Case Report / Olgu Sunumu

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A Case of *Elizabethkingia meningoseptica* in the Neonatal Intensive Care Unit

Yenidoğan Yoğun Bakım Ünitesinde *Elizabethkingia meningoseptica* Olgusu

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Abstract

Elizabethkingia meningoseptica (*E. meningoseptica*) is a Gram-negative rod that is commonly found in the natural environmental such as soil, plants, foodstuffs, water but is rarely causes human infection. It can cause many clinical conditions like urinary tract infection, meningitis, septicemia, osteomyelitis, necrotizing fasciitis, cellulitis, endocarditis, abdominal abscess, endophthalmitis. Especially immunosuppressed patients and premature infants are risky groups for *E. meningoseptica* infections. The case was born in another center by cesarean section at 36th gestational week and 2.830 grams and was referred to our hospital with the diagnosis of prematurity, respiratory distress, septicemia, stage 4 intraventricular hemorrhage, hydrocephalus on the 27th postnatal day. The patient had no laboratory findings suggestive of infection other than elevated C-reactive protein level in his routine examinations and an external drainage catheter was implanted because of hydrocephalus. *E. meningoseptica* was produced in the cerebrospinal fluid sample taken simultaneously. Empirically, meropenem, colistin and vancomycin treatments were initiated and the treatment was not changed according to the culture antibiogram results. Infant was discharged 45 days after hospitalization. Neonatal meningitis caused by *E. meningoseptica* is fatal in more than half of the cases. In this case, it was aimed to draw attention to the importance of early diagnosis and treatment of microorganism, as well as virulence in terms of clinical course.

Keywords: Newborn, BOS, *E. meningoseptica*

Öz

Elizabethkingia meningoseptica (*E. meningoseptica*) genellikle toprak, bitki, gıda maddeleri, su gibi çevre ortamında yaygın olarak bulunan, nadiren insanda enfeksiyona neden olan, Gram-negatif çomaktır. Üriner sistem enfeksiyonu, menenjit, sepsis, osteomyelit, nekrotizan fasiit, selülit, endokardit, abdominal apse, endoftalmit gibi pek çok klinik tabloya neden olabilmektedir. İmmünosuprese hastalar, prematüre bebekler *E. meningoseptica* enfeksiyonları açısından riskli gruplardır. Olgu, başka bir merkezde sezaryan ile 36 haftalık, 2,830 gram olarak doğmuş ve prematürite, solunum sıkıntısı, sepsis, evre 4 intraventriküler kanama, hidrosefali tanılarıyla, şant takılmak üzere postnatal 27. günde hastanemize sevk edilmiştir. Rutin tetkiklerinde C-reaktif protein düzeyi yüksekliği dışında enfeksiyon varlığını düşündürecek herhangi bir laboratuvar bulgusuna rastlanmayan olguya, hidrosefali nedeni ile eksternal drenaj kateteri takılmış, bu sırada alınan beyin omurilik sıvısı örneğinde *E. meningoseptica* üretilmiştir. Ampirik olarak meropenem, kolistin ve vankomisin tedavileri başlanan olgunun kültür antibiyogram sonucuna göre tedavisi değiştirilmemiş olup, yatışından 45 gün sonra taburcu edilmiştir. *E. meningoseptica*'nın neden olduğu neonatal menenjit, olguların yarısından çoğunda fatal seyirlidir. Bu olgu ile mikroorganizmanın erken teşhis ve tedavisinin yanı sıra virülansının klinik seyir açısından önemli olduğuna dikkat çekmek istenmiştir.

Anahtar Kelimeler: Yenidoğan, BOS, *E. meningoseptica*

Introduction

E. meningoseptica, previously known as CDC Group IIa, *Flavobacterium meningosepticum* (1959), *Chryseobacterium meningosepticum* (1994), is from the *Flavobacteriaceae* family, and a non-motile, catalase, oxidase and indole positive, non-glucose fermenting, Gram-negative aerobic rod.[1-3] It is commonly found in environmental media such as soil, plants, foodstuffs, and water.[3,4] After 24 hours of incubation at 37° on blood agar, it forms 1-2 mm in size, smooth-edged (Smoth=S) colonies with slight yellow pigmentation. It is naturally

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resistant to third and fourth generation cephalosporins, carbapenems, aztreonama, and aminoglycosides used in the prevention of infections caused by Gram-negative microorganisms.[1,4] However, *E. meningoseptica*, which is frequently sensitive to antibiotics effective against Gram-positive microorganisms such as rifampin, vancomycin, and clindamycin, may rarely cause infection in humans, but may occur in sporadic cases and epidemics.[1,3,4] Immunosuppressed patients, premature babies, and especially newborns receiving multiple antibiotic therapy are at risk of being infected with these microorganisms.[5,6] They frequently cause meningitis, and secondly, bacteremia.[6] Neonatal meningitis has a fatal course in more than half of the cases, and complications such as hydrocephalus, deafness, and brain abscess are frequently seen in survivors.[3,7]

In this case, a newborn patient with *E. meningoseptica* growth in CSF culture while in the intensive care unit is discussed.

