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Case Report

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Bilateral multivalvular polymicrobial endocarditis in an intravenous drug user

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ABSTRACT

A 30-year-old man with a history of intravenous drug use presented to emergency room with fever, fatigue and altered mental status. He was admitted to intensive care unit with the diagnosis of sepsis, disseminated intravascular coagulation, multiple organ dysfunction syndrome and acute respiratory distress syndrome. On transthoracic echocardiography, there were big vegetations on both mitral and tricuspid valves. Consecutive blood cultures grew Staphylococcus aureus and Staphylococcus hominis. The diagnosis was bilateral, multi-valvular, polymicrobial infective endocarditis. The patient had a fulminant course and died on the fourth day of admission.

1. Introduction

Intravenous (IV) drug use is a well-recognized predisposing factor for infective endocarditis (IE). According to, 'definitions of the terms used in the European Society of Cardiology 2015 modified criteria for the diagnosis of infective endocarditis, injection drug use represents a minor diagnostic Duke criterion for IE (Habib et al., 2015). Most infections are community-acquired, and Staphylococcus aureus is the leading causative microorganism, with methicillin-resistant strains becoming more prevalent (Leone et al., 2012). Also, due to high-risk behaviors, IV drug addicts are subjected to needle-borne infections by organisms that are usually non-pathogenic. Possibly due to the habit of cleaning the needles with saliva and using it to dissolve the drug, polymicrobial infection is frequent in this setting (Miró et al., 2002). In fact, the main risk factor of polymicrobial IE is IV use (Sousa et al., 2012).

2. Case

A 30-year-old man with a history of IV drug use presented to emergency room with fever, fatigue and altered mental status and he was admitted to intensive care unit (ICU) with the diagnosis of sepsis, disseminated intravascular coagulation (DIC), multiple organ dysfunction syndrome (MODS), acute respiratory distress syndrome (ARDS). On physical examination, the patient was confused. His vitals were:

Blood pressure 120/70 mmHg, pulse rate 110/minute, respiratory rate 29/minute and body temperature 40° C. A pansystolic grade 2/6 murmur was audible at the left sternal edge. The respiratory sounds were diminished in both lungs and there were rales and rhonchi in the right lung. The liver was enlarged. There were skin rashes on patella and on both lower extremities. Blood tests were as follows: White blood cell count: 16700/mm^3 (82% neutrophils), hemoglobin: 8.1 g/dl, hematocrit: 24.2%, platelets: 15000/mm^3, aPTT 33 seconds, prothrombin time 17.5 seconds, INR 1.58, D-dimer 5548 ng/ml (N: 0-243 ng/ml), fibrinogen 297 mg/dl (N: 195-410 mg/dl), fasting blood glucose 141 mg/dl, blood urea nitrogen 172 mg/dl, creatinine 2.58 mg/dl, glomerular filtration rate 45 ml/min, ALT: 38 U/L, AST: 45 U/L, GGT: 46 U/L, albumin: 1.7 g/dl, total bilirubin 11 mg/dl (N: 0.3-1.2 mg/dl), direct bilirubin 7.37 mg/dl (N: 0-0.2 mg/dl). Hepatitis and HIV markers were negative. Chest X-ray revealed bilateral diffuse pulmonary infiltrates. On transthoracic echocardiography (TTE), there were big vegetations on both mitral and tricuspid valves (Fig. 1 and 2). The structure and thickness of other heart valves were normal. On color Doppler there were moderate mitral and tricuspid regurgitation. No right-to-left communication was observed. Consecutive blood cultures grew both Staphylococcus aureus and Staphylococcus hominis. The final diagnosis was sepsis, DIC and MODS secondary to multivalvular, multipathogen infective endocarditis. He was treated with meropenem 1 gram every 12 hours, daptomycin 6 mg/kg/day and caspofungin 70 mg loading and then 50 mg maintenance dose. He was also given platelet and human albumin transfusions. However, the patient was unresponsive to treatment and on the fourth day of admission, cardiac arrest developed and the patient died.

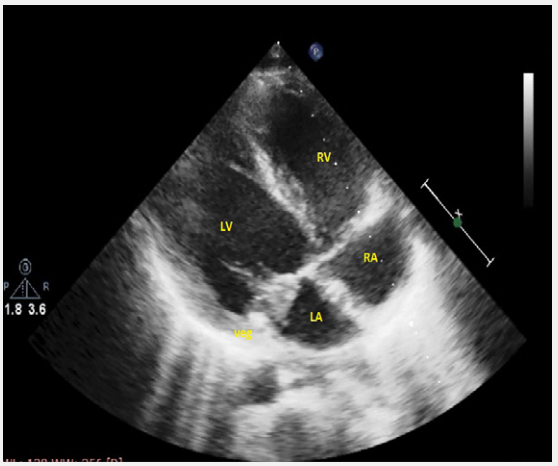

Fig. 1. Transthoracic echocardiographic image shows a large vegetation on the mitral valve (veg). RA: Right atrium, RV: Right ventricle, LA: Left atrium, LV: Left ventricle.

