Central line associated bloodstream infection caused by *Kodamaea ohmeri* in a young child

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Abstract

Introduction ***Kodamaea ohmeri*, a yeast frequently mistaken for *Candida*, has emerged in recent years as an opportunistic fungal pathogen, showing a predilection towards patients with immunosuppression, or those with long-term central venous access. This report describes a central line associated bloodstream infection (CLABSI) due to *K. ohmeri*, in a young child, which was successfully treated.**

Case report **The patient is a 5-year-old male with a history of short gut syndrome, and total parenteral nutrition (TPN) dependence who presented to the emergency room with a two-day history of productive-cough, rhinorrhea, and fever. Antibiotic therapy was initiated with cefepime and vancomycin for suspected CLABSI. However, within the first twenty-four hours of his admission, his initial blood culture from his central venous catheter became positive for yeast so fluconazole was added due to suspicion of candidemia. During his admission, his initial central line and peripheral blood culture were later speciated as *Kodamaea ohmeri*, with susceptibilities to fluconazole (MIC: 4 µg/mL) and micafungin (MIC: 0.125 µg/mL). After evaluating the susceptibilities, he was transitioned to micafungin.**

Conclusions **This case report further acknowledges that while rare, *K. ohmeri* is an emerging pathogen that has the potential to be life threatening if not accurately identified and treated with the optimal, empiric antifungal therapy. Due to potentially high mortality and antifungal resistance, this yeast species should be on the differential in patients that present with a central venous catheter and/or other underlying risk factors. Favorable outcomes can be achieved by removing indwelling catheters and administering optimal antifungal therapy.**

Keywords **Central line associated bloodstream infection, fungemia, *Kodamaea ohmeri*, echinocandin.**

Introduction

Kodamaea ohmeri, a yeast frequently mistaken for *Candida*, has emerged in recent years as an opportunistic fungal pathogen capable of causing fungemia, endocarditis, and onychomycosis.[1,2] Similar to other opportunistic organisms, *K. ohmeri* shows a predilection towards patients with acute-chronic immunosuppression (recent *1*surgeries, chemotherapy, etc.), recent antibiotic use, or those with long-term central venous access.[2] In their systematic review of 35 patients with documented *K. ohmeri* infections, Ioannou et al. noted an overall mortality rate of 37.1% (slightly higher compared to *Candida*).[2] *K. ohmeri* has been shown to have varying susceptibilities to commonly used antifungal drugs.[2-5] Azoles, particularly fluconazole, have been reported to have higher minimum inhibitory concentrations

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(MIC), with greater rates of resistance, while micafungin, amphotericin, and voriconazole have been shown to be optimal antifungals.[3,5-7] This report describes a central line associated bloodstream infection (CLABSI) due to *K. ohmeri* which was successfully treated.

Case report

The patient is a 5-year-old male with a history of ileal atresia repaired at birth with postoperative course complicated by volvulus requiring several exploratory laparotomies with subsequent jejunocolostomy, short gut syndrome, and total parenteral nutrition (TPN) dependence, who presented to the emergency room with a two-day history of productive-cough, rhinorrhea, and fevers. The mother became concerned when the patient began developing persistent, high-grade fevers >104 °Fahrenheit (40 °Celsius). For the past week she had been changing the patient's central line dressing more frequently due to increasing amounts of drainage; the patient had been tolerating his TPN and supplemental gastrostomy feeds without issue. A review of the patient's medical records noted a recent hospitalization (one month prior) for methicillin-susceptible *Staphylococcus aureus* CLABSI requiring a fourteen-day course of vancomycin; at that time, his central line was preserved.

The patient was initiated on cefepime 50 mg/kg every 8 hours, IV and vancomycin 15 mg/kg every 6 hours, IV, for suspected CLABSI. However, within the first twenty-four hours of his admission, his initial blood culture from his central venous catheter became positive for yeast so fluconazole 12 mg/kg every 24 hours, IV, was added due to suspicion of candidemia. At that time there was no growth from peripheral blood cultures; however, only one peripheral blood culture also grew positive for yeast at around thirty-six hours into his admission. Repeat peripheral blood cultures in his admission were negative for yeast. During the first two days of the hospital stay, the patient continued to develop >102 °Fahrenheit (38.8 °Celsius) fevers, with symptoms subsiding on hospital day three.

