A CASE REPORT: CULTURE-ASSOCIATED ACHROMOBACTER DENITRIFICANS

Feba John¹*, Dr. Chepsy C. Philip² and Dr. Rohan J. Mathew³

¹Pharm D Intern, Believers Church Medical College Hospital, Kuttapuzha, Thiruvalla, Kerala-689103.
²Senior Consultant, Clinical Haematology Department, Believers Church Medical College Hospital, Kuttapuzha, Thiruvalla, Kerala-689103.
³Clinical Pharmacist, Haemato-Oncology Department, Believers Church Medical College Hospital, Kuttapuzha, Thiruvalla, Kerala-689103.

ABSTRACT
Achromobacter, a gram-negative bacillus with low virulence, has been reported rare to cause clinically significant infections. We report a case of a six-year-old girl presented with recurrent fever and abdominal pain to our emergency department and had been undergoing maintenance chemotherapy for T-cell Acute lymphoblastic leukemia (T-ALL). The specimens for aerobic culture were drawn and analyzed from two different sites, that is, broviac catheter and peripheral line. The identification of bacterium Achromobacter denitrificans was assessed from the peripheral site and later was treated with an extended course of antibiotics. Subsequently, resulted in recovery of the bacterium and the removal of a chemo port implanted under the skin.

This report presents a unique case of catheter-associated Achromobacter denitrificans in immunocompromised subject.

KEYWORDS: Achromobacter denitrificans, peripheral site, T-cell Acute lymphoblastic leukemia (T-ALL).

INTRODUCTION
Achromobacter denitrificans are described as gram-negative bacterium formerly known as Alcaligenes denitrificans and recently classified as Achromobacter.¹ Although the organisms have a global distribution, it is an aerobic, non-fermenting, oxidase- and catalase-positive
motile bacterium which inhabits in soil and a variety of aquatic environments.\textsuperscript{[2]} Moreover, the bacterium can also be segregated from the normal flora of ear, gastrointestinal and respiratory tracts in some people.\textsuperscript{[3,4]} It is believed that a dysfunctional immune status plays a role in the pathogenicity of Achromobacter subspecies.

These subspecies has been described as a rare etiologic agent of infections such as bacteremia, endocarditis, meningitis, pneumonia, osteomyelitis, arthritis, peritonitis and urinary tract infection.\textsuperscript{[5]} However, some species, most notably xylosoxidans and denitrificans have the propensity to cause disease in certain populations, such as subjects with cystic fibrosis, hematologic and solid organ malignancies, renal failure, and immunodeficiencies.\textsuperscript{[6]} The diagnosis is made on the basis of appropriate specimens isolated from blood, peritoneal and pleural fluid, urine, and sweat. The risk factors identified for Achromobacter infections include immune insufficiency, human immunodeficiency virus (HIV), malignancy, cystic fibrosis, and hospitalization.\textsuperscript{[7,8]}

**CASE REPORT**

The six-year-old girl with T-cell acute lymphoblastic leukemia (T-ALL), having fever and abdominal pain was administered paracetamol (250 mg) before admission to our hospital.  
Back in April 2018, a bone marrow evaluation was performed which revealed 90 percent (%) blast cells and thus confirmed the diagnosis of T-ALL. She had already undergone the 2 phases of chemotherapy: pre-induction, induction, consolidation and interim maintenance therapies and had been planning to undergo intrathecal (IT) methotrexate (12mg), as an integral part of the maintenance phase in march from christian medical college (CMC) vellore. However, the travel restrictions arised due to covid-19 pandemic, she was referred to our hospital for the maintenance chemo in the vicinity of their house. After discussing prognosis and options with the healthcare team and parents, she received her 6th cycle of maintenance chemotherapy first dose of inj methotrexate (12mg) vincristine( 1.3mg in 10ml ns slow side push), inj dexamethasone (4mg) on 12/05/2020 dose 2 inj vincristine (1.3 mg in 10ml ns slow side push received on 17/6/2020 in our hospital.  

