

Two Cases of the Emerging *Candida auris* in a university hospital from Saudi Arabia

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Abstract

Candida auris is an opportunistic multidrug-resistant pathogen that was first isolated in 2009 and has since been reported from about 30 countries. In Saudi Arabia, only four cases of *C. auris* have previously been reported; here, we report two new cases of this infection. Both patients were polymorbid and had long hospitalization periods with recurrent intensive care unit (ICU) admissions. The findings of the tissue/blood cultures and antimicrobial therapy protocols are explained in the case report. Urine culture in both cases was positive for *C. auris*, and the colonies grew well at 42°C. The fungal isolates were confirmed by matrix-assisted laser desorption ionization time-of-flight mass spectrometry. The first patient was treated with the recommended dose of caspofungin, but he passed away. The second patient was also planned to be treated with caspofungin, but he passed away before the treatment could be initiated. The present cases further corroborate signs of a growing number of reports of *C. auris* in patients with high-risk factors, such as hospitalization in ICU, multiple chronic conditions and prolonged antimicrobial treatment exposure. It also highlights the need for hospitals to further improve their infection control practices to prevent nosocomial infections such as *C. auris*.

Keywords: *Candida auris*, multidrug resistance, nosocomial infection, Saudi Arabia

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INTRODUCTION

Candida auris is a recently recognized species that was first isolated from an ear swab from Japan in 2009, and since then, cases have been reported from 30 countries.^[1] In 2016, the Centers for Disease Control and Prevention (CDC) raised serious public health concerns over the emergence of *C. auris*,^[2] largely owing to the multidrug-resistant isolates and high mortality rates.^[3]

In the Gulf region, cases of *C. auris* have been reported from Saudi Arabia, Oman, Kuwait and the United Arab

Emirates.^[4-8] In Saudi Arabia, to the best of the authors' knowledge, four cases have been reported: three patients in 2018^[7] and a fourth patient in 2019.^[8] Here, we report the first cases of *C. auris* isolation from urine samples from Saudi Arabia.

CASE REPORTS

Case 1

An 85-year-old male with a history of cerebrovascular insult, pressure ulcer, cellulitis and abscesses in different sites, and who had stroke 5 months earlier with recurrent

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intensive care unit (ICU) admissions, was re-admitted to our hospital with infected bed sores. *Propionibacterium acnes* was isolated from sacral wounds. The patient was also found to have urinary tract infection caused by *Klebsiella pneumoniae*, as confirmed by matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS, Bruker Biotyper, USA). Empirical treatment was initiated with meropenem (1000 mg 8 hourly) for 12 days. Subsequent tissue culture from infected wounds revealed polymicrobial infection of *K. pneumoniae*, *Morganella morganii* and *Acinetobacter baumannii*. Accordingly, the meropenem treatment was extended by 28 days, followed by vancomycin 125 mg every 6 h for 17 days. The patient was regularly followed up and his vital signs during this course were: pulse, 95 beats/min; respiratory rate, 22 breaths/min; blood pressure, 120/80 mmHg and temperature, 37.3°C.

On day 27 postadmission, the patient's repeated urine culture was positive for *C. auris*, as identified using an automated identification system (VITEK-2 system; bioMérieux, Marcy l'Etoile, France), and the colonies grew well at 42°C. The fungal isolate was confirmed by MALDI-TOF MS. However, because of the complicated skin infections, the patient was initially prescribed tigecycline (50 mg) 12 hourly for 21 days. Subsequently, caspofungin (with a loading dose of 70 mg/m² followed by 50 mg/m²/day) was used to manage the *C. auris* infection along with colistin (360 mg/12 h) for 10 days. One month after the isolation of *C. auris*, the patient's condition deteriorated, and he passed away.

Case 2

A 62-year-old male with a medical history of hypertension, diabetes, peripheral vascular disease, left below elbow amputation, dyslipidemia, coronary artery disease and middle cerebral artery stroke was admitted to our hospital with fever of unknown origin. The patient's vital signs on admission were: pulse, 78 beats/min; respiratory rate, 20 breaths/min; blood pressure, 153/70 mmHg and temperature, 38°C. The patient was initially prescribed ceftriaxone (1 g 12 hourly) for 4 days, and then, based on the sensitivity report, he was switched to piperacillin/tazobactam (2.5 g 6 hourly) for 7 days. The patient's condition stabilized, and he remained under observation.

