



## Prosthetic Valve Infection Caused by *Raoultella planticola* after Mitral Valve Replacement Surgery in a Patient Undergoing Hemodialysis: A Case Report

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### Abstract

Infective Endocarditis (IE) caused by *Raoultella planticola* is extremely rare. We reported a 41-year-old male with a history of chronic kidney disease diagnosed with *Raoultella planticola* infective IE. The patient initially underwent the mitral valve replacement for *Staphylococcus aureus* infective IE. But he developed a high fever after surgery, followed by perivalvular abscess and perivalvular leakage. A second mitral valve replacement was performed and *Raoultella planticola* was found in his blood cultures. Eventually, he recovered by antibiotic treatment based on the susceptibility test. This case alerts clinicians to be aware of *Raoultella planticola* infection in immunocompromised patients undergoing cardiac surgery.

**Keywords:** *Raoultella planticola*; Infective endocarditis; Chronic renal failure; Valve replacement; Hemodialysis

### Introduction

Infective Endocarditis (IE) is a common infection that occurs in hemodialysis patients [1] and is commonly caused by *Staphylococcus species*, Enterococcal and *Streptococcus species* [2], *R. planticola* is rarely involved. *R. planticola* is a gram-negative, aerobic, nonmotile mostly found in environments with high prevalence in soil and water. It was first described as *Klebsiella planticola* and reclassified into a new genus in 2001 as *R. planticola* because its difference in 16S rRNA gene and rpoB gene [3]. To our knowledge, only one case reported an infection by *R. planticola* after cardiac surgery (cardiac implantable electronic devices) in recent years. We described here a case of bacteremia secondary to endocarditis caused by *R. planticola* infection in hemodialysis patients.

### Case Presentation

A 41-year-old man with a known history of atrial fibrillation, chronic renal failure (Chronic Kidney Disease CKD5) and regular chronic hemodialysis for 1 year, presented to our hospital with dyspnea and nausea with transient nonbilious, non-bloody emesis for 3 days. On admission, in addition to the symptoms described above, decrease respiratory sounds in both lungs was found in physical exam, and initial lab tests showed RBC 82 g/l, BNP>5000 pg/ml. No evidence of leukocytosis or leukopenia was found at first. Imaging studies included acute abdominal series and computed tomography of head, both of which were unremarkable. Considered the patient combined with acute left heart failure, hemodialysis treatment was ordered. But patient's condition had not improved, following coughed up blood on the next day. His body temperature raised to 38.9°C and the blood count revealing 94,800 leukocytes with a predominance of neutrophils (93.1%), Procalcitonin (PCT) level was 9.57 ng/ml and a serum creatinine level at 451.2 µmol/l. Abdominal ultrasound reported hepatic congestion and blood culture result found Methicillin Resistant *Staphylococcus aureus* (MRSA). Considering the patient's renal insufficiency, empirical treatment with vancomycin (dose reduced to 500 mg/day) was received and a cardiac ultrasound was ordered. Results showed mitral chordae rupture with a large reflux, pulmonary hypertension, ejection fraction of 60%. Based on these results, the patient was considered as IE. Mitral valve replacement surgery was performed. The anterior mitral chordae rupture in A2 area and the gray anterior and posterior mitral valve were observed during operation. But the patient still had intermittent fever after operation (t°=37.5°C), PCT level was 9.54 ng/ml, serum creatinine level at 466.4 µmol/l, leukocytes count was 75,000/mm<sup>3</sup> (neutrophil 95.6%) in the Intensive Care Unit (ICU) after surgery. Blood cultures did

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**Table 1:** Results of antimicrobial susceptibility testing ( $\mu\text{g/mL}$ ).

