PRIKAZ SLUČAJA – CASE REPORT

Late-onset Neonatal Sepsis due to Elizabethkingia Meningoseptica

Kasna neonatalna sepsa uzrokovana sa Elizabethkingia meningoseptica

Vesna Petrovic[1], Tanja Rozek-Mitrovic[1]

[1]Primary Health Care Center "Dr Milorad Mika Pavlovic", Indjija, Serbia

Summary

Inroduction Elizabethkingia meningoseptica is well distributed in hospitals but also in community environments. It rarely causes infections in an immunocompetent host or in hosts who haven't had a prolonged hospital stay. Premature birth is the major risk factor for neonates. Our objective is to report two cases of late-onset neonatal sepsis from Primary-care pediatrician's perspective, as well as to point out E.meningoseptica as the causative agent.

Case report We report cases of two neonates who were patients of the same pediatrician practice at the Primary Health Care Center and were born in the same maternity hospital within five days. They were not on a prolonged hospital stay. One was a preterm neonate, who was ventilated and on 5-day antibiotic treatment and negative infection markers when discharged. He was at home for 8 days, and the other one was a term neonate who was at home for 14 days from the maternity hospital having been discharged until the beginning of symptoms. In that time the term neonate had brief contact with health care services for twice, but portal of entry was not confirmed by laboratory tests.

Conclusion Primary care pediatricians should always take a careful history (maternal and infant risk factors) and observe a febrile neonate as a possible case of sepsis. Early recognition is the most important factor in decreasing the morbidity and mortality from neonatal sepsis.

Key words: bacterial sepsis, infection, neonatal period, primary health care

Sažetak

Uvod Elizabethkingia meningoseptica je dobro rasprostranjena u bolnicama, ali i u svim socijalnim okruženjima. Retko izaziva infekcije kod imunokompetentnog domaćina ili kod domaćina koji nisu imali produženi boravak u bolnici. Prevremeni porođaj je glavni faktor rizika za novorođenčad. Naš cilj je da prikažemo dva slučaja kasne neonatalne sepse iz ugla pedijatra primarne zdravstvene zaštite, kao i da istaknemo E.meningoseptica kao uzročnika.

Prikaz slučaja Prikazujemo slučajeve dvoje novorođenčadi koji su bili pacijenti iste pedijatarske ordinacije u Domu zdravlja i rođeni su u istom porodilištu u razmaku od pet dana. Nisu bili na produženom boravku u bolnici. Jedno je bilo prevremeno rođeno novorođenče, koje je ventilirano i na 5-dnevnom tretmanu antibiotikom i sa negativnim markerima infekcije na dan otpusta iz bolnice. Preveremeno rođeno novorođenče je bilo kod kuće 8 dana. Drugo je bilo terminsko novorođenče koje je bilo kod kuće 14 dana od otpusta iz porodilišta do pojave simptoma. Za to vreme terminsko novorođenče je dva puta imalo kratak kontakt sa zdravstvenim službama, ali laboratorijskim testovima nije potvrđeno ulazno mesto infekcije.

Zaključak Pedijatri primarne zdravstvene zaštite treba uvek pažljivo da uzmu anamnezu (faktori rizika za majku i bebu) i posmatraju febrilno novorođenče kao mogući slučaj neonatalne sepse. Rano prepoznavanje je najvažniji faktor u smanjenju morbiditeta i mortaliteta novorođenčadi.

Ključne reči: bakterijska sepsa, infekcija, neonatalni period, primarna zdravstvena zaštita

Introduction

Neonatal sepsis is a diagnosis made in infants less than 28 days of life and consists of a clinical syndrome that may include systemic signs of infection, circulatory shock, and multisystem organ failure. Late-onset neonatal sepsis (LONS) has been characterized as occurring after 24 hours or after the first week of life, up to 28 days or 1 month (1).

