Meningitis due to *Providencia stuartii*: a case report

*Providencia stuartii* meningitis


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Case report

A thirty-six year old male patient who stayed in the neurosurgery intensive care unit (ICU) was consulted by the infectious diseases consultant due to fever and disturbances in the consciousness.

He had history of right frontotemporoparietal craniotomy operation for intracerebral haemorrhage in the neurosurgery clinic two months ago. The patient subsequently developed cerebrospinal fluid (CSF) leakage and as a result an external lumbar drainage was inserted to the patient. Due to the need of mechanical ventilation the patient was transferred to the anaesthesiology ICU where he received meropenem for *P. stuartii* bacteremia. He was transferred back to the neurosurgery ICU forty days later.
The patient still had external ventricular drain when he was reevaluated in the neurosurgery ICU. On physical examination his axillary temperature was 38.5°C. He did not have neck stiffness but did display disturbances in the consciousness. Other findings were normal. The cerebrospinal fluid analysis (CSF) revealed a white blood cell count of 200/mm³, >90% neutrophils, CSF glucose level: 24 mg/l, protein level: 190 mg/dl. His complete blood count revealed leukocytosis (leukocyte count:32000/mm³ and neutrophils 90%). Concomitant blood cultures did not yield any pathogen, but CSF culture yielded gram-negative bacteria, which were identified as *Providencia stuartii* by VITEK 2 (bioMerieux Inc, Mercy L’Etoil, France). The isolate was found susceptible to meropenem, imipenem, ertapenem, amikacin, piperacillin-tazobactam and levofloxacin and resistant to amoxycillin/clavulonate, ampicillin, gentamicin, cefuroxime, cephalozine, cefepime, tigecycline and co-trimoxazole by disc diffusion method. The patient was started meropenem 2 g q8h. His fever resolved on the 4th day and on the sixth day the culture was negative. Meanwhile his CSF findings also improved. This regimen was continued for twenty-one days. On follow-up he could not be discharged from the hospital since his general status did not improve sufficiently. Hence, he died two months later due to repeating intracranial haemorrhage.

**Discussion**

Despite improvements in the intensive care management and broad-spectrum antibiotics, community and hospital-acquired meningitis is still associated with significant mortality and morbidity. Gram-negative bacilli associated meningitis is relatively rare in the community but comprises a significant portion of nosocomial meningitis cases (4, 5, 6).

The tribe *Proteae* comprises the genera *Proteus*, *Morganella* and *Providencia*. There are five species in the genus *Providencia*: *Providencia stuartii*, *P. rettgeri*, *P. alcalifaciens*, *P. rustigianii*, and *P. heimbachae*. The most common species is *P. stuartii*. *Providencia* can be differentiated from *Proteus* and *Morganella* based on their ability to use citrate and ferment D-mannitol (3, 7, 9, 10).
Providencia infections are very rare and are mostly hospital-acquired. Providencia spp. is mostly isolated from urine samples of long-term urinary catheterized cases but may rarely cause bacteraemia and endocarditis (4, 7, 9, 10). In a population based laboratory surveillance study performed in Calgary-Canada, prevalence of Providencia infections was found to be 3.4/100,000/year (7). In a study performed in a Turkish tertiary-care educational hospital, only 0.02% of 3974 gram-negative rods isolated between 2001-04 were Providencia (1).

Long term urinary catheterization is the most common underlying risk factor for Providencia infections; paraplegia, urologic stent and age are among the additional risk factors (2, 7, 8). The present case had long term ICU stay, long-term urinary catheterization, lumbar drainage and previous P. stuartii bacteremia. Theoretically, the most likely hypothesis for the development of meningitis is ascending infection. However, urine cultures performed both at the time of bacteremia and meningitis were negative. Hence, it is difficult to determine the origin of the infection. Antibiotic susceptibility pattern of the bacteremia and meningitis strains were similar except bacteremia strain was intermediate resistant to amoxyccillin/clavulonate, gentamicin, cefuroxime and sensitive to ceftriaxone and cefepime, while meningitis strain was resistant to amoxyccillin/clavulonate, gentamicin, cefuroxime and intermediate resistant to ceftriaxone and cefepime. It can be suggested that, if tests had been performed at the same time, susceptibility results could have been similar, but there were 36 days between bacteremia and meningitis episodes. We can speculate that the bacteremia strain and meningitis strain could be the same but unfortunately that strain was not saved and we could not prove or eliminate this hypothesis.

P. stuartii and P. rettgeri are often resistant to multiple antibiotics including gentamicin, first-generation cephalosporins and ampicillin (1, 2, 9). They may also be extended-spectrum beta-lactamase producers. Hence, the treatment must be guided by antibiotic susceptibility testing. Our strain was resistant to aminoglycosides and all cephalosporins and was therefore treated with high-dose meropenem.

Scapellato et al (8) reported a case of P. stuartii meningitis after vancomycin-resistant Enterococcus faecium meningitis, treated with imipenem. To our knowledge
this is the second case of *P. stuartii* meningitis in the literature. The case presented in this paper strengthens the views advocating the importance of CSF sampling in the management of meningitis. It seems that *P. stuartii*, which rarely causes post-neurosurgical meningitis, may be successfully treated with meropenem.

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References


