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# *Providencia stuartii* Aortic Prosthetic Valve Endocarditis with Formation of Paravalvular Pseudoaneurysm

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## Abstract

Infective endocarditis (IE) is characterized by high morbidity and mortality. *Providencia stuartii* infections are very rare and mainly acquired in a hospital setting, being isolated primarily in urine cultures of patients with long-term urinary catheters; rarely causing bacteremia and endocarditis. The authors present a case of a 74-year-old male patient with vascular risk factors and a biological aortic prosthetic valve hospitalized for urosepsis with *P. stuartii* bacteremia. He underwent antibiotic susceptibility-guided therapy, resulting in both negative urine and blood cultures. However, the patient was later re-admitted due to persistent *P. stuartii* urosepsis and bacteremia. A transesophageal echocardiogram revealed endocarditis of the prosthetic aortic valve, complicated with extensive aortic root pseudoaneurysm, fistulized into the left atrium. Given the co-comorbidities and extent of the disease, he was not a candidate for surgical intervention and therefore maintained broad-spectrum antibiotic therapy. Unfortunately, the patient didn't respond to best medical treatment and died of septic shock.

**Keywords:** Infectious endocarditis; *Providencia stuartii*; Urinary tract infections; Cardiac abscess; Pseudoaneurysm

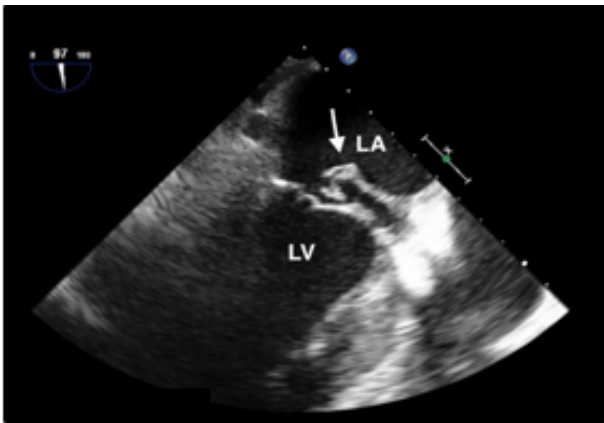
## Introduction

Infectious endocarditis (IE) is characterized by high morbidity and mortality. The virulence of the infectious agent and type of valve involved (native or prosthetic) are crucial determinants in the extent of the infection, which may progress to form abscesses, fistulas and pseudoaneurysms. *Providencia* spp genotype includes five facultative gram-negative bacilli, which are *P. stuartii*, *P. rettgeri*, *P. alcalifaciens*, *P. Rustigianii* and *P. heimbachae*. The most prevalent of these agents, *P. stuartii*, is also the most commonly associated with infection [1]. However, *P. stuartii* infections are very rare and mainly acquired in the hospital. *Providencia* species are mainly isolated in urine cultures from patients with long-term urinary catheterization, which may rarely cause bacteremia or

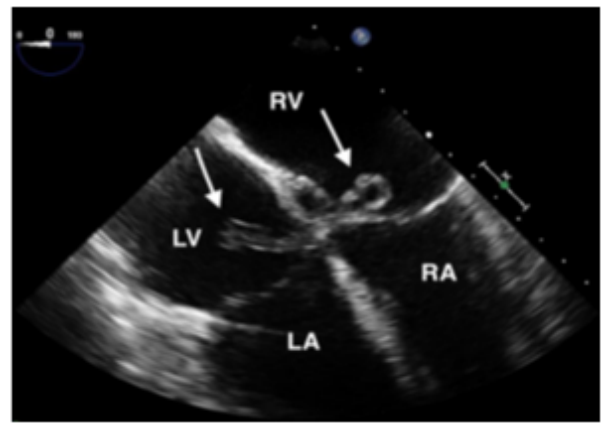
infectious endocarditis [2,3]. The authors report a case of *P. stuartii* endocarditis with an aggressive evolution to highlight the importance of early and prompt diagnosis suspicion.

## Case Presentation

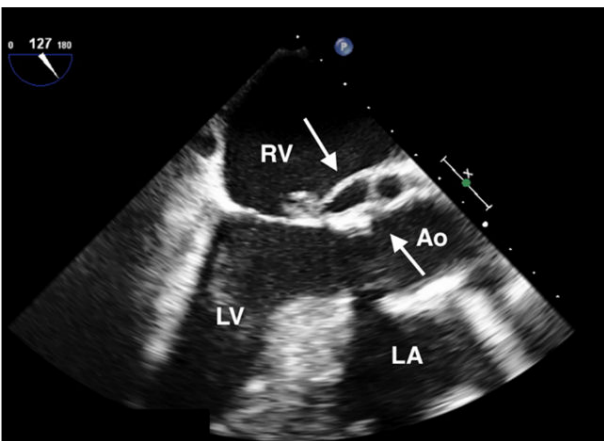
The authors present the case of a 74-year-old male patient with history of metabolic syndrome (hypertension, diabetes mellitus, mixed dyslipidemia and grade II obesity), valvular heart disease with aortic stenosis submitted to valve replacement with a biological aortic prosthesis 3 years before hospitalization and chronically urinary catheterization for lower urinary tract symptoms due to benign prostatic hyperplasia. The patient was admitted to the hospital with the diagnosis of urosepsis with isolated *P. stuartii* in urinary and blood cultures. However, the patient maintained persistent bacteremia after 10 days of susceptibility-guided antibiotic therapy with piperacilin/tazobactan. Therefore, the patient was submitted to a transthoracic echocardiogram, which revealed absence of valvular vegetations. Antibiotic therapy was adjusted according to a new susceptibility profile, and the patient-initiated treatment with amikacin and cefepime. Having completed a 14-day cycle, urine and blood cultures were negative after antibiotic suspension and the patient was discharged. However, the patient was readmitted one week later due to urinary sepsis recurrence and persistence of *P. stuartii* in urine and blood cultures. A transthoracic echocardiography was performed, raising the suspicion of aortic and mitral valve endocarditis. Consequently, the patient underwent a transesophageal echocardiography (TOE), which confirmed prosthetic aortic valve endocarditis, complicated by an extensive aortic root pseudoaneurysm, which was fistulized to the left atrium, associated with a large vegetation in the right atrium (Figures 1-4). Because of the severe comorbidities and extent of the disease, surgical intervention was considered to be high risk and therefore, the patient was rejected for cardiac surgery and broad-spectrum antibiotic therapy was initiated. Unfortunately, despite all supportive measures, the patient evolved unfavorably, with progression to multiple organ dysfunction and dying of septic shock.



