

Pseudomonas aeruginosa meningitis isolated from green cerebrospinal fluid: A rare case report

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Abstract

A case of 20 year old male patient reported to the trauma intensive care unit with the history of road traffic accident. He had history of head injury for which craniotomy was carried out. Green colour Cerebrospinal Fluid (CSF) was collected and sent for microbiological examination. Motile gram negative bacilli with hemolytic colonies on blood agar were found which further subjected for bio-chemical reaction and antibiotic susceptibility testing. It was suspected to be *pseudomonas* species. A bluish green pigment on MacConkey agar and Nutrient agar was observed. The isolate was identified to be *pseudomonas aeruginosa*.

Keywords: *pseudomonas aeruginosa*, cerebrospinal fluid, meningitis, bacilli.

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INTRODUCTION

Pseudomonas aeruginosa is an invasive, gram negative opportunistic pathogen that causes a wide range of severe infections include bacteremia, pneumonia, meningitis, urinary tract and wound infection¹. It is due to its resistance to common antibiotics and antiseptics that it establishes itself widely in the hospital. Although it is one of the gram-negative rods and common in the nasal cavity, it rarely causes postoperative intracranial infections². However, development of a *P. aeruginosa* infection in the central nervous system (CNS) can lead to serious meningitis or ventriculitis³. Therefore, the treatment of *P. aeruginosa* infection requires prompt medical evaluation and appropriate antibiotic selection⁴.

The aim of this article is to describe a rare case of *Pseudomonas aeruginosa* meningitis, its clinical features and management following neurosurgical procedure.

CASE REPORT

A 20 year old male patient reported to the trauma intensive care unit with the history of road traffic accident. He had history of head injury for which craniotomy was done and intraventricular drain was left in situ. After craniotomy the patient went into septic shock. CSF sample was send for microbiological examination which revealed gram negative bacilli and was further identified to be *P.aeruginosa*. He was started on ceftazidime and gentamicin. After reporting of *P.aeruginosa*, treatment was shifted to imipenem. With this treatment patient recovered.

Microscopy

Wet mount revealed 4-5 polymorphonuclear lymphocytes/hpf along with motile bacilli. Gram stain revealed plenty of pus cells and Gram negative bacilli. Culture done on blood agar and MacConkeys agar was incubated at 37°C for 16to 18hour. Next day on blood agar 2-3 mm, circular, raised irregular margin, haemolytic colonies were present (Figure1). MacConkeys agar showed nonlactose fermenting, green smooth, circular,

raised, entire irregular margin 3-4 mm colonies (Figure 2). Bacterial strain was further identified by standard biochemical test and AST was performed.

Biochemical reactions

Bacterial strain was Catalase and oxidase test positive. Indole, Methyl red(MR),VP and H₂S test negative, Triple sugar iron agar showing reaction of alkaline over no change and growth at 42^o C. Special O-F media of Hugh and Leifson was used it shows that bacterial strain utilized glucose oxidatively with acid production. Nitrate was reduced to nitrite and further to gaseous nitrogen. Arginine dihydrolase test was positive (Figure 3). Blue-green diffusible pigment on Muller Hinton agar plate of antibiotic susceptibility testing, oxidase positive test, Triple sugar iron agar showing reaction of alkaline over no change and growth at 42^o C confirm the bacterial strain as *P.aeruginosa*⁶. Antibiotic susceptibility testing

by Kirby Baur disk diffusion method- It was sensitive to meropenem and resistant to Piperacillin-tazobactam, ceftazidime, amikacin and levofloxacin⁵.

Pathological examination

Haemoglobin-11.4g/dl,
RBCs-4.74million/cmm,WBC-15600/cmm,Neutrophils-55%, Lymphocytes-43%, Monocytes-1%, Eosinophils-1%, basophils-0%.Platelet-481000/cmm

Biochemical parameters of Blood

Protein-5.8g/dl,albumin-2.8g/dl,globulin-3.0g/l,SGOT-29IU/L,SGPT-32IU/L,sodium-135meq/L,potassium-4.3meq/L,creatinine-1.5mg/l,BSL-72,BUL-56,MCHC-28.64g/dl

Parameters of CSF

Protein-262mg/dl, Glucose-35mg/dl, WBC-689 cells/micro litre. There was neutrophilic predominance.



Figure 1

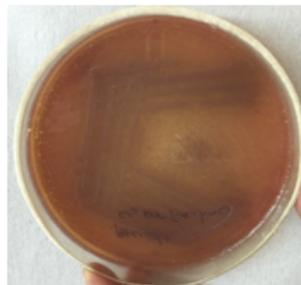


Figure 2



Figure 3

Legend

Figure 1: Showing haemolytic colonies on blood agar

Figure 2: Showing nonlactose fermenting colonies on MacConkey agar

Figure 3: Moller's decarboxylase media

DISCUSSION

Meningitis is the most common infectious complication caused by the different kinds of pathogen^{7,8}. This complication is rare with accompanying high morbidity and mortality without immediate treatment. *P.aeruginosa* is responsible for a wide range of nosocomial infection including post-neurosurgical meningitis⁹. In the study done by Erdem *et al* the incidence of postoperative meningitis was 2.7% and commonly isolated organisms were acinetobacter spp and methicillin resistant staphylococcus aureus and third most common organism was pseudomonas aeruginosa¹⁰. Previous studies showed that *Pseudomonas aeruginosa* was responsible for 8.3% - 10.7% of meningitis in post-surgical patients^{10,11}. Variable incidence rate are partly related to methodological issue like definition and surveillance methods¹⁰. Though staphylococci are known to be frequent pathogen in post-operative nosocomial meningitis, the risk of colonization by gram negative bacilli is increased in hospitalized patients^{9,12}. In this patient on gross examination a green CSF was found

which on culture grew pseudomonas *aeruginosa*. It was tested for ceftazidime, levofloxacin, meropenem. It was sensitive to imipenem and meropenem and resistant to ceftazidime and ceftriaxone. This finding was similar to the study done by Lauderdale and Jones *et al*¹¹. Yadegaryina *et al* reported the study on the changing pattern of infectious agents in post neurosurgical patients in which they found a high rate of post neurosurgical meningitis due to acinetobacter baumannii resistant to carbapenem. But in our case gram negative organism pseudomonas aeruginosa was isolated from post neurosurgical patient and was sensitive to imipenem and meropenem. C.R.Huang *et al* revealed that 3rd generation cephalosporin resistant *P.aeruginosa* strains cultured from the clinical CSF specimen of adult bacterial meningitis have emerged in recent year¹¹. The emergence of clinical isolates of extended- spectrum cephalosporin resistant gram negative bacteria, including *pseudomonas aeruginosa* strains has resulted in a therapeutic challenge in the management of serious infectious diseases including nosocomial adult bacterial meningitis¹¹. The

reported risk factor for nosocomial meningitis include postoperative CSF leakage, intraventricular shunt operation, external ventricular drainage, repeated operation and emergency surgery and inappropriate therapy⁹. *P. aeruginosa* meningitis is severe nosocomial meningitis associated with reported mortality of 21-40% that occurs predominantly secondary to invasive procedure^{11, 14}.

CONCLUSION

This case report highlighted the unusual occurrence of *P. aeruginosa* in CSF of post neurosurgical patient and emphasized the importance of preventive strategies against it

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