Pyopericardium followed by constrictive pericarditis due to Corynebacterium diphtheriae

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Abstract

Pyopericardium is a rare entity associated with a high mortality. We report a case of a 44-year old man presenting with simultaneous constrictive pericarditis and pyopericardium due to Corynebacterium diphtheriae. Pericardiectomy and epicardiectomy were performed without cardiopulmonary bypass, with an excellent result.

Keywords: Constrictive pericarditis • Pyopericardium • Corynebacterium diphtheriae

INTRODUCTION

Pyopericardium is a rare entity, with Staphylococcus aureus being the most common offending pathogen. However, Gram-negative bacteria and fungi (Candida and Aspergillus species) are increasing in frequency [1]. Pyopericardium is most commonly described in neonates and children. The treatment consists of draining the pus of the pericardium and administration of the appropriate antibiotics.

A literature search found fewer than 40 cases of pyopericardium in adults. We report a case of a 44-year old male, with constrictive pericarditis and pyopericardium due to Corynebacterium diphtheriae and review the pertinent literature.

CASE REPORT

A 44-year old Caucasian male, with history of alcohol abuse, was admitted in our department with septic shock due to constrictive pericarditis. On admission, his vital signs were blood pressure (BP) 70/40 mmHg, heart rate (HR) 135 bpm and oxygen saturation 84%. The patient complained for dyspnoea and symptoms of upper airway tract infection initiating 1-month prior to his admission. He did not receive any medication for these symptoms. His chest X-ray showed opacification of the right middle and lower lobes. Laboratory findings revealed leucocytosis (17 000/dl), C-reactive protein (CRP) = 19.03 mg/dl, total bilirubin = 2.5 mg/dl and positive D-dimers. Echocardiography discovered an ejection fraction (EF) of 70/40 mmHg, heart rate (HR) 135 bpm and oxygen saturation 84%. The patient has not had a booster diphtheriae tetanus vaccine.

Two hours after his admission, the patient developed respiratory arrest and right heart failure. He was intubated and CPR was provided with high doses of vasopressors. An urgent median sternotomy was performed. After opening the thickened (~2 cm) pericardium, 500 ml of pus was drained. The thickened parietal and visceral pericardium, including its diaphragmatic surface, was resected laterally towards each phrenic nerve (phrenic-to-phrenic technique) in order to liberate the myocardium. A suction heart positioner was used in the standard position used for off-pump coronary artery bypass grafting. Despite pericardiectomy performed, the haemodynamic status of the patient did not improve [BP = 80/40 mmHg, central venous pressure (CVP) = 25 mmHg, HR = 140 bpm, right ventricular end-diastolic pressure (RVEDP) = 22 mmHg]. The epicardium was also thick, compressing the heart (sclerotic epicardial peel). Complementary epicardiectomy was performed and in areas where this was not feasible the turtle cage technique was used. After epicardiectomy was completed, the haemodynamics (BP = 120/70 mmHg, CVP = 8 mmHg, HR = 100 bpm) and the right heart catheterization (RVEDP = 8 mmHg) were normalized and the vasopressors’ infusion rate was progressively diminished.

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Cultures of pericardium, epicardium and pericardial fluid revealed multisensitive corynebacterium diphtheria (C. diphteriae). Appropriate antibiotic treatment (erythromycin) was administered. The patient was weaned from vasopressors agents on the first postoperative day. His postoperative course was uneventful. The EF 2 months after his discharge was 55% and it remained stable during the yearly follow-up. The pathological examination revealed chronic pericarditis with granulation tissue. The patient has not had a booster diphtheriae–tetanus vaccine.

DISCUSSION

Purulent pericarditis (PP) is a rare entity accounting for <1% of unselected cases of acute pericarditis [1]. It is most frequent in the childhood and rare in the adulthood. The most common associated
illnesses are pneumonia, chest wall infections or thoracic surgery operations [2]. Nowadays, <25% of cases present an underlying primary infectious focus. Predisposing factors include previous peri-cardial disease (due to uremia-tumour or collagen vascular disease), immunosupression, alcohol abuse or chest trauma [3]. Gram-positive bacteria are isolated in 40–45% of all cases of PP with S. aureus being the most frequently cultured (in about one-third of cases) [1–3]. Currently, Gram-negative enteric bacteria and fungi (Candida and Aspergillus species) are increasing in frequency [4]. Reviewing the pertinent literature in PubMed (key words: pyopericardium), 38 cases were published from 1908 till nowadays. The most interesting and important cases are summarized in Table 1. Hirose et al. [5] report a case of constrictive pericarditis due to Corynebacterium pyogenes in an infant. We assume that the rarity of this pathology is due to the systematic vaccination protocols in the developed countries.

