



Case Report

Bacteremia due to *Elizabethkingia meningoseptica*Takashi Shinha^{a,*}, Rakesh Ahuja^b^a Department of Pathology, Microbiology and Immunology, Vanderbilt University Medical Center, 1301 Medical Center Drive, Nashville, TN 37232, USA^b Department of Medicine, Long Island College Hospital, 339 Hicks Street, Brooklyn, NY 11201, USA

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ABSTRACT

Elizabethkingia meningoseptica is a nonfermentative gram-negative bacillus that is ubiquitously found in hospital environments and as such, it has been associated with various nosocomial infections. Immunocompromised individuals are particularly at increased risk for developing severe infections due to *E. meningoseptica*, including bacteremia. *E. meningoseptica* is resistant to multiple antimicrobials commonly used for gram-negative bacteria and conventional empirical antimicrobials targeting those organisms may result in unfavorable outcome. We report a case of bacteremia due to *E. meningoseptica* in a patient who necessitated chronic hemodialysis therapy to heighten awareness of this emerging pathogen among patients on hemodialysis.

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Introduction

Elizabethkingia meningoseptica, previously known as *Chryseobacterium meningosepticum*, is a gram-negative bacillus that is widely distributed in nature [1]. *E. meningoseptica* was originally described as *Flavobacterium meningosepticum* in 1959 by an American bacteriologist Elizabeth O. King [2]. It is ubiquitously found in soil and water and it has also been recovered from hospital environments. *E. meningoseptica* is nonmotile, oxidase-positive and a medically important nonfermentative gram-negative bacillus that has been associated with a broad range of infectious etiologies, notably outbreaks of neonatal meningitis [3,4]. In adults, *E. meningoseptica* can also cause pneumonia, endocarditis, and bacteremia primarily in immunocompromised individuals [5,6]. For instance, in a study of 118 cases of *E. meningoseptica* bacteremia, the most common underlying predisposing conditions were malignancies (36%) and diabetes mellitus (25%) [7]. Recognition of *E. meningoseptica* is paramount for clinicians since multi-drug resistance is common for this organism. We report a case of bacteremia due to *E. meningoseptica* in a patient who necessitated chronic hemodialysis therapy secondary to a longstanding history of diabetic nephropathy.

Case report

A 68-year-old male with a history of diabetes mellitus, hypertension, and end-stage renal disease was in his usual status until five days prior to presentation when he developed fatigue, anorexia and fevers. Hemodialysis had been initiated 33 years before due to his progressive diabetic nephropathy. The patient's medical history was otherwise unremarkable and he was up-to-date with his annual physical evaluation. On physical examination, the patient appeared ill. The temperature was 101.0 °F, blood pressure 103/64 mm Hg, pulse 107 beats per minute, respirations 21 breaths per minute and oxygen saturation 97% on room air. His heart sounds revealed tachycardia without murmurs and his lungs disclosed crackles on the right side. Laboratory studies revealed a white blood cell count of 10,800 cells/mm³ with 87% polymorphonuclear leukocytes, hemoglobin of 10.5 g/dL, and platelets of 214,000 mm³. The level of sodium was 137 mmol/L, potassium 4.4 mmol/L, bicarbonate 20 mEq/L, urea nitrogen 31 mg/dL, and creatinine 2.3 mg/dL. Two sets of cultures of the blood obtained through the hemodialysis catheter at the time of admission grew gram-negative bacilli after 48 h of incubation. Another two sets of the blood cultures collected through a peripheral vein also grew gram-negative bacilli. The blood agar demonstrated multiple yellow pigmented colonies. The organism was nonmotile, oxidase and indole positive. Subsequently, it was identified as *E. meningoseptica* based on further biochemical reactions and automated bacteriology identification system in the laboratory. The patient was treated with intravenous vancomycin for 4 weeks based on the susceptibility results; the isolate was considered susceptible to

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vancomycin with a Minimal Inhibitory Concentration (MIC) value of 1 µg/mL using broth microdilution methodology. The hemodialysis catheter was removed and the catheter tip sent for culture demonstrated no growth. The patient became afebrile and his subsequent blood cultures remained sterile.

Discussion

E. meningoseptica is ubiquitously found in soil and water. Because of its survival in hospital environments, nosocomial outbreaks can occur as a result of exposure to a contaminated water source or medical devices. Notably, it has been reported to cause neonatal meningitis associated with nosocomial outbreaks [3,4]. In adults, most infections due to *E. meningoseptica* are also nosocomial, particularly affecting immunocompromised individuals. Potential risk factors for developing *E. meningoseptica* bacteremia identified in the literature include malignancies, steroid use, diabetes mellitus, neutropenia, and organ transplant [7,8]. Our patient had a longstanding history of diabetic nephropathy which necessitated chronic hemodialysis therapy. Importantly, *E. meningoseptica* bacteremia has been described in patients with a wide array of renal pathology which required chronic hemodialysis therapy [9–14]. Our patient potentially developed catheter-related bacteremia considering its ability to contaminate medical devices and the blood cultures positive for *E. meningoseptica* through the hemodialysis catheter.

Optimal antimicrobial guidelines to treat *E. meningoseptica* remain to be established. It is usually resistant to many antibiotics commonly used to treat infections caused by gram-negative bacteria. It is generally resistant to aminoglycosides, and β-lactam agents, including carbapenems, due to the production of extended spectrum β-lactamases (ESBL) and metallo-β-lactamases [15]. In contrast, *E. meningoseptica* is often susceptible to agents used for gram-positive bacteria. Vancomycin has been described as an active agent against *E. meningoseptica* [16,17], particularly in cases of infantile meningitis due to *E. meningoseptica* [18,19]. However, contradictory results with high vancomycin MIC values against *E. meningoseptica* have also been reported [20,21]. Rifampin is potentially effective when used as part of combination therapy [17,22]. Although the advanced molecular techniques have become available to detect drug resistant genes for metallo-β-lactamase and ESBL, the mechanism of action of antimicrobial agents used for gram-positive bacteria against *E. meningoseptica* has not been well described in the literature [23,24]. Currently, validated susceptibility testing methods are not available and MIC breakpoints have not been established by the Clinical and Laboratory Standards Institute (CLSI) for *E. meningoseptica*. Results of susceptibility testing may vary substantially when different methods are used. In general, broth microdilution methodology is more reliable than disk diffusion technique [13].

Conclusions

E. meningoseptica is ubiquitously found in hospital environments. It has been associated with severe nosocomial infections related to contaminated medical devices. Therefore, when *E. meningoseptica* is isolated from clinical specimens, its pathogenic potential associated with clinical significance should be thoroughly evaluated. Bacteremia due to *E. meningoseptica* primarily occurs in immunocompromised individuals, including those with various nephropathy which necessitated hemodialysis therapy. Recognition of *E. meningoseptica* is of critical importance for clinicians since conventional empirical treatment against gram-negative bacteria

may result in unfavorable outcome given its unique antimicrobial susceptible pattern.

Conflicts of interest statement

None declared.

Sources of funding

None declared.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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