CASE REPORT

Meningitis due to *Ochrobactrum anthropi* an Emerging Pathogen

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Abstract

Ochrobactrum anthropi (*O. anthropi*) are environmental organisms and are emerging opportunistic pathogens of low virulence in humans. *O. anthropi* is resistant to several broad-spectrum antimicrobial agents. It is resistant to several β lactam agents, which are commonly used to treat gram-negative infections. We report a case of meningitis due to *O. anthropi* in a patient diagnosed with phyllodes tumor of the breast in a cancer hospital.

Keywords: Coronavirus disease 2019, Immunosuppressed individuals, *Ochrobactrum* species.

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Introduction

Ochrobactrum species are nonlactose fermenting, motile, gram-negative, oxidase, and urease-positive bacilli and belong to the family Brucellaceae. Previously classified under *Achromobacter* species or CDC group Vd, *Ochrobactrum* species now belongs to the new genus *Ochrobactrum*.[1] The genus derives its name from the Greek word ochre's from the characteristic pale yellow color of its colonies. The three species commonly isolated from the clinical samples are O. anthropi, *O. intermedium*, and *O. pseudo intermedium*.[2] *O. anthropi* are part of the normal flora of the human large intestine. They were also isolated from various hospital sources like antiseptic solutions, water, and contaminated pharmaceuticals.[3] *O. anthropi* and *pseudomonas* species share the same microbial niche like plants, soil, water, antiseptic solutions, dialysis fluids, and normal saline, etc.[4,5] *O. anthropi* is resistant to several broad-spectrum antimicrobial agents. It is resistant to several β lactam agents, which are commonly used to treat gram-negative infections, including most penicillins and cephalosporins. *O. anthropi* is a low-virulence, opportunistic pathogen associated with human infections, mainly in immunocompromised patients and in patients with intravascular devices.

We will discuss the clinical course and implications of meningitis due to *O. anthropi* in a patient with phyllodes tumor of the breast along with its successful management.

Case Description

A 31-year-old female presented with a large infected foul-smelling fungating mass of the left breast and was diagnosed as a Phyllodes tumor of the breast. The patient was planned for a left mastectomy. As per hospital protocol, preoperative testing for coronavirus disease 2019 (COVID-19) was performed, and the patient was diagnosed with COVID-19. The patient had no systemic comorbidities and was shifted to the isolation ward for further management of COVID-19. The patient was hemodynamically stable with a high-resolution computed tomography score of COVID-19 reporting and data system 1 (CORADS-1) and maintained oxygen saturation of 97% on room air. The patient was afebrile, anemic with a hemoglobin of 8.5 g/dL, and had a leukocytosis of 25,700. The patient was given a packed cell volume (PCV) transfusion for anemia. Pus culture from the mass grew *proteus mirabilis* and *citrobacter koseri*. Based on the antibiotic sensitivity pattern patient was started on cefoperazone + sulbactam 3 gm intravenous (IV)/twice daily and injection metrogyl 500 mg IV/thrice daily (TID). Daily dressing of the wound was done and on day 3rd, the leucocyte count was reduced to 23,000. The blood culture was sterile. On day 5th, inflammatory markers were markedly elevated with interleukin-6 of 444.1 pg/mL, a C-reactive protein of 48 mg/L, and procalcitonin (PCT) of 82.02 ng/mL. The patient developed hypokalemia 2.8 mmol/L and hyponatremia 129 mmol/L but was hemodynamically stable, conscious, and maintained on room air. Repeat COVID-19 real-time reverse transcriptase-polymerase chain reaction on day 14th was negative, and on day 15th patient developed altered sensorium, neck rigidity, altered behavior, low Glasgow coma scale (GCS) with leukocytosis of 45,300, and procalcitonin of >200 ng/mL with clinical signs suggestive of meningitis/septic encephalopathy. GCS score of the patient was eye- opening response to pain only, motor response flexion in response to pain, verbal response incomprehensible speech (E2M3V2). Computed tomography brain was normal. In view of her clinical condition Right toilet mastectomy was performed on day 16th, and the patient had a tracheostomy for airway protection.

