

An Unusual Presentation of Native Valve Endocarditis Caused by *Staphylococcus warneri*

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Staphylococcus warneri is a coagulase-negative staphylococcal (CoNS) bacterium. It is a common saprophyte on human skin, present in approximately 50% of the healthy adult population; it has emerged as a cause of serious infection in the past two decades. In most cases, there is a predisposing condition, such as a new implant or surgical procedure, before the identification of *S warneri* as the pathogen. It is believed that CoNS are mostly associated with prosthetic valve infections. *S warneri* can lead to a slow growing and an indolent course and late diagnosis. Cases of CoNS infective endocarditis are less likely to have a vascular or immunologic phenomenon and can lead to large vegetations requiring valve replacement if not detected in time. There are currently only two cases of native valve endocarditis from community-acquired *S warneri* in the literature. We report a case of native valve endocarditis in an immunocompetent patient without any of the usual predisposing risk factors. Our case illustrates the importance of CoNS bacteremia and the implications of delayed diagnosis of CoNS endocarditis in clinical practice.

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KEY WORDS

Staphylococcus warneri • Native valve endocarditis • Coagulase-negative *Staphylococcus* species • Infective endocarditis

Staphylococcus warneri, a coagulase-negative staphylococcal (CoNS) bacterium, is part of normal skin flora.¹ It has been associated with osteomyelitis and ventriculoperitoneal infections, as demonstrated in several case reports.²⁻⁷ Rarely, it is the culprit organism of native valve endocarditis; in most cases, there are predisposing conditions such as a recent implant,^{7,8} surgical procedure,³ or an immunocompromised state.⁵ We could find only two cases of isolated native valve *S warneri* infection without any such predisposing conditions.^{2,9} We report a rare case of *S warneri* native valve endocarditis in an immunocompetent patient with no predisposing cardiac disease.

Case Report

A 59-year-old man presented to the intensive care unit with lethargy and abdominal pain that he'd been experiencing for the past 3 days. He was found to have acute kidney injury and was hypotensive. Initial laboratory testing revealed a serum potassium level of 5.9 mmol/L and a creatinine level of 5.5 mg/dL. The patient's past medical history included renal cell carcinoma, for which he had undergone right-sided nephrectomy 15 years prior. There was no history of recent major surgery but he did have a scalp laceration sustained 2 weeks prior that

required suturing. The wound site reportedly healed well and there were no signs of active infection. Laboratory values improved significantly after hydration. Physical examination revealed a grade 3/6 holosystolic murmur radiating to his axilla. Results of his blood culture revealed bacteremia with *S warneri* in three of five tests. Failure to recognize initial blood cultures as a true positive contributed to delayed antibiotic therapy.

Diagnosis

Results of three out of five blood cultures were positive for *S warneri*. A work-up for the etiology of bacteremia included magnetic resonance imaging of the spine (he complained of chronic back pain); results were negative for any infectious process. Results of radiographic imaging of prior ankle hardware (> 12 years old) were also negative for evidence of infection. A transthoracic echocardiogram was performed to evaluate his pansystolic murmur and demonstrated large vegetation on the

demonstrated the vegetation to be 1.6 × 0.6 cm on posterior leaflet with smaller vegetation on the tip of the anterior leaflet.

Treatment

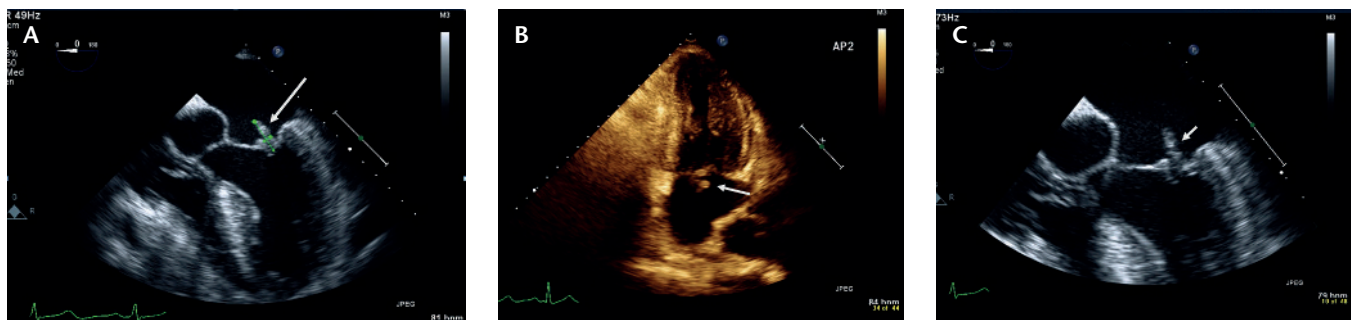
A conservative approach with intravenous antibiotics was planned due to the patient's lack of high-risk features (heart failure, stroke, or embolic phenomena), the fact that the culprit organism was not a highly resistant organism, and the fact that the patient was a poor candidate for long-term anticoagulation. He was treated with intravenous nafcillin initially, as recommended by an infectious disease specialist, and blood cultures were repeated every 48 hours until results were negative. This was followed by 6 weeks of cefazolin (2 g three times daily) after the patient was transferred to a long-term acute care facility. Outpatient follow-up was given with the understanding that surgical intervention may be warranted should he prove to fail medical management, including development of heart failure symptoms, progression of

