Case study

Infective endocarditis caused by *Pseudomonas stutzeri* in a patient with Marfan syndrome: Case report and brief literature review

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**ABSTRACT**

Invasive infections due to *Pseudomonas stutzeri* have rarely been described and mainly occur in immunocompromised individuals. We report a case of infective endocarditis caused by *P. stutzeri* after previous cardiac surgery in a Lebanese patient with Marfan syndrome. We review the literature and conclude that this pathogen may be of particular medical relevance in the Mediterranean Basin.

**Introduction**

Human infections due to non-fermentative bacteria of the genus *Pseudomonas* account for considerable morbidity and mortality worldwide. While most infections are caused by *P. aeruginosa*, other *Pseudomonas* spp. may also give rise to severe infections, albeit less frequently. *P. stutzeri* has been reported as a pathogen that may occasionally cause severe deep-seated infections such as vertebral osteomyelitis and meningitis in immunocompromised individuals [1].

Here, we describe a case of infective endocarditis caused by *P. stutzeri* in a Lebanese patient with Marfan syndrome, and we review the literature to elucidate specific factors related to severe *P. stutzeri* infections.

**Case report**

A 22-year-old male patient with Marfan syndrome was referred to our hospital in Germany for severe and symptomatic aortic insufficiency. He had undergone valve-preserving aortic root replacement (valve reimplantation) and concomitant mitral repair with implantation of an annuloplasty ring three years earlier in his home country, Lebanon. After having lived in Germany for two years, he had developed severe and symptomatic aortic insufficiency. Echocardiography on admission showed severe aortic insufficiency and dilatation of the left ventricle (end-diastolic diameter 80 mm). In addition, floating structures were found on echocardiography that were consistent with vegetations on the mitral annuloplasty ring (Fig. 1). Diagnostic work-up for possible endocarditis was performed.

At the time of presentation, the patient was afebrile, there was mild elevation of leukocytes and a C-reactive protein (CRP) of 25 mg/L (normal value: < 5 mg/L). Blood cultures were drawn, and empiric antimicrobial treatment with intravenous ampicillin/sulbactam was initiated. Assuming a device-related endocarditis, the patient underwent repetition of surgery. After dissection of adhesions and connection to cardiopulmonary bypass, the heart was explored. The aortic valve showed signs of cusp retraction and low commissural height, there was no evidence of active endocarditis. Repair was considered not feasible, and the valve replaced with a 25 mm mechanical prosthesis (St. Jude Medical). The mitral valve was inspected; the valve itself was found intact, but there were gross vegetations located on the annuloplasty ring. The ring was excised; no new annular stabilization was performed. The postoperative course was unremarkable.

After surgery, vancomycin was added to the empiric antimicrobial regimen to cover pathogens giving rise to prosthetic device infections, in particular coagulase-negative staphylococci. Microbiologic cultures of the surgically removed annuloplasty ring grew *P. stutzeri*. This was confirmed by polymerase chain reaction (PCR) assays, and no additional pathogens were identified.

Thus, the diagnosis of definite infective endocarditis was made [2]. The antimicrobial treatment was immediately adjusted to an antimicrobial regimen consisting of piperacillin/tazobactam and gentamicin. The isolated *P. stutzeri* strain was found susceptible to several antimicrobials including piperacillin/tazobactam, ceftazidime, and the carbapenems. Minimal inhibitory concentrations (MICs) were lower for ceftazidime than for piperacillin/tazobactam, and treatment was thus re-adjusted to ceftazidime intravenously for four weeks. Gentamicin

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was stopped after 7 days.

Follow-up echocardiographic studies were unremarkable. All blood cultures taken during the further in-hospital stay of the patient remained negative. The patient was discharged home in good general condition on oral ciprofloxacin for additional four weeks. Upon several follow-up outpatient visits after completion of the antimicrobial treatment, the patient was asymptomatic and no irregularities were seen on echocardiography.

Discussion

The case reported here is the fourth description of an endocarditis due to the gram-negative bacterium *P. stutzeri*, and the first one in a patient with Marfan syndrome. Gram-negatives pathogens account for less than 10% of all cases of infective endocarditis worldwide [3,4], and endocarditis due to *Pseudomonas* spp. is a rarity. However, previous reports indicated that unusual bacterial pathogens such as *Abiotrophia defectiva* [5], *Brucella suis* [6] and *Neisseria mucosa* [7] might be of particular relevance as agents of infective endocarditis in patients with Marfan syndrome.

