

Elizabethkingia Meningoseptica Bacteremia in a Child: A Case Report

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ABSTRACT

Elizabethkingia meningoseptica is a Gram-negative bacteria which can cause rare but severe infections in humans. Here, we report a case of sepsis due to *E. meningoseptica* in an immunocompetent pediatric patient. While a 32-month-old girl with a diagnosis of cerebral palsy was being followed in the pediatric intensive care unit, fever and general condition disorder developed. Laboratory results showed white blood cell count: 18600/mm³, hemoglobin level: 9.0 g/dl, platelet count: 186000/mm³, and C-reactive protein level: 17.5 mg/L (0–5 mg/L). Clinical sepsis was suspected and empirical treatment of vancomycin (60 mg/kg/24 h: Q6 h) and cefepime (150 mg/kg/24 h: Q8 h) was started. However, blood culture resulted as *E. meningoseptica* which was susceptible to trimethoprim/sulfamethoxazole and ciprofloxacin. The patient was successfully treated with trimethoprim/sulfamethoxazole plus ciprofloxacin for 14 days.

INTRODUCTION

Sepsis is the leading cause of death worldwide in the pediatric population resulting in an estimated 7.5 million deaths annually.^[1] It is defined as a life-threatening organ dysfunction or the systemic inflammatory response syndrome caused by dysregulated host response in the presence of a proven infection.^[1,2] It is usually the primary cause of death from an infection and it requires urgent medical attention.^[2] Septic shock is a subcategory of sepsis with additional cardiovascular organ dysfunction that is not resolved after initial fluid resuscitation.^[3] Among patients with sepsis or septic shock in whom a pathogen was identified in the blood culture, Group B streptococci and enteric Gram-negative rods were most commonly identified in infants. *Haemophilus influenzae*, *Neisseria meningitidis*, *Staphylococcus aureus*, and *Streptococcus pyogenes* were

the most commonly identified bacteria in children.^[3] However, case reports and literature data have shown that a wide variety of microorganisms can cause sepsis.

Elizabethkingia meningoseptica formerly known as *Flavobacterium meningosepticum* or *Chryseobacterium meningosepticum* is a rod shaped Gram-negative bacteria that belongs to the *Flavobacteriaceae* family. It is a non-motile, non-fastidious, non-spore forming, non-fermentative and obligate aerobe, catalase, oxidase, and urease positive bacteria.^[4] It can cause rare but severe human infections especially in the immunocompromised hosts and can result in fatal outcomes. It is known to be a causative agent in outbreaks of meningitis in premature newborns and infants in neonatal or pediatric intensive care units.^[4] In addition, *E. meningoseptica* infection may be associated with endocarditis, dialysis-induced peritonitis, wound infection,

bacteremia, and hospital-acquired pneumonia.^[5] Here, we report a case of sepsis due to *E. meningoseptica* in an immunocompetent pediatric patient.

CASE REPORT

A 32-month-old female patient was hospitalized in the pediatric intensive care unit of our hospital with the diagnosis of cerebral palsy. She was connected to mechanical ventilator through tracheotomy. Birth history revealed a term birth by normal vaginal delivery, and birth weight was 2700 g. She had an afebrile seizure when she was 5 months old and she was diagnosed with cerebral palsy. She had nasogastric tube and jugular central venous catheter. On the 10th day of admission, she had fever and worsening of her clinical condition. The source of fever was not identified on physical examination. Blood cultures were taken from both the central venous catheter and peripheral vein. The laboratory results showed white blood cell count: 18600/mm³, hemoglobin level: 9.0 g/dl, platelet count: 186000/mm³, C-reactive protein level: 17.5 mg/L (0–5 mg/L), and Interleukin-6 level: 258.9 pg/ml (reference range: 0–7 pg/ml). Biochemical values including electrolytes, liver and renal function tests were all within normal range. On the grounds that clinical sepsis was suspected, empirical treatment with vancomycin (60 mg/kg/24 h: Q6 h) and cefepime (150 mg/kg/24 h: Q8 h) was initiated. Peripheral and central catheter blood samples were cultured in an automated blood culture system (Bact/ALERT bioMérieux, Marseille, France). Twelve hours after, it was placed in the device, a positive signal was detected. Gram-negative and rod-shaped bacteria were seen in the smears prepared from blood culture samples. Blood samples from the positive bottle were streaked onto Columbia sheep blood agar, chocolate agar, and MacConkey agar (bioMérieux, Marcy l'Étoile, France). After overnight incubation period, 1–2 mm, circular, smooth, gray yellow and non-hemolytic colonies grew on blood agar and chocolate agar, but no growth was detected on MacConkey agar. Bacteria identification was performed using the MALDI TOF VITEK[®]MS device (bioMérieux, Marcy l'Étoile, France). MALDI TOF VITEK[®]MS identified the bacterium as *E. meningoseptica* with 100% agreement. Antimicrobial susceptibility test was performed with Vitek-2 Compact system using AST N325 susceptibility card. The bacterial isolate was resistant to piperacillin/tazobactam, aztreonam, ceftazidime, cefepime, meropenem, imipenem, tobramycin, amikacin, and gentamicin. It had intermediate sensitivity to tetracycline and it was sensitive to trimethoprim/sulfamethoxazole, ciprofloxacin, levofloxacin. Therefore, antibiotic therapy was switched to trimethoprim/sulfamethoxazole plus ciprofloxacin. The central venous catheter was removed. Control culture from the peripheral blood samples were obtained on the 3rd day of antibiotic therapy and remained sterile. Trimethoprim/sulfamethoxazole was continued for 14 days. No vegetations were seen by echocardiography on the heart valves. No subsequent recurrent infections were observed.

