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Case report

# Persistent *Elizabethkingia meningoseptica* bacteremia in a patient with multiple myeloma

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ABSTRACT

*Elizabethkingia meningoseptica* is a non-motile, gram-negative organism, previously classified as part of the *Flavobacterium* then *Chryseobacterium* genus. It has been isolated in hospital settings and has been known to cause infection, particularly in immunocompromised patients. Treatment has remained a challenge as this organism is resistant to many traditional antimicrobials used to treat gram-negative infections. We present a case of persistent *E. meningoseptica* bacteremia in a patient despite tailored antimicrobial therapy.



## Case presentation

A 56 year-old male presented with weakness, fatigue, and left knee swelling. Medical history was significant for advanced multiple myeloma for which he received two bone marrow transplants and a recent admission for *Pseudomonas aeruginosa* bacteremia two months prior, treated with one week of ceftazidime and one week of oral ciprofloxacin. He followed up with his infectious diseases physician on the day prior to admission and underwent blood cultures for complaints of a low-grade fever and was sent to the emergency department after gram negative rods were identified.

On physical examination, the patient did not appear to be in any acute distress. The patient's temperature was 36.4 C, heart rate 77, blood pressure 120/73, respiratory rate 18, and oxygen saturation 99% on room air. The patient was also noted to have mild swelling of the left knee with mild warmth. Laboratory studies were significant for a white blood cell count of 37,000 cells/μL, hemoglobin 7.8 g/dL, platelets 51,000/μL, sodium 135 mmol/L, BUN 42 mg/dL, creatinine 1.32 mg/dL, protein 9.4 g/dL, c-reactive protein 7.2 mg/dL, and erythrocyte sedimentation rate >140 mm/hr. The patient was initially treated with ceftazidime for presumed *Pseudomonas* bacteremia. However, blood cultures obtained the day prior to admission grew an organism identified as *Elizabethkingia meningoseptica* in the aerobic bottles as identified using the Vitek 2 system (bioMérieux) with sensitivity performed using E-test strips. The organism was resistant to ceftazidime and other beta-lactams but was reported to be sensitive to ciprofloxacin and trimethoprim-sulfamethoxazole.

The patient's antimicrobial therapy was switched to intravenous ciprofloxacin. He underwent a left knee irrigation and was noted to have 1,080 cells/μL on the fluid analysis, however cultures from that procedure remained negative. However, repeat blood cultures two days after treatment with ciprofloxacin, once again grew *E. meningoseptica*. The patient underwent a transthoracic echocardiogram, which was negative for vegetations. Extended susceptibility testing was carried out on the patient's blood cultures as summarized in Table 1. He underwent an indium leukocyte imaging scan which showed increased radiotracer uptake at the distal left femur concerning for osteomyelitis. However, an MRI with contrast only revealed edema of the soft tissue around the knee but no obvious osteomyelitis. The patient was continued on ciprofloxacin with the addition of rifampin and tigecycline to his treatment regimen. The patient was continued on this regimen for 5 days with tigecycline being discontinued prior to discharge. Upon discharge, the patient was advised to continue taking ciprofloxacin and rifampin indefinitely, given his limited life expectancy with his multiple myeloma. His final blood culture on the day of discharge also eventually grew *E. meningoseptica*, however, follow-up cultures after discharge were negative, making it 11 days before blood cultures became negative. Subsequent cultures on outpatient visits over one month later remained negative.

## Discussion

*E. meningoseptica* has been found in water sources such as faucets and sinks and can occur in hospital settings when medical equipment has been exposed to contaminated water or improperly sterilized [1]. It is a biofilm forming organism, which allows it to colonize intravascular lines and ventilators and also contributes to its resistance to chlorinated water, allowing it persist in hospital

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**Table 1**
Antimicrobial sensitivities for *Elizabethkingia meningoseptica* isolated from blood cultures.

| Antibiotic | MIC | Susceptibility |
|---|---|---|
| Amikacin | ≥64 μg/mL | Resistant |
| Aztreonam | ≥64 μg/mL | Resistant |
| Ceftazidime | ≥64 μg/mL | Resistant |
| Ceftriaxone | ≥64 μg/mL | Resistant |
| Ciprofloxacin | 1 μg/mL | Susceptible |
| Gentamicin | ≥16 μg/mL | Resistant |
| Imipenem | ≥16 μg/mL | Resistant |
| Piperacillin + Tazobactam | ≥128 μg/mL | Resistant |
| Rifampin | 0.5 μg/mL | Susceptible |
| Tigecycline | 4 μg/mL | Intermediate |
| Trimethoprim + Sulfamethoxazole | 80 μg/mL | Resistant |
| Vancomycin | 16 μg/mL | Resistant |

taps and sinks [2]. Infection with this organism has been seen in hospital settings, particularly in neonates and immunocompromised patients [3]. Risk factors associated with poor outcomes in *E. meningoseptica* infection include hypoalbuminemia, central line infection, and increased pulse rate at the onset of infection [4].

Treatment of *E. meningoseptica* infections has remained a challenge. This organism has been shown to produce chromosomal metallo-B-lactamse and thus can hydrolyze most beta-lactam antimicrobials, including cephalosporins, carbapenems, and extended spectrum penicillins [5]. Most antimicrobials used for the treatment of infection due to gram negative organisms have little activity against *E. meningoseptica*. 28-day mortality has been described to be as high as 41% in *E. meningoseptica* bacteremia as instituting the proper therapy is often delayed [6]. An optimal regimen for treatment has yet to be described, however, *E. meningoseptica* has displayed sensitivity to many antimicrobials used against gram positive organisms. Fluoroquinolones, tigecycline, and rifampin have also displayed in-vitro activity against *E. meningoseptica* isolates. Common treatments that have been used include vancomycin plus rifampin, a fluoroquinolone with vancomycin and rifampin, and fluoroquinolone monotherapy [1,6,7].

In this case, the patient was immunocompromised given his multiple myeloma. He had recently received chemotherapy just prior to this hospital admission and may have become infected with this organism at his infusion center. Most reported cases of *E. meningoseptica* infection have been in healthcare settings and associated with implantable medical devices or intravascular catheters [8]. This case was unique in that the patient remained persistently bacteremic on ciprofloxacin, which his *E. meningoseptica* was sensitive to. Adequate suppression and treatment was only achieved on treatment with ciprofloxacin and rifampin after discharge.

## Conclusion

*E. meningoseptica* should be considered as a possible infectious organism in patients with the appropriate risk factors who have not responded to conventional antimicrobial therapy. Given its inherent resistance to most common antimicrobials used to treat gram negative organisms, treatment presents an inherent challenge and further investigation is needed to determine the optimal therapeutic regimen for this organism.

## Author statement

Both listed authors (Waleed Malik and Gavin McLeod) participated sufficiently in the work to take full responsibility for the content of this manuscript, *Elizabethkingia meningoseptica bacteremia in a patient with multiple myeloma*. Dr. Malik conducted a literature review on the above topic and drafted the manuscript with the assistance of Dr. McLeod. Dr. McLeod made any final revisions to the manuscript before submission of the case report.

Signed by all authors as follows:
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Both authors contributing to the production and publication of this paper have no conflicts of interest to declare.

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