Antimicrobial agent	Minimum Inhibitory Concentration (MIC)
Levofloxacin	0.5
Cefazolin	$\geq 64$
Ceftriaxone	$\geq 64$
Cefepime	$\geq 64$
Gentamicin	$\leq 1$
Piperacillin/tazobactam	64
Piperacillin PRL	$\geq 128$
Amikacin	$\leq 2$
Tigecycline	24
Imipenem	4
Ampicillin/sulbactam	$\geq 32$

not find another bacterium but MRSA. Empirical treatment with vancomycin (500 mg/day) and Imipenem and Cilastatin Sodium (250 mg/day every 12 h) was received, per the 2015 ESC Guidelines for the management of infective endocarditis. The patient's body temperature decreased, PCT level was decreased to 4.62 ng/ml, serum creatinine level at 352.4  $\mu\text{mol/L}$ , leukocytes count was 50,400/ $\text{mm}^3$  (neutrophil 73.2%). However, the body temperature raised to 38°C two days later, PCT level was up to 10.29 ng/ml, serum creatinine level at 466.4  $\mu\text{mol/L}$ , leukocytes count was 69,500/ $\text{mm}^3$  (neutrophil 84.2%). Cardiac ultrasound showed perivalvular leakage occurs in the artificial mitral mechanical valve. The patient immediately underwent a secondary surgery for mitral valve replacement. Perivalvular abscess and perivalvular leakage were found around posterior prosthetic valve during operation. The cardiac function of patient was improved after surgery. Nevertheless, the patient still had fever ( $t^\circ = 37.5^\circ\text{C}$ ), PCT level was 40.62 ng/ml, serum creatinine level at 555.0  $\mu\text{mol/L}$ , leukocytes count was 77,000/ $\text{mm}^3$  (neutrophil 91.9%), and the original treatment plan was invalid. Blood culture was taken again and *R. planticola* was found on day 3 after the secondary surgery. According to susceptibility testing (Table 1), tigecycline (50 mg/dose every 12 h) combined levofloxacin (500 mg/day) were used and the patient's condition was controlled: Body temperature returned to normal, PCT level decreased to 3.84 ng/ml, serum creatinine level at 461.2  $\mu\text{mol/L}$ , leukocytes count was 47,800/ $\text{mm}^3$  (neutrophil 79.5%). After 1 week of tigecycline and levofloxacin administration, a series of blood cultures were carried out that turned out to be sterile after 4 days of culture. He remained afebrile afterwards. After 2 months follow-up, there was no evidence of recurrence or relapse.

## Discussion

We report the case of a bacteremia by an unusual bacterium in a dialysis patient. The infection was considered as a result of multiple invasive procedures (mechanical ventilation, endotracheal intubation, exogenous catheter) and low immunity of the patient. Blood culture identified the pathogen as *R. planticola* and susceptibility testing allowed an efficient mono antibiotic regimen by a tigecycline to be used. Chronic kidney disease is a high risk of endocarditis because its burden of dialysis access related bloodstream infections [4]. Prosthetic valve endocarditis accounts for approximately 20% of all endocarditis cases [5]. Most cardiac related infective endocarditis infections are secondary to staphylococcal species [6]. *R. planticola* is a rare opportunistic pathogen and not reported in infective endocarditis. It usually invaded immunocompromised patients and

usually invaded soft tissue, urinary tract and gastrointestinal tract of immunocompromised patients and resulting in cholecystitis, gastroenteritis, cystitis, pneumonia and bacteremia, joint infections [7-9]. It has been reported that *R. planticola* resistance to beta-lactams including carbapenems [9], but there are no clear guidelines as to the approach toward treatment of *R. planticola*. Antibiotic treatment should be based on blood culture and drug susceptibility test. In our case, the patient cumulated several risk factors including chronic renal failure, chronic hemodialysis, indwelling cardiovascular device, mechanical ventilation, endotracheal intubation and anticoagulation use. These conditions may have contributed to native valves and prosthetic valves endocarditis. We have not been able to determine the entry point of the pathogen. Vancomycin and beta-lactam agent were used in combination as first-line treatment before and after the mitral valve replacement surgery according to the blood culture result (Methicillin Resistant *S aureus*, MRSA), The infection was once controlled. However, a reinfection was found in prosthetic valves endocarditis and *R. planticola* was found in blood culture. To our knowledge, this is the first case of *R. planticola* bacteremia in prosthetic valves endocarditis. Postoperative catheter care, the underlying immunocompromised condition and low antibiotic dosage of the original treatment plan which considered renal insufficiency of patient, could have contributed to the infection although the source of the pathogen is unclear.

## Conclusion

*R. planticola* is a serious emerging pathogen and associated with multiple infectious conditions. Clinicians should be aware of such fatal infections when patients undergoing cardiac surgery. The treatment plan should be assigned to provide correct antibiotic regimen after accurate identification of pathogens and actively prevent postoperative intravascular catheter-related infections.

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