ORIGINAL RESEARCH PAPER

Medical Microbiology

A RARE CASE OF ONYCHOMYCOSIS IN GREAT TOE CAUSED BY TRICHOSPORON ASAHII IN AN IMMUNOCOMPETENT PATIENT.

KEY WORDS: Non dermatophyte moulds, Onychomycosis, Trichosporon.

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ABSTRACT

Trichosporon species cause superficial infections including onychomycosis but with the increase in number of immunosuppressed patients Trichosporon species related invasive infections with high mortality rates are becoming prevalent globally. A rare case of onychomycosis caused by Trichosporon asahii in a female with diabetes is presented. The infection was characterized by brown- black pigmentation with visible onychogryphosis of the nail plate of great toe in right foot. Nail clippings taken from affected nail showed yeast like cells on direct microscopy. The culture growth was identified as T.asahii based on culture morphology, microscopy and biochemical reactions. The patient was put on treatment with oral fluconazole (400 mg weekly) for 10 months. The onychomycosis showed improvement within three months of therapy. The inherent resistance of Trichosporon to common antifungals makes it a grave infection. Early detection and treatment for this emerging pathogen plays a key role in dealing with this fungus.

INTRODUCTION

The wide use of broad- spectrum antifungal prophylaxis in immunocompetent hosts has led to emergence of Non-dermatophyte moulds or non- candida yeast infections particularly Trichosporinosis [1]. Trichosporinosis can have fatal outcomes if not detected and managed early with appropriate antifungal therapy [2,3]. The genus Trichosporon are yeast like fungi having at least 9 Trichosporon species that are pathogenic to humans : T.asahii, T.cutaneum, T.inkins, T.ovoides, T.asteroids, T.loubieri, T.pullulans, T.janonicum and T.mucoides. T.asahii and T.mucoides can cause invasive infections in humans while the others mainly cause superficial infections [4]. The global problem of antifungal resistance and high heterogeneity in the antifungal susceptibility in different fungal species is a matter of concern particularly with the availability of few classes of antifungal drugs [3]. The early identification of this potentially pathogenic Trichosporon can thus assure an efficient antifungal therapy.

Case Report

A 46 year –old female presented with yellowish discoloration with onychogryphosis and lifting up of nail of right great toe. Slight tenderness was noted on pressing the nail (Figure 1). The patient is a diabetic for 8 years with good glycemic control (on oral hypoglycemic). Nail clippings were taken from the affected nail. KOH wet mount showed yeast like structures. Sample was cultured on Sabouroud's dextrose agar with chloramphenicol. After 48 hours of incubation creamy white smooth colonies with raised surface were obtained (Figure 2). Lactophenol cotton blue staining from culture growth revealed yeast like fungi with septate hyphae fragmented into oval arthroconidia (Figure 3). The growth was positive for urea hydrolysis (Figure 4). The pathogen was identified as T.asahii based on culture morphology, microscopy and biochemical reactions.

DISCUSSION

In the recent years, onychomycosis caused by Trichosporon species has been increasingly reported with T.asahii, T.mucoides and T.inkin being the main pathogens[5]. T.asahii is also reported to cause systemic opportunistic infections or invasive trichosporinosis[6]. T.asahii is reported to cause systemic opportunistic infections or invasive trichosporinosis with a mortality rate between 50 % to 80%. It is a predominant cause of fungemia in immunocompromised patients after Candida species [7]. The ability of T.asahii to produce virulent factors has an important role in its pathogenesis. A study by Sun et al showed clinical isolates of T.asahii showed haemolysin activity as compared to non- clinical isolates[8].

A phenomenon of phenotypic switching, a reversible change of colonial morphology or microscopic features has been observed in T.asahii. The clinical isolates of T.asahii are capable of producing two different morphotypes one producing a rough colony with more hyphae while the second produced more of conidia[9]. Another virulence factor is the ability of T.asahii to protect itself by producing biofilm which could have important role in the pathogenesis of Trichosporonosis [10]. In an in- vitro study on biofilm growth kinetics of T.asahii clinical isolates it was seen that T.asahii cells formed a mature biofilm at 72 hours comprising of both yeast like and filamentous structures in extracellular matrix of 20 to 40 um in thickness [11]. They reported a moderate to weak production of biofilms by clinical isolates of T.asahii.

T.asahii has been reported as an amphotericin B resistant pathogen an antifungal, which is treatment of choice for systemic infections. T.asahii exhibits a high MIC of ≥2ug /ml to amphotericin B [12]. Triazoles like fluconazole (FLC), Voriconazole (VRC) and itraconazole (ITR) and posaconazole (POS) display better in vitro activity against T.asahii with relatively low MIC's(FLC 1.27 to ≤ 10.3ug/ml, ITR≤1.4 ug/ml, POS≤0.25 ug/ml) . Voriconazole has shown to be particularly effective against Trichosporon species with MIC's as low as ≤0.28 ug/ml [13]. Triazoles inhibit the fungi by interacting with enzymes at a mitochondrial level causing the accumulation of free radicals inside the fungal cell thereby inhibiting it. Triazoles have emerged as a promising therapy for infections with Trichosporon species. The inherent resistance of T.asahii to commonly used antifungals makes it a

more grave cause of invasive trichosporinosis with invasion occurring exogeneously through colonized skin or endogeneosly by translocation through gut in immunocompromised patients [14].

