



## *Pseudomonas stutzeri* prosthetic valve endocarditis: A case report and review of the literature

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### ABSTRACT

We report a case of *Pseudomonas stutzeri* endocarditis in Lebanon. The patient had a recent history of prosthetic aortic valve replacement and presented to the emergency department with fever and chills. Transesophageal echocardiography confirmed the presence of a vegetation on the prosthetic valve and blood cultures yielded *P. stutzeri*. The patient was treated with surgery and antibiotics but deteriorated and passed away four days after admission. To our knowledge, this is the fifth case of *P. stutzeri* endocarditis reported in the literature, and the first case with early presentation and mortality.

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### Introduction

*Pseudomonas stutzeri* is a Gram-negative, rod-shaped, aerobic, catalase and oxidase positive bacterium that is ubiquitously present in the environment [1] but rarely implicated in human disease. Over the past two decades, *P. stutzeri* has been increasingly recognized as a cause of infection in humans. Patients with *P. stutzeri* infection usually have predisposing risk factors such as immunosuppression or recent surgery and most patients respond successfully to antibiotic therapy reflecting the relatively low degree of virulence of this organism [1].

This report focuses on the clinical presentation, management, and outcome of *P. stutzeri* endocarditis in a Lebanese patient with a recent history of prosthetic aortic valve replacement (AVR). To the best of our knowledge, this is the first reported case of fulminant *P. stutzeri* endocarditis resulting in early mortality.

### Case report

A 72-year-old male known to have hypertension, coronary artery disease, and a recent history of AVR presented to the emergency department (ED) in December 2017 with chills and sweats associated with headache and anorexia of one-week duration. He

had no documented fever at home as he had regular paracetamol intake, but on presentation to the ED, he was found to be febrile.

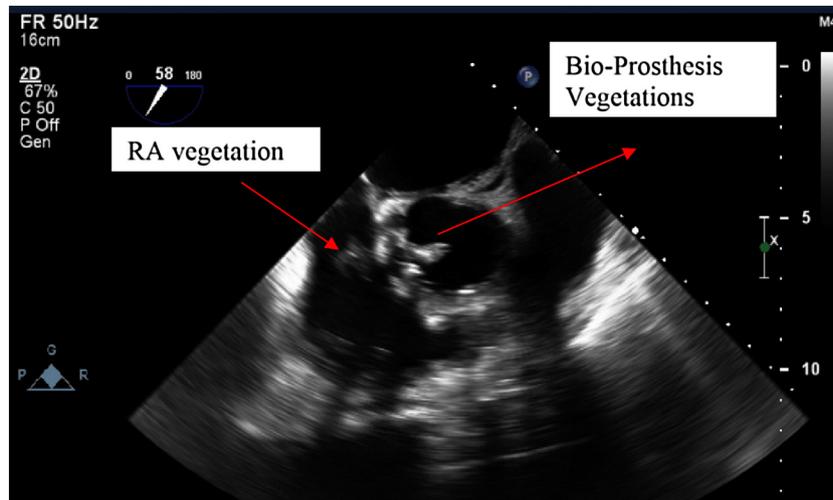
The patient had AVR with a tissue valve due to severe aortic stenosis 26 days prior to presentation. Post-operatively, he had an uneventful hospital stay for 6 days and was discharged home with no complications. Few days after discharge, he developed left arm phlebitis at the site of intravenous line insertion which was treated by his general practitioner as an outpatient with a course of oral amoxicillin/clavulanate for 10 days. His last dose of antibiotics was 7 days prior to presentation.

In the ED, the patient had a temperature of 38.4 °C with stable vital signs. On auscultation, he had a diastolic murmur and minimal bibasilar pulmonary crackles. The remainder of the physical exam was unremarkable. Laboratory tests were significant for leukocytosis with a white blood cell count (wbc) of 17,200 cells/mm<sup>3</sup> and 87% neutrophils, C – reactive protein of 249.7 mg/L, creatinine of 1.4 mg/dL, and normal liver function tests and electrolytes. Two sets of blood cultures were taken, and urgent transesophageal echocardiography (TEE) was performed due to the high suspicion for prosthetic valve endocarditis (PVE). TEE showed a 7 × 8 mm mass on the prosthetic aortic valve with a micro-abscess of 10 × 10 mm on the aortic root (Fig. 1) and fistula formation with communication to the right atrium (Fig. 2). The tricuspid valve showed an 18 × 8 mm oscillating mass originating from the aortic root abscess in favor of vegetation (Fig. 1). The ejection fraction (EF) was preserved at 55–59%. The patient remained hemodynamically stable, afebrile, and normotensive and initially refused surgical intervention. Due to the recent history of nosocomial phlebitis, *Staphylococcus* PVE was highly suspected. He was accordingly started on gentam-