Elizabethkingia meningoseptica is a gram-negative bacillus that is widely distributed in hospitals but also in the community environment. It is a multi-drug-resistant organism that is associated with high mortality and morbidity in newborns and immunocompromised patients. Infection in neonates most commonly presents with meningitis and bacteremia (2, 3, 4). We report two cases of late-onset neonatal sepsis due to E.meningoseptica in two neonates from the same local community who were patients at the same pediatric practice and were born at the same maternal hospital within five days.

Case Reports

Case 1

A child was born by Caesarean delivery at 35 weeks' gestation, with 2500g birth weight and AS 8/9 (Table 1).

Table 1. Birth characteristics and markers of infection of presented cases

		Case 1	Case 2
Sex		Male	Male
Birth Characteristics	Week of gestation	34 1/7	40 6/7
	Birth weight (g)	2500	3470
	Apgar score	8/9	10/9
	Delivery	Caesarean	Vaginal
Markers of Infection	CRP mg/l	140.1	80
	Le G/l	15.89	18.9
	Neu G/l	11.64	10.1
	Er T/l	5.07	3.83
	Hgb g/l	170	126
	Trc G/l	290	404
	Rectal temperature	39.4	38.8
	Hemoculture	Positive E.Meningoseptica	Positive E.Meningoseptica
	Cerebrospinal fluid culture	Positive E.Meningoseptica	Negative

He was the second twin naturally conceived by a 24-year-old woman. After birth he was ventilated because of signs of respiratory distress. He had received a 5-day intravenous course of antibiotics (ampicilin, gentamicin), then the sepsis workup was negative (CRP and blood cultures taken in the neonatal intensive care unit) and after seven days he was discharged home. Until 16th day of life he had no contact with health care service.

On the 16th day of life he was presented in the Primary-care pediatrics as a preterm male neonate with a history of fever (rectal temperature 38.5°C), irritability and reduced feeding. All symptoms started on the afternoon the day before the exam. On initial physical examination, he was febrile (rectal temperature 39.4°C), pale, conscious, and crying monotonously. Mild tachypnea, abdominal distension, normal heart sounds, variable muscle tone and incomplete primitive reflexes were noted.

Markers for infection were high (CRP 140.1 mg/l, Le 15.9 G/l, Ne 11,64 G/l). After Primary-care pediatrician' exam he was sent to the tertiary care hospital. According to the discharge note, on the first day of hospitalization a lumbar puncture indicated purulent meningitis (cloudy cerebrospinal fluid appearing in fast droplets) so empirical double intravenous antibiotic therapy was introduced (meropenem, vancomycin). The first hemoculture and cerebrospinal fluid culture were positive for E.meningoseptica. Then the treatment was changed according to the antibiotic susceptibility pattern of the isolated bacteria (trimetoprim-sulfametoxazole, levofloxacin and vancomycin). Hemoculture was negative after three days of the beginning of the therapy, but cerebrospinal fluid culture has still been positive.

As the markers for infection gradually normalized and cerebrospinal fluid culture became negative, on the 10th day of hospitalization he was moved from intensive care unit to neonatal care unit. He was hospitalized for 60 days because he developed post-infectious hydrocephalus, requiring ventriculo-peritoneal shunt insertion. He was operated on 48th day of hospitalization. After discharging he has follow up by neonatologist, immunologist, physiatrist and neurosurgeon.

Case 2

The patient was born by vaginal delivery 6 days after 40 weeks' gestation with 3470 g birth weight and AS 10/9. He was the second child from his mother's second pregnancy. He was discharged home 3 days after birth from the maternity hospital. He had an umbilical polyp and was under the control of a neonatal surgeon.
The last visit to the surgeon was three days before his illness started. In the 19th day of life he was presented in the Primary-care pediatrics as a term male neonate whose symptoms started on the evening before a pediatrician's examination. He was lethargic and sleepy but not refusing meals, and became febrile on the morning of the examination (rectal temperature 38.6°C).
On initial physical examination, the neonate was conscious and febrile (rectal temperature 38.8°C). He had abdominal distension, mild tachycardia and normal breathing, increased muscle tone and incomplete primitive reflexes. Markers for infection were high (CRP 80 mg/l, Le 18.9 G/l, Ne 10.1 G/l). He was sent to the tertiary care hospital. According to the discharge note, after hospital admission a lumbar puncture excludes meningitis then empirical double intravenous antibiotics therapy was introduced (ceftazidim, vancomycin).

