

# An Infective Endocarditis Case Report Involving Both Native Aortic and Mitral Valves Due to *Streptococcus Vestibularis*

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**Abstract:** Infective endocarditis (IE) is a life-threatening disease, with its mortality rate varying depending on the infectious agent. Streptococci are among the most common causes of infective endocarditis. However, *Streptococcus vestibularis* has rarely been associated with human infections, typically affecting patients with underlying conditions such as immunosuppressive diseases, valve replacement, rheumatic heart disease, and hemodialysis. We present the case of a 26-year-old man who presented with fever, unanticipated weight loss, and fatigue. Although no typical risk factors for infective endocarditis were identified at admission, transesophageal echocardiography revealed a bicuspid aortic valve with calcification, paravalvular aortic abscess formation, and vegetations on the anterior leaflet of the mitral valve. Blood cultures grew *S. vestibularis*, which was initially sensitive to benzylpenicillin but developed emergent resistance on the third day of the antibiotic treatment. Subsequently, ceftriaxone therapy was initiated, and blood cultures became sterile on day 10. The patient eventually underwent aortic valve replacement. We report the first known case of native aortic and mitral valve endocarditis caused by *S. vestibularis*, accompanied by a paravalvular abscess around the native aortic valve, in a patient who had no typical risk factors for infective endocarditis, except for a bicuspid aortic valve.

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## Introduction

Infective endocarditis (IE) is an infection of the endocardial layer of the heart, typically caused by bacteria or fungi. *Staphylococcus aureus* is responsible for approximately 31% of cases, primarily affecting the heart valves (both native and prosthetic). *Viridans streptococci* are the second most common cause, accounting for 17% of cases, while enterococci rank third in frequency (Hubers et al., 2020). Risk factors for infective endocarditis include intravenous drug use, the presence of heart valve diseases such as a bicuspid aortic valve, implanted intracardiac devices, and prosthetic heart valves (Vincent and Otto, 2018). Infective endocarditis can lead to systemic complications due to embolic events. It may progress to involve cardiac vegetations, valvular and periannular abscesses, and mycotic aneurysms (Hubers et al., 2020).

*Streptococcus vestibularis* was first isolated from the vestibular mucosa of human oral cavities and described as a new species of *Streptococcus viridans* in 1988 (Whiley and Hardie, 1988).

In a study on antibiotic resistance among Viridans group streptococci, 50 blood culture isolates were found to exhibit resistance to penicillin and tetracycline in 30% of cases, to clindamycin in 40%, and to cefotaxime in 20%. All isolates were susceptible to vancomycin, chloramphenicol, levofloxacin, and linezolid (Ergin et al., 2011). We aimed to present the first reported case of infective endocarditis involving both the native mitral and aortic valves due to *S. vestibularis* in the literature.

## Case report

A 26-year-old man was admitted to the hospital with a 2-month history of fever, fatigue, night sweats, and an unexpected weight loss of 10 kg. He had no known medical conditions or allergies, and this was his first hospital admission. His family history was unremarkable, aside from a paternal history of diabetes mellitus. He had been smoking cigarettes for 10 years.

Regarding risk factors for infective endocarditis, he had no history of intravenous drug use, rheumatic fever, or recent surgical or dental procedures. However, poor dental hygiene and dental caries were noted on physical examination. Cardiac auscultation revealed a mid-systolic murmur at the second intercostal space on the right sternal border, radiating to the neck, as well as a systolic murmur heard best at the apex, radiating to the left axilla. Otherwise, the physical examination was unremarkable, with no signs of infective endocarditis.

Abdominal examination revealed hepatosplenomegaly. Laboratory tests showed normocytic, normochromic anemia (hemoglobin level of 10 g/dl) and neutrophilic leukocytosis (white blood cell count of  $15.2 \times 10^3/\mu\text{l}$ , with 86% neutrophils). Serum analysis revealed normal vitamin B12 and folic acid levels, elevated ferritin, and decreased iron, consistent with anemia of chronic disease. Routine liver, thyroid, and kidney function tests were within normal limits. However, C-reactive protein (CRP) and erythrocyte sedimentation rate were elevated. The ASO (antistreptolysin O) test was negative.

