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Article

Elizabethkingia meningoseptica causing meningitis after decompressive craniectomy for traumatic brain injury in a immunocompetent adult: Serious Neurocritical care Concern

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Elizabethkingia meningoseptica causing meningitis after decompressive craniectomy for traumatic brain injury in a immunocompetent adult: Serious Neurocritical care Concern

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Abstract: Elizabethkingia is aerobic Gram negative bacteria is widely distributed in soil, food and food. It is very rarely pathogenic for human and especially those who are immunocompromised and various risk factors includes intravenous catheter, ventilatory support. We report a case, who had undergone decompressive craniectomy for traumatic brain injury, developed meningitis, CSF culture showed growth of Elizabethkingia and treated successfully with antibiotics therapy. This study reminds that rare pathogen should also be considered as causative organism for meningitis especially in postoperative cases and it responds well to antimicrobial therapy.

Key words: Meningitis, post-decompressive surgery, immunocompetent host, treatment

Introduction

Elizabethkingia meningoseptica, previously termed as Flavobacterium meningosepticum or Chryseobacterium meningosepticum is an aerobic Gram-negative, rod-shaped bacterium (15).

It is a rare human pathogen, widely distributed in soil, plants, food and potable water and wet surface in the hospital environment. It can cause serious infections in immunosuppressed and intubated patients with prolonged mechanical ventilation. Intravascular devices such as intravenous catheter, urinary catheter, intravascular

implant are important risk factors.

Historically, it was associated with neonatal meningitis and sepsis, first identified by King Elizabeth in 1959 (7).

Subsequently, outbreaks of neonatal meningitis, septicaemia and pneumonia in severely immunocompromised and prolonged ventilated individuals were reported. E. meningoseptica is considered inherently resistant to the usual empiric therapy aimed at Gram-negative bacilli. Authors report a rare case of meningitis caused by E. meningoseptica in an adult operated for severe head injury, managed at tertiary care trauma centre.

Case illustration

A 26-year-old patient was admitted with acute subdural haemorrhage following road traffic accident with Glasgow coma scale of E1VtM2 and underwent decompressive craniectomy and discharged from hospital with GCS of E1VtM3 status. Two months following discharge, he was readmitted with high grade fever. On admission vitals were stable with tense bulging flap on decompressive craniectomy site and neck rigidity. Routine urinary examination, haematological and biochemistry tests were carried out. Repeat computed cranial tomography scan revealed presence of presence of hydrocephalus associated with gross dilatation of ventricles. An emergency CSF diversionary procedure, external ventricular drain placement was performed. CSF sample sent for bacterial cultures identified the isolated bacterium as gram negative bacilli, *E. meningoseptica*.

CSF sugar level was 30 mg/dl and CSF protein was 240mg/dl. The isolate was sensitive to piperacillin-tazobactam, cotrimoxazole, tigecycline and vancomycin. Patient was treated with intravenous antibiotics according to culture sensitivity for three weeks, to which he responded favourably.

Discussion

E. meningoseptica, is a non-fermentor Gram-negative bacillus, widely found in water, soil and wet surfaces of the hospital environment. Environmental studies have indicated that this organism can survive even

in chlorine-treated water, colonizes in sink basins and taps and ventilator tubing (15).

Most of the reported cases are of neonatal meningitis (7). Isolation of this organism in adults cases of pneumonia, endocarditis and meningitis are reported but none in a case of severe head injury (3).

Bloch et al (2) reported in 1997 a series of 15 immunocompromised patients with *E. meningosepticum* infections. 80% of the patients had nosocomial-acquired infections while 20 % were colonized with *E. meningosepticum* without evidence of infection.

The incidence of *E. meningoseptica* may be under-reported as identification is difficult without an automated system. Environmental samples should be taken to identify the source of infection. Treatment of *E. meningoseptica* infection is challenging because of organism's multidrug resistance. Quinolones, vancomycin, trimethoprim-sulfamethoxazole, and rifampicin have been documented as potential therapies (5). *E. meningoseptica* is usually resistant to colistin and carbapenems which are used to treat extended-spectrum beta-lactamase-producing *Klebsiella pneumoniae* and *Acinetobacter baumannii*, and these characteristics give it a survival advantage.