The first hemoculture was positive for E.meningoseptica, but cerebrospinal fluid culture and the umbilical swab were negative. Antibiotics were changed according to the antibiotic susceptibility pattern of the isolated bacteria (ciprofloxacin, vancomycin). Hemoculture was negative after three days of the beginning of the therapy. He was discharged home after 16 days of hospitalization. After discharging he was followed by neonatologist and physiatrist for a year.

Discussion

In neonates LONS is an uncommon but very serious infection with a significant mortality and morbidity in those who survived.

Among hospitalized newborns the reported incidence of LONS is 0.61% to 14.2% (5). A positive culture is the gold standard for the diagnosis of neonatal sepsis (6). Physicians must recognize any factor (maternal or infant) that may increase an infant's risk of developing sepsis. If treated early in full-term neonates prognosis of sepsis is good, but this is not the case for premature ones (1, 7).

E.meningoseptica manly infects neonates but also all immunocompromised patients. Some studies reported that the annual incidence of E.meningoseptica infection was 0.01 per 1000 hospital admissions in 2009, and then increased to 0.04 per 1000 admissions from 2016–2017. Half of the reported E.meningoseptica infections involve neonates who weighed less than 2,500 grams at birth (8, 9). In the community environment E.meningoseptica can be found in plants, soil, and fresh and marine water, and in health-care settings it is commonly found in saline solutions used for the reconstitution of antibiotics, and in water sinks and tanks (2, 4).

Even if it only accounts for approximately 1%–21% of all Elizabethkingia pathogens isolated from clinical specimens, most cases of this infection were connected to health care-associated infections (10). In our report we had two infants who were born in the same maternal hospital within five days. They were not on a prolonged hospital stay (longer than 2 weeks). And after dischargement from maternal hospital they had the same living place. Preterm neonate had 2500 g birth weight and was at home for 8 days and the term neonate was at home for 14 days until the symptoms begun. In that time the term neonate had contact with health care service twice, but suspected portal of infection entry was not confirmed by laboratory tests (navel swab). According to all these findings more epidemiological research should be done to find the cause of infection.

Meningitis due to E.meningoseptica is the most common infection in premature newborns and infants, with a reported death rate of over 50%, and bacteremia is the second most common presentation. E.meningoseptica is resistant to many antimicrobial agents with no standard guidelines for empirical treatment (4, 11). Successful treatment of E.meningoseptica meningitis using a combination therapy of vancomycin with other antibiotics has been presented in some reports (12). Vancomycin with other antibiotics was parenteral therapy of both presented hosts and both of them survived but the preterm patient with neurological sequela.
In some studies the mortality rate from all E.meningoseptica infections was 15.4 %, and neurological morbidity in patients with bacteremia and meningitis was 75 % (13).

Both neonates in this case report had late-onset neonatal sepsis (positive blood cultures), and preterm one had a meningitis due to E.meningoseptica (positive cerebrospinal fluid culture). On the other hand, E.meningoseptica rarely causes infection in post neonatal immunocompetent hosts (14), and not all neonates exposed to this organism became ill. The study by Maraki S. et al suggested that E.meningoseptica colonization in neonates does not necessarily lead to infection (15).

These case reports are very representative for LONS, but cause of epidemiological data lacking we couldn't say if this is hospital or community acquired sepsis.

