexpected complications after pericardiocentesis for hemorrhagic shock occurred. Patients who undergo pericardiocentesis should be observed in the hospital for several days. If sudden changes in vital signs occur, the underlying complications should also be considered, and it is important to act promptly and review the patient's prior procedures.>

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### Introduction

Ultrasound-guided pericardiocentesis of the left anterior chest is considered safe [1]. However, complications such as chamber lacerations, intercostal vessel injury, and pneumothoraxes occurred in 1.2% of patients who underwent pericardiocentesis [2]. Here, we report a patient with unexpected hemorrhagic shock that occurred after pericardiocentesis via the upper edge of the rib due to a branch injury of the left internal thoracic artery (LITA).

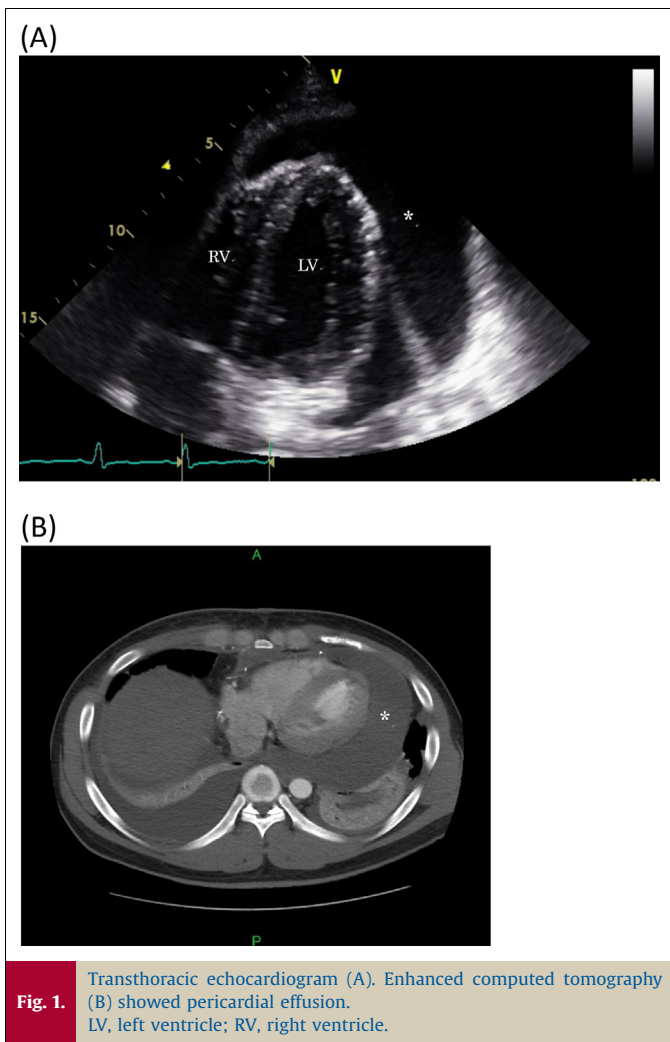
### Case report

A 23-year-old man without relevant medical history was admitted to our hospital due to a continuous fever of 39 °C that began 5 days previously. Based on a blood test, we suspected that inflammation was present, and Gram-positive cocci were detected in the patient's blood culture. Cardiac ultrasonography showed a vegetation of 20 × 10 mm on the bicuspid aortic valve and mild

aortic regurgitation. The patient was diagnosed with infective endocarditis and underwent aortic valve replacement using an artificial mechanical valve. Anticoagulation therapy was started, and all drains were removed by day 5. We stopped heparin because his prothrombin time-international normalized ratio (PT-INR) was elevated to 2.13 on day 7.

On day 13, the patient had tachycardia and dyspnea while walking. Echocardiography and computed tomography (CT) showed the presence of pericardial effusion (Fig. 1A, B). Low blood pressure (<80 mmHg) and jugular venous distension were observed, and we diagnosed the patient with cardiac tamponade. Because pericardial fluid was confined and a subxiphoid or parasternal approach was difficult to perform, we performed echo-guided pericardiocentesis from the upper edge of the sixth rib in the left anterior chest. In this procedure, we used a small drain of 1.7 mm that was made of polyurethane using the Seldinger method; and 600 ml of the pericardial effusion was drained without reversing the vascular flow. The fluid was exudative, and the hematocrit level was 18.2%. Although pericardial effusion was bloody, we removed the drain for the following reasons. First, the fluid volume increased slowly. Second, we thought it would be better to repeat the procedure if there was more fluid accumulation. Finally, it was also

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important to prevent the occurrence of any infection in the patient. We compressed the puncture site for several minutes. The patient's respiratory distress was alleviated, and his heart rate became normal. Because pericardial effusion was bloody, and his PT-INR was elevated to 2.87, we temporarily stopped warfarin. Two days later, the PT-INR fell to 1.38. The hemoglobin level was 9.1 g/dl, and the hematocrit level was 27.5%. There was no increase in left pleural and pericardial effusion the next day that was seen on chest X-ray and echocardiogram.

