



Short report

Outbreak of *Elizabethkingia meningoseptica* sepsis with meningitis in a well-baby nursery

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ARTICLE INFO

Article history:

Received 1 November 2016

Accepted 26 November 2016

Available online 30 November 2016

Keywords:*Elizabethkingia meningoseptica*
Outbreak

Term neonates

Well-baby nursery

SUMMARY

Between March and May 2012, three neonates born at a regional maternity hospital developed *Elizabethkingia meningoseptica* (previously *Chryseobacterium meningosepticum*) sepsis with meningitis aged <10 days, and were treated successfully with intravenous ciprofloxacin plus vancomycin or piperacillin-tazobactam for three to six weeks. Four (16.6%) of 24 environmental specimens obtained from the nursery and delivery room were positive for this organism. All of the clinical isolates and two isolates from storage boxes for pacifiers and pacifier covers were genetically identical. After changing the storage boxes to stainless steel boxes that underwent regular autoclave sterilization, there were no further cases of infection with *E. meningoseptica*.

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Introduction

Elizabethkingia meningoseptica, initially named as *Flavobacterium meningosepticum* and subsequently as *Chryseobacterium meningosepticum*, is a non-fastidious, oxidase-positive, Gram-negative bacillus that is widely distributed in nature, including in soil and water.¹ *E. meningoseptica* has been reported to be associated with significant human diseases, with an incidence rate ranging from 0.007 to 0.399 per 1000 admissions,^{2,3} and is particularly recognized as a cause of neonatal meningitis.^{4,5} Nosocomial outbreaks of infection with *E. meningoseptica* have been reported in both neonatal and

adult intensive care units.^{4–7} According to a study in a medical centre in Taiwan, 86% of *E. meningoseptica* infections were healthcare associated, and 60% occurred in intensive care units.³

E. meningoseptica is resistant to many antimicrobial agents commonly used to treat Gram-negative infections.^{2,3} The problem of selecting appropriate antimicrobial treatment is compounded by the lack of published breakpoints for determining antimicrobial susceptibilities for *E. meningoseptica* until recently, and the lack of clinical trial data. Mortality rates in invasive infections with *E. meningoseptica* as high as 50% have been reported.^{2,3}

This article reports an outbreak of *E. meningoseptica* sepsis with meningitis involving three near-term newborns in a well-baby nursery in a local hospital in Taiwan; all three infants survived. The molecular epidemiological investigations that led to identification of the source of the outbreak are also presented.

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Materials and methods

Outbreak

The local maternity hospital, located in northern Taiwan, provides primary care for obstetric and paediatric care. There are 30 beds in the postpartum ward and 32 beds in the nursery. Between March and May 2012, three neonates, born in this hospital, developed sepsis with meningitis at seven to nine days of age. All three infants were nearly full-term (gestational age 36, 37 and 38 weeks, respectively), with normal birth weights. *E. meningoseptica* was identified in the blood and cerebrospinal fluid (CSF) of each infant. A summary of the three cases is shown in Table I. All three cases were treated with intravenous ciprofloxacin plus vancomycin or piperacillin-tazobactam for three to six weeks, and survived. At follow-up, each of the infants had some degree of ventriculomegaly, and one infant required ventriculoperitoneal shunt insertion for management of hydrocephalus. Nevertheless, none of the infants were found to have developmental delay after two years of follow-up.

Investigation and intervention in the maternity hospital

After the second case occurred, hand hygiene education to mothers and staff, and environmental cleaning were enhanced. The water used to prepare infant feeds was tested repeatedly, but *E. meningoseptica* was not cultured.

After the third case, a wider investigation was conducted. As there were no temporal overlaps between the three cases, an environmental reservoir was suspected. Twenty-four environmental swabs (Venturi Transystem, Copan Innovation Ltd, Murrieta, CA, USA) were collected from the postpartum wards, the nursery and the delivery room, focusing on moist areas (feeding bottles, pacifiers and storage boxes, sinks, taps and refrigerator handles).

Laboratory investigations

Swabs were cultured on BAP and EMB agar plates. Non-lactose-fermenting colonies that were oxidase-, DNase-, spot indol- and aesculin-positive were identified as *E. meningoseptica* using ID GN32 test kits (Biomerieux, Marcy l'Etoile, France).

Genetic relationships between the five clinical isolates from the three outbreak cases, environmental isolates and four unrelated clinical isolates from other parts of the hospital were determined using pulsed-field gel electrophoresis (PFGE).

Ethical approval

This study was approved by the Institutional Board of Chang Gung Memorial Hospital (Ref. No. 104-1673B), and informed consent was waived.

Results

Environmental survey and molecular analysis

All five *E. meningoseptica* isolates from the three patients shared an identical PFGE pattern (type A). The results of environmental sampling are shown in Table II.

Table I Characteristics and clinical manifestations of three neonates with *Elizabethkingia meningoseptica* meningitis and sepsis

	Patient 1	Patient 2	Patient 3
Admission date	6 th March 2012	27 th March 2012	19 th May 2012
Date of birth	27 th February 2012	20 th March 2012	10 th May 2012
Sex	Male	Female	Male
Gestational age (weeks)	36	37	38
Birth weight (g)	2400	2880	2540
Age (days) and location at time of infection onset	8, home	7, nursery	9, home
Diagnosis	Meningitis and sepsis	Meningitis and sepsis	Meningitis with subdural abscess and sepsis
Treatment	Ciprofloxacin + piperacillin-tazobactam for 4 weeks	Vancomycin + ciprofloxacin for 6 weeks	Ciprofloxacin + piperacillin-tazobactam for 3 weeks
Outcome and follow-up	Ventriculomegaly, remained, normal growth and neural development at 2 years and 3 months	Ventriculomegaly, resolved later, normal growth and development at 2 years and 3 months	Hydrocephalus, ventriculoperitoneal shunt insertion at 3 months and revision after 2 years, growth and development not delayed at 2 years and 2 months

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