

## Pseudomonas aeruginosa: Uncommon Cause of Bacterial Meningitis

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### Abstract

**Introduction** Gram negative bacillary meningitis is uncommon disease that needs proper diagnosis and urgent treatment to avoid serious complications. Escherichia coli, Klebsiella pneumonia and Pseudomonas aeruginosa are the most frequent gram negative bacilli. Use of third generation cephalosporins has made a significant therapeutic change with significant reduction in mortality. Ceftriaxone should always be the drug of choice until the full sensitivity report is available. Here, we report a case of bacterial meningitis caused by *Pseudomonas aeruginosa* which is thought to be secondary to previous ear infections. The diagnosis was confirmed by gram stain and culture of the cerebrospinal fluid. The patient was successfully treated with intravenous antibiotic for total of three weeks.

**Key words** Pseudomonas aeruginosa, meningitis, ear, infection.

### Introduction

*Pseudomonas aeruginosa* is increasingly recognized as an emerging opportunistic organism of clinical significance. One of its very worrying features is its increasing antibiotic resistance and high mortality<sup>(1)</sup>. It is not very common pathogen of adult gram negative meningitis<sup>(2)</sup>. It may occur as a spontaneous infection or as a complication of neurosurgical events like penetrating trauma, haemorrhage, craniotomy, extra-ventricular drain, clipping of arterio-venous malformation, ventriculo-peritoneal shunt, spinal anaesthesia and brain or nasopharyngeal tumours with invasion of the base of skull<sup>(3-5)</sup>. Recurrent otitis media is another reported risk factor. Immune suppressed patients and recipients of cochlear implants are at higher risk<sup>(6)</sup>.

### Case Report

A 38-year-old gentleman was admitted to the hospital with 5 days history of headache and fever. The pain was of sudden onset, frontal,

described as worst ever headache and associated with high grade fever and neck stiffness. He denied abnormal respiratory, genitourinary or ear-nose-throat symptoms. He was an ex-smoker, having 10 pack year smoking history. He had no significant past medical or surgical history apart from recurrent right ear infection few years ago which resulted in reduced hearing on the same side but he never required admission for such. He had no history of trauma, seizure or altered sensorium. No history of recent travel or contact with sick patient. Initial clinical examination was significant for high grade fever with temp of 38.9°C, mild tachycardia with heart rate of 110 beat per minute and some neck rigidity but no other meningeal or neurological signs. No papilloedema on fundoscopy. Ears were full of wax so it was difficult to assess the tympanic membranes but no discharge was noted. His C-reactive protein was significantly elevated with mild neutrophilic leucocytosis. Rest of his basic blood

investigations were normal including coagulation profile, renal profile, bone profile and liver function test. He had a CT brain which was reported as normal after which he immediately had a lumbar puncture which showed a turbid fluid with high opening pressure of 25 cm. The cerebrospinal fluid (CSF) analysis showed 450 WBC (polymorph predominant, 90%) with high protein and low glucose levels. He was covered initially with empirical antibiotic and anti-viral as per hospital's policy which include ceftriaxone 2 gm twice a day, vancomycin 1 gm twice a day and acyclovir 10 mg/ kg three times a day intravenously. The empirical therapy was given to the patient less than 1 hour after the lumbar puncture which was done on the day of admission. *Pseudomonas aeruginosa* was suspected few hours later by gram stain and further confirmed by culture after 48 hours. Accordingly; the acyclovir got stopped and the antibiotic got changed to ceftazidime as advised by microbiologist based on laboratory sensitivity report. He had MRI brain and spines which showed leptomeningeal enhancement but no other abnormality. CSF cytology showed no malignant cells. The patient showed a dramatic recovery within 72 hours and got discharged from the hospital on day 5 and antibiotic was continued in the community via a peripherally inserted central line for total of 21 days. It is worth to mention that his immunological work up was normal and that his retroviral screen was negative.

### **Discussion**

Meningitis should always be excluded, if suspected, and treatment should be initiated as soon as possible. Lumbar puncture for CSF analysis is the gold standard test to confirm or exclude this condition which could be life threatening. Gram stain examination of CSF allows a rapid and accurate identification of the causative bacterium in 60-90% of patient and has a specificity of > 97%. However, this correlates with the CSF concentration of bacteria which can be improved by use of

cytospin technology which is also useful if the submitted specimen is too small <sup>(7)</sup>. It also depends on the causative pathogen that had been 90% for *Streptococcus pneumoniae*, 86% for *Haemophilus influenzae*, 75% for *Neisseria meningitidis*, 50% for gram negative bacilli and approximately 33% for *Listeria monocytogenes* <sup>(8)</sup>. The gram stain result correlates also with timing of initiation of antibiotics and could also be affected by human factors like operator contamination or observer mis-interpretation <sup>(9)</sup>. Other important and promising tests of CSF in addition to the basic biochemical tests include culture, latex agglutination, Limulus lysate assay, enzyme linked immunosorbent assay, polymerase chain reaction and others. Once a bacterial pathogen is identified and sensitivity test is reported then antimicrobial treatment should be modified for optimal therapy. Despite administration of third generation cephalosporins, mortality rate had been reported to be as high as 83% in the spontaneous gram negative bacillary meningitis versus 35% in the post neurosurgical patients <sup>(4)</sup>.

Our patient was treated with the proper antibiotic according to sensitivity report for total of 3 weeks with which he had a full and dramatic recovery.

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