Case Report

The patient, who was born with a cesarean section from a 34-year-old mother at 36 weeks and weighed 2.830 grams in another center and was followed up with the diagnoses of prematurity, respiratory distress, sepsis, and stage 4 intraventricular hemorrhage, developed hydrocephalus, and was referred to our hospital on the postnatal 27th day for a shunt. It was learned that after the delivery, the patient was given respiratory support with a mechanical ventilator for 7 days, fluid support with an umbilical vein catheter for 12 days, total parenteral nutrition support for 6 days, ampicillin, gentamicin for 5 days, and vancomycin and meropenem for 22 days.

In the physical examination of the patient who was hospitalized in the neonatal intensive care unit, it was detected that the patient had: Height 48 cm (10-25 percentile), body weight 2.780 grams (10-25 percentile), head circumference 36 cm (90 percentile), heart rate 112/min, respiratory rate 40/min, body temperature as rectal 37 °C and normal values. His general condition was moderate, hypotonic, hypoactive, respiratory sounds, heart and abdominal examination were normal, suction was weak, fontanelle was found to be curved, hemoglobin was 10.2 g/dL, white blood cell was 16.200/mm^3, in peripheral smear 50% lymphocytes, 24% polymorph core. leukocytes, 10% rods, 16% metamyelocytes were seen and platelet count was found to be 427,000/mm^3. In other routine biochemistry and microbiology tests, there was no finding suggesting the presence of infection other than a high C-reactive protein level (39 mg/L), and the patient's *Toxoplasma*, CMV, *Rubella* IgM and IgG were also negative. When the patient was evaluated radiologically, there was bilateral mild infiltration in the chest X-ray, severe dilatation in the third, fourth and both lateral ventricles in the cranial tomography, effacement in the hemispheric sulcus and fissures, partial thinning of the cerebellar and cerebral parenchyma, and partial decrease in density in the white matter. CSF samples were taken from the patient, who had an external drainage catheter due to hydrocephalus, and sent to the biochemistry and microbiology laboratories. When the sample was examined biochemically, it was determined that the protein increased 403 mg/dL, glucose <5 mg/dL decreased, and the cell increased 20x104/mL. Gram and Giemsa stains were made from the CSF sample sent to the microbiology laboratory, inoculated on blood agar, MacConkey agar, Sabouraud dextrose agar and chocolate agar for culture and incubated in an oven with carbon dioxide at 37° for 16-24 hours. Abundant PNL and Gram-negative *Coccobacilli* were observed in the direct Gram stain evaluation of the sample. The next day, small, dull colonies grew on blood agar, Gram staining of the colonies showed that the microorganism was Gram-negative rod, and catalase, oxidase and indole tests were evaluated as positive. The bacterium was identified as *E. meningoseptica* by MALDI-TOF MS (Bruker, Germany) and Vitek 2 (BioMérieux, France) systems. Since the Vitek 2 device was not sensitive to microorganisms, Kirby-Bauer disk diffusion test was performed in line with EUCAST's recommendations, and the zone diameters were calculated as piperacillin-tazobactam 25 mm, trimethoprim-sulfamethoxazole 25 mm, and ciprofloxacin 28 mm. For carbapenems, aminoglycosides, colistin, and second and third generation cephalosporins, the zone diameter was 0 mm. Vancomycin susceptibility was evaluated with both Kirby-Bauer disc diffusion method (20 mm) and gradient test (0.75 µg/mL) (MIC Test Strips, Bioanalyse, Turkey).

Empirically, intravenous meropenem, colistin and vancomycin treatments from external ventricular shunt were initiated, and the patient's treatment was not changed according to the culture antibiogram results. In the follow-up, it was observed that the CSF protein decreased from 403 to 96 mg/dL and there was no growth in the control CSF cultures. All treatments were discontinued on the 21st day and the external shunt was removed, and then a permanent ventriculoperitoneal shunt was inserted. The patient was discharged because there were no signs of shunt dysfunction.

