



Cardiac Tamponade with Aortic Dissection Relieved by Pericardial Rupture after Cardiopulmonary Resuscitation

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Abstract

An 82-year-old woman with DeBakey type II acute aortic dissection who was found unconscious and revived 21 minutes after onset by cardiopulmonary resuscitation was referred to our hospital and underwent emergency ascending aortic replacement. Intra-operatively, a large amount of fluid from a bloody pericardial effusion drained into the left thoracic cavity through a pericardial rupture as a consequence of chest compression during cardiopulmonary resuscitation.

Keywords: Acute aortic dissection; Cardiac tamponade; Pericardial rupture; Cardiopulmonary resuscitation

Introduction

In a clinical series on Stanford type-A acute aortic dissection, pericardial tamponade was identified in 17% to 45% of patients [1]. A rapid increase in pericardial effusion can cause a severe hemodynamic compromise in a short period of time. Herein, we report a rare surgical case of DeBakey type II complicated with a large amount of fluid from a pericardial effusion that drained into the left thoracic cavity through a pericardial rupture as a consequence of chest compression during cardiopulmonary resuscitation.

Case Presentation

An 82-year-old woman was admitted for cardiopulmonary arrest from unknown cause. She was revived 21 min after the onset of cardiopulmonary arrest by Cardiopulmonary Resuscitation (CPR). A physical examination revealed unconsciousness (Glasgow Coma Scale, E3VTM6), a blood pressure of 59/47 mm Hg and a heart rate of 96 bpm. The chest X-ray at the local hospital revealed no typical findings (Figure 1A). However, her chest X-ray on admission revealed an opacified left hemithorax and a mediastinal shift towards the right side (Figure 1B). Contrast computed tomography performed 30 min after onset at the local hospital revealed DeBakey type II Acute Aortic Dissection (AAD) complicated with pericardial and left pleural effusion (Figure 2). Transthoracic echocardiography confirmed pericardial effusion and an intimal flap in the ascending aorta. Thus, emergency surgery was started 5 hours and 38 min after onset.

Surgical Technique

Under general anaesthesia, sternotomy was performed, and the pericardium was opened. However, a small amount of pericardial effusion was observed; thus, left pleural drainage was performed through a newly generated pleural hole. The bloody left pleural effusion (1,200 mL) was drained. Transesophageal echocardiography revealed no dissection or rupture of the descending

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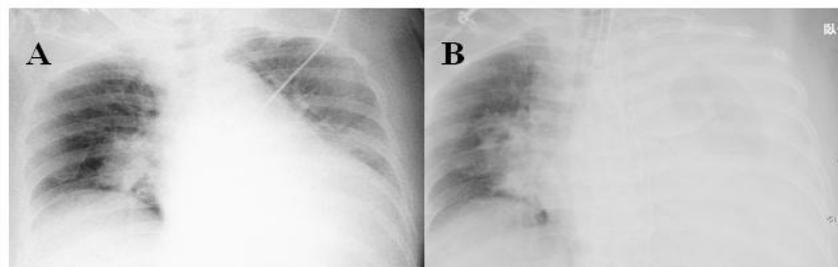


Figure 1: (A) Chest X-ray at the local hospital revealed slight cardiomegaly, (B) Chest X-ray on admission revealed an opacified left hemithorax and a mediastinal shift towards the right side.



Figure 2: Preoperative CT scan revealing DeBakey type II aortic dissection (white arrow), pericardial effusion (black arrow) and left pleural effusion (white triangle) but no dissection or rupture of the descending aorta.

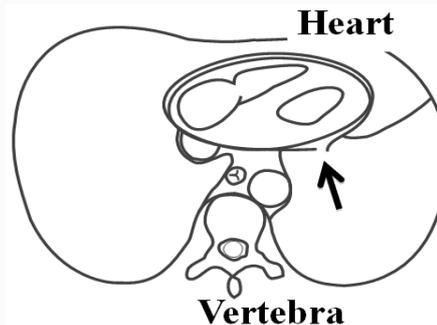


Figure 3: Schematic of pericardial rupture in the chest. A longitudinal tear was noted at the left pleuropericardium (black arrow). The tear made communication between the intrapericardium and left thoracic cavity.

aorta. After administration of 3 mg/kg heparin, cardiopulmonary bypass was established with the left femoral artery and bicaval cannulation. Under moderate hypothermic circulatory arrest with retrograde selective cerebral perfusion, the ascending aorta was opened. An intimal tear was located at the ostium of the brachiocephalic artery and just superior to the sinotubular junction. The dissection was limited at the ascending aorta. After transaction of the ascending aorta, both aortic stumps were reinforced using the inner and outer Teflon felt sandwich method with 4-0 monofilament horizontal mattress sutures. Inspection of the pericardium revealed a longitudinal tear 25 mm in length at the left pleuropericardium (Figure 3).

Communication was noted between the pericardium and left thoracic cavity. The ascending aorta was replaced with a Woven Dacron graft (Triplex™, 28 mm × 8 mm; Vascutek Ltd., Glasgow, Scotland). Although the patient survived the surgery, complications occurred, including cerebral infarction with left-side hemiparesis, resulting in 28 days of respiratory support after tracheotomy. The patient was discharged on postoperative day 35 for rehabilitation.

Discussion

Surgery should be performed immediately for patients with Stanford type A AAD with cardiac tamponade. In the present case, the circulatory status of the patient was maintained despite the long time that transpired prior to surgery because a large amount of liquid from a pericardial effusion drained to left thoracic cavity through the left pleuropericardium hole. CPR-related injuries can frequently occur in the chest, but the incidence of pericardial tears without fractures following chest compression is rare [2,3]. Laceration during CPR more commonly occurs in the left posterolateral pericardium [4]. As a similar pathophysiology, most (86%) congenital pericardial defects are typically located on the left side [4,5]. A congenital

pericardial defect with type A AAD and rupture has also been reported [5]. However, considering the clinical course of our patient who experienced cardiac arrest following the onset of AAD and who was revived by CPR, the longitudinal shape of the pericardial tear discovered intra-operatively suggested that the hole in the left pleuropericardium was caused by CPR. Relatively few reports on pericardial tears due to chest compression in the absence of rib or sternal fractures have been reported [3,4], and such tears are extremely rare in patients with AAD [4].

In summary, we experienced an extremely rare case of DeBakey type II AAD complicated with cardiac tamponade that was relieved by drainage into the left pleural cavity through a pericardial rupture as a consequence of chest compression during CPR.

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