

# Successful Management of an Occult Cardiac Tamponade with Prompt Surgical Intervention and a Novel, Defined Pericardial Irrigation Protocol

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## Abstract

Purulent pericarditis is a rare entity in the postantibiotic era. It usually occurs in patients who have underlying chronic and immunosuppressing conditions and its presentation in the healthy adult population is quite rare. Infection of the pericardial space can occur via direct extension from infectious endocarditis, pneumonia, or empyema, or from a more distant source such as meningitis. Purulent pericarditis carries a very high mortality because of delay in the diagnosis and early occurrence of fatal complications. We describe a case of purulent pericarditis with impending cardiac tamponade in a previously healthy 40-year-old female patient, which was successfully treated with a combination of prompt surgical drainage and a novel irrigation protocol.

## Keywords

- ▶ cardiovascular surgery
- ▶ empyema
- ▶ infection
- ▶ pericardium

## Introduction

A 40-year-old female patient presented to the emergency department complaining of a 2-week history of feeling generally unwell with worsening dyspnea and chest pain over the last 5 days. She denied any night sweats or rigors. She has been previously well, with no previous medical history. On physical examination, she was afebrile, normotensive, and in sinus tachycardia of 115 beats/min. Chest auscultation revealed decreased air entry, worse on the right side with dullness to percussion. Remainder of her examination was unremarkable. She was hypoxic with an arterial P<sub>aO<sub>2</sub></sub> of 7.5 kPa on room air. Chest X-ray showed bilateral pleural effusions, being significantly worse on the right side (▶Fig. 1a). Laboratory data on admission showed a white blood cell count of  $18.4 \times 10^9/L$ , and a C-reactive protein of 228 mg/L. An ultrasound-guided thoracocentesis was performed under local anesthesia and 500 mL of pus was drained. An 8F pigtail catheter was left in situ for drainage. As it was likely that this was a complex effusion, a thoracic computed tomography (CT) scan was performed.

The CT findings were surprising as they showed not only the evident bilateral pleural effusions but a large significant pericardial effusion measuring up to 3.5 cm posteriorly with evidence of restrictive ventricular filling (▶Fig. 1b, c). The patient was immediately transferred to the Cath-laboratory for an emergency echo-guided pericardiocentesis. Before the procedure, she became hemodynamically unstable, and went into decompensated shock requiring emergency intubation and inotropic support. Echocardiogram showed a large amount of circumferential pericardial effusion with right atrial, right ventricular, and left ventricular diastolic collapse (▶Fig. 1d). Pericardiocentesis was performed under ultrasound guidance to relieve the tamponade and 800 mL of thick, viscous, and frank pus was aspirated (▶Fig. 2a, b). A pericardial drain was left in situ and she was started on empirical vancomycin and piperacillin/tazobactam. Drainage from the pericardial drain was minimal due to the thick and viscous effusion that had probably occluded the drain. The patient was brought to theater for a pericardiotomy and thorough washout of the pericardial cavity with warm saline (▶Fig. 2c). Three pericardial drains and a large bore right-sided chest

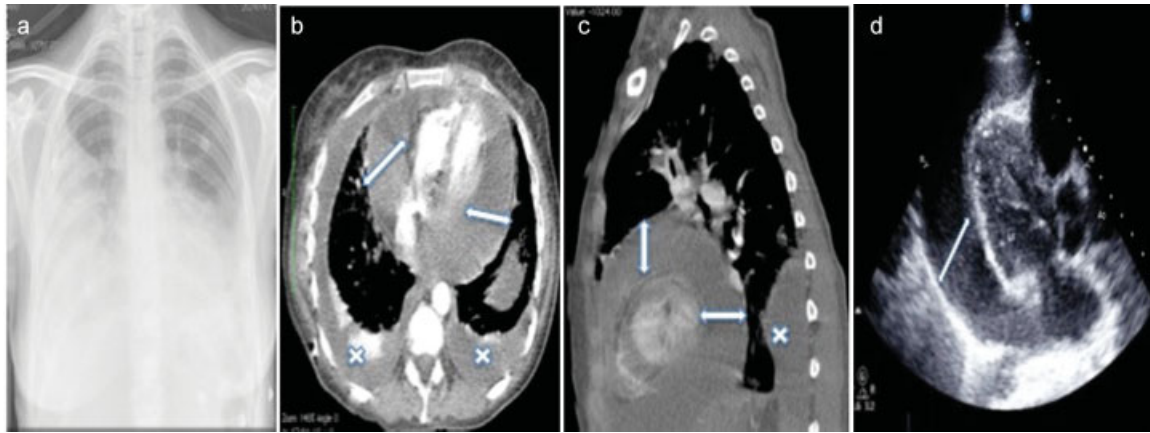
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**Fig. 1** (a) Chest X-ray on admission showing bilateral pleura effusions. (b and c) Significant pericardial effusion (white arrows) on computed tomography scan, along with bilateral pleural effusions (white cross). (d) Echocardiography showing a large pericardial effusion along with significant diastolic collapse.

drain were inserted and a washout of the right pleural cavity was performed. Postprocedure, the pericardial drains were flushed with 1 L of warm normal saline every 8 hours to irrigate the pericardial space. The patient was extubated 2 days following her procedure. A urine sample taken was positive for *Streptococcus pneumoniae* antigens and antimicrobial therapy was changed to ceftriaxone 2 g intravenously twice a day, for which the strain isolated was sensitive. The antibiotics were continued for 10 days, and 8-hourly pericardial lavage was undertaken for 7 days, until all the effluent from her drains were clear. All her drains were removed 15 days following her surgery and she was eventually discharged home well.

