Infective Endocarditis caused by *Streptococcus acidominimus*

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Abstract

Purpose: The case of an infective endocarditis caused by *Streptococcus acidominimus* is reported.

Summary: An 81-year-old Caucasian man underwent an elective transcatheter aortic valve implantation (TAVI) due to his severe aortic valve stenosis. He presented to the hospital 3 weeks later with a 1-week history of fever (39ºC) that did not resolve following a 3-day course of azithromycin and a 5-day course of ciprofloxacin. Three sets of blood sample cultures were taken. Empirical antimicrobial treatment was initiated to target gram-positive and gram-negative microorganisms and it consisted of vancomycin 1 g i.v. every 12 hours and imipenem/cilastatin 500 mg i.v. every 6 hours. After 48 hours, the blood culture was positive for *Streptococcus acidominimus*. The strain was sensitive to ampicillin, cephalosporins, tetracycline, and vancomycin. It was resistant to penicillin, macrolides, trimethoprim/sulfamethoxazole and fosfomycin. Transesophageal echocardiography (TEE) showed a small mobile vegetation attached to the anterior mitral valve leaflet along with mild mitral regurgitation. The patient was diagnosed with native mitral valve infective endocarditis and imipenem/cilastatin was discontinued. The patient showed clinical and laboratory improvement during his 2-week hospitalization. A peripherally inserted central catheter was put in place and the patient was discharged on i.v. vancomycin to complete a total of 6 weeks treatment, after which the infection was resolved.

Conclusion: An 81-year-old man diagnosed with mitral valve endocarditis caused by *S. acidominimus* was successfully treated with vancomycin.

Index terms: *Streptococcus acidominimus*; endocarditis; vancomycin

Introduction

Infective endocarditis (IE) is a relatively rare infectious disease according to population surveys with an annual incidence ranging from 3 to 7 per 100 000 person-years.[1] It is characterized by high morbidity and mortality and is considered as the third most common life-threatening infection.[1] Infective endocarditis is defined as a serious infection of the endocardium of the heart, particularly the heart valves.[2]

Transcatheter aortic valve implantation (TAVI) is an alternative to surgical aortic valve replacement (SAVR) for treatment of severe aortic stenosis in patients at high surgical risk.[3] Prosthetic valve endocarditis (PVE) could be a complication following valve replacement and it occurs with similar rates after SAVR or TAVI (incidence of 0.3%–1.2% per patient-year).[3] Commonly isolated pathogens in post-TAVI endocarditis are coagulase-negative staphylococci, Staphylococcus aureus, enterococci and oral streptococci followed by gram-negative bacteria.[3]

Streptococcus acidominimus, a gram-positive coccus, is a member of the viridans group streptococci (VGS). It was first isolated in 1922 from bovine sources, mainly from the skin and vagina of calves. It is considered a common bacterial pathogen in veterinary medicine leading usually to metritis in cattle.[4] It is rarely pathogenic in humans, but it has been reported as a causative infectious microorganism in a few cases: pneumonia,[5,6] otitis media,[7] brain abscess,[8] multiloculated empyema,[9] meningitis,[6] pleural effusion, peritonitis, and sepsis.[4] Only three cases of infective endocarditis caused by *S. acidominimus* were previously reported in the literature.[5,10,11]

We present the case of an 81-year-old man admitted to our hospital because of infective endocarditis caused by *S. acidominimus*.

Case Report

An 81-year-old Caucasian man (weight 90 kg, height 180 cm) underwent an elective transcatheter aortic valve implantation (TAVI) due to his severe aortic valve stenosis. After one week, he presented to the emergency department with fever (39ºC), nausea and one episode of vomiting and was prescribed a 3-day course of oral azithromycin. The fever recurred on the third day of the antibiotic course and the patient was prescribed a 5-day course of oral ciprofloxacin by another physician. Two weeks later, the patient decided to come back to the hospital when the fever did not resolve on both antibiotics. He presented with high grade fever (39ºC) and was admitted to the internal medicine ward. He had no other complaints.

