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Case Report
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Fulminant Native Valve Infective Endocarditis Caused by *Staphylococcus caprae*

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Abstract

Staphylococcus caprae is a coagulase negative staphylococcus that is found in goats' milk, but rarely causes human infection. Herein, we report a rare case of fulminant bicuspid aortic valve infective endocarditis caused by *S. caprae* in the absence of apparent risk factors.

Keywords: *Staphylococcus caprae*; Infective endocarditis; Coagulase-negative staphylococcus

Introduction

Infective Endocarditis (IE) is a serious condition associated with a high risk of morbidity and mortality. Between 2000 and 2011, the incidence of IE in the United States increased from 11 per 100,000 populations to 15 per 100,000 populations [1]. IE due to coagulase negative *staphylococci* is considered rare in the absence of implantable foreign bodies or recent invasive procedure [2]. *Staphylococcus caprae* is a coagulase negative staphylococcus that is found in goats 'milk, but rarely causes human infection [3]. Herein, we report a rare case of fulminant bicuspid aortic valve infective endocarditis caused by *S. caprae* in the absence of apparent risk factors.

Case Presentation

A 28 year old white male with past medical history only significant for infertility presented to the Emergency Department with fever to 101.4°F and malaise for two days. He also reported mild, constant, achy left upper extremity pain extending from the elbow to the tips of the fingers. On the day of admission, he developed a mild nonproductive cough without any chest pain or shortness of breath. He did not report palpitations, chills, night sweats, weight loss, sick contacts, recent illness, dental procedures, or travel. The patient is an office clerk who lives with his wife, and has no history of tobacco, alcohol or intravenous drug use. He was started on clomiphene orally four months earlier for infertility.

On physical examination the patient appeared comfortable. BP 104/42 mmHg, heart rate 114 beats per minute, RR 14 unlabored and temperature 100.4°F. An III/VI systolic murmur was appreciated at the lower left sternal border. There were no conjunctival or palatine petechiae, splinter hemorrhages, Osler's nodes or Janeway lesions. The spleen was not enlarged. Neurologic and musculoskeletal examination was normal.

Laboratory data showed a WBC of 15.1 k/ul, hemoglobin 11.6 gm/dl, MCV 78.4 fL, CRP of 6.57 mg/L (normal value <3.0 mg/L), ESR of 81 mm/hour (Normal value <15 mm/hour), BNP of 395 pg/mL (normal value <100 pg/mL), and troponemia with a flat curve that peaked at 0.71 ng/ml. A 12-lead EKG revealed a sinus tachycardia at 134 beats per minute with very subtle ST depressions in leads V5 through V6.

The patient was admitted to a telemetry unit and started on vancomycin and Ceftriaxone. Transthoracic echocardiogram demonstrated a mildly reduced left ventricular systolic function with an ejection fraction of 51% to 55%; a mobile mass of moderate size on the aortic valve; mild aortic valve regurgitation, trace mitral valve regurgitation, and an edematous aortic root. By the following morning two sets of blood cultures were positive for gram-positive cocci in clusters; two additional sets of cultures were sent.

On afternoon rounds the patient complained of fatigue and shortness of breath. Examination revealed a BP of 118/55 mmHg, heart rate of 140 beats per minute and a respiratory rate of 18 per minute. The JVP was elevated, there were new rales bilaterally and there was a Corrigan's pulse. Urgent cardiac surgery evaluation was requested and the patient underwent an emergent aortic valve replacement with 25 mm St. Jude mechanical aortic valve.

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Table 1: *Staphylococcus caprae* antibiotic sensitivity profile.

Antibiotics	Sensitive	Resistant
Clindamycin	+	
Erythromycin	+	
Gentamicin	+	
Oxacillin	+	
Penicillin G		+
Rifampin	+	
Tetracycline	+	
TMP-SMX	+	
Vancomycin	+	

Intraoperatively, the patient was noted to have a true bicuspid and bicommissural aortic valve. A "rather generous" left coronary leaflet was completely destroyed by infection with several vegetations protruding from it. Ultimately all four sets of blood cultures (8 bottles) and all intraoperative specimens from the valve and vegetations grew. *S. caprae* resistant only to penicillin Antibiotics were deescalated to Nafcillin 2 gm intravenously every 4 hr. (Table 1) summarize *Staphylococcus Caprae* antibiotic sensitivity profile.