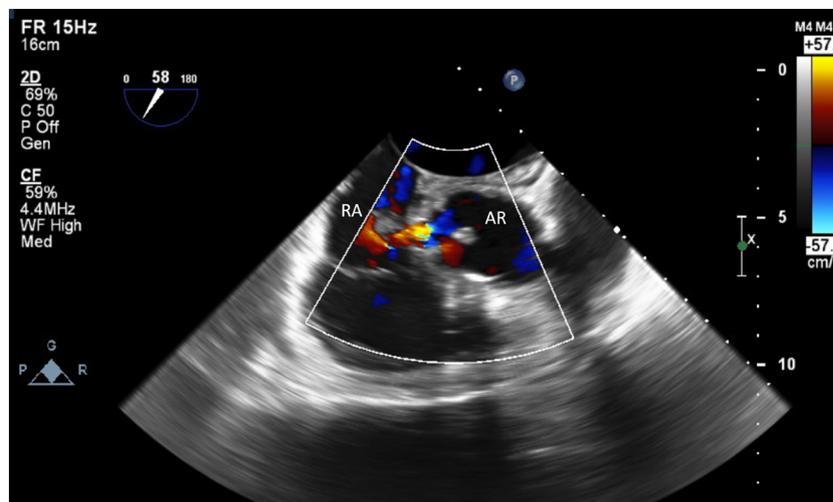
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**Fig. 1.** Transesophageal echocardiography, mid esophageal short axis view of the heart, showing a 7 × 8 mm mass on the aortic bio-prosthesis and an 18 × 8 mm mass on the tricuspid valve both in favor of vegetations.



**Fig. 2.** Transesophageal echocardiography, mid esophageal short axis view of the heart with color doppler showing fistula formation between the aortic root and right atrium. RA: right atrium, AR: aortic root.

**Table 1**  
Susceptibility profile of the *P. stutzeri* isolate.

Tested antibiotics	Reported sensitivity
Amikacin	S
Aztreonam	S
Cefepime	S
Ceftazidime	S
Ciprofloxacin	S
Gentamicin	S
Imipenem	S
Piperacillin/tazobactam	S
Trimethoprim/sulfamethoxazole	S

S: sensitive.

icin, vancomycin, and rifampin empirically based on the American Heart Association recommendations for the management of PVE in adults [2]. Two sets of blood culture grew *Pseudomonas* spp. on MacConkey agar after 16 and 17 h respectively. The isolated organism was sensitive to all tested antibiotics (Table 1), therefore, the patient was switched to ceftazidime 2 g intravenously every 8 h. Speciation of the *Pseudomonas* spp. using Matrix Assisted Laser Desorption/Ionization-Time of Flight (MALDI-TOF) revealed *P. stutzeri*.

After discussion of the risks and benefits, the patient agreed to proceed with surgery but deteriorated clinically shortly thereafter and had acute onset dyspnea with fever. Echocardiography revealed a worsening EF and severe aortic and tricuspid regurgitation. Urgent surgery was performed with closure of the fistula, and replacement of aortic and tricuspid valves. Intraoperative echocardiography documented closure of the fistula and good function of the aortic and tricuspid valves. Few hours post-operatively, he became hypotensive and succumbed to his illness and passed away. Because of the rapid deterioration, it was thought that death was attributed to *P. stutzeri* infection. Autopsy was not performed and therefore, secondary causes of death such as post-operative complications could not be ruled out.

Intra-operative culture from the bio-prosthetic valve grew *P. stutzeri*. All other intra-operative cultures including blood cultures taken on the day of surgery were negative.