The patient's medical history included type II diabetes mellitus, hypertension, dyslipidemia, coronary artery disease, benign prostatic hyperplasia and severe aortic valve stenosis. He was receiving the following medications before admission: metformin 850 mg three times daily, candesartan 16 mg once daily, bisoprolol 2.5 mg twice daily, atorvastatin 10 mg once daily, clopidogrel 75 mg once daily, and acetaminophen 1000 mg every 6 hours as needed. He was initially prescribed azithromycin 500 mg daily for 3 days. The fever was persistent, so ciprofloxacin 500 mg twice daily for 5 days was prescribed by a different physician. His is surgical history included pilonidal cyst removal, transurethral resection of the prostate (TURP), coronary artery stent placement (2 years ago) and transcatheter aortic valve implantation (TAVI) 2 weeks prior to fever onset. The patient had no known drug or food allergies and a negative history for intravenous drug use. He is a previous smoker (stopped 7 years ago). He did not have any family/social history related to animal exposure. The patient had good oral hygiene with no recent dental procedures. Initial laboratory results revealed a normal white blood cell count (5.91 $\times$ $10^3/\mu L$; normal, 4-10 $\times$ $10^3/\mu L$), an elevated neutrophil percentage (81.8%; normal, 40-74%), a

low hemoglobin concentration (9.2 g/dL; normal 14-18 g/dL), an elevated C-reactive protein (12.3 mg/dL; normal <0.5 mg/dL), a normal AST (32 U/L; normal 10-40 U/L), a normal ALT (38 U/L; normal 7-56 U/L), a normal albumin concentration (3.9 g/dL; normal 3.5-5.4 g/dL), a normal urine output (0.9 ml/kg/hr), a normal BUN (15 mg/dL; normal 7-20 mg/dL), a normal serum creatinine (0.9 mg/dL; normal 0.7-1.2 mg/dL), and a creatinine clearance of 73.8 ml/min calculated using the Cockcroft-Gault equation. A physical examination did not reveal anything relevant besides the fever. He had no Roth spots, no Osler's nodes and no splinter hemorrhages. The chest X-ray, urinalysis and urine culture had normal findings. Three sets of blood sample cultures were taken (the first and last sample being > 1 hour apart) prior to initiating antibiotics. Empirical antimicrobial treatment was initiated to target gram-positive and gram-negative microorganisms and it consisted of vancomycin 1 g i.v. every 12 hours and imipenem/cilastatin 500 mg i.v. every 6 hours. Concomitant medications during hospitalization included the following: oral esomeprazole 40 mg once daily, subcutaneous enoxaparin 40 mg once daily, oral candesartan 16 mg once daily, oral bisoprolol 2.5 mg twice daily, oral atorvastatin 10 mg once daily, oral clopidogrel 75 mg once daily, oral iron polymaltose 100 mg/ folic acid 0.35 mg once daily and i.v. acetaminophen 1g every 6 hours as needed for fever.

After 48 hours, the blood cultures were positive for *Streptococcus acidominimus* which was identified by an automated microbial identification system (Vitek, BD Phoenix). When tested by the Kirby-Bauer method, the strain was susceptible to: ampicillin, cephalosporins, tetracycline, and vancomycin. It was resistant to: penicillin, macrolides, trimethoprim/sulfamethoxazole and fosfomycin. Transesophageal echocardiography (TEE) showed a small mobile vegetation attached to the anterior mitral valve leaflet along with mild mitral regurgitation whereas no vegetation or regurgitation were seen on the bioprosthetic aortic valve. Consequently, the patient was diagnosed

with native mitral valve infective endocarditis. Since the isolated *S. acidominimus* was resistant to penicillin and minimum inhibitory concentrations (MIC) were not performed, vancomycin i.v. 1 g every 12 hours was continued and achieved a target trough concentration (measured weekly) between 15 and 20 mcg/mL. Imipenem/cilastatin was discontinued. A follow-up blood culture taken 3 days after antibiotic therapy was negative and the patient showed clinical and laboratory improvement during his 2-week hospitalization. Reluctance to de-escalate from vancomycin was due to the lack of experience in treating this organism especially that the patient was improving and the infection was life-threatening. A peripherally inserted central catheter (PICC line) was put in place and the patient was discharged on i.v. vancomycin to complete a total of 6 weeks of therapy, after which the infection clinically and microbiologically resolved.

