JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Case report

Ochrobactrum anthropi: An emerging pathogen causing meningitis with sepsis in a neurotrauma patient

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Abstract

Ochrobactrum anthropi is an unusual emerging pathogen especially in the hospital environment. Most of the reported cases are nosocomially acquired infections in patients with various indwelling and invasive medical devices, such as central venous catheters and drainage tubes. We report a case of nosocomially transmitted invasive catheter related septicaemia with meningitis due to *O. anthropi,* in an elderly immunocompetent male with a head trauma admitted to a level -1 trauma centre. This report describes clinical and microbiological characteristics of rare pathogen and also highlights the importance of rapid identification, susceptibility testing of such opportunistic pathogens in trauma settings and its unique antibiotic susceptibility profiles. This requires prompt treatment with timely intervention, and appropriate antimicrobial therapy, alongside adherence to strict infection control practices.

Key words: *Ochrobactrum anthropi;* emerging; pathogen; nosocomial.

J Infect Dev Ctries 2017; 11(9):733-735. doi:10.3855/jidc.9146

(Received 13 July 2016 – Accepted 27 February 2017)

Introduction

Ochrobactrum species belongs to the *Brucellaceae* family and its name is derived from the Greek ochre's, meaning pale yellow; the characteristic colour of its colonies [1]. Among genus *Ochrobactrum,* mainly 3 species, *O. anthropi*, *O. intermedium*, and *O. pseudointermedium* have been isolated from the clinical samples. Of them, *O. anthropi* is becoming increasingly recognized as an opportunistic and nosocomial pathogen. It is a non-fastidious, gram-negative, motile, non-fermenting bacillus with strict oxidative metabolism [2]. *O. anthropi* is considered as a potential pathogen in hospitals because it has microbial niche in water sources – normal saline, antiseptic solutions, dialysis fluids and on invasive medical devices on account of its ability to adhere to various synthetic materials [3].

This bacterium is unique and challenging in its antimicrobial sensitivity patterns. It is resistant to multiple and commonly used classes of antibiotics used to treat gram negative bacterial infections usuallyβ-lactams, including most cephalosporins and penicillins further complicating the clinical scenario. Sporadic cases have been reported in the literature with limited literature from the Indian subcontinent.

This report focusing on clinic-microbiological characteristics of *O. anthropi,* to the best of our knowledge, is one of the first cases report from the Indian subcontinent of *O. anthropi* causing concurrent or subsequent meningitis and invasive blood stream infection in a neurotrauma patient and its successful management and outcome.

We discuss the clinical course and impliactions of this rare nosocomial pathogen *O. anthropi* along with its successful management in a head injury victim admitted at a level-1 trauma centre, highlighting the importance of being aware of this pathogen along with effective liaisons between microbiologists and clinicians for a better clinical outcome in these cases.

Case Report

The patient was a 58-year-old male victim of a train accident, resident of Banaras, Uttar Pradesh and was initially admitted in Banaras hospital and then referred to the Jai Prakash Aryan Apex trauma centre in September 2015 with a high grade fever and loss of consciousness. The patient had suffered a severe head injury and had left fronto-temporal contusion with subarachnoid and intraventricular haemorrhage. He also had a left femoral neck fracture and an olecranon fracture. He was a known hypertensive for 6 years and

