A very rare complication of subacute pericarditis: a case report of spontaneous coronary artery rupture

Brief title: A case of spontaneous coronary artery rupture

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Learning points

- Although acute pericarditis generally has a good clinical course, careful follow-up is required for cases that emerge after invasive procedures, such as thorascopic surgery.
- **Spontaneous coronary artery rupture (SCAR)** is an extremely rare disease with a variable clinical course. In cases of sudden cardiac tamponade or cardiac arrest, SCAR should be considered as a differential diagnosis.
- Transcatheter arterial embolization for SCAR is less invasive and feasible.
Echocardiography showed that there was no significant change in pericardial effusion compared with that on re-admission.

He noticed shortness of breath during exertion.

He underwent robot-assisted thoracoscopic surgery.

Discharged

Re-admission

After 3hr

Cardiac arrest

Echocardiography showed the presence of increased bloody pericardial effusion with cardiac tamponade.

Emergency coronary angiography showed the multiple ruptures in the distal left anterior descending artery.

Transcatheter arterial embolization was performed.
Abstract (208 words)

Background: Spontaneous coronary artery rupture (SCAR) is an extremely rare and highly lethal disease.

Case Summary: A 74-year-old man who had undergone respiratory surgery (robot-assisted thoracoscopic surgery) presented with exertional dyspnoea since post-operative day (POD) 6. Echocardiography and contrast-enhanced computed tomography showed diffuse pericardial effusion, and a 12-lead electrocardiogram showed widespread concave ST-segment elevation. The diagnosis of acute pericarditis was made based on the absence of significant elevation of cardiac enzymes and the presence of elevated C-reactive peptide levels. The patient was started on anti-inflammatory medication, including steroids; however, on POD 11, the patient developed a sudden cardiopulmonary arrest due to cardiac tamponade. Extracorporeal cardiopulmonary resuscitation was performed, and an emergency coronary angiography showed contrast extravasation from the left anterior descending artery to the epicardium. He was diagnosed with SCAR and underwent transcatheter arterial embolisation (TAE) and pericardial drainage.

Discussion: In this case, SCAR occurred during the course of acute pericarditis. We speculated that the cause of SCAR was more affected with pericarditis than injury by the respiratory surgery. The clinical course of acute pericarditis generally has a good prognosis, but the rare occurrence of fatal complications should be considered, suggesting the need for careful follow-up. In addition, TAE was a less invasive and feasible treatment for SCAR.

Keywords: case report, spontaneous coronary artery rupture, transcatheter arterial embolisation, pericardial effusion, tamponade, cardiac arrest, subacute pericarditis

Abbreviations list: SCAR = spontaneous coronary artery rupture, POD = postoperative day, CK = creatine kinase, TTE = transthoracic echocardiography, ECG = electrocardiography, ECMO = extracorporeal membrane oxygenation, LAD = left anterior descending artery, NSAIDs = nonsteroidal anti-inflammatory drugs, OCT = optical coherence tomography

Text (1,135 words)

Introduction

Spontaneous coronary artery rupture (SCAR) is extremely rare, and its aetiology is still not fully understood (1-7). Moreover, acute pericarditis is an inflammatory condition of the pericardium and its aetiology is considered idiopathic in developed countries, but most cases are caused by viral infections. In most cases, remission is achieved with a combination of non-steroidal anti-inflammatory
drugs and colchicine (8, 9). We herein report a case of cardiac tamponade and cardiac arrest due to SCAR in the subacute phase of acute pericarditis.

