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CASE REPORT

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Ochrobactrum anthropi sepsis in a 15-month-old child: A case report

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Key Clinical Message

Ochrobactrum anthropi (*O. anthropi*), a rare opportunistic pathogen, caused sepsis in a malnourished 15-month-old African child. Early detection and appropriate antibiotics led to full recovery, highlighting the importance of robust surveillance for emerging pathogens in vulnerable populations.

Abstract

While rarely causing infections, *O. anthropi*, a non-fermenting, obligately aerobic, flagellated gram-negative bacillus, demonstrates oxidase positivity and indole negativity. Traditionally, *Ochrobactrum* spp is considered a low threat due to its environmental abundance and mild virulence. It is, however, a multidrug-resistant bacteria known for causing opportunistic infections in humans. *O. anthropi* is typically associated with catheter-related bloodstream infections. The first documented case was in 1998; most cases have been reported in developed countries. We present a case of *O. anthropi* sepsis in a malnourished child in sub-Saharan Africa. We report a case involving a 15-month-old African female who presented with symptoms and signs of protein-energy malnutrition and sepsis. The blood culture revealed *O.anthropi*. We treated the child with the empirical first-line antibiotics per the national guidelines, intravenous ampicillin and gentamicin for a week, and the child fully recovered. This report describes a rare case of *O. anthropi* sepsis with malnutrition in an African female child. *O. anthropi* is an emerging pathogen causing opportunistic infections in both immunocompetent and immunocompromised patients. We report that early bacterial detection, appropriate antibiotic susceptibility and antimicrobial management based on local antibiogram data may be essential for excellent patient outcomes. Additionally, we recommend more robust surveillance to detect such rare emerging pathogens.

KEYWORDS

case report, infectious disease, malnutrition, *Ochrobactrum anthropi*, opportunistic infections

1 | INTRODUCTION

Ochrobactrum anthropi is a non-fermenting, obligately aerobic, oxidase positivity and indole negativity, flagellated gram-negative bacillus. *O. anthropi* is an emerging opportunistic pathogen rarely implicated in causing sepsis.[1] Unlike its typical domain of catheter-related bloodstream septicemia, non-indwelling catheter sepsis is an exceedingly uncommon clinical presentation for this unusual human pathogen.[2] Traditionally, *Ochrobactrum* spp is considered a low threat due to its environmental abundance and mild virulence. *Ochrobactrum* spp shares a close lineage with brucellae but boasts a lower virulence profile.[3] However, recent reports highlight their increasing role in causing potentially serious infections, including endocarditis and septicemia, even in immunocompetent individuals.[4] The first case of *Ochrobactrum* spp was reported in 1998 in a patient with a liver transplant who developed a liver abscess.[5] *O. anthropi* was also implicated in severe osteomyelitis as an opportunistic infection in an immunocompromised patient.[6] Most reported cases are from developed countries.[7] We report a case of *O. anthropi* sepsis in a 15-month-old child at a rural hospital in Central River Region, the Gambia.

2 | CASE HISTORY/ EXAMINATION

A 15-month-old African female was brought to the hospital by her mother on account of 4 days of high-grade intermittent fever that was relieved by a cold bath. Additionally, she had a history of a gradual onset cough, which was not paroxysmal, not barky, and not provoked. The patient was experiencing rapid breathing but did not have difficulty breathing. The child also had a history of multiple episodes of vomiting that were not projectile, not bilious, and of minimal volume. The vomitus initially contained a recently ingested meal and later became yellowish. There was no history of the passage of loose stool or any other significant symptoms. The mother also complained that the child had been feeding poorly, and the amount of urine the child produced in the last 24 h prior to presentation was scanty. The mother also noticed that the child could no longer control her neck movement and could not sit without support, which was not the case before the illness. All the symptoms were noted 4 days before presentation. Moreover, about a week before the presentation, the mother complained that the child was only tolerating breastfeeding, which was insufficient for the child because she was not lactating adequately. The child was fed with local pap without milk and rice meal. She poorly tolerated the meal, and subsequently, the mother noticed that her child was losing weight.

The child was given some unspecified over-the-counter medications and herbal concoctions at home.

Physical examination revealed an acutely ill-looking child with a temperature of 38.8°C, lethargic, not jaundiced, not pale, a-cyanosed, moderately dehydrated with a capillary refill of >2 s, sunken eyes, dry mouth, cold and clammy extremities and no pedal oedema. Her weight was 6.5 kg, her mid-upper arm circumference (MUAC) was 11.5, and her height was 73 cm (*Z* score of less than −3 SD).