CONCLUSION

We were able to incriminate T.asahii as the single agent of nail infection. Thus in patients with increased risk of life threatening infections with rare fungal pathogens a prompt identification of opportunistic pathogen in onychomycosis can prevent a fatal invasive infection. This can help achieve the best possible outcome for the patient. The study invites future epidemiologic and virulence research to determine T.asahii as an important etiological agent of onychomycosis.

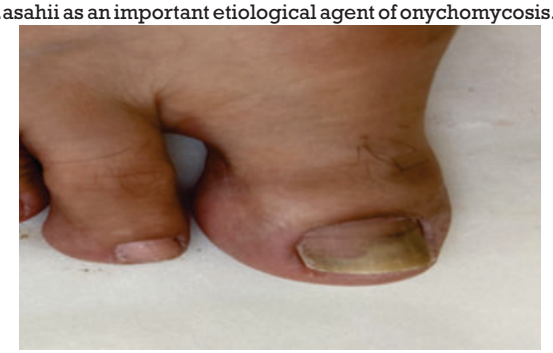

Figure-1: Brown-black pigmentation of the nail plate and subungual hyperkeratosis of the toe of the right foot.

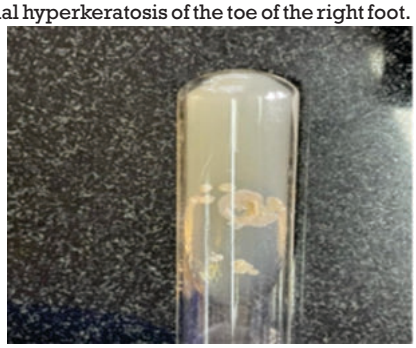

Figure 2: White Creamy And Smooth Colonies Of Trichosporon Asahii.

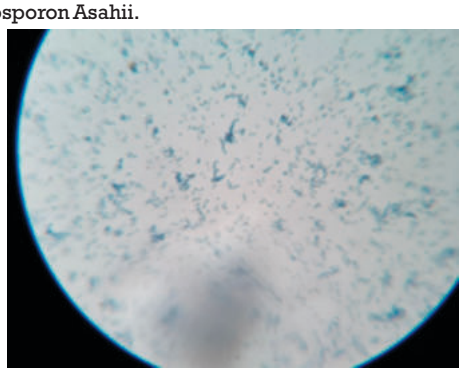

Figure 3: Microscopic morphology of T.asahii (lactophenol cotton blue wet mount).

Figure 4: Biochemical for T.asahii (Urease positive).

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

Ethical Consideration

Written informed consent was obtained from the patient.

REFERENCES

1) Malani AN, Kauffman CA. Changing epidemiology of rare mould infections; implications for therapy. Drugs. 2007;67:1803-12.
2) Perlin DS, Rautemaa- Richardson R, Alastruey – Izquerdo A. The global problem of antifungal resistance : prevalence, mechanisms and management. Lancet Infect Dis. 2017;17:e 388-e392.
3) Sah R, Sain AS, Chawla S, Wadhwa T, Gupta N. Disseminated Trichosporon asahii infection in a combined liver-kidney transplant recipient successfully treated with Voriconazole . Immun Inflam Dis. 2019;7:125-129.
4) Dudhat Vaibhav L, Karvathekar M and Patil S. Rare case of Trichosporon mucoides skin infection in an immunocompetent patient. Int J Curr Microbiol App Sci. 2017;6(1):315-318.
5) Dhib I, Fathallah A, Yaacoub A et al. Clinical and mycological features of onychomycosis in central Tunisia : A 22 years retrospective study (1986-2007).Mycoses. 2012;56:273-280.
6) Weber JK, Scharf S, Wather G, Fliih G, MacKenzie CR, Kondakci BH, Vasconcelos MK. Detection of invasive Trichosporon asahii in patient blood by a fungal PCR assay. Access Microbiology. 2021;3:000285.
7) Chabasse D, Pihet M. Mycological diagnosis of onychomycosis. J Mycol Med.2014;24:269-78.
8) Sun W, Su J, Xu S et al. Trichosporon asahii causing nosocomial urinary tract infections in intensive care unit patients: genotypes, virulence factors and antifungal susceptibility testing. J Med Microbiol .2012;61:1750-1757.
9) Kara Shima R, Yama Kami Y, Yama gata E, et al. Increased release of glucuronoxylomannan and induced phenotypic changes in Trichosporon asahii by repeated passage in mice. J Med Microbiol. 2002;51:423-432.
10) Dag A, CariKcioglu N. Investigation of some virulence factors of T.asahii strains isolates from the clinical samples of hospitalized patients. Mikrobiyologi Bultani. 2006;40:225-235.
11) Di Bona ventura G, Pompilio A, Picciani C et al. Biofilm formation by the emerging fungal pathogen T.asahii development, architecture and antifungal resistance. Antimicrob agents Chemother. 2006;50:3269-76.
12) Chagas-Neto TC, Chaves GM, Melo ASA, Colombo Al. Bloodstream infections due to Trichosporon species: species distribution, Trichosporon asahii genotypes determined on the basis of ribosomal DNA intergenic spacer sequencing and antifungal susceptibility testing. J Clin Microbiol. 2009;47:1074-81.
13) Tanyildiz HG, Yesil S, Toprak S, Candir MO, Sahin G. Two case presentations infected by Trichosporon asahii and treated with voricoazole successfully. Case Rep Infect Dis .2015;6:513-15.
14) Mehta V, Nayyar C, Gulati N, Singla N, Rai S, Chander J. A comprehensive review of Trichosporon species : An invasive and Emerging fungus. Cureus. 2021;13 (8):e17345.