The role of tigecycline is not defined, but our patient had a clinical response after treatment with tigecyclin, as the culture showed sensitivity to it. Shailja et al (12) showed that *E. meningoseptica* isolates were resistant to cephalosporins, aminoglycosides, trimethoprim-sulfamethoxazole, beta -lactam combinations, carbapenems while only one

isolate was susceptible to ciprofloxacin. All the isolates were susceptible to vancomycin, still six of nine neonates died even after using vancomycin. Though the organism is susceptible to vancomycin in vitro, its efficacy in vivo is questionable.

About ten cases of adult meningitis are reported in literature (1, 3, 4, 8-11, 13-15) but only two cases after neurosurgical procedure (Table 1). This is probably the first case report

of *E. meningoseptica* causing meningitis in trauma patients. Severe head injury leads to prolonged hospital stay of these predominantly young adult patients who otherwise have no other co-morbidities. High degree of suspicion with rapid diagnosis and prompt institution of appropriate therapy for prolonged period (about 3-4 weeks) are essential in the management of such infections.

TABLE 1

Review of important cases developing meningitis following neurosurgical procedure

S. no.	Author/ reference	year	Preceding neurosurgical procedure	Interval of meningitis onset	outcome
1	Wang et al (14)	2014	Aneurysm clipping in 73-year old male	10 days	favourable
2	Chan et al (3)	1983	Transsphenoidal hypophysectomy	Not reported	favourable
3	Current case	2017	Decompressive craniectomy	Two- months	Excellent

About 90% of reported cases of adult meningitis have debilitating predisposing conditions ie. hematological disorders, immunosuppressive state, neoplasms and diabetes mellitus. The common manifestations included fever, disturbances of consciousness, seizure, hydrocephalus and stroke. The initial CSF cultures and Gram stains were inconclusive in 50% cases. Despite treatment, about 50% died during the course of treatment (9).

Lu et al. observed the clinical and laboratory manifestations in the adult is similar to bacterial meningitis caused by other bacterium. So, clinical diagnosis may be confirmed by isolating positive CSF culture,

for which repeated CSF cultures may be needed (9). Lu et al. reported a 21 year old diabetic patient with meningitis, confirmed by a positive CSF culture. She presented with fever, headache, consciousness disturbance, and seizure. CSF analysis revealed a purulent inflammatory reaction. She was discharged after 21-day course of intravenous antibiotics therapy (9).

Wang et al. (14) reported a 73-year-old male patient of ruptured middle cerebral artery aneurysm which was clipped followed by lumbar external drainage for acute hydrocephalus. Ten days later, CSF culture showed growth of *E. meningoseptica* which responded favourably.

Chan et al (3) in 1983 reviewed literature of Flavobacterium meningosepticum causing adult meningitis and could find only five cases. Chan et al reported a female developing meningitis following transsphenoidal hypophysectomy surgery. She recovered completely with oral rifampicin and intravenous chloramphenicol and cefoperazone.

Jean et al. (6) observed Elizabethkingia meningoseptica as a potential threat to patients in critical care unit because of multidrug resistance which may produce E. meningoseptica outbreaks and create an important health issue. Control of such outbreak requires strictly following standard infection control measures, isolation of contact, identification of the source and very important is cleaning of equipment.

Conclusion

Elizabethkingia meningoseptica possess a potentially important threat to patients in neurosurgical critical care unit due to existence of multidrug resistance causing E. meningoseptica outbreaks. It is highly important laboratories should have the facilities to identify the organism. Awareness about this organism and sensitivity testing is required to reduce morbidity and control outbreaks. Authors presented case of Elizabethkingia meningoseptica causing meningitis in an operated case of decompressive craniectomy for traumatic brain injury with successful treatment.

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