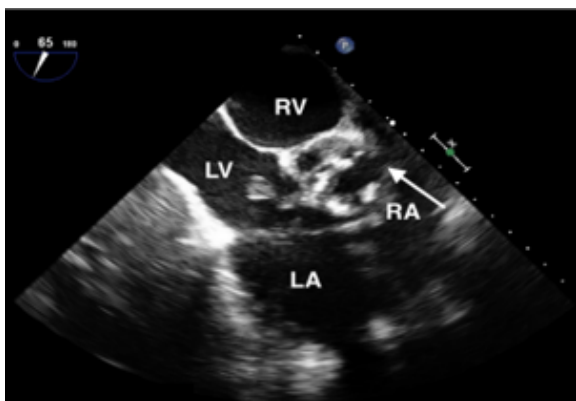
**Figure 1** TOE (2 chamber view), Mitral valve pseudoaneurysm (arrow); LA – Left Atrium; LV – Left Ventricle.



**Figure 4** TOE (4 chamber view), Vegetation in the right atrium (arrows); RA – Right Atrium; RL – Right Ventricle; LA – Left Atrium; LV – Left Ventricle.



**Figure 2** TOE (3 chamber view), Periaortic abscess (arrows); RL – Right Ventricle; LA – Left Atrium; LV – Left Ventricle; Ao – Aorta.



**Figure 3** TOE (4 chamber view). Pseudoaneurysm with fistulization and vegetation in the right atrium (arrow). RA – Right Atrium; RL – Right Ventricle; LA – Left Atrium; LV – Left Ventricle.

## Discussion

IE is often a diagnostic challenge, especially in older patients with multiple comorbidities. Infection is a possible complication of valve prostheses, occurring in 1% to 4% of all patients with prosthetic valves. This is usually caused by transient bacteremia from a genitourinary source or after dental manipulation [2]. Long-term urinary catheterization is the most associated risk factor with *P. stuartii* infections. For this reason, it is classically isolated in urocultures of patients with urinary catheters, in similarity to the case presented above. However, advanced age, paraplegia and urinary diversion are also contributing factors [3-5]. *P. stuartii* is only rarely responsible for bacteremia or endocarditis. In the presented case, persistent bacteremia is considered to be responsible for prosthetic valve infection. Moreover, the diagnosis *P. stuartii* endocarditis was based on the persistence of bacteremia in several cultures and identification of complicated aortic abscess with fistulization [6] Upon reviewing the literature, the authors solely found a single case of reported *P. stuartii* endocarditis [7]. The authors believe that this association is underdiagnosed, due to the diagnostic difficulty in challenging older populations, to the attribution of persistent bacteremia to the maintenance of bladder catheters and due to the fact that gram negative bacilli are not typical causative agents of endocarditis. The formation of paravalvular abscesses occurs more frequently in prosthetic valve infections, in comparison to native valves. This complication appears more frequently when there is aortic valve involvement and the presence of staphylococci, although any virulent organism (especially gram-negative species), may also complicate with paravalvular abscess. Extension up to the aortic root may develop, with consequent destruction of the valvular apparatus, forming pseudoaneurysms. In turn, the rupture of the pseudoaneurysm can lead to the formation of fistulous communications between the aorta and the left atrium, left ventricle or pulmonary artery. Rarely, the pseudoaneurysm can rupture into the right atrium, with

consequent fistulous communication such as that described in the above-reported clinical case [8].

Echocardiography is crucial in the diagnosis of IE and consequent complications. Because of its universal availability, transthoracic echocardiography is usually the first exam to be performed in the initial approach of these patients. However, it cannot exclude the diagnosis of IE in a case of high suspicion, even if vegetations are absent, due to the diminished sensitivity compared to transesophageal echocardiography. TOE remains the gold standard in the exclusion of endocarditis, as it plays an important role in the detection of prosthetic valve dysfunction, paravalvular leaks, abscess or fistula formation. Early identification of complications has a huge impact on clinical decision-making for therapeutic management and may determine the outcome of the patient [9,10].

## Conclusion

The case presented above intends to underline the importance of having a low suspicion threshold for IE in any prosthetic valve patient, presenting with fever, evidence of valvular dysfunction and/or persistent bacteremia. The combination of swift clinical evaluation and performing the appropriate imaging studies allows for early abnormality detections. Prompt diagnosis is crucial in the prevention of complications, in allowing for timely and adequate institution of antibiotic therapy and, if necessary, in the referral for a surgical approach.

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