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A Rare Cause of Native Valve Endocarditis in a Patient on Dialysis

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Abstract

We present a case of a 63-year-old man with a past medical history of end stage kidney disease on dialysis that was admitted to the hospital due to a native valve infective endocarditis secondary to a healthcare associated bloodstream infection caused by an uncommon gram-negative bacillus: Enterobacter cloacae. The patient was treated with antimicrobial therapy for 6 weeks and was later discharged. In this case, we will discuss the risk factors, pathophysiology diagnostic criteria and treatment options associated with this rare infection.

Keywords: Enterobacter cloacae • Antimicrobial therapy • Diagnostic criteria

Introduction

Infective endocarditis (IE) is a rare disease with a high morbidity and mortality if left untreated and can lead to various sequelae after the resolution of the disease. It has an incidence of 15 per 100,000 person-years [1]. One of the etiological agents associated with IE is Enterobacter cloacae, being a very infrequent cause, with 50 cases reported to date [2]. IE can be associated with health care in up to 34% of cases; due to the use of intravascular catheters for hemodialysis and non-hemodialysis, as well as invasive procedures [3]. According to studies carried out in the American population, patients who undergo hemodialysis have 18 times the risk of developing IE [4]. Likewise, other comorbidities that increase the risk of IE are chronic kidney disease (CKD), malignancy, human immunodeficiency virus and advanced age (58-77 years) [5].

In this article, a case of IE due to Enterobacter cloacae is described in a 63-year-old male patient in Lima, Peru.

Case Presentation

A 63-year-old male patient with a past medical history of chronic kidney disease on renal replacement therapy (RRT) through a central venous catheter (CVC) for 6 years, came into the emergency service of our hospital complaining with 2-weeks of intermittent fever (T=38ºC), weight loss, malaise and asthenia. He denied any palpitations or shortness of breath. Upon physical examination, a holosystolic murmur, grade III/VI with radiation to the armpit was evidenced; the rest of the physical examination was unremarkable. Labs drawn showed: Leukocytes=16 530 mm³, filled=165.3 (1%), hemoglobin=10.20 g/dL, potassium=7.1 mmol/L, C-reactive protein=167.8mg/dL, Procalcitonin=33.65 ng/ml creatinine=13.68 mg/dL, Urea=126 mg/dL. Two peripheral blood cultures and a trans CVC culture were taken. Hemodialysis was performed and empirical antibiotic therapy with vancomycin 1gr EV every 48hrs was started, due to the risk of CVC-associated infection by methicillin-resistant Staphylococcus aureus (MRSA). Cardiology and nephrology where consulted. Following nephrology recommendations, the central line was changed and hemodialysis was performed every other day. On the second day of hospitalization a transthoracic echocardiography (TTE) was performed, which showed moderate concentric hypertrophy of the left ventricle associated with severe primary mitral regurgitation due to the presence of a mass attached to the posterior leaflet. A transesophageal echocardiography (TEE) was ordered as per cardiology recommendations. The following day blood cultures drawn on admission grew Enterobacter cloacae, sensitive to carbapenems and aminoglycosides (Table 1).

Based on blood culture and sensitivity results, vancomycin was discontinued and patient was started on Imipenem at a dose of 500 mg IV every 12h. During the seventh day of hospitalization a TEE showed that the mitral valve had a nodular appearance suggestive of posterior mitral leaflet vegetation, associated with severe mitral regurgitation (Figure 1). Based on Duke criteria a diagnosis of IE was confirmed. Labs drawn later that day showed inflammatory markers were getting back to baseline with a Leukocyte count=7550 mm³, band neutrophils=0, CRP=58 mg/L and procalcitonin of 8.9 ng/mL, peripheral blood cultures were drawn and came back negative 5 days later. During the second week of hospitalization, Cardiovascular Surgery was consulted. Following their recommendations, patient was not a candidate for surgical intervention and antibiotic therapy was continuing with echocardiographic follow-up. During the remaining course of hospitalization, patient remained afebrile and showed signs of clinical improvement. He was later discharged after completing 6 weeks of the antibiotic regimen with instructions of outpatient follow up with cardiology and nephrology.

Results and Discussion

Infectious endocarditis is cause by damage to the endocardium and or heart valves and is characterized by the formation of vegetations due to complex

Table 1. Antibiotic resistance profile of isolated enterobacter cloacae.

Antibiotic	MIC	Interpretation
Amikacin	≤ 8	Sensible
Cefepime	≤ 1	Sensible
Ceftazidime	≤ 1	Sensible
Ceftriaxone	≤ 1	Sensible
Ciprofloxacin	1	Sensible
Gentamicin	≤ 2	Sensible
Levofloxacin	≤ 1	Sensible
Tigeciclin	2	Sensible
Piperacillin/Tazobactam	> 2/38	Resistant