Discussion

E. meningoseptica was first described as a meningitis agent under the name *Flavobacterium meningosepticum* in an article published in 1959.[8] Bacteria appear as neonatal meningitis in the first two weeks of life in premature infants and are reported as an opportunistic nosocomial pathogen in more than 75% of cases in infants ≤3 months old.[3,4] In

the development of infection, especially prematurity is the primary risk factor for the host, and mortality rates are quite high in infants with low birth weight (<2.500 grams).[9,10] Other risk factors are suppression of the immune system, underlying medical diseases, long hospital stay, use of broad spectrum antibiotics, chronic dialysis, and use of invasive devices such as central venous catheters.[9,11]

In our case, the patient was born 36 weeks old, 2.830 g and was diagnosed with prematurity, respiratory distress, sepsis, stage 4 intraventricular hemorrhage, hydrocephalus and was referred to our hospital for treatment. He was a risky newborn for *E. meningoseptica* infections due to mechanical ventilator support, need for central venous catheter, broad-spectrum antibiotics and the use of total parenteral nutrition.

The source of infection in infants is usually colonization of *E. meningoseptica* in their noses, respiratory systems or gastrointestinal systems.[4] In various studies, it has been shown that bacteria are prone to colonization on surfaces such as faucets, mechanical ventilators, washing solutions, some disinfectants, baby feeding liquids, injectors, and bed rails.[4,12,13] The effectiveness of chlorination for disinfection in hospital water systems and even municipal water facilities is insufficient on this bacteria.[4]

Since the case was the only case seen in our hospital, it is thought that colonization and even infection of *E. meningoseptica* produced in the CSF culture taken during shunt insertion developed before the patient was referred to our hospital.

Bacteria produce chromosomally simultaneous metallo beta-lactamases and broad-spectrum beta-lactamases, and thus have intrinsic resistance to many antibiotics, including polymyxins and tigecycline. This feature reduces treatment options.[14] In a study, the mortality rate was found to be 57% in cases of meningitis caused by *Elizabethkingia*.[10] It is also thought that early diagnosis and treatment, and even empirical treatment, are very important in reducing mortality rates.[10] Although some studies suggest the use of vancomycin alone in infections caused by *E. meningoseptica*, Kirby et al.[7] found that antimicrobial agents used in infections with vancomycin and other Gram-positive microorganisms showed weak activity against this bacterium.[15] In various *in vitro* studies, while the combination of intravenous vancomycin and rifampin is recommended in neonatal meningitis cases caused by *E. meningoseptica*, it is also stated that the combination of meropenem and vancomycin should be avoided due to its antagonistic effect.[15] In addition, studies have reported that new quinolones are promising in the treatment of *E. meningoseptica* infections.[7,15] In our case, empirical intravenous meropenem, external ventricular shunt colistin and vancomycin treatments were started, but according to the patient's culture results, no quinolone antibiotic was added to the treatment.

Bacteremia is the second most common manifestation of *E. meningoseptica* infections in both newborns and adults. Mortality in infants is lower than meningitis. In their literature review, Bloch et al.[10] also found that bloodstream infections were associated with contaminated anesthetics in nine of 15 cases, systemic symptoms disappeared within 72 hours without specific antibiotic therapy, this is an indication of low virulence of the bacterium, and it was cleaned quickly by the the bacterium's immune system in a normal host.[7]

In this case, it is thought that the patient's discharge without changing the empirical treatment according to the culture result is due to the low virulence of the microorganism, the early vancomycin treatment started from the external ventricular shunt, and the supply of infected CSF drainage with the inserted shunt.

Like many microorganisms that rarely cause infection, there are no standardized *in vitro* antimicrobial susceptibility tests for *E. meningoseptica* and limit value ranges in which the results can be evaluated, therefore, treatment approaches for such microorganisms are formed by clinical experience.

The liquid microdilution method is the valid method for antibiotic susceptibility results of *E. meningoseptica*. However, since the liquid microdilution method was not studied in our laboratory, the zone diameters determined by the Kirby-Bauer disk diffusion method were considered as a guide.

Information

Our case was presented as a poster at the 5th National Congress of Clinical Microbiology. Poster no: P211 (28 October-1 November 2019, İzmir).

Ethics

Informed Consent: Informed consent was obtained.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: H.D., Y.Ü.S., Concept: İ.K., Design: İ.K., Y.Ü.S., Data Collection or Processing: H.D., İ.K., Analysis or Interpretation: İ.K., Y.Ü.S., Literature Search: H.D., İ.K., Writing: H.D., İ.K.

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