Case Reports

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Ochrobactrum anthropi Bacteremia in Immunocompromised Patients: A Unique Threat with Serious Implications

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Abstract

Ochrobactrum anthropi has emerged as opportunistic pathogen in recent times and is known to produce nosocomial infections. Identifying this pathogen is a diagnostic challenge but automation has a role in it. There has been underreporting of the cases or infection due to the low virulence and ignorance of their clinical importance. We report first two cases of bacteremia due to *Ochrobactrum anthropi* in immunocompromised hosts admitted in a tertiary care hospital in Uttarakhand. This work highlights the importance of early diagnosis using automated methods and administration of proper antibiotics for the treatment of patients.

Keywords: *Ochrobactrum anthropi*; Immunocompromised; Sepsis.

INTRODUCTION

Ochrobactrum anthropi is a Gram negative and non-fermentative human pathogen, which belongs to the B*rucellaceae* family. Earlier it was categorized as CDC group VD1. [1]It is capable of surviving even in intrusive medical instruments and antiseptic solutionsin addition to forming biofilm causing hospital-acquired infections at frequent rates. [2] Though it is of low virulence but It is responsible for bacteremia, localized infections, catheter or foreign body associated infections in immunocompetent and immunocompromised individuals.[3] There are diagnostic challenges and difficulty in identifying the organism. Currently, there are no standard guidelines to treat *O. anthropi* related infections. Here, we discuss two cases of *Ochrobactrum anthropi* bacteremia in immunocompromised patients that have been confirmed by culture, as well as the diagnostic and therapeutic protocol for its successful therapy.

CASE PRESENTATION

Case 1

A 19 year old female was brought to the emergency in an unconscious state. Two days prior to admission, the patient was apparently healthy till her third trimester when suddenly she developed throbbing headache followed by sudden onset abnormal tonic, clonic asymmetric right sided rigidity which later converted to generalized symmetric synchronous body movements of limbs with frothing. She was taken to local hospital where termination of pregnancy was advised. After 48

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hours of lower segment cesearean section, she had sudden onset of swelling in the neck, lips and face followed by loss of consciousness. On admission patient was in altered mental status, hypertensive and with acute kidney injury. MRI brain was done suggestive of Posterior reversible encephalopathy syndrome (PRES). Ultrasound pelvis revealed retained products of conception (RPOC). Evacuation was done by the gynaecology team and was sent for culture and sensitivity. *Klebsiella pneumoniae* was isolated in culture following which targeted therapy was started. Blood counts revealed increased WBC, neutrophilia and lymphocytopenia. Ventilator support was given to the patient and indwelling catheters were placed insitu. (KFT) and (LFT) was deranged. Blood sample was collected in BacT/alert bottle and sent to bacteriology laboratory. Within 24 hours, theblood sample flagged positive. On subculture to 5% sheep blood agar and MacConkey agar colonies were grown as shown in *Fig 1* and *Fig 2*. On MacConkey agar,

Fig. 1: Growth on blood agar

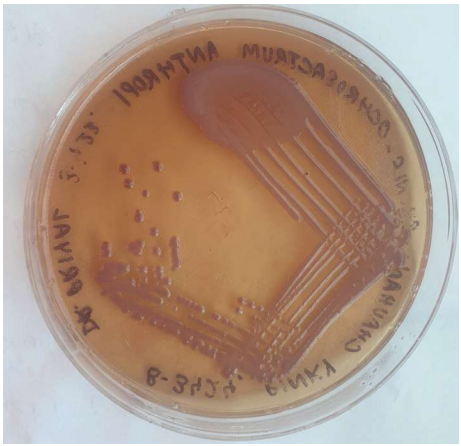

Fig. 2: Growth of non-lactose fermenting colonies on MacConkey agar

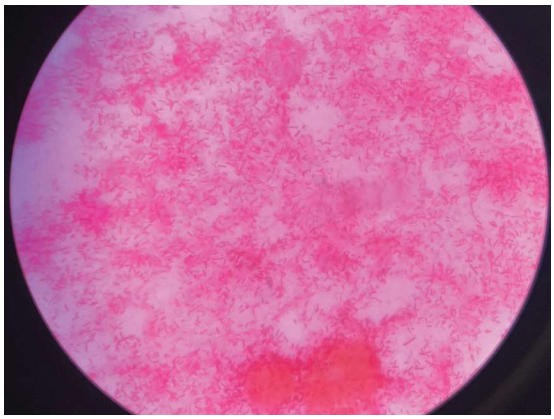

Fig. 3: Gram stain smear revealing gram negative bacilli (Magnification 1000X)

colonies were non lactose fermenting, mucoid. They were gram negative bacilli (*Fig 7.3*), motile, catalase and oxidase positive. Phenotypic identification and antimicrobial susceptibility was done by automated Vitek 2 (Biomeriux, France)system which identified it as *Ochrobactrum anthropi* with 99% probability. The AST was reported according to CLSI guidelines 33rd edition 2023 MIC breakpoints for other non-enterobacterales.[4] The patient was started on meropenem. Improvement was seen inher condition. Her blood profile improved, counts were decreased and she became afebrile. Her repeated blood samples were sent for culture but showed no growth after 5 days of incubation. After few days, her condition started worsening. Blood urea increased gradually and Ferritin levels were also increased gradually. The patient developed coagulopathy with bicytopenia. Bone marrow biopsy was done and she was diagnosed with hemophagocytosis lymphohistiocytosis with DIC. The patient was transfused many times to prevent active bleeding. The patient went into hemorhhagic shock with active bleed from nasogastric tube and malena. UGI endoscopy was done that revealed active bleeding from the ulcer in the fundus of the stomach. Urgent embolization of the left gastric artery was done. Post procedure vitals were stable but then she went into asystole at night. High quality CPR was done but the patient could not be recovered and succumbed to death.

