




Cutaneous candidiasis caused by *Candida albicans* in a young non-immunosuppressed patient: an unusual presentation

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Abstract

Candidiasis is a fungal infection caused by yeasts that belong to the genus *Candida*. There are over 20 species of *Candida* yeasts that can cause infection in humans, the most common of which is *Candida albicans*. *Candida* yeasts normally reside in the intestinal tract and can be found on mucous membranes and skin without causing infection. However, under immunocompromised conditions, *Candida* can cause significant infections in susceptible patients. Herein, we report a peculiar presentation of a *C. albicans* cutaneous infection in an immunocompetent young subject. This case widens our knowledge on the *C. albicans* infections both in terms of host susceptibility and cutaneous manifestations.

Keywords

Candida albicans, cutaneous candidiasis, mycotic infection

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Introduction

The skin is a complex and dynamic ecosystem inhabited by bacteria, archaea, viruses, and fungi. Several genera have been reported to be common fungal skin commensals, such as *Malassezia*, *Rhodotorula*, *Debaromyces*, *Cryptococcus*, and in some sites, *Candida*.¹ In particular, *Candida* species are frequently colonizers of the skin and mucosal surfaces of our body, including the genitourinary tract, oral cavity, and gastrointestinal tract.² Over the 200 species of *Candida* identified, only 15 of them are human pathogens and *Candida albicans* is the most prevalent.² Indeed, *C. albicans* is responsible for a wide range of diseases from more superficial and milder clinical manifestations to life-threatening diseases in immunocompromised patients.³ Its ability of growing in different

morphological forms (i.e. unicellular budding yeast, pseudohyphae, and true hyphae) enables this

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Figure 1. Clinical presentation of cutaneous *Candida albicans* infection. (a) Clinical appearance of the infection showing multiple, hard papules on a scaly, reddish skin. (b) Improvement of the papules after 2 weeks of oral fluconazole treatment.

microorganism to become virulent and invade host tissues.^{4,5} Therefore, variations in the skin environment, antibiotic therapy, underlying diseases, and/or alterations in the immune system can induce the switch of *C. albicans* from a commensal to a pathogen, thereby causing significant infections in susceptible patients.^{3,6} Among cutaneous candidiasis, the infection usually affects intertriginous and interdigital areas and its typical clinical presentation is characterized by dry, erosive, erythematous, or scaly skin; flaking collarette; or pustules.⁷ Herein, we report the case of a 37-year-old otherwise healthy man who had a peculiar and previously unreported cutaneous manifestation of *C. albicans* infection.

Case report

A 37-year-old man referred to our clinic for itchy, painless papules on his left foot (Figure 1(a)). The subject provided a written informed consent for information and images in accordance with the Declaration of Helsinki. The patient reported not to be a smoker, not to suffer from hypertension, and to have a sedentary lifestyle. In addition, he referred that he was not under any antibiotic or corticosteroids therapy nor that he had changed his diet or soaps for personal hygiene. Laboratory tests revealed no sign of diabetes (glycemic values of 86 mg/dL) or immunodeficiency (white blood cell count of 9610mm^{-3} and a CD4 lymphocyte count of $825\ \mu\text{L}^{-1}$).

Clinical examination of patient's left foot revealed a scaly, reddish skin with multiple, hard papules on the medial surface of the dorsum, with a diameter of 1 mm. No specific distribution pattern was noticed (Figure 1(a)). Their hard consistency ruled out vesicular lesions, whereas unilateral spreading and scaly borders led us to hypothesize a mycotic infection.

Microbiological culture of cutaneous swabs/skin specimens on Sabouraud plates revealed creamy, rapidly growing, white colonies, confirming a candidiasis. Colony subculturing on chromID[®] *Candida* agar (bioMérieux, Inc., France) showed only blue-colored colonies, suggestive for *C. albicans* species. Species identification was performed by VITEK2 system (bioMérieux, Inc.) and matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) analysis. The peptide mass fingerprinting of *C. albicans* by MALDI-TOF MS is shown in Figure 2. Microscopic examination of methylene blue–stained *C. albicans* culture highlighted the formation of true hyphae (Figure 3). Histopathological analysis was consistent with a superficial mycosis describing fungal periodic acid–Schiff (PAS)-positive structures in the stratum corneum, orthokeratotic hyperkeratosis, epidermal hyperplasia, spongiosis, vesicles filled with serum and neutrophils, and superficial perivascular lymphocytic infiltrate (data not shown). Antifungal susceptibility tests, carried out by VITEK2 (bioMérieux, Inc.)