In terms of his management, after his blood culture was positive for yeast, his central line was removed. While he did not have his central line access, he obtained his nutrition from peripheral parenteral nutrition. After forty-eight hours of monitoring his initial blood cultures, vancomycin and cefepime were discontinued as well. During his admission, his initial central line and peripheral blood culture were later speciated as *K. ohmeri*, with susceptibilities to fluconazole (MIC: 4 µg/mL) and micafungin (MIC: 0.125 µg/mL), with no resistance to antifungal drugs. The Epsilometer test (Etest) method was used to determine antifungal susceptibilities. After evaluating the susceptibilities, on day three of the hospital stay, he was transitioned to micafungin 2 mg/kg every 24 hours, IV, per infectious diseases recommendation. He received four doses of his fourteen-day course during his hospital stay.
Echocardiography was unremarkable for signs of disseminated fungal entity. Additionally, doppler ultrasound for vein mapping revealed all patent vessels with no signs of thrombi in any of the vessels. After three repeated peripheral blood cultures were negative, he had a new central venous catheter inserted for his TPN and he was sent home to complete a fourteen-day course of micafungin via his new central venous catheter. He was hospitalized for a total of six days.

Discussion

This patient presented with a CLABSI due to *K. ohmeri*, which was subsequently treated with micafungin. *K. ohmeri* is a yeast which has been increasing in prevalence and is known to cause invasive infections.[2] Cases of *K. ohmeri* fungemia have been reported in the literature with a variety of causes, predisposing conditions, and risk factors.[2,5,6,8,9] Many patients that develop *K. ohmeri* fungemia are immunosuppressed from chemotherapy or hematologic malignancies, have a central venous catheter requiring removal for successful treatment, or have had previous systemic antibiotic use.[2,10] Blood culture is the gold standard in the diagnosis and species identification should carefully be obtained due to frequent misclassification as *Candida* spp.[6] Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) was done to identify *K. ohmeri*. This is an accurate and rapid method for identifying microorganisms

and has been shown to correctly identify 98.9% of PCR-sequenced yeasts.[11]

This case presents another example of a patient who had multiple risk factors that predisposed them to developing *K. ohmeri* fungemia. The patient received total parenteral nutrition via a central venous catheter, both of which have been shown to be risk factors.[2] There have been 18 previous cases of *K. ohmeri* fungemia that have been reported in patients with central venous catheters, 13 of which required removal as part of the treatment.[2,6,8] In addition to catheter removal, the patient in this case was treated with micafungin, which is fungicidal compared to fluconazole, a fungistatic antifungal drug. Previous studies have highlighted echinocandins, specifically micafungin, as a more effective treatment option when compared to fluconazole.[3,5-7,10]

Conclusions

This report has described the case of a 5-year-old male with short gut syndrome requiring TPN via a central venous catheter presenting with *K. ohmeri* fungemia. This case report further acknowledges that, while rare, *K. ohmeri* is an emerging pathogen that has the potential to be life threatening if not accurately identified and treated with the optimal, empiric antifungal therapy. This yeast species should be on the differential in patients that present with a central venous catheter and/or other underlying risk factors and show no improvement with antibiotics. Favorable outcomes can be achieved by removing indwelling catheters and administering optimal antifungal therapy.

Consent: Written informed consent was obtained from the patient's parents for the publication of the case report.

Authors' contributions statement: All authors meet the ICMJE authorship criteria. AH was responsible for the organization, coordination, and drafting of the manuscript. All authors were responsible for the organization and coordination of the care provided to the patient. All authors reviewed the patient's chart and were responsible for clinical information obtained. All authors contributed to the writing of the final manuscript. All authors read and approved the final version of the manuscript.

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