## Discussion

PVE following surgical valve replacement occurs in 1%–3% of patients in the first year after surgery and is associated with high morbidity and mortality [3]. Around 10% of all endocarditis cases

**Table 2**  
Cases of *P. stutzeri* endocarditis between 1962–2017.

Cases	Country	Year of publication	Valve	Antibiotics used	Outcome	Source of infection	Time after cardiac surgery
<i>P. stutzeri</i> causing late prosthetic valve endocarditis [7]	Israel	1987	Prosthetic	Tobramycin, mezlocillin	Cured	Not identified	2 years
Multimicrobial endocarditis caused by <i>Streptococcus salivarius</i> and <i>P. stutzeri</i> ; good course after early surgery [8]	Spain	2002	Native	Penicillin G, gentamicin, aztreonam,	Cured	Not identified	Not applicable
Case of indolent endocarditis due to <i>P. stutzeri</i> with genetic evidence of relapse after 4 years [9]	France	2008	Prosthetic	Cefotaxime, ceftriaxone, gentamicin, ciprofloxacin, doxycycline	Cured	Not identified	6 years
Infective endocarditis caused by <i>P. stutzeri</i> in a patient with Marfan syndrome: case report and brief literature review [6]	Lebanon	2017	Prosthetic	Ceftazidime	Cured	Not identified	Recurrence after 10 years <sup>a</sup> 3 years
<i>Pseudomonas stutzeri</i> prosthetic valve endocarditis: a case report and brief review of the literature	Lebanon	2018	Prosthetic	Ceftazidime	Deceased	Not identified	26 days

<sup>a</sup> Cardiac surgery in 1997 followed by *P. stutzeri* endocarditis in 2003 and recurrence in 2007.

are caused by Gram negative bacteria. While *Pseudomonas* species rarely cause PVE, *Pseudomonas aeruginosa* is the most frequently implicated pathogen in this group [4]. *P. stutzeri* with its low virulence and high susceptibility to antibiotics has not been frequently implicated in PVE [5].

Most cases of proven *P. stutzeri* infection were documented in patients with risk factors such as immunosuppression, presence of comorbidities, previous history of surgery and previous trauma or skin infection [1]. To date, many cases of *P. stutzeri* infection have been reported in the literature ranging from bacteremia, pneumonia, osteomyelitis, arthritis, and ocular infections [5,6] with this case being the 5th description of *P. stutzeri* endocarditis.

Reports of *P. stutzeri* endocarditis are summarized in Table 2. Cases were reported from Israel, Spain, France, and Lebanon [6–9]. Three cases of *P. stutzeri* PVE occurred on an average of 4 years post cardiac surgery, while one case affected a native valve in a patient with no prior surgical history. The source of infection could not be identified in any of the cases. All patients were successfully treated with surgery and antibiotics and survived.

There is no data comparing monotherapy to combination therapy for *P. aeruginosa* endocarditis mainly due to the rarity of the condition. Recommendation to use combination therapy with 2 antipseudomonal antibiotics including an aminoglycoside is mainly based on expert opinion and observational studies. Data regarding treatment of *P. stutzeri* endocarditis is absent and is mainly based on case reports. Given that *P. stutzeri* was sensitive to all tested antibiotics and the likelihood of nephrotoxicity and ototoxicity with aminoglycosides in this elderly patient, monotherapy with ceftazidime combined with early surgery was regarded as the treatment of choice based on the judgment of the treating physician.

*P. stutzeri* has been isolated from the environment and surfaces at our facility including medical equipment and ventilators on multiple occasions. In our case, the source of infection and the portal of entry could not be identified, however, contamination of medical devices might be playing a role [6]. Strict measures were taken by the Infection Prevention and Control team to insure adherence

of the staff with medical devices disinfection policies. The isolated organism was susceptible to a wide range of antibiotics as in previously reported cases. As in our case, all previously reported cases of *P. stutzeri* endocarditis have been from countries of the Mediterranean Basin [6]. To our knowledge, this is the first case of fulminant early prosthetic valve endocarditis occurring only one month post cardiac surgery and leading to death.

## Conclusion

*P. stutzeri* infections are being recognized more frequently, especially in countries of the Mediterranean Basin. The source of infection remains unclear. *P. stutzeri* endocarditis typically occurs years after cardiac surgery and affected patients appear to have a good response to therapy as *P. stutzeri* isolates remain susceptible to a wide array of antibiotics. Our case proves that early infection and mortality are possible outcomes of *P. stutzeri* endocarditis.

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## Competing interests

None declared.

## Ethical approval

Not required.

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