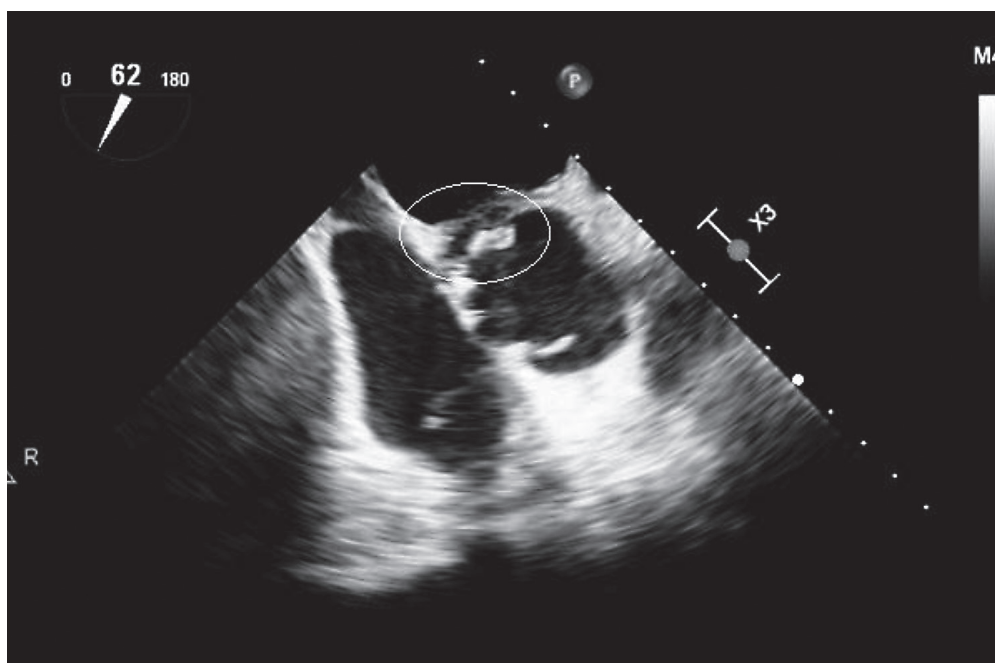


Figure 1: Transesophageal echocardiography revealed the presence of a paravalvular abscess around the aortic valve, along with vegetations.

The first set of blood cultures (two bottles) grew *Streptococcus vestibularis*, which was sensitive to benzylpenicillin, and treatment with benzylpenicillin was initiated. Two additional sets of blood cultures were sent to the laboratory on the third and sixth days, both of which unexpectedly grew *S. vestibularis* resistant to benzylpenicillin. Consequently, antibiotic therapy was switched to ceftriaxone.

A thoracoabdominal computed tomography (CT) scan and a dental consultation were requested to investigate the origin of the *S. vestibularis*. The dental examination revealed no abnormalities apart from generally poor oral hygiene. The thoracoabdominal CT scan showed hepatosplenomegaly and hypodense lesions in the spleen, consistent with splenic infarction.

Transthoracic echocardiography revealed a bicuspid aortic valve with calcifications, accompanied by severe regurgitation and mild stenosis. Transesophageal echocardiography demonstrated a paravalvular abscess around the aortic valve and vegetations on the anterior leaflet of the mitral valve (Figure 1). No other complications of infective endocarditis were observed.

After 10 days of ceftriaxone therapy (2 g daily), blood cultures became sterile. The patient's clinical condition remained stable, with the exception of fluctuating fever and elevated C-reactive protein. Physical examination findings were unchanged. A second transesophageal echocardiogram on the 10<sup>th</sup> day revealed severe aortic regurgitation, along with persistent paravalvular abscess formation.