On day 14 postadmission, blood culture and sputum sample analysis revealed *Staphylococcus epidermidis* and methicillin-resistant *Staphylococcus aureus* infections, respectively. Accordingly, clindamycin (600 mg 8 hourly) was prescribed for 12 days. One week later, blood culture was positive for *K. pneumoniae*, while *Pseudomonas aeruginosa* was isolated from transtracheal aspirate culture. Blood

culture had been set with two venipunctures from separate sites, as per our hospital's guidelines. Accordingly, ceftazidime (1 g 8 hourly for 23 days) and gentamycin (150 mg/day for 5 days) were added to the treatment regimen. The patient was regularly followed up and the average vital signs were: pulse, 110 beats/min; respiratory rate, 24 breaths/min; blood pressure, 190/110 mmHg and a recurrent temperature of 38°C. The response to the treatment was poor, and thus, meropenem (500 mg/8 h) was prescribed for 10 days, followed by colistin (5 mg/kg) divided every 6 h for 5 days.

On day 47 postadmission, the patient's urine culture was positive for *C. auris* (using VITEK-2 system, bioMérieux, Marcy l'Etoile, France) and the colonies grew well at 42°C. The fungal isolate was confirmed by MALDI-TOF MS. Management was planned with caspofungin; however, 3 weeks after the isolation of *C. auris*, the patient's condition deteriorated, and he passed away before the treatment could be initiated [Figure 1].

DISCUSSION

The current report presents the first cases of *C. auris* isolated from urine samples in Saudi Arabia, thereby contributing to the international awareness of this pathogen. The infection patterns in this report is in line with previous reports on *C. auris* infections, indicating that patients with hospitalization in ICU, multiple chronic conditions and prolonged antimicrobial treatment exposure are at high risk.^[9]

In 2018, Abdalhamid *et al.* reported the first cases of *C. auris* from Saudi Arabia in three female patients with different medical conditions, who were admitted to the ICU ward and were on antibacterial coverage. *C. auris* had been isolated from blood samples and pleural tissue.^[7] The fourth confirmed case from Saudi Arabia was reported in 2019 in a male patient admitted to the hospital due to a severe head injury who had developed multiple acquired hospital infections. *C. auris* was detected from femoral line catheter tip samples and peripheral blood cultures using VITEK-2 system and confirmed by MALDI-TOF.^[8] Similarly, in both our cases, *C. auris* infection was detected using the VITEK-2 system (and the colonies grew well at 42°C) and confirmed by MALDI-TOF. However, a major challenge with *C. auris* is that it can be misidentified by routine diagnostic tools, such as VITEK-2, API-20C and MALDI-TOF MS, and may only be detected with molecular techniques.^[10,11]

In our cases, *C. auris* was found in noninvasive specimens (urine samples), which indicated *C. auris* colonization.