The central nervous system showed a conscious but lethargic child, sunken anterior fontanelle, generally reduced reflexes and no signs of meningeal irritations. Also, there was poor neck control and general hypotonia.

The respiratory rate was 48 breaths per minute. Oxygen saturation was 100%, tachypnoeic, and there was no area of dullness on percussion. The breath sounds were vesicular on auscultation.

The heart rate was 140 beats per minute, with normal heart sounds.

The rest of the physical examination was unremarkable.

3 | METHODS (DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS AND TREATMENT)

A primary diagnosis of sepsis with severe acute malnutrition and a differential diagnosis of suspected pneumonia was made. We requested a blood culture, microscopy, sensitivity, chest X-ray, malaria parasite microscopy, rapid diagnostic test for malaria, and hemoglobin concentrations. The random blood sugar was 5.4 mmol/L. We wanted to do a complete blood count and electrolyte assay, but our lab is underequipped.

We commenced the child on empirical first-line antibiotics as per the national guidelines: IV ampicillin 50 mg/kg six hourly and IV gentamicin 5 mg/kg daily. Additionally, we placed her on paracetamol 7.5 mg/kg eight hourly. We also instituted intravenous fluid (dextrose saline) for resuscitation and commenced her on Formula 75 (F75) food supplement to manage the protein-energy malnutrition.

4 | CONCLUSION AND RESULTS (OUTCOME AND FOLLOW-UP)

The chest X-ray findings were essentially normal, and no anomalies were seen (Figure 1). The hemoglobin concentration was 10.2 g/dL, and the rapid diagnostic

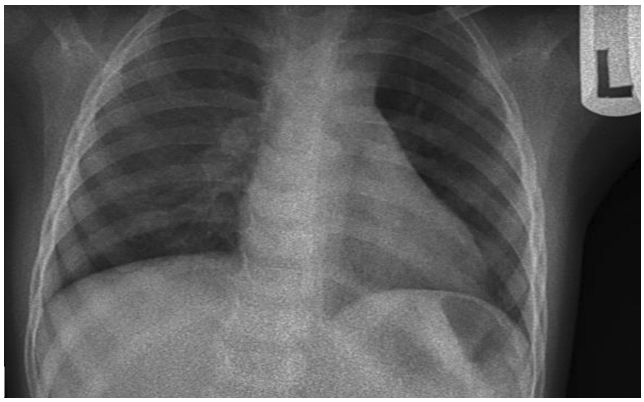

FIGURE 1 Chest x-ray of the child.

test for malaria was negative. The blood culture yielded glucose non-fermenting, obligately aerobic, flagellated gram-negative rods, demonstrating oxidase positivity. We processed the bacterium for identification using the Analytical Profile Index (API) 20NE. The identification number 0006544 on the API is consistent with *O. anthropi*.

4.1 | Chest X-ray

After 24 h of admission, the fever gradually reduced, and the child was still breathing fast. The repeat hemoglobin concentration was 8.7 g/dL (to rule out hemoconcentration during admission). On the third day of admission, the child improved well, with no fever, no tachypnoea, and the vomiting had stopped. On the fifth day of admission, the child was well hydrated and was tolerating oral feeds appropriately. Her weight had increased to 6.9 kg, and her vital signs had normalized. Due to limited resources, we could not investigate antibiotic susceptibility further. The child was discharged well after 1 week of admission and treated with empirical first-line antibiotics. She was seen a week later at the malnutrition clinic for a follow-up.

5 | DISCUSSION

O. anthropi is a gram-negative motile bacillus, non-fermentative, oxidase- and urease-positive, aerobic bacteria, previously categorized as Achromobacter species or group Vd by the Center for Disease Control and Prevention, belonging to the new genus *Ochrobactrum*.[8] Sepsis is a critical medical condition or a clinical syndrome that results commonly but not always from bacteraemia with systemic manifestation that may result in organ failure or death if not promptly recognized and managed adequately.[9] Sepsis is a leading cause of morbidity and mortality in children across the globe, as more than 40% of the global burden occurs in under 5 years of age, making pediatric sepsis a significant cause of death for this age group.[10] In 2017, about 25.2 million pediatric and neonatal sepsis cases were reported by the global burden of disease.[11,12]