The patient subsequently underwent aortic valve replacement surgery without any perioperative complications. However, he experienced an ischemic stroke on the 7<sup>th</sup> postoperative day. Following medical and surgical treatment, the patient made a full recovery and was discharged on oral anticoagulation therapy.

## Discussion

Infective endocarditis has an increasing incidence and a high mortality rate worldwide. Reports indicate that 10,000 to 15,000 cases occur annually in the United States (Slipczuk et al., 2013). IE is associated with serious complications, prolonged hospitalization, surgery, long-term antibiotic therapy, significant economic burden, and high mortality (Vahabi et al., 2019; Chen et al., 2022). The average age of individuals diagnosed with IE has increased in the United States; however, the average age in Turkey remains lower at 47 years. The male-to-female ratio is approximately 1.5:1 (Slipczuk et al., 2013; Vahabi et al., 2019).

IE caused by *Streptococcus viridans* is typically associated with dental procedures. However, our patient had no history of any dental interventions and no other known risk factors for IE, aside from the bicuspid aortic valve, which was detected later. The most common etiological agents of IE include *Staphylococcus aureus*, *Streptococcus viridans*, enterococci, and coagulase-negative staphylococci, respectively (Hubers et al., 2020).

A review of the literature (PubMed, Google Scholar, Web of Science, Scopus, EMBASE, and EBSCO) using the keywords “infective endocarditis” and “*Streptococcus vestibularis*” identified five articles (five case reports), none of which described an instance of infective endocarditis involving both native aortic and mitral valves (Cunliffe and Jacob, 1997; Partridge, 2000; Doyuk et al., 2002; Tufan et al., 2010; Kuwauchi et al., 2023). To our knowledge, our case represents the first reported instance of IE caused by *S. vestibularis* in which both native aortic and mitral valves were affected.

*Streptococcus viridans* is a significant component of the human oropharyngeal microbiota and can cause serious infections, including infective endocarditis, abscesses, and bacteremia, particularly in neutropenic patients (Fish et al., 1995). The antibacterial activity of penicillin against *Streptococcus viridans* depends on its binding affinity to penicillin-binding proteins (PBPs). Penicillin resistance can occur when this affinity is reduced, typically due to alterations in one or more amino acids near the penicillin-binding site of the PBPs. While *S. viridans* isolated from IE cases are generally sensitive to penicillin, bacteremia caused by penicillin-resistant *S. viridans* is common in neutropenic patients (Lopardo et al., 2022). In our case, *S. vestibularis*, which was initially sensitive to benzylpenicillin, grew in the first two sets of blood cultures. However, it unexpectedly developed emergent resistance to benzylpenicillin in subsequent cultures. As a result, antibiotic therapy was switched to ceftriaxone.

Penicillins and aminoglycosides are the antibiotics most commonly associated with the development of resistance during monotherapy. In contrast, *Streptococcus* species have a 13% emergent resistance rate during antibiotic therapy with penicillin (Fish et al., 1995).

This patient had only one identified risk factor for IE: a bicuspid aortic valve. The source of *S. vestibularis* remains unclear, but the most likely origin is oral flora, given the patient's poor oral hygiene. Furthermore, no abnormal findings were detected during physical examination or thoracoabdominal computed tomography except hepatosplenomegaly and splenic infarcts, which could suggest a plausible source for

*S. vestibularis*. These splenic infarctions were consistent with and supported the diagnosis of IE.

This was the patient's first hospital admission. His clinical presentation was typical for IE; however, the involvement of both the aortic and mitral valves, the unusual causative agent (*S. vestibularis*), and the unclear source of infection were atypical features for IE.

## Conclusion

We report a case of infective endocarditis caused by *S. vestibularis*. To the best of our knowledge, this is the first reported case of IE due to *S. vestibularis* involving both native aortic and mitral valves, with an annular paravalvular abscess.

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