Case Report

Onychomycosis due to *Cunninghamella bertholletiae* in an Immunocompetent Male from Central India

Karuna Tadepalli,1 Pradeep Kumar Gupta,1 Dinesh P. Asati,2 and Debasis Biswas1

1Microbiology Department, AIIMS Bhopal, India
2Dermatology Department, AIIMS Bhopal, India

Correspondence should be addressed to Karuna Tadepalli; karuna.microbiology@aiimsbhopal.edu.in

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Onychomycosis is a fungal infection of nails seen frequently in immune competent and immune compromised patients due to dermatophytes, *Candida* spp., *Fusarium* spp., *Scopulariopsis brevicaulis*, *Penicillium* spp., and *Aspergillus* spp. We report a case of onychomycosis in a young immunocompetent male who presented onycholysis of a solitary nail without inflammation. The etiological agent was diagnosed to be *Cunninghamella bertholletiae*, a fungus pertaining to the order Mucorales (subdivision Mucoromycotina) and known for some of the invasive lesions among immunocompromised patients. This case demonstrates the association of onychomycosis with *Cunninghamella bertholletiae* in an immunocompetent individual, not reported so far.

1. Introduction

*Cunninghamella bertholletiae* (order Mucorales, subdivision Mucoromycotina) is a saprophytic, ubiquitous fungus found in soil [1]. Although *C. bertholletiae* is known to be the only clinically relevant species in the Cunninghamellaceae family [2–4], other species were recently reported as human pathogens [5]. Although it was first isolated from Brazilian soil samples by Stadel in 1911, *C. bertholletiae* was recently recognized as a cosmopolitan soil organism [6]. The first case of *C. bertholletiae* infection was described in 1958 from a patient with lymph sarcoma and immunosuppressive therapy. *C. bertholletiae* remains a rare cause of mucormycosis and has been described almost exclusively (98%) for immunosuppressed hosts [6]. We report a rare case of onychomycosis due to *C. bertholletiae* in an immune competent patient.

2. Case Report

A 30-year-old male patient residing in Bhopal (Central India) presented to the dermatology department with a lesion in the nail of the left middle finger (Figure 1) for about five years, with history of traumatic injury and no previous use of antifungal therapy. He complained only about the cosmetic aspect as improper growth and unhealthy look of the nail. Professionally, he was involved with mycology laboratory work for few years in United Kingdom and nurtured his hobby of gardening with bare hands very frequently and then returned to India and is continuing with his work.

On local examination he presented onycholysis and onychodystrophy, with no apparent thickening or inflammation of ungueal bed. There was no history of other symptoms except for nail dystrophy. Systemic examination was normal.

On mycological examination, fungal elements were observed in 20% potassium hydroxide (KOH) preparations as broad hyaline sparsely septate hyphae (Figure 2). Nail specimen was cultured on Sabouraud dextrose agar (SDA) and incubated at 30°C. A rapid growth within 48 hours as wooly white mycelia was observed with reverse pale (Figure 3) and almost filling the whole plate within 72 hours. This mature growth turned grey and further darkened with age, with a reverse remaining pale (Figure 4). On performing lactophenol cotton blue (LPCB) wet mount of the fungus broad, hyaline, and sparsely septate hyphae with branching sporangiophores and terminal vesicle covered with spine-like denticles, and each denticle with a single sporangiolum,
Figure 1: Left middle finger nail showing onycholysis and onychodystrophy.

Figure 2: 20% KOH wet mount showing broad hyaline sparsely septate hyphae (2-3 septa).

Figure 3: Growth on SDA within 48 hours at 30°C.

Figure 4: Mature growth on SDA after 72 hours.

3. Discussion

Primary cutaneous and cutaneoarticular cases of mucormycosis caused by *C. bertholletiae* were reported following percutaneous inoculation or trauma in patients with diabetes mellitus, renal transplant recipients, and an i.v. drug abuser with AIDS [6]. Cutaneous *C. bertholletiae* infection was also described for a patient with leukemia who died 18 days after development of a necrotic skin lesion following the use of elastic adhesive tape surrounding a pleural effusion damage site [7]. Cutaneous *C. bertholletiae* infections typically appear as necrotic lesions, with occasional creamy white exudates and granules [6]. There are no reports of onychomycosis documented so far due to *Cunninghamella* spp. *C. bertholletiae* can be found as environmental contaminants [4]. However, an isolate of *C. bertholletiae* from any clinical material should be analyzed carefully because it is not an ordinary contaminant. In at least two cases, misinterpretation of mycological laboratory findings caused fatal delay or lack of treatment [8, 9]. In our case, presence of fungal elements on direct KOH wet mount could be correlated with the results of the culturing. Also, repeated samples showing the same results suggest the possibility of such saprobič fungal infections particularly in chronic presentations in immunocompetent patients.

*C. bertholletiae* is a fast-growing mold that can grow at room temperature to 45°C.
Figure 5: LPCB wet mounts showing branching sporangiophores with vesicles (roughly 32 𝜇m), single-celled sporangiolum and sporangiospores attached to denticles and hyaline broad hyphae with 2-3 septae.

Figure 6: SDA slants incubated at 30°C and 45°C showing similar growth morphology after 48 hours of incubation.

4. Conclusion

The laboratory diagnosis of *C. bertholletiae* onychomycosis, as well as with other nondermatophyte fungal infections, should always necessarily be confirmed whether the fungus is the real etiologic agent of the onychomycosis, by collecting repeated fresh samples and processing for KOH wet mount examination and culture for morphological examination, or wherever the facilities are available followed by a final molecular identification by ITS region amplification and sequencing.

Ethical Approval

Institutional Human Ethics Committee of All India Institute of Medical Sciences Bhopal approved the case study and approval reference number is IHEC-LOP/2015/IM0047.

Consent

The authors declare the following. (1) They have obtained written, informed consent for the publication of the details
relating to the patient(s) in this report. (2) All possible steps have been taken to safeguard the identity of the patient(s). (3) This submission is compliant with the requirements of local research ethics committees.

Conflict of Interests

The authors declare that they have no competing interests.

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