CASE SERIES

EPIDEMIOLOGICAL ANALYSIS AND SUCCESSFUL MANAGEMENT OF A CANDIDA AURIS OUTBREAK IN A SECONDARY CARE HOSPITAL SETTING IN SAUDI ARABIA; AN OUTBREAK REPORT

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Candida auris has emerged as a major diagnostic and therapeutic challenge in the hospital environment. C. auris is resistant to many antifungals, making it a newer example of one of the world’s most problematic and feared health threats. We recently confronted a cluster of C. auris cases at our hospital during the spring of 2020. This outbreak investigation took place at the ICU of King Khalid hospital Al Majmaah Saudi Arabia. Considering its potential to cause an outbreak with serious consequences, strict control measures were implemented thus effectively controlling the outbreak.

Keywords: Candida auris; Outbreak; Multi drug resistance

INTRODUCTION

A progressive shift from predominance of candidiasis due to non-albicans Candida species has been observed in the recent few years.1 This change in pattern of candida infection has essentially increased with the advent of C. auris. This newly emerged multidrug-resistant fungal pathogen, is now among the world’s most feared microbe. It is associated with a high mortality and outbreak of severe infections.2 Initially isolated from the external ear of a Japanese patient in 2009, Candida auris has now been reported from different parts of the world.3 It exhibits a capacity to efficiently form biofilms and displays capability of nosocomial transmission.4 We present here the experience of the outbreak in our hospital.

Outbreak report

We encountered this fungal pathogen at our ICU at King Khalid hospital AlMajmaah (KKHM), between April to May 2020. The Candida scoring system proposed by Leon et al5 was used to define patients at high risk of invasive infection. Based on this criteria, patients were grouped as follows: colonized by Candida, a possible Candida infection and a proven candida infection. The case was defined as a patient with positive C auris culture with same phenotypic characteristics as the index case.

Index case was a 79 years old female referred from a nearby Tumair General Hospital in April 2020. She tested positive for Candiduria on three separate occasions within a span of two weeks and later positive for candidemia.

Second case was also a referred patient from Al Ghat hospital and the laboratory reported isolation of Candida species in urine and Blood culture of this patient. The second case was placed on the bed next to the index case.

This is in coherence with our laboratory finding of Candida species on the environmental samples collected from beds of both, the index case and the second case. Subsequently, C. auris was isolated from three more patients over a period of one month.

Table-1: C auris outbreak in ICU of King Khalid Hospital AlMajmaah, KSA, in 2020: Patient summaries

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age (years),</th>
<th>sex</th>
<th>Specimen type</th>
<th>Date of isolation of C auris</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>79</td>
<td>F</td>
<td>Urine</td>
<td>27/3/2020</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>F</td>
<td>Blood</td>
<td>29/3/2020</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>M</td>
<td>Urine</td>
<td>20/4/2020</td>
</tr>
<tr>
<td>4</td>
<td>94</td>
<td>M</td>
<td>Urine</td>
<td>22/4/2020</td>
</tr>
<tr>
<td>5</td>
<td>92</td>
<td>M</td>
<td>Urine</td>
<td>22/4/2020</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>F (staff nurse)</td>
<td>Nasal Swab</td>
<td>26/4/2020</td>
</tr>
<tr>
<td>7</td>
<td>36</td>
<td>F (cleaner)</td>
<td>Nail Swab</td>
<td>26/4/2020</td>
</tr>
</tbody>
</table>
All the above samples were tested in the microbiology lab and the results were immediately notified to ICU and Infection Control Department and health directorate Riyadh as Critical Reports. An outbreak was declared by the infection control department. An outbreak ad hoc committee was formed to investigate the situation.

To find out the source of outbreak, environmental screening and surveillance was carried out. Infection Control department ordered surveillance swabs from 75 health care workers to be sent to the Microbiology laboratory of KKMH, as a part of screening protocol for a suspected outbreak of Candida species in the ICU. Health care workers included all attending Physicians, nursing staff from ICU and the cleaners assigned to the area.