was on regular anti-hypertensive medication. He also had a history of benign prostatic hyperplasia (BPH) for which he undergone transurethral resection of the prostate (TURP) 3 years previous. Upon initial examination, The Glasgow Coma Scale (GCS) score of the patient was E3 V1 M4 and his airway was found to be potentially threatened with bilateral pleural effusion on pneumoscan and his cervical spine was stabilized. He had an episode of fever (38°C), a heart rate of 94 beats per minute with hypotension, having a blood pressure reading of 100/64 mm of Hg and respiratory rate of 24 breaths per minute. He was initially stabilised with continuous infusion intravenous fluids, antipyretics, pain killers, and splintage. His laboratory parameters were haemoglobin 7.6 g/dL due to blood loss for which he was given a blood transfusion, post appropriate blood compatibility testing, total leukocyte count (TLC)-12,200 cu/mm^3 with predominance of polymorphs (65%). He was given intravenous (IV) amoxycillin-clavulanic acid 1.25 grams 8 hourly and metronidazole 400 mg 8 hourly for 4 days. Subsequently he showed a decrease in his level of consciousness (E2 VT M2) with intermittent vomiting episodes and recurrent bouts of fever. He was put on ventilator after his progressive fall in consciousness and difficulty in maintaining spontaneous respiration. He also had urinary incontinence for which he was put on a urinary catheter. After CT findings of cerebral contusion in the light of the aforementioned symptoms, he was diagnosed post traumatic hydrocephalus. He underwent decompressive craniectomy with lax duroplasty and his fractures were managed by open reduction and external fixation (ORIF) and plating. Post operatively, he developed a high grade continuous fever (40◦C) with leucocytosis (TLC-18,100 cu/mm^3), and tachycardia (heart rate-96/min), differential counts showed 85% neutrophils, 12% lymphocytes, 2% monocytes and 1% eosinophils. Paired blood cultures (central and peripheral), mini bronchoalveolar lavage (mini BAL), and urine were sent as a component of fever pack to our laboratory. Lumbar puncture (LP) was also carried out to drain the cerebrospinal fluid (CSF) and a sample was sent to our laboratory forculture, cell counts, protein and sugar estimation. Paired blood samples were put in BacT /Alert 3D blood culture bottles and patient was escalated to injection cefoperazone, sulbactam, amikacin, and metronidazole. The CSF protein was 356 mg/dL, sugar 45 mg/dL, red blood cell 10 cells/mm^3, white blood cell 90 cells/mm^3 with 80% polymorphs and 20% lymphocytes.

The CSF sample yielded positive growth after 24 hours of aerobic incubation. The gram stain showed gram-negative rods. The culture demonstrated growth of smooth yellow circular 1-2 mm colonies with entire edges and regular margins on blood agar after 24 hours incubation with non lactose fermenting minute (0.5-1 mm) colonies on Mac Conkey agar. After a period of 48 hours, we also obtained positive growth signal in BacT /Alert 3D machine broth from both the bottles. The bottles also grew gram negative bacteria. The organism was non-fermenting, motile, positive both for catalase and oxidase tests. The organism was identified as *O. anthropi* byautomated identification - Vitek 2 system (BioMerieu'x, Marcy L'Etoile, France). The central line blood cultures were positive 3 hours earlier than the peripheral venous cultures on BacT /Alert 3D, along with semi quantitative culture (>15 colonies of same organism from catheter and peripheral blood culture) suggesting it as catheter related bloodstream infection. The CSF cultures were repeated on 2 occasions in the subsequent 7 days and continued to yield the growth of the same organism. Other clinical samples, urine and mini BAL were sterile. The central catheter tip was sent for culture and it grew >10^2 colonies of *Ochrobactrum anthropi* further corroborated this episode as a catheter-related bloodstream infection. Drug susceptibility for both CSF and blood was performed by the disc diffusion method in accordance with CLSI guidelines, as well as VITEK 2 automated system (BioMerieu'x, France). With no established CLSI breakpoints for *O. anthropi*, the interpretive breakpoints for *Pseudomonas* were used. The isolate obtained from both blood and CSF had same antibiogram. It was multidrug resistant, susceptible to amikacin, cefepime –tazobactam, cotrimoxazole, tigecycline, colistin and was resistant to a wide range of antimicrobials -ceftazidime, cefepime, chloramphenicol, cefoperazone sulbactam, piperacillin tazobactam, ciprofloxacin, imipenem, and meropenem. The Patient was started on injection cefepime-tazobactam 1.12 gm and amikacin 400 mg both 12 hourly after the susceptibility reports were received. Vigorous environmental sampling was done for stringent source tracking for this device-associated infection which included intravenous fluids and solutions (I.V.), I.V. infusion sets, disinfectants, thermometer and swabs from hands of healthcare personnel were taken however, none of them grew *O. anthropi.*

The antimicrobial therapy continued for 16 days. The cultures sent 7 days after the antibiotic therapy were sterile and the patient clinically responded to the therapy with following parameters on day 20 – temperature -37.5◦C, heart rate of 84 beats per minute,

respiratory rate of 18 breaths per minute, Glasgow score $E_4 V_3 M_5$, haemoglobin 8.2 g/dL, total leukocyte count- 10,000 cu/mm^{3}and was finally discharged after 24 days of stay in the hospital.