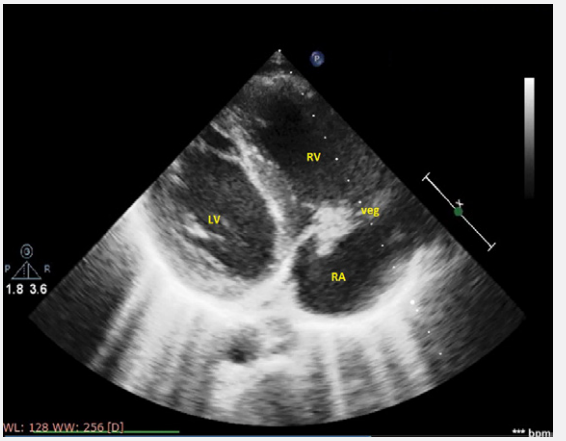

Fig. 2. Transthoracic echocardiographic image shows a large vegetation on the tricuspid valve (veg). RA: Right atrium, RV: Right ventricle, LV: Left ventricle.

3. Discussion

The majority of IE cases involve a single valve and the occurrence of multivalvular endocarditis is uncommon. The incidence of multivalvular endocarditis was reported between 13% and 18% in different series (Kim et al., 2000; Abid et al., 2010; Selton-Suty et al., 2010). In these series, the most common etiologic micro-organisms were staphylococci. However, in a review by Selton-Suty, the multivalvular location was often related to group D streptococci (Selton-Suty et al., 2010). Multivalvular IE includes both bilateral IE (affecting left and right heart valves at the same time) and IE affecting both mitral and aortic valves. The proposed mechanisms for multivalvular IE are: i-) Simultaneous seeding during the same bacteremia, ii-) Sequential seeding from a previously damaged valve, iii-) Creation of a new valvular lesion secondary to the infection of the first one, iv-) Spread of infection between left and right heart through congenital shunts. Multivalvular IE is frequently responsible for severe heart failure (Abid et al., 2010) and often needs aggressive and complex surgical therapy (Selton-Suty et al., 2010).

Our patient had bilateral endocarditis (affecting mitral and tricuspid valve), which is seen in only 5%-10% of patients (Sousa et al., 2012). Bilateral location usually occurs in patients with intracardiac devices and IV drug users (Duval et al., 2004). Our patient was an IV heroin addict and IE continues to be an important health problem among IV drug abusers. Injection drug users represent 5%-10% of all IE cases (Miró et al., 2002). Staphylococcus aureus is responsible for most of IE cases among these patients. Other agents are; staphylococci, pseudomonas and pathogenic fungi (Sousa et al., 2012). Remarkably, recurrent IE is more common in IV drug addicts, and the median time interval between episodes is shorter in addicts than in

non-addicts. This fact can be at least partly explained by the continuation of drug use in many of these patients (Vilacosta et al., 2016). Recurrent IE is also common in HIV positive injection drug users.

Right-sided endocarditis accounts for %5 - 10% of all IE cases and is common in IV drug abusers (Habib et al., 2015). In IV drug users, the right-sided endocarditis has a high recurrence rate and most of these patients develop sepsis, congestive heart failure, embolization, or other complications that lead to organ failure, intensive care unit admission and surgery (Brown et al., 2002). Among injection drug users, a new pattern is on the rise; infection on the left side of the heart with a severe clinical course (Mathew et al., 1995). Left- sided endocarditis, compared to right, and polymicrobial, compared to single organism are risk factors for increased morbidity and mortality in IV drug addicts with IE (Garcia-Granja et al., 2015).

In our patient, blood cultures grew Staphylococcus aureus and Staphylococcus hominis. The causative microorganism can be identified in roughly 90% of the episodes of IE. The isolation of more than one microorganism in patients with IE (polymicrobial IE) is quite uncommon, ranging from 1% to 6.8%. However, the frequency of polymicrobial endocarditis is rising. In a recent study, among 1011 episodes of left-sided endocarditis, 60 were polymicrobial (5.9%) (Garcia-Granja et al., 2015). In 1991, Adler et al. (1991) reported an IV drug addict patient with tricuspid valve endocarditis involving 7 pathogens. Polymicrobial multivalve endocarditis is described in patients with prolonged IV infusion, in patients with congenital heart disease with shunts, and particularly in injection drug users. The most common combination of microorganisms are: *Staphylococcus aureus* and Streptococcus pneumonia (second *Staphylococcus aureus and Pseudomonas aeruginosa* and third *Candida spp*. with bacteria). Polymicrobial endocarditis carries a very high mortality rate (greater than 30 %) and an uncommonly large number of patients (more than 50%) need heart surgery either to control the infection or to repair cardiac damage resulting from the infection. Combined therapy, medical and surgical, represents the standard of care in cases of polymicrobial endocarditis (Sousa et al., 2012).

In conclusion, polymicrobial multivalve endocarditis has a fulminant course and low survival rate in injection drug users. Patients with this type of endocarditis need to be identified and treated as soon as possible.

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