Two days after pericardiocentesis, the patient suddenly felt dyspnea while walking to the toilet. His SpO<sub>2</sub> level decreased drastically, oxygenation could not be maintained in an oxygen mask, and we had to start non-invasive positive pressure ventilation (NPPV). Subsequently, the patient fell into vital shock and lost consciousness. Echocardiography did not show pericardial effusion, but fluid had accumulated in the left thoracic cavity. We performed left thoracic cavity drainage, during which dark red blood flowed out, and acute bleeding was suspected. In the blood test, the hemoglobin level was 9.2 g/dl, and the hematocrit level was 29.0%. No decrease was observed for 2 days, which was why we suspected the presence of sudden hemorrhage. After administering a pressor drug and a transfusion to raise the patient's blood pressure, we performed a contrast-enhanced CT. It showed extravasation of the contrast agent in the left thoracic cavity (Fig. 2A, B), and hemorrhage after pericardiocentesis was considered to have occurred.

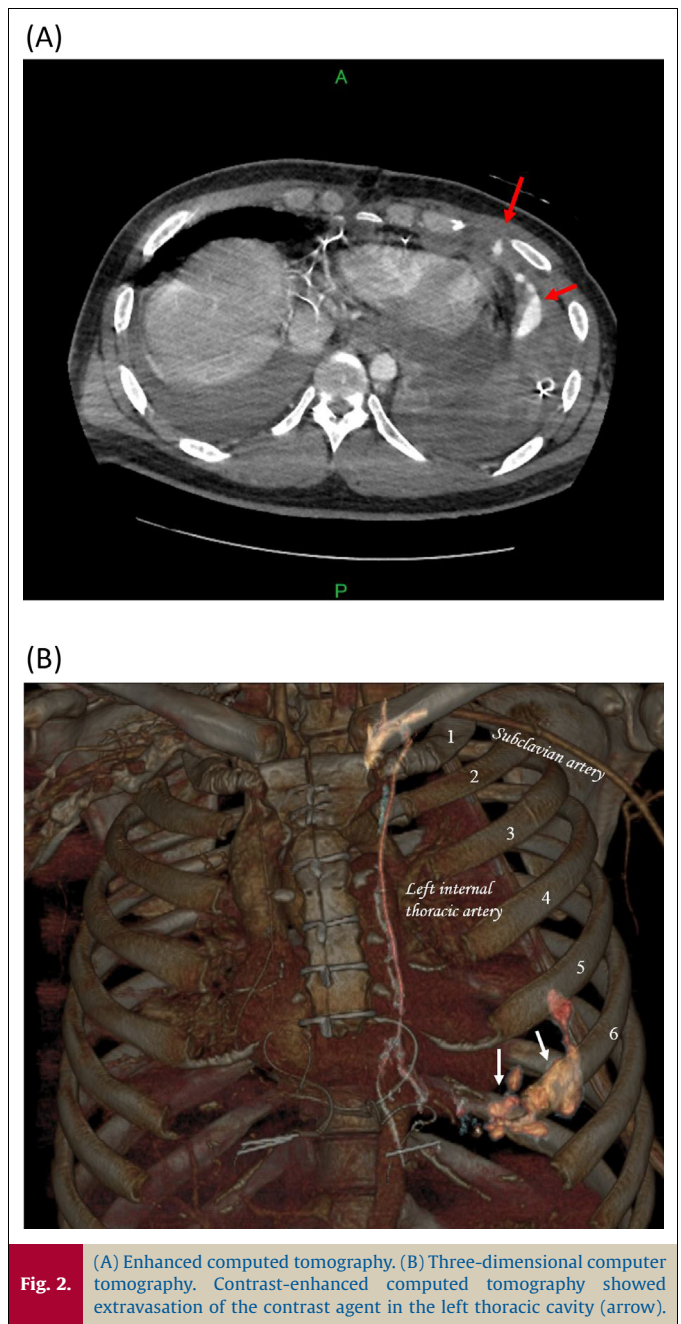


Fig. 2. (A) Enhanced computed tomography. (B) Three-dimensional computer tomography. Contrast-enhanced computed tomography showed extravasation of the contrast agent in the left thoracic cavity (arrow).

Angiography was performed to identify the source of the bleeding and determine the appropriate therapy. Bleeding was not observed in the intercostal artery arising from aorta, but hemorrhage from the branch of the LITA was revealed (Fig. 3A). Because there was peripheral anastomosis between them, we performed embolization with coils and administered N-butyl-2-cyanoacrylate from the distal site of bleeding (Fig. 3B). NPPV could be withdrawn after the procedure. The left thoracic drainage tube was removed on day 37, and antibiotic treatment was finished on day 46. The patient was discharged on day 48 without recurrence of the hemothorax.

## Discussion

We reported on a patient with hemorrhagic shock due to left intrapleural bleeding 2 days after undergoing pericardiocentesis via the upper edge of the rib. Although the puncture site was

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