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Nosocomial infection by *Elizabethkingia meningoseptica*

MIC 493

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Introduction:

Elizabethkingia bacteria belonging to the family *Flavobacteriaceae* in the phylum *Bacteroidetes*. *Elizabethkingia meningoseptica* or was (*Chryseobacterium meningosepticum*).

The bacterial genus *Elizabethkingia* has been known and was named after the American bacteriologist Elisabeth O. King, who in 1959 discovered *Flavobacterium meningoseptica*, which, until 1994, had been the previous name for *Elizabethkingia meningoseptica*. She used serological techniques to type strains isolated in epidemiological studies. Of the six serotypes (A-F) King described, type C was responsible for the majority of cases of meningitis.

Combined phylogenetic and phenotypic data show that *C. meningosepticum* should be transferred to a new genus, *Elizabethkingia* gen.

E .meningeoseptica is a ubiquitous waterborne saprophytic bacillus not considered part of the normal human flora.

It rarely causes infection in the postneonatal immunocompetent host.

Description:

Elizabethkingia meningoseptica is a multi-drug resistant organism. *Elizabethkingia meningoseptica* Gram-negative bacillus non-fastidious, oxidase, urease and catalase positive, Glucose non- fermenting, non-motile, form biofilm, aerobic nonspore forming bacteria, which can be cultivated on blood and chocolate agar at 37C.

Good growth is observed on TSA and nutrient agar at 28–37 °C, but no growth is observed at 5 or 42 °C. Colonies are white–yellow, non-pigmented, semi-translucent, circular and shiny with entire edges.

Habitat and transmission:

Elizabethkingia meningoseptica ubiquitous it widely distributed in nature like soil, fresh and salt water, highly prevalent in the gut of *Anopheles* mosquitoes. Also in hospital environments via contaminated medical equipment, particularly in neonatal wards. The organisms have been recovered from dialysis systems, pharmaceuticals, medical devices (including intravascular catheters, respirators and intubation tubes) and intravenous lipid solutions, and municipal water supplies including those which have been adequately chlorinated. *E. meningoseptica* is usually isolated from clinical specimens. Previously reported clusters of infection with this microorganism have been linked to items such as respiratory equipment, contaminated syringes in ice chests, vials, sink drains, sink taps, tube feedings, flush solutions for arterial catheters, pressure transducers and antiseptic solutions. The latter sources greatly contribute to

extensive contamination of healthcare settings. Direct person-to- person spread from healthcare workers, or between infants, has also been reported.

Another investigation considered that the hands of healthcare workers were the likely route of trans- mission of *E. meningoseptica* between paediatric patients.

It is reasonable to assume that colonization with *E. meningoseptica* at sites such as the respiratory tract, other mucous membranes, and non-intact skin sites can follow exposure to exogenous sources and that patients colonized in this way may then act as sources of infection for other vulnerable individuals.

Additionally, the fact that Chryseobacterium spp. have occasionally been cultured with *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter* spp. or meticillin-resistant *Staphylococcus aureus* with *E. meningoseptica* from clinical samples complicates our understanding of the exact pathogenic role of *E.meningoseptica.*

Etiology and antibiotic resistant:

E. meningoseptica responsible for invasive disease but not fully understood. The bacterium produces an elastase which causes ophthalmia when injected into the eyes of rabbits, and death following intracerebral injection in mice.

It is pathogen causing neonatal meningitis, pneumonia, bacteraemia sepsis and soft tissue infections especially in immunocompromised patients and elderly. *E. meningoseptica* is a common cause of neonatal meningitis, especially in premature infants during the first weeks of life, and also causes a wide range of human infections as an opportunistic pathogen. It recorded case-fatality rates of over 50% partly because of multidrug resistance.

Recent surveys have revealed that almost all cases of bacteraemia due to *E.meningoseptica* occur in nosocomial settings and that these patients usually have a history of antibiotic exposure or at least one preexisting comorbidity (including immunocompromise associated with haemato oncological malignancy and organ transplantation and conditions which necessitate frequent long-term hospital admissions).