**Case Presentation**

A 74-year-old man underwent a robot-assisted thoracoscopic surgery for suspected left lung cancer and was discharged without clinical symptoms on post-operative day (POD) 5. However, he experienced dyspnoea the next day. Contrast-enhanced computed tomography (CT) on POD 7 showed pericardial effusion (Fig. 1a), and he was admitted to the respiratory surgery unit on POD 8. His vital signs were the following: blood pressure, 153/73 mmHg; pulse rate, 111 bpm; SpO2, 97% (room air); body temperature, 36.4°C. Laboratory examinations showed the following results: C-reactive protein level, 12.5 mg/dL (normal value, 0.3 < mg/dL); white blood cell count, 11,700/µL (normal value, 3,300-8,600/µL); creatine kinase-MB, 1.0 U/L (normal value, <12.0 U/L); high-sensitivity troponin I, 19.8 pg/mL (normal value, <26.2 pg/mL). A 12-lead electrocardiogram (ECG) showed widespread concave ST-segment elevation (Fig. 1b). Transthoracic echocardiography (TTE) showed that the left ventricular wall motion was within the normal range. Mild pericardial effusion with diffuse low-echoic mass was observed (Fig. 1c). However, there were no findings suggestive of cardiac tamponade. Based on these results, we concluded that he had an acute pericarditis. So, we started oral medication with loxoprofen 180 mg/day and colchicine 1.0 mg/day on admission, and we added 20 mg/day of hydrocortisone one day after admission because he had strong inflammation. No elevation of creatine kinase or troponin I was observed during the clinical course (Fig. 2). TTE on POD 11 showed that the left ventricular wall motion was within normal range, and there was no significant change in pericardial effusion (Fig. 1e) compared with that on admission; the 12-lead ECG also showed slight improvement (Fig. 1d). However, he experienced increased respiratory distress and cardiac arrest after 3 h. Cardiopulmonary resuscitation was performed, but spontaneous circulation did not resume, and veno-arterial extracorporeal membrane oxygenation was initiated because of the presence of increased bloody pericardial effusion by portable echocardiography. An emergency coronary angiography was performed (Fig. 3a), and multiple rupture sites were found in the distal left anterior descending artery (LAD) (Fig. 3b). Because of the presence of pooling in the pericardial cavity, we concluded that he had experienced cardiac arrest due to cardiac tamponade caused by SCAR. Transcatheter arterial embolisation (TAE) was performed via the left femoral artery, and a 7-Fr guiding catheter was inserted into the left coronary artery. Coil embolisation (2.0/15 mm × 2+2.0/20 mm ×2) was performed in the distal LAD using a microcatheter. After 5 min, the blood oozing decreased but persisted; hence, we used a 2.6-Fr microcatheter and added gelatine sponge (Spongell®;
Astellas Pharma Inc., Tokyo, Japan) for embolisation (Fig. 3c). After TAE, the lumen of the vessel in the LAD was observed by optical coherence tomography, but there were no findings suggestive of acute coronary syndrome such as plaque rupture or erosion (Fig. 3d–f). Pericardial drainage presented with approximately 280 mL of haemorrhagic pericardial effusion. The pericardial effusion from the drainage tube gradually decreased and the effusate was pale and bloody. The infarction area was limited to the apex, and there were no signs of heart failure after TAE. He was weaned from veno-arterial extracorporeal membrane oxygenation after approximately 36 h because his circulation was stable. There was no increase in pericardial fluid. He was transferred to the general ward for rehabilitation on POD 81.

**Discussion**

Coronary artery rupture is often associated with underlying diseases such as aneurysms and dissections, and previous case reports of Kawasaki disease, Behçet’s disease, and vascular Ehlers-Danlos syndrome are scattered (1-4). It has also been reported in patients sustaining mechanical injuries such as intervention, traumatic injury, and surgical treatment (5-7). However, SCAR without a cause is extremely rare (2). In contrast, acute pericarditis often occurs spontaneously in developed countries, and most cases are caused by viral infections. In most cases, remission can be achieved with a combination of non-steroidal anti-inflammatory drugs and colchicine. The prognosis of spontaneous acute pericarditis is generally good, with a very low long-term risk of sequelae such as constriction (8, 9).