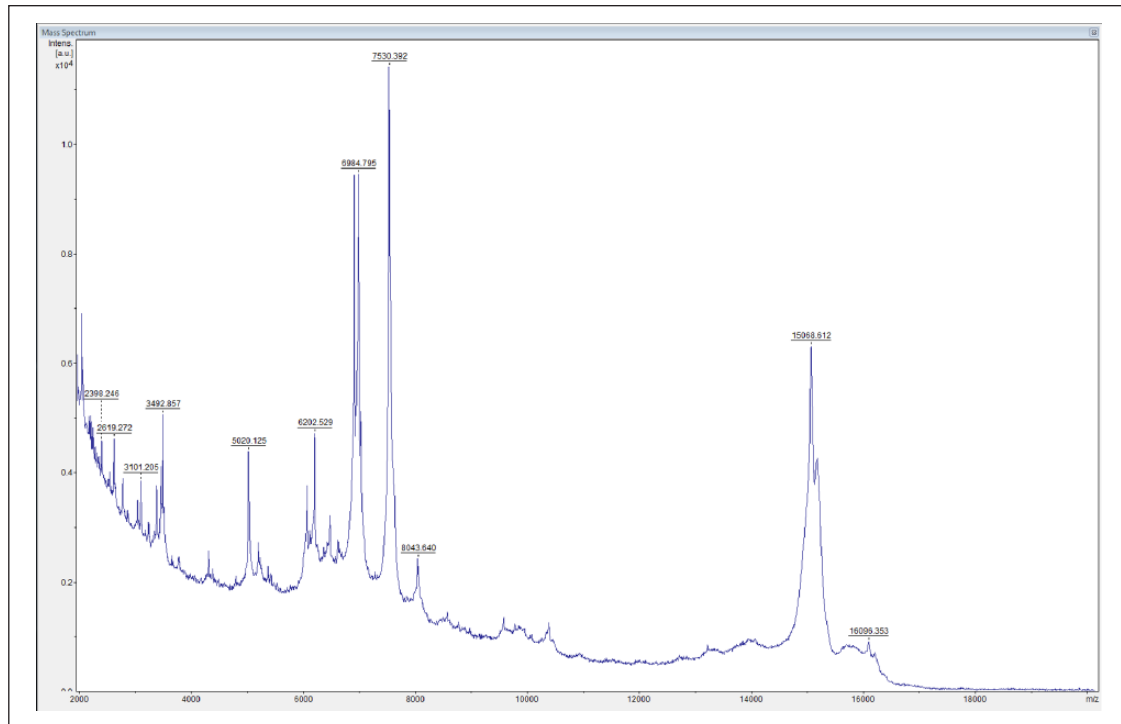


Figure 2. Peptide mass fingerprinting of *Candida albicans* performed by MALDI-TOF MS.

and Sensititre YeastOne® Systems (Thermo Scientific), following the manufacturer's instructions (www.mcsdiagnostics.com), showed that the isolate was susceptible to fluconazole. Therefore, the patient received oral fluconazole therapy (100 mg/die) and 2 weeks after treatment showed a clinical improvement characterized by a significant decrease in the number of papules (Figure 1(b)).

Discussion

Skin *C. albicans* infections may be triggered by physical, chemical and immunological local factors or individual systemic immunodeficiencies.⁸ Immunological impairments can induce a typical disorder consisting of mucosal, cutaneous and unguis persistent and/or recurrent lesions, known as chronic mucocutaneous candidiasis.⁹ Immunosuppressed patients are at major risk to develop a *C. albicans* infections, including premature neonates, diabetics, HIV-positive patients, and those receiving organ transplants or chemotherapy.¹⁰ However, also immunocompetent subjects can be susceptible to these infections, but mainly with a healthcare-related acquisition.¹¹ However, the case reported herein

involves a patient with a symptomatic cutaneous candidiasis without evidence of local or systemic immunodeficiency condition, as determined by immunologic evaluation. However, the onset and exacerbation of this *C. albicans* infection could arise from a combination of other factors such as genetic predisposition and environmental factors including skin pH, food, soaps, and house dust mites that might have induced major changes in the local microbiota. In addition, the extensive ability of *C. albicans* to colonize skin and mucosal surfaces and the expression of infection-associated genes should be taken into account.¹² These virulence factors, including the production of different hydrolytic enzymes, adhesins, the ability to form biofilms, and morphological dimorphism, expressed upon slight changes in the environmental condition might enable the onset of the infection.¹³

In this case report, we describe a presentation of an unusual cutaneous *C. albicans* infection appearing with unilateral papules in an immunocompetent patient. The uncommon site and the peculiar clinical manifestation of the described infection in this case further broaden the wide spectrum of candidiasis and could aid the diagnosis of unusual *C. albicans* infections.

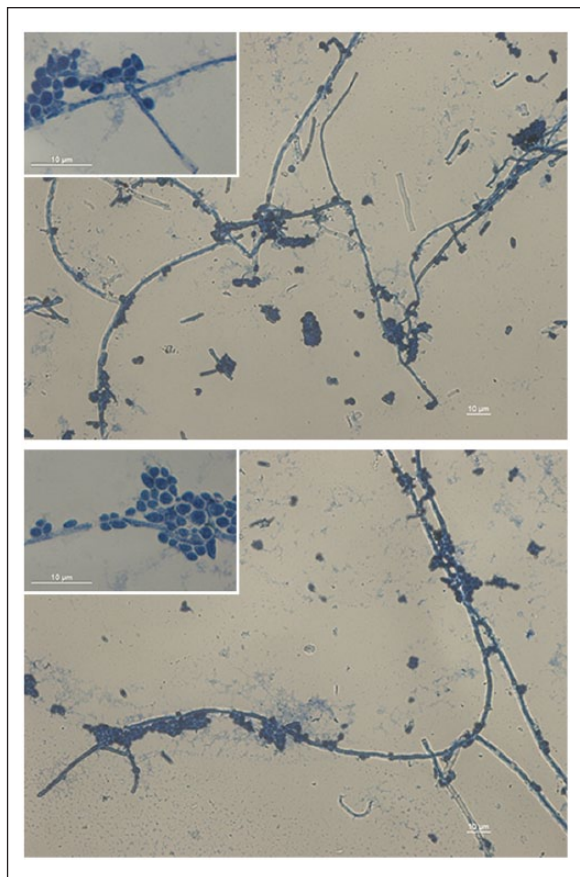


Figure 3. Filamentous stage of development of *Candida albicans*. Formation of true hyphae in liquid Sabouraud medium of the *C. albicans* isolated after 72 h at 28°C. The heat-fixed smear was stained with methylene blue. Images were acquired with a magnification of 400× and relative insets at 1000×, using a Leica DM5000B microscope equipped with Digital FireWire Color Camera systems Leica DFX300 and processed using the Leica Application Suite 2.7.0.R1 software (Leica).



Declaration of conflicting interests

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