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Case report

Pulmonary artery intravascular abscess: A rare complication of incomplete infective endocarditis treatment in the setting of injection drug use

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ABSTRACT

Infective endocarditis (IE) is a serious complication of injection drug use. Right-sided IE encompasses 5–10% of all IE cases, with the majority involving the tricuspid valve (TV). The predominant causal organism is *Staphylococcus aureus*. Most cases of right-sided IE can be successfully treated with antimicrobials, but approximately 5–16% require eventual surgical intervention. We report the case of a 36-year-old female with active injection drug use who developed methicillin-sensitive *Staphylococcus aureus* IE of the tricuspid valve. Associated with poor adherence to medical therapy as a consequence of opioid addiction, she developed septic emboli to the lungs and an intravascular abscess in the left main pulmonary artery. These long-term potentially fatal, sequelae of incompletely treated IE require surgical intervention, as medical therapy is unlikely to be sufficient. Surgical management may involve TV replacement, pulmonary artery resection, and pneumonectomy. Prevention of these complications may have been achieved by concurrent opioid addiction therapy. An intravascular pulmonary artery abscess is a novel complication of advanced IE that has not been previously reported. This complication likely arose due to incomplete IE treatment as a consequence of opioid addiction, highlighting the need for concurrent addiction management. Intravenous antimicrobial therapy is likely not adequate, and surgical intervention, including pulmonary artery resection and pneumonectomy may be necessary.

Introduction

Tricuspid valve infective endocarditis (TVIE) is a serious complication of injection drug use (IDU) with a mortality rate of 10–15% and potential for further deadly complications [1–3]. *Staphylococcus aureus* accounts for 60–90% of cases of TVIE, with enterococci, streptococci, *Pseudomonas*, and HACEK organisms occurring less frequently [1,2,4]. Most cases of TVIE are treated medically, with only approximately 4% of all IE surgeries in North America for TVIE [5]. Surgical treatment is indicated in cases of persistent and refractory infection with difficult to eradicate organisms i.e. fungi [1,4]. Additionally, large valve vegetations and persistent septic pulmonary emboli are indications for operative management [1]. We report the case of a patient with a history of active IDU who developed methicillin-sensitive *Staphylococcus aureus* (MSSA) TVIE and Candida fungemia. After numerous unsuccessful attempts to complete medical therapy, she developed septic pulmonary emboli, proximal lung abscesses, and an abscess in the left main pulmonary artery. We highlight the importance of concurrent treatment of opioid addiction with intravenous antimicrobial therapy in patients with IDU and deep-seated infections to prevent long term complications, and review the literature to understand potential surgical treatment of such sequelae.

Case presentation

A 36-year-old Caucasian female with a history of active IV heroin use, anxiety, and depression presented to the emergency department (ED) with one week of chest pain and shortness of breath. A transthoracic echocardiogram revealed a 13 × 26 mm vegetation of the tricuspid valve (TV) with moderate tricuspid regurgitation. She was treated with IV vancomycin and cefepime, however left the hospital against medical advice (AMA) after one day, feeling that her pain was poorly controlled. She returned to the ED within 24 hour s with dyspnea and a productive cough. Chest x-ray revealed a right middle lobe infiltrate. Blood cultures grew MSSA (Fig. 1), and she was admitted to the ICU and treated with oxacillin. She completed one day of therapy, once again leaving AMA. She returned to the hospital the following day with severe dyspnea. Imaging revealed new septic emboli in the lung fields

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Organism	S.aureus			
Antibiotic	MIC (mcg/ml)	INTER	Dosage	Cost Drug/Day
Daptomycin	<=0.5	S		
Erythromycin	>4	R	PO 250-500mg q6h	$$
			IV 500mg q6h	$$$$
Levofloxacin	<=2	S	PO 250-500mg qd	$
			IV 500mg qd	$$$
Linezolid	2	S		
Meropenem	<=4	S	IV 500mg-1g q8h #	$$$$$
Oxacillin	0.5	S	IV 1-2g q6h	$$$$
Penicillin	>8	R	PO 125-250mg q6h	$$
			IV 1-3 million units q6	$$$$
Tetracycline	<=4	S	PO 250-500mg q6h*	$$
Trim/Sulfa	<=0.5/9.5	S	PO 160-800mg q12h	$
			IV 2.5-5mg (TMP)/kg q6h	$$$$
Vancomycin	2	S	IV 1g q12h*	$$$
			PO 125-500mg q6h	$$$

Fig. 1. MICs for blood cultures growing methicillin-sensitive *Staphylococcus aureus*.

