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A rare case of community-acquired *Elizabethkingia anophelis* meningitis in an immunocompetent patient

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Dear Sir,

A 53-year-old Singaporean Chinese man presented to Changi General Hospital with a one-day history of fever, altered mental status and two episodes of generalised tonic-clonic seizures. He had no known past medical history or history of recurrent infections, including during childhood. He used to consume alcohol daily, but there was no history of liver disease. He had not travelled overseas in the preceding six months. His work in a moving company mainly involved moving refrigerators. He did not have any hobbies and was not using any health supplement products.

On examination, the patient had a fever of 39.4°C; his blood pressure was 108/74 mmHg, heart rate was 112 beats per minute, respiratory rate was 18 per minute and oxygen saturation was 100% on room air. He appeared confused, with a Glasgow Coma Scale (GCS) of 12, and his neck was supple. His pupils were equal and reactive to light. There was no focal neurological deficit. Laboratory tests revealed the following: haemoglobin 11 g/dL; white blood cell count $15.5 \times 10^3/\mu\text{L}$; platelets $99 \times 10^3/\mu\text{L}$; sodium 130 mmol/L; potassium 3.2 mmol/L; chloride 87 mmol/L; bicarbonate 4 mmol/L; creatinine 133 $\mu\text{mol/L}$; albumin 38 g/L, total bilirubin 38.0 $\mu\text{mol/L}$; alkaline phosphatase 266 U/L; alanine aminotransferase 74 U/L; aspartate aminotransferase 115 U/L; serum lactate 17.59 mmol/L; and procalcitonin 2.33 $\mu\text{g/L}$. Computed tomography of the brain was normal.

Lumbar puncture was performed the next day. The opening and closing pressures were 21 cm H₂O and 9 cm H₂O, respectively. Cerebrospinal fluid (CSF) analysis revealed a cell count of 126 cells/mm³, CSF glucose of 1.6 mmol/L and serum glucose of 5.3 mmol/L. He had a low CSF–serum glucose ratio of 0.30 and an elevated protein level of 0.92 g/L. Cell differential showed a neutrophilic predominance of 70%. CSF meningitis/encephalitis bacterial polymerase chain reaction panel was negative.

The patient was started on high-dose intravenous ceftriaxone and acyclovir for empiric treatment of community-acquired meningoencephalitis. However, he continued to develop high fever on Day 2 of admission and remained confused. On the same day, both blood and CSF cultures returned positive for multidrug-resistant *Elizabethkingia anophelis* (*E. anophelis*), which was resistant to ceftriaxone, amoxicillin/clavulanic acid, ciprofloxacin and meropenem. Antibiotics were changed to intravenous levofloxacin (minimum inhibitory concentration ≤ 1) and oral trimethoprim/sulfamethoxazole (minimum inhibitory concentration ≤ 2). The patient began showing neurological recovery with improvement in GCS 12 hours following the change of antibiotics. His high lactate on admission was attributed to his seizures since there was no evidence of tissue hypoperfusion or hypoxia on admission. Repeat lactate measurement three hours later showed a drop to 2.35 mmol/L. Full neurological recovery returned on Day 3 of admission. Antibiotics were continued for a total duration of 14 days. Retroviral screen was negative and immunoglobulin levels were normal.

The genus *Elizabethkingia* comprises aerobic, non-fermenting and non-motile Gram-negative rods. This includes *E. anophelis*, *E. meningoseptica*, *E. miricola* and *E. endophytica*. Although *E. anophelis* was first isolated from the midgut of the *Anopheles gambiae* mosquitoes in 2011,⁽¹⁾ the epidemiology is poorly understood.

A study has hypothesised that many previously described *E. meningoseptica* isolates may actually have been *E. anophelis* and that *E. anophelis* may have been underreported, accounting for a significant proportion of *Elizabethkingia* infections.^(2,3) Previously reported outbreaks of *E. anophelis* in Singapore were seen in a nosocomial setting, and these were attributable to inadequate handwashing and the use of contaminated water taps.^(2,4) Another example of a reported outbreak of *E. anophelis* was in Wisconsin, USA between 2015 and 2016, where all the reported patients had healthcare exposure.⁽⁵⁾ A study from Hong Kong showed that out of 45 cases of *Elizabethkingia*-like bacteraemia, 15 were caused by *E.*

anophelis. This included pneumonia (n = 5), catheter-related bacteraemia (n = 3), neonatal meningitis (n = 3), nosocomial bacteraemia (n = 2) and neutropenic fever (n = 2).⁽³⁾

Little is known about the actual incidence of *E. anophelis* in Singapore. Even though mosquitoes were found to be unlikely vectors of transmission,⁽⁶⁾ we are cognizant that the *Anopheles* mosquito is commonly found locally. As *E. anophelis* is commonly multidrug resistant⁽⁷⁾ and infections are associated with high mortality,⁽³⁾ correctly identifying *E. anophelis* is important in helping clinicians understand its epidemiology and clinical disease spectrum.

From our understanding, this is the first reported case of community-acquired *E. anophelis* meningitis in an immunocompetent adult. It highlights the importance of investigating for alternative drug-resistant microorganisms when the patient does not respond to first-line empiric antibiotics.

Yours sincerely,

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