Meningitis is also well recognized and is associated with poor outcomes especially in paediatric cases of *E. meningoseptica* meningitis which frequently result in hydrocephalus and brain damage.

The diagnosis of infection depends on culturing blood samples, which sterile site.

E. meningoseptica is resistant to many antimicrobial agents commonly used to treat Gram-negative infections maybe of the ability of highlevel biofilm production (which may render *E. meningoseptica* less susceptible to antimicrobials).

E. meningoseptica has been noted to exhibit good susceptibility to many antibiotics effective against Gram-positive cocci.

Microbiological techniques didn't exactly identify the right antibiotic. Studies confirmed using frequent inappropriate antibiotic in *Elizabethkingia meningoseptica* infections its subsequent influence on mortality risk.

The virulence factors responsible for invasive *E.meningoseptica* disease have not yet been fully elucidated. In an immunocompetent host, his bacterium is cleared rapidly by immune defenses without antibiotic treatment. Premature birth is a primary risk factor for neonates, and half of the reported *E.meningoseptica* infections involving neonates have involved infants who weighed less than 2,500 grams at birth.

Elizabethkingia meningoseptica has been reported to cause a rare case of an Early neonatal. Causing sepsis and meningitis. The case is unique due to the patient was infected by *E. meningoseptica* of a female baby born by vaginal delivery at 37weeks with symptoms appearing in the first 2 days of life. The baby was not premature and was not immunocompromised, which are known risk factors for acquiring the infection.

Case report:

This was a case of a female baby born by vaginal delivery at 37weeks gestation weighing 2,600 grams. The mother was a primigravida with no known risk factors.

After two days of the neonate's life the mother came to the emergency department with her baby due to these symptoms on the baby: tachypnea since birth, high fever rich to 38.7 for one day, and a decreased level of consciousness without abnormal movements.

Blood sample was taken then Anemia and thrombocytopenia was detected. Also There was a derangement of coagulation profile with partial thromboplastin time. Persistent metabolic acidosis with high lactate was noted. She was admitted into neonatal intensive care with tachypnea since birth, high fever rich to 38.7 and a decreased level of consciousness. Brain ultrasound showed prominent bilateral ventricles and a lumbar puncture was performed.

Cerebrospinal fluid -CSF sample was take and analysis showed: glucose (2.9 mg/dL); proteins (159 mg/dL), leucocyte (95 cell/ mm^3), 0% neutrophils, and 100% lymphocyte.

Cranial ultrasound showed bilateral intraventricular hemorrhage.

She developed convulsions which were controlled through intravenous phenobarbitone.

She was started the empirical treatment with intravenous double dose ampicillin and cefotaxime was initiated.

On the third day, peripheral blood culture and cerebrospinal fluid microbiology isolated results were a gramnegative bacteria as Chryseobacterium- *E. meningoseptica*.

The isolated organism was gram-negative, rod shape, oxidase-positive, non-motile, non-fermenting, organism grew well on chocolate agar and blood agar and yield yellow pigmentation but not readily evident after 24 hours of incubation.

Therapeutic:

Mention before She was started the empirical treatment with intravenous double dose ampicillin and cefotaxime was initiated. *E. meningoseptica* was found to be sensitive to ciprofloxacin and levofloxacin, with intermediate sensitivity to tigecycline, and it was resistant to colistin, trimethoprim- sulfamethoxazole, third-generation cephalosporins and carbapenems.

The initial combination of antibiotics therapy was changed to ciprofloxacin vancomycin for a total of 6 weeks and rifampicin added for the initial 2 weeks of therapy.

After 48 hours of starting the treatment, a blood culture was performed and the results showed the same organism with same sensitivity of. After 96hours the result of blood culture was sterile.

Magnetic resonance imaging of the brain showed multiple sub-ependymal foci of hemorrhage, ischemic insults, sequel cystic encephalomalacia in periventricular areas, and improvements of basal leptomeningeal enhancement.

She was discharged from hospital when she able to breathe without assistance and had satisfactory full oral feeding. Brain magnetic resonance imaging follow-up at the time of discharge showed post hemorrhagic ventricular dilatation.

