Citrobacter koseri

Citrobacter is a Gram-negative bacilli from the Enterobacteriaceae family that colonize the human gastrointestinal and urogenital tract. They produce sepsis, focal infections and less frequently affect the central nervous system, where they are responsible for 1.3 % of cases of neonatal meningitis [1)].

Two transmission mechanisms for Citrobacter species have been described in the neonatal period: vertical and horizontal (mainly nosocomial infection). The onset of symptoms in the first days of life suggests vertical transmission, although it is often difficult to isolate the pathogen in the mother [2)].

Pathogenesis

The pathogenesis of Citrobacter meningitis and brain abscess in humans is still not clear. During experimental central nervous system (CNS) infection in neonatal rats, C. koseri resides primarily intracellularly within macrophages and neutrophils. Accumulation of necrotic tissue and infiltrating phagocytes results in expansion of the brain abscess. Some instances of intraparenchymal abscesses do not follow the classic pattern of common cerebral abscesses and lack a fibrous capsule [3)].

Treatment

Citrobacter koseri treatment.

Complications

Multilocus hydrocephalus is a frequent complication that requires the use of complex drainage techniques; intraventricular urokinase can also be used [4)].

Outcome

The mortality rate for a central nervous system (CNS) infection with CK is 30 %. Of those who survive, 80 % of individuals present with serious neurological damage requiring long-term monitoring [5)].

Case reports

Algubaisi et al. reported on a 6-week-old infant with multiple brain abscesses caused by Citrobacter koseri that resolved after treatment with combined surgical drainage and intravenous therapy with meropenem and fosfomycin [6)].

Brain abscess caused by Citrobacter koseri infection in an adult is extremely rare, and only 2 cases have been described. Here, we reported a 73-year-old male presenting with a 3-week headache. A history of diabetes mellitus was noted. The images revealed a brain abscess in the left frontal lobe and pus culture confirmed the growth of Citrobacter koseri. The clinical symptoms improved completely postoperatively [7)].

Nuñez Cuadros et al. reported 3 cases with good outcome [8)].

Pyogenic spinal epidural abscess Is an uncommon Infectious occurrence. Clinical prospects of pyogenic spinal epidural abscess are graver if not promptly diagnosed and treated appropriately. A case of spinal epidural abscess has been presented with sinus tract formation at L4-L5 level, of pyogenic aetiology that progressed to paraplegia over the course of the disease. MRI pointed towards an epidural abscess extending from T12 vertebral level to S1 vertebral level. Surgical decompression in the form of laminectomy and evacuation of pus was done and antibiotics were given according to culture and sensitivity. Histopathological analysis revealed the acute suppurative nature of the abscess. Citrobacter kasori was isolated on pus culture. Pyogenic epidural abscess with causative organism being Citrobacter kasori has least been documented [9)].

After a 36-week diamniotic dichorionic gestation, an infant was delivered by elective caesarean section due to growth restriction and altered diastolic flow in the umbilical artery. Birth weight was 2140 g. The patient was admitted for exclusive parenteral nutrition, with umbilical venous catheter placement. Sinus tachycardia and temperature instability with positive inflammatory markers occurred at 51 h. Penicillin and gentamicin were started, but 6 h later septic shock with disseminated intravascular coagulation was noted. Vancomycin and meropenem were started and penicillin suspended. Citrobacter koseri was isolated from blood culture. Generalised clonic convulsions occurred on day 4, and an electroencephalogram revealed severe encephalic dysfunction. Cerebrospinal fluid cytochemical analysis was suggestive of meningitis, although culture was negative. Cefotaxime was added to the drug regimen. Cranioencephalic MR showed a temporal abscess and diffuse hemispheric destruction, with no indications for neurosurgery. After 6 weeks of therapy, neuroimaging follow-up showed multiloculated cystic encephalomalacia. Currently, the patient is 14 months old with axial hypotonia and decreased movements. The source of infection has not been determined. Nosocomial infection cannot be excluded and vertical transmission is unlikely. [10)].

Chowdhry et al. performed a retrospective review of two cases of C. koseri brain abscesses along with a review of the literature regarding diagnosis and treatment.

Early aggressive surgical and medical treatment resulted in favorable outcomes for two children with C. koseri brain abscesses, one diagnosed at 6 weeks of age and the other at 2 months of age.

C. koseri brain abscesses can be devastating and have been associated historically with significant

morbidity and mortality. However, favorable outcomes are possible, and aggressive surgical and medical management should be considered for patients with C. koseri abscesses. [11].

A 2-month-old girl developed meningitis, ventriculitis and brain abscess in the course of Citrobacter koseri infection. She was successfully treated with the combined use of antibiotics, intra-cavitary urokinase and surgery, thus avoiding the development of hydrocephalus and of ventricular loculation. C. koseri is a Gram-negative pathogen with a strong predilection for the neonatal brain. Brain abscesses develop in roughly 77% of cases, causing severe neurological sequels in one-half and death in one-third of patients. The authors aim to report the role of neurosurgical treatment for managing the severe complications that may arise in the course of C. koseri brain infection and the use of urokinase for preventing the development of loculated hydrocephalus [12].

Lind et al. reported the second case of a Citrobacter-associated brain abscess in an adult and the first report of its association with an intradural tumor. Excluding those associated with trauma, neurosurgical procedures, and proximity to the skull base, only seven other cases of abscesses associated with intracranial tumors have been published. Five of seven tumor-associated abscesses with a microbiological diagnosis involved gram-negative bacteria, a finding that may indicate a predilection of these microorganisms for intracranial tumors. This 78-year-old female patient presented with a 6-month history of confusion and personality changes. Her medical history included paroxysmal atrial fibrillation and a 10-day course of high-dose dexamethasone but no other predisposing conditions for sepsis. She was afebrile, had no focal neurological deficits, and had no systemic abnormalities on examination. Computed tomographic imaging revealed a noncalcified, homogeneously enhancing, 3-cm-diameter, extra-axial tumor associated with the right anterior falx cerebri. The tumor did not extend to the skull base. At craniotomy, 10 to 20 ml of thick pus was found around the posteroinferior surface of the tumor. On extended culture, this material demonstrated Citrobacter koseri growth, which was effectively treated with ceftriaxone followed by meropenem and one repeated abscess aspiration. No systemic source of the infection was found.

The characteristic endothelial invasiveness of Citrobacter and related gram-negative bacteria may predispose to the formation of abscesses in association with intracranial tumors. [13].

Agrawal and Mahapatra described a case of a newborn with Citrobacter koseri meningitis with multiple brain abscesses, with a successful outcome following multiple burr-hole aspirations and prolonged antibiotic therapy. An aggressive surgical approach combined with intravenous antibiotics (including imipenems, to which the organism is very sensitive) for a minimum of 4 weeks appears to improve the outcome of infection with this virulent organism [14].

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