Case 2

A 67 year old male patient presented to emergency with cough and dyspnea for past 5 days. There was acute exacerbation with worsening of cough and was febrile associated with hemoptysis since 5 days. He is known case of ILD-IPF since 2021 and was on nintedanib 150 mg twice a day and had no episodes of exacerbation before. He was referred to

AIIMS and was managed with nebulization, oxygen therapy and NIV support. Blood sample was collected and sent to laboratory for proper work-up. CBC revealed increased WBC count (17000/cu mm) and raised NLR. Procalcitonin was also raised. Patient was started on Piperacillin-tazobactum I/V, Oseltamivir and azithromycin empirically in view of infective etiology. CTPA with HRCT chest was done suggestive of reticular opacities with honeycombing appearance and traction bronchiectatic changes in B/L lungs predominantly in upper lobes along with ground glass opacities in B/L lungs. Normal bronchial arteries study. Thus no indication for bronchial artery embolization and hemoptysis was managed on medications. Samples were collected and sent to laboratory for proper work up. SARS-CoV2 RT-PCR Negative. Sputum gram stainand culture, and urine culture sensitivity were sterile. Blood culture revealed non-lactose fermenting colonies which was oxidase positive and identified as *Ochrobactrum anthropi* by Vitek 2. Antibiotics were modified based on sensitivity pattern. Gradually patient improved clinically and his O2 requirement decreased from CPAP to 4L/ min via Nasal prongs and currently no need for CPAP support. Thus patient was hemodynamically stable and discharged.

DISCUSSION

Ochrobactrum anthropi, first described by Holmes *et al.* in 1988, is a strict aerobic, motile, non-fermenterand hydrolyses the urea[5]. The name *Ochrobactrum* has been derived from the Greek word "Ochros which means yellow color. Due to its ability to persist in intravenous fluids and dialysis fluids, it has recently become an opportunistic infection in immunocompromised individuals, particularly in hospital settings. Exact incidence of *O. anthropi* infections is not knownin India but reports of bacteremia due to this from various parts of the country has been enlisted in *Table 1*. It has been linked primarily with bacteremia and sepsis, especially in patients who are catheterised[3]. Despite initially being believed to be an opportunistic pathogen that causes infections in critically ill or immunocompromised patients, *O. anthropi*is increasingly being recognised as a pathogen in immunocompetent hosts as well and has been found to be associated with osteomyelitis, pelvic abscess, prosthetic valves, trauma, endophthalmitis, and use of contaminated pharmaceuticals.[3-7]

*O. anthropi*form biofilms in catheters and other medical devices, similar to *Pseudomonas* species. Therefore, a breakdown in sterile clinical practises and tools is the root of O. anthropi's nosocomial capability for causing blood stream infections. It favours sources that are aquatic. By using traditional culture techniques, it is frequently mistaken for *Pseudomonas or Brucella*. Consequently, it is a challenge to correctly diagnose *O. anthropi* which often lead to misidentification and underestimation of its prevalence.[8] Our case reports demonstrate the function and significance of automated culture methods for the quick and precise identification of this rare etiological agent up to species level, ensuring that it is not overlooked in everyday microbiological laboratory practices. Automation in clinical Microbiology is the key to enable quick and accurate identification of such uncommon pathogens that are likely to be missed by conventional approaches. [9]Due to its intrinsic resistance to many antibiotics, empirical therapy may not be effective, and susceptibility testing should be performed to guide targeted antibiotic treatment. The isolates in our caseswas susceptible to ciprofloxacin, aminoglycosides, trimethoprim-sulfamethoxazole and carbapenems but were resistant to penicillin, ampicillin, cephalosporins, combination of beta lactam and beta lactamase inhibitor antibiotics and colistin. *O. anthropi* produces Amp C β-lactamase and thus not respond to conventional antibiotic therapy. [10] For their 7-year investigation on OA blood stream infections, Zhu *et al.* suggested using monotherapy with quinolones or carbapenems or both in unfavourable patient circumstances. [11] Thoma *et al.* had also shown *Ochrobactrum*strains were highly resistant to β-lactam antibiotics, susceptible to ciprofloxacin, and 97. 1% were susceptible to trimethoprim/sulfamethoxazole. [12] In our study, boththe isolates were susceptible to carbapenems, trimethoprim/sulfamethoxazole, and minocycline andrecoveredwithmonotherapy.