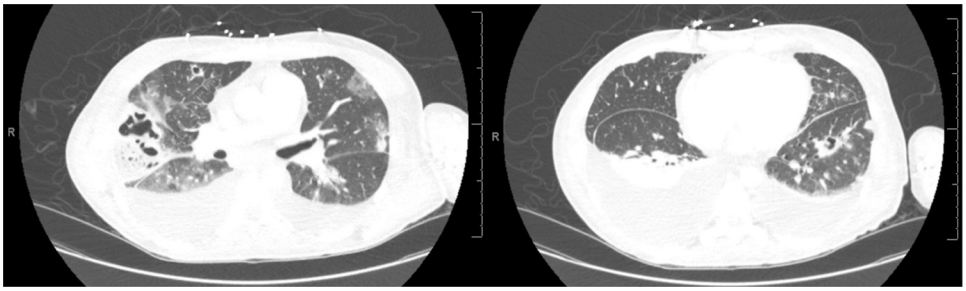

Fig. 2. CT chest with IV contrast revealing new septic emboli in the lung fields.

(Fig. 2). The patient was admitted and completed an eight day course of oxacillin and was discharged to a skilled nursing facility (SNF) with a peripherally inserted central catheter (PICC) line for continued medical treatment with oxacillin. She eloped from the SNF after 12 days.

Three weeks later, she presented to an outpatient appointment with confusion and weakness. Blood cultures grew *Candida famata*, and the patient was urged to report to the ED for treatment. She was given one dose of caspofungin in the ED before leaving AMA. Blood cultures drawn prior to administration of caspofungin subsequently grew *Candida parapsilosis*, and the patient was again advised to return to the ED. She was hospitalized and treated with oxacillin and fluconazole and developed substernal chest pain. Blood cultures remained positive for MSSA throughout the hospital course, with no further growth of Candida. Repeat chest x-ray during this admission showed multifocal airspace opacities and continued cavitary lesions in the lung fields. She left AMA after seven days due to persistent and inadequately controlled symptoms of opioid withdrawal.

One week later she returned to the ED in septic shock. She was administered IV fluids, vancomycin, caspofungin, and ceftriaxone in the ED and admitted to the hospital where she began to complain of pleuritic chest pain. CT of the chest with IV contrast demonstrated multiple new solid cavitary lesions bilaterally, a left sided loculated effusion, and a 1.8 cm diameter fluid attenuation within the left perihilar lung surrounding a consolidation, suspicious for a septic intravascular pulmonary embolism with abscess formation in the left main pulmonary artery (Fig. 3). Imaging strongly indicated that the abscess was likely not within the wall of the pulmonary artery, but intraluminal, with inflammation of the artery wall. Although the artery did appear dilated on CT, there did not appear to be any pseudoaneurysms. Trans-esophageal echocardiogram revealed a $1.9 \times 1.5 \times 1.5$ cm diameter multi-lobulated, highly mobile vegetation on the anterior leaflet of the TV with severe regurgitation and possible leaflet perforation.

Cardiothoracic surgery was eventually consulted for potential surgical intervention, but the patient was considered a poor surgical candidate due to her continued hemodynamic instability and history of non-compliance to therapy. A repeat chest CT was obtained which showed proximal right-sided lung abscesses and findings suspicious for additional emboli in the segmental and subsegmental arteries of the right lower lobe. She was discharged to a subacute nursing facility for six weeks of treatment with cefazolin. Blood cultures remained negative for two weeks prior to discharge. The patient completed her six-week antibacterial course with one relapse of heroin use. Repeat imaging after completion of therapy demonstrated a large highly mobile vegetation of the tricuspid valve, unchanged in size from previous studies, with continued severe tricuspid regurgitation.

Discussion

To our knowledge this is the first reported case of an abscess in the left main pulmonary artery as a complication of IE. The development of this abscess demonstrates the importance of completion of intravenous antimicrobial therapy and the necessity of addiction management in promoting patient adherence with intravenous antimicrobial therapy. This patient repeatedly withdrew from medical therapy due to her heroin addiction and thus developed serious and life threatening complications of IE including TV perforation, septic emboli, and an arterial abscess.

TV repair/replacement is a well-studied treatment option for IE with the patient meeting criteria for stage D tricuspid regurgitation (symptomatic, severe TR) and published indications for TV surgery [6]. Studies have shown better peri-operative and event free survival with TV repair as compared to replacement [1,8]. Indications for replacement include significant leaflet tethering, distortion of the valve, ventricular