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CASE REPORT

Opportunistic infections due to *Candida auris* in Patients with Multiple Comorbidities

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Abstract

The *Candida* species are usually considered as commensals on skin, mucous membrane, and gastrointestinal tract. Among various non-albicans *Candida* species, *Candida auris* is gaining importance due to serious outbreaks of invasive infections in healthcare settings worldwide. We report a series of three clinical cases associated with *Candida auris* infections. All of these *Candida auris* isolates were identified by VITEK-2 compact automated system. The antifungal susceptibility data showed that all of the three *Candida auris* isolates were multi-drug resistant in nature and sensitive only to echinocandins including caspofungin and micafungin.

Key Words

Candida auris, NAC Species, Opportunistic fungi, MDR*Candida*

Introduction

Candida albicans is the most common clinically significant among *Candida* species. However, other *Candida* species known as non-albicans *Candida* (NAC) species are implicated in more than 50% of the infections.[1] The invasive infections due to multidrug resistant (MDR) NAC species are being increasingly reported worldwide in recent past. Among potentially MDR *Candida* species, *Candida auris* is attracting special attention due to outbreaks of invasive infections especially in intensive care units (ICUs) of the hospitals.[1,2]

Candida auris has been found to be associated with various invasive and non-invasive infections including candidemia and urinary tract infections (UTI). *Candida auris* is considered as an emerging *Candida* species reported in case reports, case series and outbreaks in the hospitals.[2-4] The majority of *Candida auris* infections are associated with comorbidities or immunocompromised states.[3-4] The identification of *Candida auris* by conventional methods is not reliable. The reliable identification can be done by matrix assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF MS) or various automated phenotypic identification systems including VITEK-2 compact with updated database version 8.01 or above.[5,6] We report three clinical cases due to *Candida auris* in patients with multiple comorbidities from a tertiary care medical teaching institute.

Case 1

A 24 years' adult male, a known case of Dandy Walker malformation with right ventriculoperitoneal (VP) shunt in-situ presented with high grade fever, uncontrolled seizures, and fall in oxygen saturation. On examination patient was drowsy with raised temperature, mild hepatomegaly, moderate splenomegaly, and right VP shunt in-situ were observed. The case was diagnosed as refractory status epilepticus with Dandy Walker malformation with right VP shunt in-situ. The patient was being managed conservatively and paired samples for blood culture along with the other routine investigations were requested. *Candida auris* was recovered from

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the blood culture samples.

Case 2

A 75 years' male presented with history of fall on ground followed by weakness of right side of the body. The patient was a known case of chronic hypertension (HTN), type 2 diabetes mellitus (T2DM), and chronic obstructive pulmonary disease (COPD) on medication. He was admitted and diagnosed as a case of cerebrovascular accident (CVA) with HTN with T2DM.

He was also having the history of chronic smoking. He was being managed conservatively and Foley's catheterization was done as a routine procedure. On fifth day of admission he developed fever with chills, lower abdominal pain, and burning. Along with the other routine investigations, the urine sample collected from the catheter following standard sample collection guidelines was subjected to culture and susceptibility testing. On culture of the urine sample, *Candida auris* was isolated. The same organism was re-isolated on repeat sample.

Case 3

A 54 years' female presented with fever, nausea, vomiting, constipation, and shortness of breath of 7 days' duration. The patient was admitted, investigated and managed conservatively. She was diagnosed as follow up case of pyogenic meningitis with Cushing's syndrome with obstructive sleep apnea with morbid obesity with coagulopathy syndrome with acute coronary syndrome. Foley's catheterization was done as a routine procedure along with other treatment modalities. The blood culture from paired blood samples as well as cerebrospinal fluid was negative for any microbial pathogen. From the urine sample collected from Foley's catheter following standard sample collection guidelines, *Candida auris* was recovered which was re-isolated from repeat culture of urine sample.