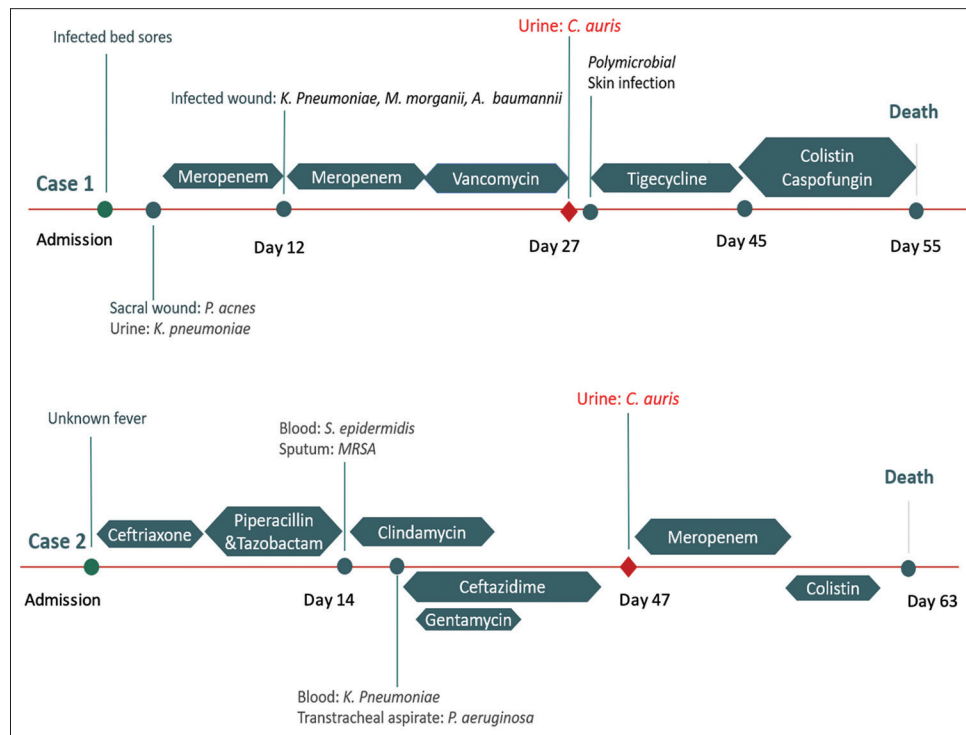


Figure 1: Timeline of the two patients with *Candida auris* infection

Colonized patients can be a source of nosocomial infection, and the true percentage of patients colonized with *C. auris* that might develop invasive infections is yet unknown.^[12,13] According to the CDC, invasive infections can develop at any point after patients become colonized, and echinocandins should be given as the initial treatment.^[14] Recent reports have stated that empirical or prophylactic antifungal therapy should be considered if a patient's condition deteriorates. In those reports, caspofungin was prescribed to safeguard against developing invasive infections in critically ill patients colonized with *C. auris*.^[13,15] However, when initiating treatment, it should be noted that *C. auris* is a multidrug-resistant pathogen, with fluconazole and amphotericin B resistance occurring in up to 90% and 35% of the cases, respectively. Therefore, echinocandins can be considered as an empirical treatment until specific susceptibility testing results are available, as <5% of *C. auris* infection cases have reported resistance to echinocandins.^[16,17]

Molecular detection of *C. auris* resistance could improve the epidemiological understanding and reduce treatment failure due to ERG11 and FKS1 mutations, which are associated with azole and echinocandin resistance correspondingly.^[18]

C. auris has high transmission capabilities which cannot easily be eradicated from the environment because it adheres to polymeric surfaces and forms biofilms.^[19] Consequently, strict isolation and regular cleaning with

high-strength chlorhexidine and hydrogen peroxide vaporization are recommended to reduce *C. auris* in the environment, in addition to daily cleaning of rooms of *C. auris* patients using disinfectants that are active against fungi.^[17] In our hospital, the *C. auris* infection occurred despite strict adherence to contact screening and infection control precautions as per the recommendations of the Saudi CDC.^[20] This may likely highlight the need for additional measures to avoid such nosocomial infections in the future.

In our cases, we were not able to perform the antifungal susceptibility testing. However, further studies and case reports should be conducted to understand the correlation between antifungal resistance, clinical outcomes and virulence phenotypes of this emerging pathogen.

CONCLUSION

This report presents the first cases of *C. auris* isolated from urine culture in Saudi Arabia as well as corroborates an emerging number of reports of this infection in patients with high-risk factors. This report also highlights this pathogen's high transmission potential, which requires strict infection control practices and patient isolation. Further research is crucial in improving the understanding of virulence factors to improve the treatment of this emerging infection.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the forms, the kin of both patients have given their consent for the clinical information to be reported in the Journal. The kin of both patients understand that names and initials would not be published, and due efforts will be made to conceal the identity of both patients, but anonymity cannot be guaranteed.

Peer review

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Conflicts of interest

There are no conflicts of interest.

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