Sterile swabs were used to collect environmental surveillance samples from various surfaces and equipment in the ICU. Urine and blood specimens were drawn from all patients admitted to the intensive care unit during that time period. Finger and nasal swabs from healthcare workers were also collected for culture. All the above samples were collected in the microbiology laboratory of the KKMH as per standard laboratory protocols. Candida isolates were sent to Riyadh regional lab for further speciation and antifungal sensitivity testing. Confirmation and susceptibility testing of antifungal drugs were performed by Vitek 2 YST card.

All the health care workers were negative, except a staff nurse and a cleaner working in the ICU. The staff nurse was 6 months pregnant and Candida was isolated from nasal swab. She was the primary care giver of the two candidemia patients and was also assigned to provide care to patient 3 and 4 (Table-1). She was also responsible for cleaning the suction apparatus. The other health care worker who tested positive for candida was a cleaner and, in this patient, Candida was isolated from the nail swab. Both the cleaner and nurse were quarantined and exempted from work for 2 weeks and given complete treatment for candidiasis. They were rescreened after 2 weeks and tested negative. The blood culture report for patient 1 and 2 was again positive for Candida with similar profile.

Almost 50 Environmental Samples collected from the ICU (samples from all beds, computer, wash areas, hand rub containers, high touch areas like door handles, door knobs, nursing station, chairs, all ventilators, and suction machines) were received in the Microbiology Laboratory. All the environmental samples were negative for Candida sp, except the samples from the Beds of the patients 1,2 and 3 (Table-1), and the samples of Suction Machine which was used for patient 1 and 2 (Table-1). The affected equipment and beds were immediately decontaminated and rescreened for Candida carriage. The process of daily cleaning protocol for the bed linen, bed rails and immediate patient surroundings was reevaluated and monitored.

Multidrug resistant Candida auris was identified in all the positive samples from the patients. All the patients except one (patient 2) expired due to the multidrug resistant Candida auris infection.

**DISCUSSION**

Public health experts have forewarned for decades that the misuse of antimicrobials is reducing their effectiveness. In recent years, fungi resistant to commonly used antifungals have raised their ugly heads adding a frightening dimension to the phenomenon that is destabilizing the foundations of current medical practice. Health care institutions worldwide are hesitant to disclose outbreaks by resistant microorganisms for fear of being perceived as infection hubs and losing reputation. All the while, these superbugs are transmitted by infected persons from hospital to community and back. Candida auris is one of the dozens of these superbugs that have developed significant antimicrobial resistance making it one of the unbeatable infectious aetiologies. About 90% of C auris is resistant to at least one antifungal and 30% are resistant to two or more than two. Only isolated a few years back; this new threat has taken roots and is spreading like a wild fire.

Our result provides several insights. In this outbreak all patients expired except one. According to CDC, Atlanta, USA, almost half of the patients infected with C auris die within ninety days. Secondly, a delay in identification of index case plays a major role in infection transmission among the patients. After initial isolation, it took almost one month to reach a final diagnosis as Candida auris infection outbreak. This delay was due in part to difficulty in laboratory identification. Candida auris is misidentified and easily confused with other candida species by routine laboratories procedures. This common situation highlights an urgent need to develop a standard protocol yielding the most accurate and rapid identification. Third, almost all patients in this outbreak exhibited poor response to standard treatment. Data from across the world highlights that most Candida auris strains are resistant to aozoles, and amphotericin B, with a few being resistant to echinocandins. Biofilm formations and efflux pumps are proposed resistance mechanisms. Micafungin is recommended as first line therapy. However this
drug is not readily available especially in resource limited settings and is expensive. Another observation augmented by this and the previous studies, is that the long term hospitalized and immunocompromised patients with central venous catheter, or other tubes/lines entering their body, or who those have received long term antimicrobials, appear to be at higher risk of fatal infection with this organism. Finally, *C. auris* has few crucial attributes: misidentification, multi drug resistance, higher risk of fatal infection, rapid and easy colonization and spread. For these reasons, if outbreaks with this pathogen occurs, containing the situation will be extremely hard. Consequently, this microbe should be sufficiently understood.

REFERENCES


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