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posterior leaflet of the mitral valve (Figure 1A). A transesophageal echocardiogram was performed to better visualize valve structure and function (Figure 1B, Figure 1C). It

valvular disease (valve destruction/worsening mitral regurgitation), development of significant conduction system disease or annular or aortic abscess, or persistent clinical

Figure 1. (A) Transesophageal echocardiogram showing 1.6 × 0.6-cm vegetation on the posterior leaflet of the mitral valve (arrow). (B) Transthoracic echocardiogram showing echodensity on the mitral valve (arrow). (C) A closer look at the vegetation on the transesophageal echocardiogram (arrow).



evidence of infection (bacteremia or fevers) after a complete course of appropriate antimicrobial therapy without other identifiable infectious sources.¹⁰

Discussion

Native valve bacterial endocarditis is most commonly caused by viridans-group streptococci. Among the various types of staphylococci associated with infective endocarditis (IE), the general consensus is that coagulase-positive staphylo-

our literature review, we found only two similar cases.^{2,9} Kamath and colleagues⁶ described a case of native valve endocarditis in a 64-year-old man who had underlying liver cirrhosis. In our patient's case, the only plausible explanation of the bacteremia and the IE that followed was that he had prior hardware placed in his ankles (> 12 years ago) and had recently sustained a scalp laceration which could have led to seeding of the bacteria onto the mitral valve. Staphylococci are known to form

pseudobacteremia.¹³ Laboratory criteria that have been suggested for true bacteremia are (1) growth within 48 hours and (2) multiple positive blood culture results for the same organism. Those that tend to represent contamination include a prolonged duration before a positive growth of blood cultures, polymicrobial growth of skin flora organism, or growth during antibiotic treatment. Despite the use of these criteria, Souvenir and associates demonstrated that 12% of patients in the contamination category had two or more positive culture results, and for 35% of samples from patients with significant bacteremia, only a single culture set had a positive result.¹⁴ False-positive blood culture results are associated with increased length of stay, inappropriate antibiotic treatments, and increased cost.¹⁵ In our patient's case, the initial positive blood culture results for CoNS could have been considered

Among the various types of staphylococci associated with infective endocarditis (IE), the general consensus is that coagulase-positive staphylococci are the culprit organism of most cases of native valve disease, and that CoNS are typically associated with prosthetic valve infections.

cocci are the culprit organism of most cases of native valve disease, and that CoNS are typically associated with prosthetic valve infections.¹⁰ Recently, there are reports of an aggressive form of IE caused by the coagulase-negative *S lugdunensis*.¹¹ Our patient's infection was due to *S warneri*, which is a common human skin present in approximately 50% of the healthy adult population,¹ and represents approximately 1% of all skin staphylococci in the healthy adult.³ In

biofilms on the polymer surface and are linked to chronic polymer-associated syndrome.¹² However, CoNS are the most common contaminants of blood cultures, mak-

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ing determination of a contaminant from a true infection challenging. Clinical guidelines exist to differentiate a true bacteremia from

a contaminant, especially because there were no other concerning features, such as fever or leukocytosis. It can be difficult to justify

MAIN POINTS

- *Staphylococcus warneri*, a coagulase-negative staphylococcal (CoNS) bacterium, is part of normal skin flora. It has been associated with osteomyelitis and ventriculoperitoneal infections, as demonstrated in several case reports. Rarely is it the culprit organism of native valve endocarditis.
- It is believed that CoNS are mostly associated with prosthetic valve infections. *S warneri* can lead to a slow growth and an indolent course and late diagnosis.
- CoNS are the most common contaminants of blood cultures, making determination of a contaminant from a true infection challenging.
- Although *S warneri* and CoNS are rare causes of infective endocarditis of native valves, they are associated with higher mortality compared with *Streptococcus viridans* and are associated with more rates of surgical management

a repeated blood culture for CoNS when there are no other clinical signs supporting the test. *S warneri* is similar to other CoNS in some aspects; it is slow growing and may lead to an indolent course. Chu and colleagues¹⁶ examined native valve IE by CoNS and found that it had a longer duration of symptoms and often had a delayed diagnosis, which was attributed to the failure to recognize initial blood culture results as a true positive result rather than as a contaminant. Also, CoNS were less likely to show vascular or immunologic evidence of IE during the course of illness, making detection even more cumbersome.

This case illustrates the importance of the presence of CoNS in blood cultures as a potential significant pathogen. It can lead to bacterial endocarditis. The various CoNS present a dilemma to clinicians, especially in the absence of any clinical symptoms. A keen physical examination in this setting is of utmost importance. In our patient's case, the new systolic murmur on cardiovascular

examination led to further investigation (echocardiography) that ultimately led to the correct diagnosis. Although *S warneri* and CoNS are a rare cause of IE of native valves, they are associated with higher mortality as compared with *Streptococcus viridans* and are associated with more rates of surgical management.¹⁶ ■

The authors declare no real or apparent conflicts of interest.

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