Corynebacterium diphtheriae is a pleomorphic Gram-positive bacillus. Its toxigenic strains produce a respiratory disease with a typical pseudomembranous pharyngitis. In addition, common complications of severe infection include myocarditis, neuritis and, to a lesser extent, nephritis [1, 6, 7]. The possibility of myocarditis or myopericarditis was in our differential diagnosis, due to at times atypical presentation of myocarditis. Our patient’s low EF (<20%) is consistent with the possibility of myocarditis. The fact that ECG, troponine and creatinine kinase-MB levels were normal, the onset of the disease, the echocardiographic and CT images, and mainly the rise in EF, the normalization of haemodynamics and right heart catheterization immediately after epicardectomy, led us to the diagnosis of constrictive pericarditis, excluding myocarditis, although some doubts remained. Pericarditis is usually secondary to the extension of an underlying condition such as infection of the oral cavity. In our case, the patient complained of symptoms of upper airway tract infection 1 month prior to his admission. He did not receive any treatment. Life-threatening infections like pyopericardium are thought to occur due to complex interplay between the magnitude of virulence of the strain and the host response. The fact that the patient delayed to receive the appropriate medical treatment and he was immunocompromized.

Table 1: Case reports of pyopericardium published in PubMed

<table>
<thead>
<tr>
<th>Study</th>
<th>Presentation</th>
<th>Bacteria</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>1 Chong et al. (2010)</td>
<td>Liver abcess</td>
<td>Escherichia coli</td>
<td>Surgical drainage</td>
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<td></td>
<td>Chest infection</td>
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<td>Antibiotics</td>
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<tr>
<td>2 Chong et al. (2010)</td>
<td>Liver abcess</td>
<td>Acid-fast bacilli</td>
<td>Anti-TB treatment</td>
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<td></td>
<td>Endoophthalmitis</td>
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<td></td>
<td>Pyopericardium</td>
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<tr>
<td>3 Chong et al. (2010)</td>
<td>Liver abcess</td>
<td>Klebsiella pneumoniae</td>
<td>IV antibiotics</td>
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<td>Pyopericardium</td>
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<td>4 Karthikeyan et al. (2008)</td>
<td>Pyopericardium</td>
<td>Enterococcus faecalis</td>
<td>Surgical drainage</td>
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<td>Antibiotics</td>
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<td>5 Ravishankaran et al. (2010)</td>
<td>Liver abcess</td>
<td>Staphylococcus aureus</td>
<td>Surgical drainage</td>
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<td>Pyopericardium</td>
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<td>Antibiotics</td>
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<tr>
<td>6 Kennedy et al. (2009)</td>
<td>Pyopericardium</td>
<td>Candida albicans</td>
<td>Piperacillin/tazobactam</td>
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<td></td>
<td>Leukaemia</td>
<td>Enterobacter faecium</td>
<td>Amphotericin</td>
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<td>Anaerobes</td>
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<td></td>
<td></td>
<td>Staphylococci</td>
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<td>7 Vijayavergin et al. (2008)</td>
<td>Pyopericardium</td>
<td>Streptococcus viridans</td>
<td>Surgery</td>
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<tr>
<td>8 Farhat et al. (2003)</td>
<td>Pyopericardium</td>
<td>Staphylococcus aureus</td>
<td>Surgical treatment</td>
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<td>Antibiotics</td>
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<tr>
<td>9 Tsai et al. (2002)</td>
<td>Liver abcess</td>
<td>Morganella morganii</td>
<td>Pigtail drainage</td>
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<td></td>
<td>Pyopericardium</td>
<td></td>
<td>Ceftriaxone</td>
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<tr>
<td>10 Hornick et al. (1995)</td>
<td>Pyopericardium</td>
<td>Nocardia asteroides</td>
<td>Surgical drainage</td>
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<td>Cefotaxime</td>
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Figure 1: CT scan showing thickening of the pericardium. Note ~2 cm thick pericardium (double white arrow) and the pericardial effusion (arrow indicates the pericardial cavity).
(alcohol abuse) explains, to some degree, the presence of this bac-
terium in the pericardial cavity and the problems that it caused.
The dissemination to the pericardium in our case is presumed to
be haematogenous.

The treatment is based on definitive surgical drainage, pericar-
diectomy and epicardiectomy. The resection of the pathological
epicardium is mandatory to liberate the myocardium and one
should never perform pericardiectomy without epicardiectomy.
If the latter is not possible, one has to perform the ‘turtle cage
operation’ [8]. The surgeon is guided on his decision not only by
the haemodynamic state of the patient, but also by the right
heart catheterization and the epicardial echography.

Constrictive PP is a rare entity. Several pathogenic micro-
organisms have been described as the offending, but C. diphtheriae
has not been reported previously. The treatment of choice is
epicardiectomy to liberate the myocardium and appropriate
antibiotic treatment, regardless the pathogenic microorganism.

Conflict of interest: none declared.

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