Conclusion:

Elizabethkingia meningoseptica is rare pathogenic, have been found to be mostly nosocomial in nature, affecting immunocompromised hosts and preterm neonates.

It has generally been reported as a causative agent in outbreaks of meningitis in neonatal intensive care units (ICUs). *E. meningoseptica* is a rare but lethal organism.

Some cases have been reported, of this outbreak occurred in a well-baby nursery amongst infants who had no invasive medical devices.

In other case report they decide that the outbreak was probably related to contamination of boxes used for storing pacifiers. After changing the storage boxes to stainless steel boxes that underwent regular autoclave sterilization, there were no further cases of infection with *E. meningoseptica*. This report adds to the list of possible environmental sources that might support the survival of *E. meningoseptica*. Direct person-to- person spread from healthcare workers, or between infants, has also been reported.

Previous studies indicated that more than 50% of the neonatal cases weighed <2500 g and the mortality rate ranged from 8% to 33% (even higher for premature infants).

This case is unique due to the patient was infected by *E. meningoseptica* with symptoms appearing in the first 2 days of life. The baby was not premature and was not immunocompromised, which are known risk factors for acquiring the infection.

Screening of the environment and patients for *E. meningoseptica* and other infection control measures, previous investigations have included mechanical ventilation equipment, catheters, infant incubators, parenteral and antiseptic solutions, feeding bottles and bags, components of the hospital water system (sinks, basins, faucets), environmental surfaces and equipment, such as doors and door handles, electrical buttons, telephones, computer keyboards, covers of medical charts as part of screening programmes.

A study confirmed infection of neonatal meningitis in which contaminated saline solution used to flush the eyes of infants was considered the most plausible source of the bacterium; in another report, aqueous chlorhexidine gluconate used for routine disinfection was similarly implicated.

Also was confirmed neonatal ICU considered parenteral nutritional solution as the source of infection, whereas, in a similar setting, sinks and rubber stoppers of milk bottles were deemed as the reservoirs of the bacterium.

some epidemiology investigators have reported success in controlling outbreaks using enhanced cleaning protocols. Although an environmental source was not identified, the outbreak was terminated following introduction of two disinfectants (hypochlorite solution, and isopropanol spray) for thrice daily cleaning on the unit with particular emphasis on objects containing, or in contact with, water.

On another study an outbreak involving 14 cases of neonatal meningitis (the source of which was a leaking sink trap) was finally controlled by repair of the faulty trap and other plumbing components, and another was terminated by repair of *E.meningoseptica* contaminated chlorinated water tanks combined with alcoholic hand rub after routine handwashing.

We should know that *E. meningoseptica* infections can be fatal, and with its special antibiotic profile, the right choice of initial antibiotic therapy is somewhat difficult for clinicians.
The possibility of inadequate antibiotic therapy is increased due to the variation in susceptibility test results when different methods are used.

Studies confirmed the broth micro dilution is the preferred method for susceptibility testing, as disc diffusion methods may be unreliable.

E. meningoseptica is generally believed to be resistant to traditional antimicrobials used in neonatal intensive care units, such as ampicillin, gentamicin and cefotaxime. Choosing the right antibiotic for this pathogen is often difficult, and studies have found that the mortality rate remains high despite the use of agents that appear to be effective in the laboratory.

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.

In other cases, to reduce high morbidity and mortality, *E. meningoseptica* infection should always be suspected by physicians when Gram-negative bacilli are detected on Gram-staining, and they should be familiar with the antibiotic susceptibility profile.

Detection of Gram-negative bacilli on Gram staining or on culture should always cause clinicians to suspect *E. meningoseptica* infection in newborns, even in term infants who do not have apparent risk factors.

Adequate awareness of antibiotics is essential to reduce high rates of disease and mortality.

Early recognition of patients colonized or infected with *E. meningoseptica* will assist in preventing spread of the bacterium. At present there are no definitive recommendations for outbreak control but standard measures and contact precautions, particularly enhanced staff hand hygiene compliance, and good antibiotic stewardship are recommended.

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