CONCLUSION

Ochrobactrum anthropi bacteremia in immunocompromised patients remains challenging and under-recognised entity. Timely recognition and accurate diagnosis are crucial to initiate appropriate antibiotic therapy, whike preventive measures can significantly reduce the risk of infection. Collaborative efforts between healthcare providers, researchers, and public health agencies are important to improve our understanding of this bacterium and develop effective strategies to manage and prevent *O. anthropi* infections in patient populations who are at risk.

Table 1: Cumulative records of *Ochrobactrum anthropi* infections reported from India

S. No	Author(Ref)	Year	Gender/ age	Co-morbidity	Type of Infection	Susceptible to	Resistant to	Treatment	Outcome
1.	Shivprakash *et al.*(1-13)	2011	75/F	Aortic valve replacement	Endocarditis	Amikacin, Ciprofloxacin, Doripenem Gentamicin, Imipenem, Meropenem Netilmicin, TMP-SMZ	N/A	Ceftriaxone (1 g intravenous twice daily), Amikacin (1 g intravenous once daily) Followed by Meropenem (500 mg 8 hourly)	Died
2.	Kumar *et al.*(2-14)	2013	45 day /M	Congenital abnormalities	Septicemia and pneumonia	Ciprofloxacin, Gentamicin, Imipenem, Meropenem, Piperacillin–Tazobactam	Amikacin, Aztreonam	Meropenem	Complete recovery
3.	Mudshingkar *et al.*(15)	2013	Neonate	Neonate	Septicemia	Amikacin, Imipenem, Meropenem	Ceftazidime, Cefepime, Gentamicin	Meropenem	Complete recovery
4.	Khan *et al.*(16)	2014	53/F	CKD, DM	Sepsis	Imipenem, TMP-SMZ	Aminoglycosides, _-lactams, Colistin, Quinolones	N?A	Died
5.	Patra *et al.*(17)	2015	54/M	Guillane Barre Syndrome	Septicemia	Amikacin, Ciprofloxacin, Gentamicin, Imipenem, Meropenem, Ofloxacin, TMP-SMZ, Piperacillin–Tazobactam	Ampicillin Aztreonam Ceftazidime, Ceftriaxone, Cefotaxime, Chloramphenicol, Piperacillin	Amikacin (15 mg/kg/ day intravenous) Piperacillin–Tazobactam (3. 375 g intravenous every 8 h)	Complete recovery
6.	Rastogi and Mathur(18)	2017	M/58 years old	Severe head injury	Septicemia with meningitis	Amikacin, Cefepime–Tazobactam, Colistin, Tigecycline TMP-SMZ	Ceftazidime, Cefepime, Cefoperazone–Sulbactam, Chloramphenicol, Ciprofloxacin, Imipenem, Meropenem Piperacillin–Tazobactam	Cefepime–Tazobactam (1. 12 gm) Amikacin (400 mg) (injection every 12 h)	Complete recovery

S. No	Author(Ref)	Year	Gender/ age	Co-morbidity	Type of Infection	Susceptible to	Resistant to	Treatment	Outcome
7.	Anjana A *et al.*(2)	2023	18 year/F	Acute lymphoblastic leukemia	Bacteremia	Amikacin, TMP-SMX, Minocycline, Imipenem, Meropenem, PTZ, Cefooperazonesulbactum,	Gentamicin, Ciprofloxacin, Levofloxacin,	Meropenem	Complete recovery
8.	Anjana A *et al.*(2)	2023	28/M	B-cell Non Hodgkin Lymphoma	Bacteremia	Ciprofloxacin, Levofloxacin, TMP-SMX, Minocycline, Imipenem, Meropenem,	Gentamicin, AmikacinPTZ, Cefooperazonesulbactum	COT	Complete recovery
9.	Sardanna, Verma Rajeev(1)	2022	70/F	CKD, DM	Septicemia (CRBSI)	ciprofloxacin, aminoglycosides, trimethoprim-sulfamethoxazole and carbapenems	penicillin, ampicillin, cephalosporins, combination of beta lactam and beta lactamase inhibitor antibiotics, chloramphenicol, tetracycline and colistin	Ciprofloxacin, Meropenem	Complete recovery
10.	Vaidhyswaran R *et al.*(19)	2022	18/F	SLE with lupus nephritis, Meckel's diverticulum	Septicemia	N/A	N/A	Meropenem, Teicoplanin	Complete recovery
11.	U arora (20)	2007	64/M	HTN, DM, CAD(LVD)	Septicemia			Ciprofloxacin, cefazolin	Died
12.	Nag A *et al.*(21)	2021	54/M	Cataract surgery	Endopthalmitis			Ciprofloxacin	Compltee recovery
13.	Radha R *et al.*(22)	2022	31/F	Phyllodes tumor of breast, COVID 19	Meningitis	Amika, Genta, Cipro, Levo, Mero, COT,	Ceftriaxone, Ceftazidime, Cefepime, PTZ	Meropenem, Amikacin	Complete recovery

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Ethics statement: The study was approved by the Institutional Ethics Committee, AIIMS Rishikesh (AIIMS//IEC/23/182).

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