CASE REPORT

Cardiac tamponade as a result of pericardial effusion in pneumococcal infections

J de Vries, TA Rijpstra, NJM van der Meer
Department of Anesthesia and Intensive Care, Amphia Hospital, Breda, The Netherlands

Abstract - Pneumococcal pericarditis has become an uncommon condition since the antibiotic era started. We describe three cases of cardiac tamponade as a result of pericardial effusion in pneumococcal pericarditis.

Keywords - pneumococcal infection, pericardial effusion, cardiac tamponade en transoesophageal echocardiography.

Introduction
Pericarditis is an uncommon, but potentially life threatening complication of pneumococcal infections. The overall incidence and etiology of pericarditis and pericardial effusion changed significantly after the introduction of antibiotics in 1943 [1-3]. Historically, streptococcus pneumoniae accounted for approximately half of the cases of pericarditis. However, the incidence has now fallen to 9% [1,3-5].

We report three patients with a severe pneumococcal infection complicated by a cardiac tamponade as a result of pericardial effusion.

Case Reports
Case 1
A 68-year old woman was admitted to the intensive care unit (ICU) with respiratory insufficiency. During the week prior to admission she had been ill with a fever and progressive respiratory distress. Besides hypertension, no other significant medical history was reported. She was dyspnoeic and hypotensive (80/40 mmHg) with an atrial fibrillation (ventricular response 150 per minute). Laboratory studies included: CRP 521 mg/L, white blood cell count 48.4×10⁹/L, creatinine 484 µmol/L, urea 48.5 mmol/L, arterial blood gas analysis pH 7.32, pCO₂ 4.8 kPa, pO₂ 7.1 kPa, bicarbonate 18 mmol/L and base excess -6.9 mmol/L. Chest X-ray revealed signs of infiltration in the left lower lobe. The rapid antigen test for streptococcus pneumoniae was positive.

Treatment was initiated with fluid therapy, vasopressors, antibiotics and amiodarone. Intubation and mechanical ventilation followed because of progressive respiratory distress. Continuous venovenous haemofiltration (CVVH) was started because of acute renal failure.

During the next few days she remained dependent of inotropic support without haemodynamic improvement. On day 5 her haemodynamic situation deteriorated and a transoesophageal echocardiography revealed significant pericardial effusion. Pericardiocentesis was performed and 250 ml of fluid was aspirated. The aspirate showed no micro-organisms.

The patient's haemodynamic and respiratory situation improved and the tracheal tube was removed. She was discharged from the ICU in good clinical condition.

Case 2
A 54-year old woman was admitted to the ICU with respiratory insufficiency. She had been ill for 5 days with coughing and progressive respiratory distress. Her previous medical history was positive for rheumatoid arthritis, Sjögren's syndrome, asthma and autoimmune hepatitis. Laboratory studies included: CRP 311 mg/L, white blood cell count 30.9×10⁹/L, creatinine 348 µmol/L, urea 47.6 mmol/L, arterial blood gas analysis pH 7.24, pCO₂ 5.9 kPa, pO₂ 16.1 kPa, bicarbonate 18 mmol/L and base excess -8.8 mmol/L. The chest X-ray revealed considerable right perihilar infiltration. The rapid antigen test for streptococcus pneumoniae was positive. Treatment was initiated with inotropics, vaspressors and antibiotics. Because the patient developed progressive respiratory distress, intubation and mechanical ventilation was necessary. Continuous venous venoous haemofiltration was started because of acute renal failure.

The patient's haemodynamic situation stabilized rapidly and the tracheal tube was removed. On day 9 her respiratory and haemodynamic situation deteriorated and ventilation had to be controlled artificially again. A transoesophageal echocardiography revealed significant pericardial effusion (figure 1). Pericardiocentesis was performed and 450 ml fluid was aspirated. The aspirate showed no micro-organisms. After the pericardiocentesis her haemodynamic situation stabilized. During the next few days she remained stable and the tracheal tube was removed. She was discharged from the ICU in good clinical condition.

Case 3
A 78-year old man was admitted to the ICU with respiratory insufficiency. He had been admitted to the hospital one day previously because of midsternal pain, a fever and respiratory distress. Computed tomography of the chest revealed no pulmonary embolism.
or aortic dissection. His previous medical history was positive for diabetes and vitamine B12 deficiency. Laboratory studies included: CRP 215 mg/L, white blood cells count 10.6×10^9/L, creatinine 284 µmol/L, urea 16.6 mmol/L, arterial blood gas analysis pH 7.28, pCO2 5.4 kPa, pO2 8.2 kPa, bicarbonate 19 mmol/L and base excess -7.8 mmol/L. Blood cultures were positive for streptococcus pneumoniae. Treatment was initiated with vasopressors, inotropics and antibiotics. Because of progressive respiratory distress, intubation and mechanical ventilation was necessary. Continuous venovenous haemofiltration was started because of acute renal failure.

The patient's haemodynamic situation deteriorated and a transoesophageal echocardiography showed 1-2 cm pericardial effusion, a moderate left ventricle function, mild tricuspid valve insufficiency and mild mitral valve insufficiency. The pericardial effusion was assessed as not enough to constitute pericardiocentesis. His haemodynamic situation stabilized, but on day 9 it deteriorated again and the transoesophageal echocardiography was repeated. This test revealed increased pericardial effusion. A pericardiocentesis was performed and 580 ml fluid was aspirated, which contained no micro-organisms. After the pericardiocentesis, the patient's haemodynamic situation stabilized. He was discharged from the ICU in good clinical condition.

**Discussion**

Pericarditis is an uncommon, but life threatening complication of pneumococcal infection. In the pre-antibiotic era, Streptococcus pneumoniae was the most common causal organism of purulent pericarditis [1,3-7].

There are five basic mechanisms by which pneumococcal pericarditis develops: direct spread from an intrathoracic focus of infection, haematogenous spread, extension from a myocardial focus, direct focus from trauma or thoracic surgery, and extension from a subdiaphragmatic supplicative focus [2,3].

This case report describes three patients with a severe pneumococcal infection complicated by a pericarditis and a cardiac tamponade. In all three patients, cardiac tamponade due to pericardial effusion was diagnosed after several days of appropriate treatment with antibiotics. A transoesophageal echocardiography was performed either because of the lack of improvement or even deterioration in the patients’ clinical and haemodynamic condition.

In general, pericardial effusion is not the most obvious reason for stagnation in recovery or haemodynamic deterioration. Other possible causes include secondary infection, including endocarditis, but non-infectious causes like myocardial infarction should also be considered.

In our patients, no signs of endocarditis were found, neither was their any proof of myocardial infarction. Further, the situation improved after pericardiocentesis in all three patients. One striking fact was that an earlier echocardiography in patient three showed no signs of pericardial effusion.

Pericardiocentesis is generally well tolerated, but may lead to a variety of serious complications, including laceration of the right ventricle or coronary artery, arrhythmias, hypotension and pneumothorax. Also acute pulmonary oedema has been reported [8,9]. Therefore, it should not be considered an option in haemodynamically stable patients.

We conclude that although Streptococcus pneumoniae usually has a normal susceptibility to penicillin and is the most common cause of community acquired pneumonia, it may still cause pericarditis and pericardial effusion, even in the era of adequate antibiotic therapy. The described cases illustrate the importance of echocardiography, in patients with a pneumococcal infection, when the haemodynamic situation does not improve or when it deteriorates. Even in situations where recent echocardiography has been performed, we advocate early repetition.

**References**