DISCUSSION

E. meningoseptica is a waterborne and saprophytic bacillus which is not considered to be a part of the normal human flora.^[6] It is widely distributed in nature. It may be normally present in fish and frogs; therefore, common sources include water supplies.^[7] It typically causes nosocomial infections via medical equipment as it colonizes indwelling devices such as intubation tubes, humidifiers, respirator circuits, and newborn incubators.^[8] Most of the outbreak sources have been linked to contaminated venous catheter lines, nutritional solution, and tap water. In addition, developments in intensive care units and increased use of medical devices are thought to increase the development of invasive infections due to microorganisms.^[6] In the case presented, the patient was most likely infected through the contaminated catheters or the nasogastric tubes used; however, the exact source could not be identified.

E. meningoseptica was reported to have a low degree of pathogenicity. Although it is a rare case of meningitis in the pediatric population, meningitis is one of the most common infection associated with this pathogen.^[6] In a study covering 28 countries and examining 283 cases of symptomatic children with *Elizabethkingia* species between 1944 and 2017, the most common clinical presentation was reported to be meningitis with 73.9%. This was followed by sepsis with 23.7% and bacteremia with 7.1%, respectively.^[9] In the same study, the reported cases mostly belonged to the immunocompromised children and the age of the children were found to be an important risk factor as the neonatal patients accounted for around three quarters of the pediatric cases. Similarly, in different previous studies, it has been reported that pre-term infants are more susceptible to *E. meningoseptica* infections.^[6,8] The case that we reported was peculiar in the sense that the patient was not born premature nor was immunocompromised. However, the presence of an underlying cerebral palsy and a tracheostomy might have caused her to be more susceptible to infections.

E. meningosepticum has an unusual susceptibility pattern; therefore, early diagnosis is critical to prevent mistreatment. The organism is resistant to many β -lactam antibiotics, including carbapenems and aztreonam.^[10] There are also studies reporting that it is resistant to aminoglycosides, clindamycin, teicoplanin, tetracyclines, and chloramphenicol.^[11,12] In the study of Lin et al.^[13] in which they presented 11 non-neonatal patients who developed blood stream infection due to *C. meningosepticum*, PCR tests have shown that the microorganism produces broad-spectrum beta-lactamases as well as metallo-beta-lactamases. In the same study, although it was reported that ciprofloxacin had superior activity on *C. meningosepticum*, it was reported that trimethoprim-sulfamethoxazole and minocycline could be good alternative agents. In a study by Chan et al.^[8] from Singapore in which they examined 13 patients aged between 0 and 18 years who developed invasive infections due to *E. meningoseptica* between 2010

and 2017, 81.8% of the patients were treated successfully with the combined use of piperacillin/tazobactam and trimethoprim/sulfamethoxazole or a fluoroquinolone. We observed that the strains isolated from our case were consistent with the previous literature as they were sensitive to trimethoprim/sulfamethoxazole, levofloksasin, ciprofloxacin, and resistant to piperacillin/tazobactam. We administered trimethoprim/sulfamethoxazole plus ciprofloxacin and the patient recovered completely.

CONCLUSION

In conclusion, to prevent *E. meningoseptica* epidemics, active infection control in the water sources of the hospitals is crucial. *E. meningoseptica* is a rare pathogen but it may cause severe morbidity and even mortality. This case implies that in patients with *E. meningoseptica* infections, early and accurate identification of the microorganism with the appropriate susceptibility testing is crucial to reduce morbidity and mortality.

Informed Consent

Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept: A.A., C.Ç.; Design: A.A., A.K., C.Ç.; Supervision: A.A., A.K., C.Ç., U.Y., Y.A., S.D.K.; Materials: A.A., A.K., C.Ç.; Data: A.A., C.Ç.; Analysis: A.A., A.K., C.Ç., Y.A.; Literature search: A.A., C.Ç., U.Y., S.D.K.; Writing: A.A., A.K., C.Ç., Critical revision: A.A., A.K., C.Ç., Y.A.

Conflict of Interest

None declared.

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Çocuk Hastada Gelişen *Elizabethkingia Meningoseptica* Bakteriyemisi: Olgu Sunumu

Elizabethkingia meningoseptica, insanlarda nadir fakat ciddi enfeksiyonlara neden olabilen gram negatif bir bakteridir. Burada immünkompetan bir çocuk hastada *Elizabethkingia meningoseptica*'ya bağlı sepsis olgusunu sunuyoruz. Otuz iki aylık kız çocuğu serebral palsi tanısıyla çocuk yoğun bakım ünitesinde takip edilirken ateş ve genel durum bozukluğu geliyor. Laboratuvar sonuçları, 18600/mm³ beyaz kan hücresi (WBC) sayısı, 9.0 g/dl hemoglobin seviyesi, 186000/mm³ trombosit sayısı, 17.5 mg/L (0–5 mg/L) C-reaktif protein seviyeleri gösterdi. Klinik sepsis şüphesi ile vankomisin (60 mg/kg/24h: Q6h) ve sefepim (150 mg/kg/24h: Q8h) ampirik tedavisine başlandı. Kan kültüründe trimetoprim//Sülfametoksazol ve siprofloksasine duyarlı *Elizabethkingia meningoseptica* olarak sonuçlanmıştır. Hasta trimetoprim//Sülfametoksazol artı siprofloksasin ile 14 gün başarıyla tedavi edildi.

Anahtar Sözcükler: Bakteriyemi; *Elizabethkingia meningoseptica*; pediatri.