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Cerebrospinal fluid (CSF) was sent for biochemical analysis and Culture. Biochemical analysis of CSF was normal (glucose 56.0 mg/dL, protein 22.7 mg/dL, and chlorides 119 mmoL/L). The gram stain of CSF showed gram-negative bacilli. CSF was subcultured on MacConkey's agar, 5% sheep blood agar, and incubated at 37°C. After 24 hours of aerobic incubation, colonies on blood agar were circular, low convex, smooth, about 1 mm in diameter, and shining with an entire margin. Colonies on MacConkey's agar were mucoid and nonlactose fermenting. Gram-negative bacilli were seen on gram staining. The organism was motile, catalase positive, oxidase positive, indole negative, urease positive, citrate positive, and nonfermenter (alkaline butt and alkaline slant on triple sugar iron medium). The isolate was identified as *O. anthropi* by a fully automated VITEK 2 (bioMerieux) compact system with 99% probability. Antibiotic susceptibility was done by Kirby-Bauer disc diffusion method. As there are no Clinical and Laboratory Standards Institute breakpoints established for *O. anthropi* interpretive breakpoints of *pseudomonas* were used. The isolate was sensitive to amikacin (30 µg/disc), gentamicin (10 µg/disc), levofloxacin (5 µg/disc), ciprofloxacin (5 µg/disc), meropenem (10 µg/disc), trimethoprim/sulfamethoxazole (1.25/23.75 µg/disc), and resistant to ceftriaxone (30 µg/disc), ceftazidime (30 µg/disc), cefotaxime (30 µg/disc), and piperacillin/tazobactam (100/10 µg/disc). The patient was started on meropenem (2 gm IV/TID) and amikacin (15 mg/kg/day IV once daily) along with other supportive management. On the 4th day of antibiotic therapy patient's sensorium improved and she was obeying simple commands. Her neurological condition normalized on day 7th of antibiotic therapy. The blood culture was not repeated as the patient improved clinically. Amikacin and meropenem were continued for 12 days, and the patient had a complete recovery and was discharged on day 42.

Discussion

Ochrobactrum anthropic (*O. anthropi*) is a gram-negative, aerobic bacilli that are distributed widely in the environment and hospital surfaces. *O. anthropi* usually causes infections in immunocompromised patients, but infections among immunocompetent patients have also been described.[4] This organism has the potential to adhere to synthetic materials[6–8] and devices like intraperitoneal catheters, central venous catheters, drainage tubes, etc., and causes infections mostly in immunocompromised patients with these devices. Although *O. anthropi* is an organism of low virulence, treatment of infections is difficult due to its variable susceptibility patterns. Most isolates of *O. anthropi* produce ampicillinase C β-lactamase OCH-1, which confers it resistant to all β-lactams except imipenem.

Ampicillinase C (AmpC) β-lactamase is inducible, chromosomal, and resistant to inhibition by clavulanic acid.[9,10] The organism is mostly considered susceptible to fluoroquinolones, gentamicin, cotrimoxazole, and colistin.[11]

Rastogi and Mathur reported a case of bacteremia and meningitis in a neurotrauma patient with a severe head injury and left frontotemporal contusion with intraventricular and subarachnoid hemorrhage.[2] A case of septicemia in a 54-year-old male with Guillain–Barré syndrome was reported by Patra et al.[3] Two cases of neonatal septicemia in premature babies were reported by Mudshingkar et al., where one baby succumbed to the infection.[12] A case of *O. anthropi* septicemia in an elderly male patient with coronary artery disease and severe left ventricular dysfunction was reported by Arora et al.[5] Torres et al. reported six cases of *O. anthropi* bacteremia, of which five were immunocompromised patients, two patients had a catheter-related infection, one patient had biliary sepsis related to *O. anthropi*, one patient had pneumonia and one patient had transjugular intrahepatic portosystemic shunt related infection.[13] Three cases of *O. anthropic* meningitis in postoperative pediatric neurosurgical patients were reported by Chang et al. The source was found to be contaminated aliquots of Hanks' balanced salt solution in which the pericardial patches were processed.[14] Due to the presence of susceptible hosts with invasive devices and selective pressure of antibiotics, there is a high probability of encountering infection with this opportunistic pathogen in intensive care units.

In our patient, the source of infection could not be identified, but as the patient was immunocompromised and was admitted to the hospital for 2 weeks prior to the infection, it could have been acquired from the hospital environment.[1] Though *O. anthropi* is an opportunistic infection, this is the first time we have isolated the organism in spite of treating immunocompromised patients.

Conclusion

Isolation of *O. anthropi* from clinical specimens warrants the implementation of strict infection control guidelines along with stringent environmental cleaning to prevent outbreaks. Awareness about this organism among clinicians is important due to its resistance to many antibiotics and as it can cause serious life-threatening infections, especially in immunocompromised patients.

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