*P. stutzeri* was first described by Burri and Stutzer in 1895 [8]. This gram-negative, rod-shaped, aerobic, and oxidase-positive bacterium is naturally found in soil and water [1]. When a clinical specimen grows the organism, it is commonly considered as colonization or

Table 1
Overview about the published cases of human *P. stutzeri* infections in the international literature (1995–2017), providing clinical information on the site of infection and the country where the infection occurred. Note: Cases published until 1994 have previously been summarised in another review [9].

| Clinical description of P. stutzeri infection | No. of reported cases | Year of publication | Country | Reference |
|---------------------------------------------|-----------------------|---------------------|---------|-----------|
| Bacteremia in a patient with acute leukemia | 1                     | 1995                | Spain   | [16]      |
| Meningitis in a patient with HIV infection  | 1                     | 1996                | Spain   | [17]      |
| Pleural empyema in a cirrhotic patient     | 1                     | 1996                | Spain   | [18]      |
| Bacteremia related to a bullous skin eruption | 1                | 1996                | Australia | [19]      |
| Community-acquired pneumonia with empyema  | 1                     | 1997                | Spain   | [20]      |
| Endophthalmitis after cataract surgery     | 1                     | 1998                | Czech Republic | [21]    |
| Community-acquired vertebral osteomyelitis | 1                     | 1999                | USA     | [22]      |
| Prosthetic joint infection of the knee in a patient with acute promyelocytic leukemia | 1 | 2000                | Israel  | [23]      |
| Panophthalmitis with orbital abscess        | 1                     | 2001                | USA     | [24]      |
| Endocarditis caused by *P. stutzeri* and *Streptococcus salivarius* | 1  | 2002                | Spain   | [13]      |
| Bacteremia in a patient with ecthyma gangraenosum and systemic vasculitis | 1  | 2004                | France  | [25]      |
| Community-acquired pneumonia with empyema in a young boy | 1  | 2004                | Turkey  | [26]      |
| Bacteremia                                  | 4                     | 2004                | Taiwan  | [27]      |
| Endophthalmitis after cataract surgery      | 1                     | 2006                | India   | [28]      |
| Pneumonia in an HIV patient                | 1                     | 2006                | United Kingdom | [10]    |
| Posttraumatic osteitis of the left femur    | 1                     | 2006                | Morocco | [29]      |
| Brain abscess in a child after previous neurosurgery | 1  | 2006                | USA     | [30]      |
| Neonatal sepsis in a baby born to a mother with pre-eclampsia and prematurely ruptured membranes | 1  | 2007                | Saudi Arabia | [31]    |
| Posttraumatic knee infection in a child     | 1                     | 2007                | Israel  | [32]      |
| Bacteremia cases in a teaching hospital over a 1-year period, all except one in patients with chronic diseases (COPD, renal insufficiency) | 8  | 2007                | Brazil  | [15]      |
| Conjunctivitis after cataract surgery       | 1                     | 2008                | India   | [33]      |
| Relapse of *P. stutzeri* endocarditis four years after initial presentation | 1  | 2009                | France  | [14]      |
| Fatal community-acquired meningitis in an immunocompetent 73-year old patient | 1  | 2009                | Turkey  | [34]      |
| Two cases of ventilator-associated pneumonia and one case of diabetic ulcer infection | 3  | 2009                | Italy   | [35]      |
| Peritonitis                                 | 1                     | 2010                | Turkey  | [36]      |
| 28 patients with detection of *P. stutzeri* from a sterile site (n = 18, blood; n = 4, peritoneal fluid; n = 3, conjunctiva; n = 2, synovial fluid; n = 1, cerebrospinal fluid) | 28 | 2012                | Israel  | [37]      |
| Peritoniitits in a 92-year old patient on continuous ambulatory peritoneal dialysis (CAPD) | 1  | 2013                | South Korea | [38]    |
| Necrotizing pneumonia in a patient with concomitant pulmonary tuberculosis | 1  | 2014                | Taiwan  | [11]      |
| Corneal ulcer in a 25-year old patient after previous neurosurgery | 1  | 2015                | India   | [39]      |
| Bacteremia with carbapenem-resistant *P. stutzeri* in a patient undergoing hemato poetic stem cell transplantation | 1  | 2015                | China   | [40]      |
| Meningitis during vedolizumab treatment in a patient with Crohn’s disease | 1  | 2015                | USA     | [41]      |
| Prosthetic vascular graft infection and prosthetic osteomyelitis of the tibia | 2  | 2016                | Canada  | [42]      |
| Prosthetic valve endocarditis (present case) | 1  | 2017                | Lebanon | –         |
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