She developed recurrent febrile illness and vomiting from the past one week before admission. Physical examination revealed a body temperature of 103\degree F, blood pressure of 100/60 mm Hg, pulse rate of 118 beats/min and room air oxygen saturation (SpO2) of 98\% whereas no tenderness, erythema, or drainage were noted at the catheter site. The laboratory examination showed decreased leukocyte count i.e. 3080 cells/mm\textsuperscript{3}. Blood culture specimens
were drawn from the broviac catheter and peripheral site, from which detected the organism A. dentificans from the peripheral site. Intravenous administration of piperacillin tazobactam was initiated. Blood culture was repeated on the third day of admission and the antibiotic was switched to intravenous meropenem 500 mg 8 hourly a day followed by trimethoprim+sulfamethoxazole (TMP-SMZ) administered for two consecutive days as a supportive therapy. The antibiotic treatment was continued for 8 days with a good clinical response and became afebrile. Repeated blood cultures from the peripheral sites showed resolution of the organism. The susceptibility of infection from implanted chemo port was considered and hence it was successfully removed. She was discharged from the hospital on day 13 of admission and had no recurrence of infection.

DISCUSSION

Although achromobacter denitrificans is considered as an opportunistic microorganism with low pathogenicity, it can lead to serious infections especially in immunocompromised hosts. Bacteremia is a significant infection and may be associated with catheter. A. denitrificans has been reported in patients with certain conditions including cancer, neutropenia, bone marrow or liver transplant, diabetes mellitus, renal failure, cystic fibrosis, HIV infection, IgM deficiency, neonates, and healthy individuals. The clinical manifestations of the infection is quite diverse among such population. Our patient had a broviac catheter and peripheral line for the administration of chemotherapy and leukopenia which have led to the development of infection.

Moreover, effective management can be challenging due to the organism’s inherent and acquired multidrug resistance patterns. An extensive review of 77 patients revealed that most isolates of pathogen were resistant to aminoglycosides, narrow-spectrum penicillins, first-and second-generation cephalosporins and were susceptible to extended-spectrum penicillins, third-generation cephalosporins, TMP-SMZ, and imipenem whereas 11 of 20 isolates were resistant to ciprofloxacin. However, preceding studies have shown that antibiotics like cotrimoxazole, piperacillin-tazobactam, meropenem and ceftazidime were sensitive to the pathogen. Although in the present case, she was initially treated with intravenous piperacillin tazobactam(2.25g) 6 hourly and later switched to meropenem based on sensitivity testing followed by TMP-SMZ, thus yielding an excellent clinical response.

Majority of infections caused by Achromobacter species are asymptomatic. Symptomatic infections include natural-valve or prosthetic valve endocarditis, meningitis, osteomyelitis,
intra-abdominal abscess, pneumonia, peritonitis, conjunctivitis, and infections due to prosthesis.[5,11,12,13] Aisenberg et al. reported a case series of patients suffering from malignancy, in which 33% infections were hospital acquired while in 25% cases infected intravenous catheters were the cause of bacteremia.[14] The management depends on administration of appropriate antimicrobial agents, yet duration of treatment is not exactly defined due to inadequate information regarding the guidelines for Achromobacter infection management. Hitherto, the cases reported had been managed with different regimens but the most remarkable response was obtained with carbapenems of durations ranging from 2 to 14 weeks.[15]

CONCLUSION
The clinical spectrum of infections by the sporadic but still significant opportunistic pathogen Achromobacter further enhanced our insight. However, there is an ongoing debate about the pathogenicity and virulence factors of clinical isolates among immunocompetent hosts to elucidate the mechanisms by which it leads to infection. Prompt identification of the pathogen and an appropriate antibiotic strategy following bacterial isolation are fundamental for unusual microorganisms. In conclusion, we report this case to highlight that a rare pathogen A. denitrificans causing bacteremia in our patient was successfully treated with antibiotics with the removal of chemo port, thus resulting in an excellent outcome.

REFERENCES