Discussion

Ochrobactrum anthropi is an aerobic, gram-negative bacillus widely distributed in environmental sources and hospital surfaces. It appears to be an emerging opportunistic pathogen especially associated with the implantation of intravenous catheters or other foreign bodies in hospital settings, due to both susceptible host population, and special predilection to adhere to foreign objects, making it a very successful nosocomial pathogen causing serious life-threatening infections in young adult trauma victims [4]. Most reports of *O. anthropi* bacteraemia are associated with intravenous line infections. Nosocomial outbreak was reported which involved three cases of *O. anthropic* meningitis in postoperative pediatric neurosurgical patients and was traced to pericardial patches processed in contaminated aliquots of Hanks' balanced salt solution [5]. To the best of our knowledge, this is one of the initial case report from India describing disseminated infection causing both meningitis and blood stream infection due to *O. anthropi* in immunocompetent trauma patient. Invasion of the bloodstream also can follow metastatic foci of infection and causes multiplication of organisms in various sites lungs, kidney, spleen, bones, or CNS, which probably happened in our patient [6].

This bacterium is unique and challenging in its antimicrobial sensitivity patterns. The therapeutic management *O. anthropi* infection is of rising concern due to its resistance to various β-lactams which are commonly employed as empirical antimicrobial therapy [7,8]. Our isolate also revealed multidrug resistant nature and was susceptible to fourth generation cephalosporins and polymyxins.

There is high probability of encountering infection due to this opportunistic pathogen particularly in intensive care units, owing to selective antibiotic pressure and presence of susceptible ill-patients on various invasive medical devices, even in an immunocompetent individual. Furthermore, in the areas where the prevalence of *Brucella* is low, confusion with this organism is frequent. Similar phenotypic properties of both organisms attributes to diagnostic dilemma and misidentification by automated identification systems in the clinical laboratory [9]. Therefore, vigilant screening, rapid diagnosis and prompt institution of appropriate therapy along with implementation of effective hospital infection control practices are essential prerequisites for successful management of this pathogen.

Conclusion

Rapid and efficient diagnosis with timely management of *O. anthropi* is a necessary condition to curb disseminated clinical complications caused by this multi drug resistant pathogen. In the absence of standard antibiotic regimen for the treatment of this organism, the antimicrobial therapy should be based on the results of adequately performed susceptibility tests for better patient management and outcome.

References

1. Mudshingkar SS, Chore AC, Pale war MS, Doha VB, Kigali AS (2013) *Ochrobactrum anthropi*: an unusual pathogen: are we missing them. Indian J Med Microbiol31:306-308.
2. Hagiya H, Ohnishi K, Maki M, Watanabe N, Murase T (2013) Clinical characteristics of *Ochrobactrum anthropi* bacteremia. J Clin Microbiol 51:1330-1333.
3. Arora U, Kaur S, Devi P (2008) *Ochrobactrumanthropi* septicaemia. Indian J Med Microbiol 26:81-83.
4. Mastroianni A, Cancellieri C, Montini G (1999) *Ochrobactrum anthropi* bacteraemia: case report and review of the literature. Clin Microbiol Infect 5: 570-573.
5. Chang HJ, Christenson JC, Pavia AT, Bobrin BD, Bland LA, Carson LA (1996) *Ochrobactrum anthropi* meningitis in pediatric pericardial allograft transplant recipients. J Infect Dis 173:656-660.
6. Hardesty JS, Juang P (2010) Recurrent *Ochrobactrum anthropi*, treatment and clinical relevance. Infect Dis Clin Pract 18: 299-303.
7. Vaidya SA, Citron DM, Fine MB, Murakami G, Goldstein EJ (2006) Pelvic abscess due to *Ochrobactrum intermedium* in an immunocompetent host: case report and review of the literature. J Clin Microbiol 44: 1184-1186.
8. Kettaneh A, Weill F-X, Poilane I (2003) Septic shock caused by *Ochrobactrum anthropi* in an otherwise healthy host. J Clin Microbiol 41: 1339-1341.
9. Vila A, Pagella H, Vera Bello G, Vicente A (2016) *Brucellasuis* bacteraemia misidentified as *Ochrobactrum anthropi* by the VITEK 2 system. J Infect Dev Ctries 10: 432-436.doi: 10.3855/jidc.7532.

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Conflict of interests: No conflict of interests is declared.