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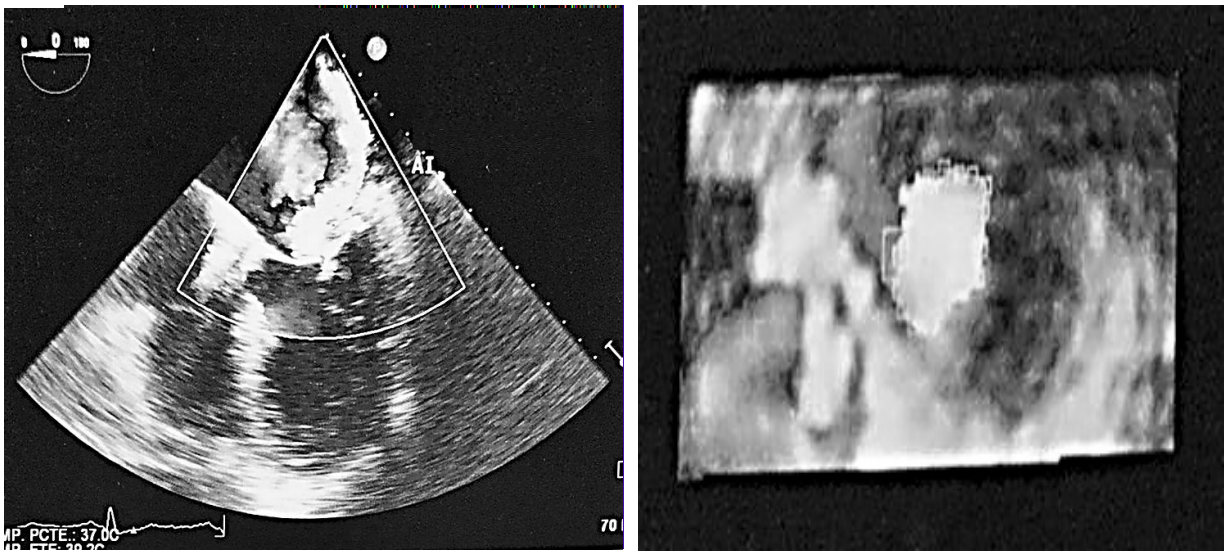

Figure 1. Mitral valve with thickened nodular leaflets with a hyperechoic image on the atrial side of the posterior leaflet suggestive of organized / calcified vegetation that conditions retraction of the posterior leaflet, as well as indentation between A1-P1, A2-P2 through which the observed 3 jets of severe eccentric insufficiency.

interaction between the invading microorganism and the host immune system. The diagnosis of IE is establish following the modified Duke Criteria. IE develop most commonly on the mitral valve, follow by the aortic valve or a combination of both, right sided IE is less common. In patients undergoing hemodialysis IE due to CVC associated bacteremia is one of the leading causes of morbidity and mortality. IE in this subset of patients is often cause by resistant pathogens due to frequent hospital admissions and the also frequent need for antimicrobial therapy [6]. Although gram positive organisms like Staphylococcus aureus and Staphylococcus epidermidis are among the most common isolated pathogens. A case control study reviewing blood stream infections in patients undergoing hemodialysis, reported that 25% of infections were caused by gran negative organism [7].

Enterobacter cloacae are a rare cause of IE. There are less than 50 cases reported in the literature to date. In a metanalysis of 2761 confirmed cases of IE most patients with non-HACEK gram negative bacillus had health care associated infections and the mortality was high despite the high rates of cardiac surgery [8]. Among patients with chronic kidney disease, the presence of vascular access was determined to be the most common risk factor for bacteremia and IE. Furthermore, the risk of bacteremia was higher in patients who had a temporary or permanent CVC compared to patients who had a AV fistula or graft. Other risk factors for bacteremia in patients undergoing hemodialysis, were Diabetes Mellitus and the presence of a low serum albumin and hemoglobin levels. Our patient who had been on hemodialysis for more than 5 years and developed IE due to health care associate BSI, had a permanent CVC and a low hemoglobin level at the time of admission.

Antibiotic resistance among gram negative bacteria has been a major concern. Enterobacter cloacae particularly carries and AmpC-like b lactamase in two forms: chromosomal and plasmid AmpC gene, providing resistance to both B lactamase inhibitors and first and third generation cephalosporins, so their use should be avoided despite being susceptible *in vitro*. The use of Carbapenems is recommend in seriously ill patients or those with complex disease [9]. EC isolated in our patient was only resistant to piperacillin-tazobactam according to the sensitivity profile. However, because of what we explain before and based on IE guidelines treatment recommendations, imipenem was chosen, obtaining a favorable clinical outcome. Surgical intervention is indicated in those who develop heart failure from valve dysfunction; have localized extension of the infection (evidence by the presence of and abscess, fistula or heart block) very high risk of embolism (valvular vegetation over 1 cm or persistent septic embolization despite appropriate antimicrobial therapy) or in those in whom the disease is caused by fungi or multidrug resistant pathogens [10]. In our case even though cardio thoracic surgery was consulted, a decision was made to continue with appropriate medical therapy given the lack of emergency surgical criteria and the patients high risk of peri and postoperative complications [11].

Conclusion

Patients who are undergoing hemodialysis are at high risk of developing infective endocarditis due to the presence of prolong vascular access and multiple hospital encounters. Even though gram positive cocci (e.g., Staphylococcus aureus) remains the most common isolated pathogens, non-HACEK gram negative bacteria such as Enterobacter spp are of growing concern due to the high rates of multidrug resistance and associated mortality.

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