Malnutrition is a major global health issue with a significant devastating effect on the under-five age group.[13] The World Health Organization (WHO) reported that about 155 million children under 5 years of age are stunted, 52 million are wasted, and 17 million are severely wasted.[14] Sub-Saharan Africa accounts for one-third of all malnourished (protein-energy malnutrition) children globally.[15] There are about 4.3 million under-five deaths yearly from malnutrition, accounting for a staggering 21.3% of deaths in this vulnerable age group.[16] Malnutrition is one of the most critical factors that affect patients' risk of infection, length of stay, and prognosis of patients with sepsis.[17] Protein-energy malnutrition is a risk factor for opportunistic infections and is associated with poorer outcomes among patients with sepsis that are not recognized and treated promptly.[18–21]

It is difficult to determine the exact global incidence of *O. anthropi* causing sepsis due to several factors, including underdiagnosis and limited data. However, *O. anthropi* was responsible for 0.5%–2% of all hospital-acquired bloodstream infections in Europe and the United States.[22] *O. anthropi* is an emerging pathogen of low pathogenicity but with varying challenging therapeutic approaches due to resistance to commonly available antibiotics where life-threatening infections occur in immunocompromised hosts.[23] *O. anthropi* is a ubiquitous organism isolated from soil, hospital water sources, antiseptic solutions, and contaminated pharmaceuticals. It may also be part of the normal gastrointestinal tract flora.[24] It is usually an opportunistic, low-virulence pathogen occasionally associated with human infections and reported commonly with immunocompromised patients or patients with intravascular devices.[25] Cases associated with indwelling vascular catheters, Gullain–Barre syndrome, neonatal sepsis with prematurity, meningitis from nosocomial infections and pneumonia have been described.[2,23,26–28] Antibiotic susceptibility varies, but it is generally susceptible to co-trimoxazole, quinolones, and aminoglycosides, particularly gentamicin.[8] It is also essential to note that it is possible to misidentify the organism due to its rarity and recent emergence in causing infections in humans. The recent publication of a misidentification case underscores the need for improved knowledge and methodologies regarding the rare pathogen *O. anthropi* and its accurate identification.[1,29–31] Unfortunately, current techniques may lack the crucial speed, affordability, and efficacy essential for optimal diagnostics in the healthcare field, especially in low and middle-income countries. Furthermore, it is vital to note the differences between

the microbiologic morphologies and characteristics of the *Ochrobactrum spp*.[32–34]

O. anthropi sepsis with background malnutrition in childhood is rarely documented, especially in the sub-Saharan region. This pathogen causes opportunistic infection in immunocompromised or patients with underlying co-morbidity. Our patient was malnourished, which is a critical risk factor for *O. anthropi* sepsis. Our case report is for a 15-month-old child who had sepsis with protein-energy malnutrition. We managed the child on empirical first-line antibiotics (ampicillin and gentamicin) per national guidelines, and she was discharged well after a week of hospital admission. It is significant to note that *O. anthropi* may be more common than reported in the literature, and it is essential to conduct more research on this emerging low-virulent pathogen. Also, this report shows that *O. anthropi*, although rarely reported, should be investigated as a cause of bacteraemia or sepsis in the pediatric age group, especially as an opportunistic infection in immunocompromised patients. Also, early detection and management based on local antibiogram data is essential for excellent patient outcomes. The lack of microbiology services in many settings in sub-Saharan Africa will mean that infections with *O. anthropi* are under-detected and may be poorly treated.

5.1 | Limitations

We had some limitations in terms of adequate investigations. We could not do a complete blood count and electrolytes because our laboratory is under-equipped. Also, we could not conduct an antibiotic susceptibility test for the organism due to inadequate reagents in our laboratory.

AUTHOR CONTRIBUTIONS

Williams Oluwatosin Adefila: Conceptualization; investigation; resources; validation; visualization; writing – original draft; writing – review and editing. **Isaac Osei:** Conceptualization; investigation; supervision; writing – review and editing. **Keita Modou Lamin:** Investigation; writing – review and editing. **Baleng Mahama Wutor:** Writing – review and editing. **Yusuf Abdulsalam Olawale:** Writing – review and editing. **Minteh Molfa:** Investigation. **Ousman Barjo:** Investigation. **Mayowa Omotosho:** Investigation. **Rasheed Salaudeen:** Investigation; supervision. **Grant Mackenzie:** Investigation; supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests in this section.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ETHICS STATEMENT

The clinical care provided was in a clinical trial approved by the Gambian Government Ministry of Health and Medical Research Council Gambia Joint Ethics Committee.

CONSENT

We obtained informed consent from the patient's father to publish this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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