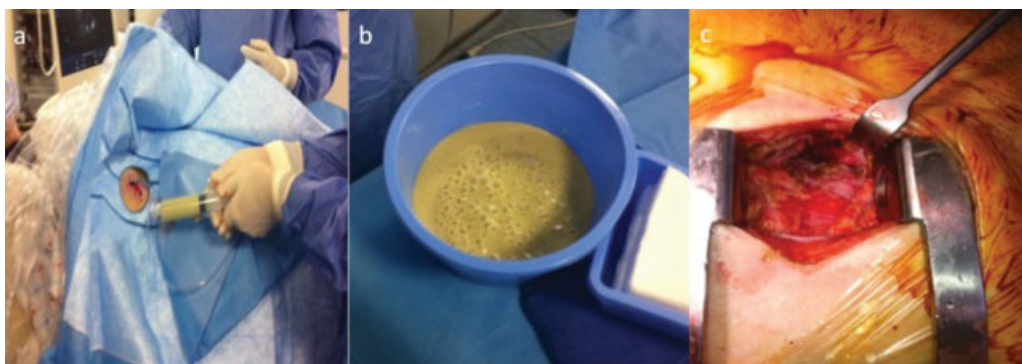
The patient underwent a repeat CT thorax and an echocardiogram 9 months after her surgery. The CT scan showed no pericardial thickening or calcification and complete resolution of the effusions. A normal pericardium, with no calcification or any residual effusion was also noted on the echocardiogram, with good biventricular function.

**Discussion**

Purulent pericarditis is rare in the postantibiotic era. Most reported cases usually arise in children or in the context of an underlying immunosuppressive condition. Because of late

diagnosis, often only discovered at autopsy, this condition carries a very high mortality of up to 30%. Common bacterial pathogens include *S. pneumoniae* (22%), *Staphylococcus aureus* (22%), and *Streptococcus pyogenes* (17%). The exact pathophysiology is unclear; it is thought that infection in the pulmonary or pleural space induces an inflammatory response in the pericardium with migration of neutrophils. Whether bacteria migrate directly from the lung into the pericardial sac or subsequent bacteremia occurs with invasion of the pericardial space, remains controversial.<sup>1</sup>

Purulent pericarditis is rarely associated with acute pericarditis features such as presence of friction rub<sup>2</sup> and its presenting symptoms such as fever, tachycardia, hypotension or shortness of breath, are usually attributed to the underlying sepsis. In the case of our patient, her presenting chest X-ray showed bilateral effusions and any features of a large, globular heart were difficult to appreciate. Diagnosis of the purulent pericarditis and impending tamponade was only made incidentally on CT scan. Without a thoracic CT scan and prompt subsequent intervention, the patient's condition would have easily progressed into shock, which would have been wrongly attributed to her underlying sepsis. Although emergency pericardiocentesis was performed promptly with aspiration of 800 mL of pus, our patient still required intubation and inotropic support,



**Fig. 2** (a and b) Emergency pericardiocentesis with aspiration of frank, viscous pus. (c) Partial pericardiectomy.

suggesting a degree of septic shock as well as the cardiogenic shock caused by the tamponade. It is important to note that while pericardiocentesis is a life-saving intervention, definitive surgical drainage of the pericardial collection is vital in preventing complications such as reaccumulation or constrictive pericarditis.<sup>3</sup> There is no consensus on the appropriate surgical procedure in this setting; some authors have suggested prophylactic pericardiectomy to prevent constrictive pericarditis in all patients.<sup>3</sup> In the case of the our patient, a subxiphoid approach with creation of a pericardial window and a defined washout protocol with warm saline was considered to be the most appropriate treatment given the fact that the patient was already in septic shock and a more invasive procedure might increase the risk of septicemia and spread of infection. We believe that is it the first time such pericardial irrigation protocol has been described in the literature. Moreover, her follow-up imaging did not reveal any sequelae of the acute purulent infection, namely, constrictive pericarditis.

## Conclusion

Purulent pericarditis is a rare, life-threatening condition. We report a case of purulent pericarditis with tamponade, which was successfully treated with prompt surgical drainage and a novel, defined irrigation protocol. We believe that this protocol worked well in the acute setting and had the desired effect therapeutically in the medium to long term, with no evidence of constrictive pericarditis at 9-month follow-up.

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