E.meningoseptica is well distributed in hospitals but also in community environments. It rarely causes infection in immunocompetent hosts and in hosts who have not been on a prolonged hospital stay. Premature birth is a major risk for neonates. Primary care pediatricians should always take a careful history (maternal and infant risk factors) and observe febrile neonates as possible cases of sepsis. Early recognition is the most important factor in decreasing the morbidity and mortality in neonatal sepsis.

Declaration of Patient Consent: The authors certify that they obtained all appropriate patient consent forms. In the forms, the patients gave their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity. We received no financial support or sponsorship.

References

1. Ershad M, Mostafa A, Dela Cruz M, Vearrier D. Neonatal Sepsis. Curr Emerg Hosp Med Rep. 2019; 7(3):83-90.
2. Güngör S, Ozen M, Akinci A, Durmaz R (2003) A Chryseobacterium meningosepticum outbreak in a neonatal ward. Infect Control Hosp Epidemiol 24:613–17.
3. Chan JC, Chong CY, Thoon KC, Tee NWS, Maiwald M, Lam JCM et al. Invasive paediatric Elizabethkingia meningoseptica infections are best treated with a combination of piperacillin/tazobactam and trimethoprim/sulfamethoxazole or fluoroquinolone. J Med Microbiol. 2019; 68(8):1167-72.
4. Ceyhan M, Celik M. Elizabethkingia meningosepticum (Chryseobacterium meningosepticum) Infections in Children. Int J Pediatr. 2011; 2011:215237.
5. Dong Y, Speer CP. Late-onset neonatal sepsis: recent developments. Arch Dis Child Fetal Neonatal Ed. 2015; 100(3): F257-63.
6. Iroh Tam PY, Bendel CM. Diagnostics for neonatal sepsis: current approaches and future directions. Pediatr Res. 2017; 82(4): 574–83.
7. Avva U, Mueller M. Fever In A Neonate. [Updated 2021 August 31]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482196/
8. Choi MH, Kim M, Jeong SJ, Choi JY, Lee IY, Yong TS, et al. Risk Factors for Elizabethkingia Acquisition and Clinical Characteristics of Patients, South Korea. Emerg Infect Dis. 2019; 25(1): 42-51.
9. Güngör S, Ozen M, Akinci A, Durmaz R. A Chryseobacterium meningosepticum outbreak in a neonatal ward. Infect Control Hosp Epidemiol. 2003; 24(8):613-7.

10. Lin JN, Lai CH, Yang CH, Huang YH. Elizabethkingia Infections in Humans: From Genomics to Clinics. Microorganisms. 2019; 7(9):295.
11. Bennett JE, Dolin R, Blaser MJ. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases 8th Edition. Elsevier Health Sciences. 2014; 293.
12. Tai IC, Liu TP, Chen YJ, Lien RI, Lee CY, Huang YC. Outbreak of Elizabethkingia meningoseptica sepsis with meningitis in a well-baby nursery. J Hosp Infect. 2017; 96(2):168-71.
13. Jean SS, Lee WS, Chen FL, Ou TY, Hsueh PR. Elizabethkingia meningoseptica: an important emerging pathogen causing healthcare-associated infections. J Hosp Infect. 2014; 86:244–9.
14. Barnawi AI, Kordy FN, Almuwallad OK, Kassarah KA. Early neonatal sepsis and meningitis caused by Elizabethkingia meningoseptica in Saudi Arabia. Saudi Med J. 2020; 41(7):753-6.
15. Maraki S, Scoulica E, Manoura A, Papageorgiou N, Giannakopoulou C, Galanakis E. A Chryseobacterium meningosepticum colonization outbreak in a neonatal intensive care unit. Eur J Clin Microbiol Infect Dis. 2009; 28(12):1415-9.

Primljen/Received:18.1.2023**.**
Prihvaćen/Accepted: 11.3.2023.

Correspondence to:
Vesna Petrovic
Novosadska, 22320 Indjija, Serbia
Mail: dr.vesna.petrovic@gmail.com