Discussion

The most commonly isolated pathogens in infective endocarditis following TAVI are coagulase-negative staphylococci (24.5%), *Staphylococcus aureus* (21%), enterococci (21%) and oral streptococci.[3] Infective endocarditis post-TAVI could be classified as early (60 days), intermediate (60 days – 1 year) and late (>1 year) based on the onset of infection following the procedure.[3] The incidence of infective endocarditis post-TAVI is estimated up to 18% for the early, 62% for the intermediate and 20% for the late infection.[3] Based on this classification our patient has an early infection. In these infections, vegetations could be present on the stent frames or the valve leaflets.[3] The affected valve could be the prosthetic aortic valve or the mitral valve by contact with the transcatheter heart valve which is the case in our patient since the vegetation was present on the mitral valve instead of the implanted bioprosthetic aortic valve.

A MEDLINE search (1970 – January 2019) of English literature using the terms "*Streptococcus acidominimus"* and "infection" revealed only three case reports of endocarditis caused by this microorganism. The first case, reported by Brachlow et al. in 2003, described the case of a 15-year old boy with a ventricular septal defect (VSD) who presented with fever, malaise, diarrhea, vomiting, right sided chest pain with dyspnea without the peripheral classical findings of endocarditis.[10] He had a visible vegetation on TEE and a positive blood culture that showed a *S. acidominimus* strain sensitive to all tested antibiotics but with intermediate susceptibility to penicillin. He was treated with cefotaxime for 9 days and then vancomycin and gentamicin were continued for 6 weeks post-discharge.

The second case, reported by Dalal et al. in 2008, described the case of an 80-year-old female with multiple comorbidities including an aortic valve replacement 10 years ago presenting with fever and lethargy without the peripheral classical findings of endocarditis.[5] TEE showed a vegetation on the prosthetic aortic valve and blood cultures were positive for *S. acidominimus* sensitive to all tested antibiotics. Treatment was started for endocarditis with vancomycin and piperacillin/tazobactam and then de-escalated to ceftriaxone for 6 weeks with oral rifampin for 3 weeks.

The third case, reported by Abukar et al. in 2015, described the case of a 77-year-old female presenting with fever, malaise and fatigue.[11] Examination of the patient revealed livedo reticularis across the anterior aspect of her knees and a pansystolic murmur. She did not have the classical findings of endocarditis. TEE showed a vegetation on the mitral valve and a left atrial myxoma. Blood cultures grew *S. acidominimus* sensitive to penicillin and erythromycin. She was treated with benzylpenicillin and erythromycin for 6 weeks.

Classical findings of endocarditis such as petechiae, splinter hemorrhages, conjunctival hemorrhages, Janeway lesions, Roth spots, or Osler's nodes were absent in all three reported cases as well as our patient case which may be due to the fact that the infection involves an unusual microorganism.[5] The isolated *S. acidominimus* in all three endocarditis cases were sensitive to all antibiotics with the exception of one being intermediate to penicillin in contrast to our case in which the microorganism was resistant to penicillin as well as erythromycin, clindamycin, trimethoprim-sulfamethoxazole and fosfomycin. In the other reported patient cases of infections caused by *S. acidominimus,* three of the strains had a similar resistance pattern.[4, 12] Before the susceptibility results, it is important to take into consideration that the microorganism is showing resistance to multiple antibiotic classes.

Conclusion

An 81-year-old man diagnosed with native mitral valve infective endocarditis caused by *S. acidominimus* was successfully treated with 6 weeks of vancomycin.

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Key Points

- This is a rare case report of infective endocarditis caused by *Streptococcus acidominimus*.
- In contrast to the other three similar published case reports, the strain in this patient shows an increased level of resistance to multiple antibiotic classes.
- The patient was successfully treated with six weeks of vancomycin therapy.