The clinical course in this case was consistent with that of acute pericarditis. The rationale is the presence of widespread concave ST-segment elevation, high levels of inflammatory markers, diffuse exudative pericardial effusion, and no significant elevation of cardiac enzymes. The TTE showed low-echoic pericardial effusion, and the CT value of pericardial effusion on contrast-enhanced CT was about 45 Hounsfield Unit, which was not high enough to suspect the bloody fluid. Furthermore, no antithrombotic or anticoagulant therapy was administered. Thus, the possibility of rebleeding after haemostasis was low. So, we suggested that SCAR had not occurred initially on admission. Although corticosteroids are not recommended as a first-line treatment for acute pericarditis in the European Society of Cardiology guidelines (8), we decided to administrate of corticosteroids the day after admission because of the possibility of strong inflammation associated with an iatrogenic etiology (surgical invasion). However, there was no contact with the pericardium during the surgery, and the electrocautery counter-electrode plate was placed on the lateral side of the left lower leg; therefore, the relevance of the respiratory surgery on SCAR could not be explained. In addition, there was no
report that drugs such as corticosteroids or colchicine induced the SCAR. So, we speculated that the cause of SCAR was more affected with pericarditis than injury by the respiratory surgery.

The treatment of SCAR is usually emergency open-heart surgery in previous reports, and coil embolisation has been reported in one case (2). TAE is used as a bail-out method for complications during percutaneous coronary intervention and can be performed more quickly and less invasively than open-heart surgery, especially when the source vessel is small, as in this case. The important disadvantage is that the use of embolic materials results in permanent loss of the vessel lumen beyond the site of deployment and subsequent infarction (10). In this case, TAE was chosen because of its unstable circulatory system. Furthermore, we thought that pericardial drainage would decrease the pressure in the pericardial cavity and increase the amount of bleeding; therefore, we decided to perform TAE first. We suggested that TAE was a less invasive and feasible treatment for SCAR.

We report a case of SCAR with cardiac arrest in the subacute phase of acute pericarditis, an extremely rare event. Although acute pericarditis generally has a good clinical course, it may result in fatal complications such as sudden cardiac rupture, suggesting the need for careful follow-up.

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The authors have no conflicts of interest to disclose.

Conflicts of interest: none declared

References


**Figure Legends**

Figure 1. (a) Contrast-enhanced computed tomography on post-operative day (POD) 7 showing a diffuse pericardial effusion. (b) Twelve-lead electrocardiogram (ECG) on admission showing widespread concave ST-segment elevation with sinus rhythm. (c) Transthoracic echocardiography (TTE) on admission (POD 8) showing pericardial effusion with diffuse low-echoic mass. (d) Twelve-lead ECG on POD 11 showing slight improvement of ST elevation compared with that on admission.
(e) TTE on POD 11 showing no significant change in pericardial effusion compared with that on admission. Yellow arrows in panels c and e show the pericardial effusion around the left and right ventricular walls, respectively.

Figure 2. Clinical course of the patient with spontaneous coronary artery rupture associated with acute pericarditis after respiratory surgery. POD, post-operative day; CRP, C-reactive protein; WBC, white blood cell; CPK, creatine phosphokinase; NSAIDs, non-steroidal anti-inflammatory drugs.

Figure 3. Emergency coronary angiography (a) showing multiple ruptures from the distal part of the left anterior descending artery (LAD) (b). We performed the transcatheter arterial embolisation using coil embolisation and gelatine sponge (c). The lumen of the vessel in the LAD was observed by optical coherence tomography (OCT). The OCT sections of panels d, e, and f correspond to the arrows in panel a. There were no findings suggestive of acute coronary syndrome (d, e, and f).
Fig. 2

- CRP (mg/dL)
- WBC (x10^3/μL)
- CPK (U/L)

Timeline:
- POD4: Discharge
- POD5
- POD8: Hospitalisation
- POD9
- POD10
- POD11
- POD12: Cardiac arrest

Therapy:
- Hydrocortisone 20 mg/day
- Colchicine 1.0 mg/day
- NSAIDs (loxoprofen 180 mg/day)