

Implantable device-related endocarditis detected by point-of-care echocardiography in a patient with dyspnea and chest pain

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ABSTRACT

We describe a case of a 70-year-old man who presented to the emergency department with dyspnea and chest pain. He had history of atrial fibrillation, chronic obstructive pulmonary disease, prosthetic mitral valve and pacemaker implantation. He had a sepsis related to multiple bilateral septic emboli pointed out by chest computed tomography scan. Point of care echocardiography showed a pacemaker-related endocarditis with large vegetation on the right ventricular lead. The patient started empiric antibiotic therapy and he was addressed to complete hardware removal.

Introduction

Septic pulmonary embolism (SPE) is an uncommon disorder that generally presents with an insidious onset of fever, respiratory symptoms and lung infiltrates. Clinical and radiologic features at presentation are usually nonspecific and the diagnosis of this disorder is frequently delayed.¹

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Case Report

A 70-year-old man with history of atrial fibrillation episodes, chronic obstructive pulmonary disease, prosthetic biological mitral valve and pacemaker implantation some years ago, presented to the Emergency Department with chest pain, fever and dyspnea. He was on treatment with amiodarone, ramipril, furosemide, bisoprolol, inhaled medications and edoxaban. At admission blood pressure was 130/70 mmHg, heart rate was 80 beats/min, oxygen saturation was 85% (FiO₂ 21%) with tachypnea (26 breaths/minute) and body temperature was 37.7°C. Chest examination revealed diffuse decreased vesicular murmur with crackles in the bases. Cardiovascular examination revealed augmented first heart sound, normal peripheral pulses and no edema. Arterial blood gas analysis revealed moderate hypoxemia. Electrocardiogram showed non-specific abnormalities. Chest X-ray showed non-specific opacities in the lower lungs (Figure 1). Results of blood test were consistent with a sepsis (Table 1). The patient underwent chest computed tomography (CT) scan that revealed multiple nodules consistent with the diagnosis of septic emboli (Figure 2). Point of care echocardiography was done following a standard protocol.^{2,3} Lung ultrasound revealed a diffuse B-profile pattern. Focus cardiac ultrasound showed a pacemaker lead vegetation with a maximum diameter of 1.9 cm (Figure 3) confirmed by transesophageal echocardiography. The patient started empiric antibiotic therapy with ampicillin and gentamicin after two sets of blood cultures had been obtained and he was referred to the division of infectious diseases with availability of cardiac surgery for pacemaker lead removal. One blood

culture in the ED was positive for *Escherichia coli* infection.

Discussion

Historically, SPE has been associated with risk factors such as intravenous (IV) drug use, pelvic thrombophlebitis and suppurative processes in the head and neck. However, increasing use of indwelling catheters and devices as well as increasing numbers of immunocompromised patients have changed the epidemiology and clinical manifestations of this disease.¹ Historically, SPE was most commonly associated with Lemierre's syndrome, post-partum septic pelvic thrombophlebitis and right-sided infective endocarditis (IE) in IV drug users. Within the last decade, attention has been drawn to changes in the epidemiology, including the importance of infected vascular catheters and implantable devices and more recently septic thrombophlebitis due to contiguous deep soft tissue or bone infection of the extremities.⁴ As showed in a recent study, sources of infection in-

Table 1. Laboratory tests.

Parameter	Value	Unit of measure
Red blood cells	3.62	$\times 10^6/\text{mL}$
Hemoglobin	10.1	g/dL
Hematocrit	31.2	%
Platelets	240	$\times 10^3/\text{mL}$
White blood cells	46.49	$\times 10^3/\text{mL}$
Neutrophils	44.89	$\times 10^3/\text{mL}$
Glucose	134	mg/dL
Urea	63	mg/dL
Creatinine	2.04	mg/dL
Sodium	145	mEq/L
Potassium	3.2	mEq/L
Calcium	8.1	mg/dL
Albumin	2.6	g/dL
Aspartate aminotransferase	171	UI/L
Alanine aminotransferase	119	UI/L
Bilirubin total	2.96	mg/dL
Bilirubin direct	2.77	mg/dL
International normalized ratio	2.62	-
Activated partial thromboplastin time	37.1	sec
C-reactive protein	213.2	mg/L
Procalcitonin	52.5	ng/mL
Pro-BNP	270.7	pg/mL



Figure 1. Chest X-ray showing non-specific opacities in the lower lungs.



Figure 2. Chest computed tomography-scan showing multiple septic emboli in both lungs.



Figure 3. Point-of-care echocardiography, apical 4-chamber view showing a pacemaker-related endocarditis with large vegetation on the right ventricular lead.

cluded skin and soft tissue (44%), IE (27%) and infected peripheral deep venous thrombosis (17%), in particular, in 85% of cases there was *Staphylococcus aureus* bacteremia.⁴ Infection of cardiovascular implantable electronic devices, in particular lead endocarditis, is an emerging problem with significant morbidity, mortality and health care costs. Staphylococcal species predominate as the causative organisms. Diagnosis is reliably made by blood cultures and transesophageal echocardiography.⁵ Transthoracic echocardiography is recommended as the first-line imaging modality in suspected infective endocarditis.⁶ Point-of-care ultrasound (POCUS) has been reported to diagnose both right- and left-sided IE^{7,8} and, for this reason, it is convincing that it can be useful also to detect infection of cardiovascular implantable electronic devices. It must be clear that a normal echocardiographic examination (included negative transesophageal echocardiography) does not rule out cardiac device-related IE. High clinical suspicion is fundamental especially in this setting of patients. The results of the first blood culture done in ED should be interpreted with caution due to the fact that *Escherichia coli* is an unusual bacterium for IE and could be also a contaminant. The management of cardiac device-related IE consists of prolonged antibiotic therapy and complete hardware removal. Percutaneous extraction is recommended in most patients with device infection, even those with vegetation >10 mm. Surgical extraction may be considered in patients with large vegetations (>20 mm) and should be considered if percutaneous extraction is incomplete or impossible or when there is associated severe destructive tricuspid IE.⁶

Conclusions

SPE is a possible complication of right-sided IE.¹ POCUS has an important role in speeding up the diagnosis that must be suspected, particularly in the presence of implantable devices.⁷

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