Postoperatively, the patient had an uneventful recovery and was discharged on post-op day 5 to take standard heart failure medications, warfarin, and nafcillin for a total of 6 weeks. During the following week, pancytopenia and elevated liver function tests developed; nafcillin was discontinued and cefazolin was initiated. One week later the patient developed a diffuse maculopapular rash and severe pruritus unresponsive to antihistamines. Cefazolin was discontinued and vancomycin was begun but despite high doses, adequate levels were not achieved and treatment was completed with daptomycin. By week 4 of treatment inflammatory markers had returned to normal. At follow up two weeks after discontinuing antibiotics, the patient was back at work and repeat cultures were negative.

Discussion

Several studies have demonstrated the growing importance of CoNS (Coagulase-Negative *Staphylococci*) as pathogens in patients with IE. In one study of 2781 patients with IE, coagulase-negative *staphylococci* were identified as the causative agent in 11% [4]. However, Infective endocarditis caused by coagulase negative *staphylococci* is considered rare in patients with no history of artificial heart valves, implantable cardiac devices, catheter or intravenous drug abuse [2].

Although considered a less virulent pathogen, infective endocarditis due to coagulase negative *staphylococci* is associated with significant morbidity and mortality. Rasmussen found no significant difference in in-hospital mortality (21%) or need for early surgery (41% *vs.* 47%) between *S. aureus* and coagulase negative *staphylococci* though 1-year mortality was better with CoNS (24%) than SA (37%) [5]. Fulminant endocarditis is extremely rare with CoNS IE and has only been reported with *S. lugdenensis* and *S. epidermidis* [6]. *S. caprae* is a coagulase-negative staphylococcus first identified in goats in 1983. Since then the organism has been sporadically isolated in humans [7]. Kanda et al. [7] found that 6% of 1,500 clinical isolates of coagulase negative *staphylococci* from human subjects were *S. caprae* in a Japanese hospital [7]. Seng reviewed the literature in 2014 and identified 106 cases of *S. caprae* human infection. Bone and joint infection (usually associated with an implantable foreign body) and otitis externa accounted for 63 of 106 cases and endocarditis was found in only one patient [3]. Almost all reported cases of invasive disease have been associated with hospitalization, prior antibiotic use, multiple co-morbidities and/or foreign bodies [3].

Although consistently isolated from goats, few of the patients colonized or infected with *S. Caprae*, have had contact with goats or goat's milk [3]. To analyze the difference between human and goat isolates of *S. caprae*, Vandenesch and his colleagues subjected isolates to ribotype analysis. Both human and goat isolates appeared phylogenetically to derive from the same lineage but the human isolates' ribotypes were clearly distinguishable by the presence of a core of four specific bands possibly reflecting evolutionary changes within the species between human and goat isolates [8].

Our patient had no history of implantable cardiac foreign materials, intravenous drug abuse, antibiotic exposure or recent invasive procedures including dental procedures. Indeed other than evaluation for infertility some months earlier, he had no contact with the healthcare system. He had no contact with goats, goat milk or any goat-milk-containing products. His only risk factor for IE was a bicuspid valve.

Conclusion

We present the second case of IE and the first case of fulminant endocarditis due to *S. caprae. S. caprae* is a coagulase-negative staphylococcus that is predominantly Methicillin Sensitive. Although it is generally considered a low virulence pathogen that sporadically infects or colonizes hospitalized patients, it is capable of causing acute endocarditis of native valves in non-hospitalized patients and may lead to aggressive destruction of those valves. This report provides further evidence of the expanding role of coagulase-negative *staphylococci* in community-acquired infections.

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