Table1:CDC's Interpretative Breakpoints of Antifungal For Candida *auris*

Antifungal Name	Resistant Breakpoints (MIC in µg/mL)
Fluconazole	≥ 32
Amphotericin B	≥ 2
Caspofungin	≥ 2
Micafungin	≥ 4

The species level identification of *Candida* species was done by VITEK-2 compact automated system (bioMerieux, France). As the antifungal susceptibility interpretation breakpoints are not established for *Candida auris* by CLSI or EUCAST, the interpretation was done according to minimum inhibitory concentration (MIC) breakpoints as suggested by centers for disease control and prevention (CDC) for *Candida auris*.[6] The CDC suggested MIC breakpoints for *Candida auris* are shown

Table 2: Summary of All of the Three Cases

Characteristics	Case 1	Case 2	Case 3
Underlying conditions/ Comorbidities	VP shunt in-situ, Presence of CVC, Recurrent hospital admissions, Prolonged hospital stay	T2DM, COPD medication, Steroid therapy, Indwelling Foley's catheter, Chronic smoking	Steroid therapy, Indwelling Foley's catheter, Prolonged hospital stay,
Clinical entity associated with *Candida auris*	Blood stream infection due to *Candida auris*	CAUTI due to *Candida auris*	CAUTI due to *Candida auris*
Sensitive antifungals	Caspofungin and micafungin	Caspofungin and micafungin	Caspofungin and micafungin
Targeted antifungal therapy	Micafungin	Micafungin	Micafungin
Follow-up and outcome	Recovered and discharged after 15 days	Recovered and discharged after 14 days	Recovered and discharged after 21 days

VP shunt-Ventriculoperitoneal shunt; CVC-Central venous catheter; T2DM-Type-2 Diabetes mellitus; COPD-Chronic obstructive pulmonary disease; CAUTI-Catheter associated urinary tract infection.

in Table 1. The summary of all cases is depicted in Table 2. The colony characteristics of *Candida auris* on SDA are shown in Figure 1.

Figure 1: Colony Characteristics of *Candida auris* on Sabouraud Dextrose Agar

Discussion

The *Candida auris* was first isolated in 2009 in Japan. Thereafter, it has been reported in various case reports, case series and outbreaks worldwide.[2-4] *Candida auris* cannot be identified reliably by conventional methods due to misidentification as other biochemically related *Candida* species. The reliable identification can be done byMALDI-TOF MS or various automated systems including updated VITEK 2 with data base 8.01 or above.[5,6]

All of the cases in this study were having multiple risk factors. The various risk factors were also observed by other studies including a review on *Candida auris* from healthcare facilities in Asia by Thatchanamoorthy *et al.* and they reported ICU stay, presence of indwelling devices, immuno compromised states, underlying chronic diseases, and exposure to antimicrobials among various risk factors.[7] The similar findings on association of risk factors with *Candida auris* infections were also documented from other studies.[2,4]

Candida auris being an MDR pathogen, the misidentification of *Candida auris* as other *Candida* species may result in higher mortality due to wrong selection of antifungal for treatment resulting in treatment failure. *Candida auris* was exhibiting resistance tomost of the antifungals, susceptible only toechinocandins such as micafungin and caspofungin. Prayag *et al.* also reported the most of the *Candida auris* isolates sensitive to echinocandins and resistant to azole group of antifungals.[8] Ashraf *et al.* also reported *Candida auris* sensitivity to echinocandins while resistant to fluconazole, voriconazole, and amphotericin B. The echinocandins are considered as the first line antifungal treatment for *Candida auris*, due of resistance to azoles and amphotericin B.[9] The reliable identification as well as AFST of *Candida auris* is of utmost importance to guide suitable antifungal treatment.

Conclusion

Candida auris is an opportunistic and emerging pathogen in hospital environment particularly among patients with various risk factors including immuno compromised states, prolonged hospital or ICU stay, and presence of indwelling devices. The MDR nature frequently leading to treatment failure resulting in higher mortality is a matter of serious concern. The early institution of suitable antifungal based on reliable identification is crucial to decrease the mortality.

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