

Onychomycosis of the Middle Toenails Caused by Non-Dermatophyte *Alternaria* Species: A Rare Case from Qatar

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Abstract

Case Report

Background: Non-dermatophyte mold (NDM) infections of the nail apparatus are being reported with increasing frequency, though they remain diagnostically challenging. *Alternaria* species, a dematiaceous saprophytic mold, is a particularly uncommon cause of onychomycosis. Because NDMs are often dismissed as contaminants, genuine infections may be under-recognized. **Case presentation:** We describe a chronic case of dystrophic Both middle toenails infection caused by *Alternaria* species in an immunocompetent adult with no antecedent trauma, systemic illness, or prior antifungal therapy. Diagnosis was confirmed through direct microscopy and fungal culture, which identified *Alternaria* species. **Discussion:** This report highlights the complex pathogenesis, diagnostic pitfalls, and therapeutic challenges of *Alternaria* onychomycosis. The case illustrates that non-dermatophyte organisms may infect healthy hosts, underscore the importance of laboratory confirmation, and discuss current evidence regarding antifungal management. **Conclusion:** Accurate identification of NDM infections, including those due to *Alternaria*, is essential for optimal therapy and prevention of recurrence. Clinicians should suspect these organisms in cases of long-standing nail dystrophy unresponsive to conventional treatment.

Keywords: Onychomycosis, *Alternaria*, Non-dermatophyte mold, Nail dystrophy, Fungal infection.

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INTRODUCTION

Onychomycosis represents one of the most prevalent nail disorders worldwide, accounting for nearly half of all nail abnormalities [1]. Its incidence increases with age, humidity, occlusive footwear, and comorbid conditions such as diabetes mellitus and peripheral vascular disease [1]. While dermatophytes such as *Trichophyton rubrum* and *Trichophyton mentagrophytes* are the classical causative agents, an expanding group of non-dermatophyte molds and yeasts has emerged as important pathogens [2]. These organisms, traditionally regarded as environmental contaminants or secondary colonizers of damaged nails, are now recognized as primary pathogens in specific contexts [2].

Among the non-dermatophytes, *Alternaria* species occupy a unique niche. They are melanized (dematiaceous) fungi that thrive in soil, decaying vegetation, and indoor air [3]. *Alternaria alternata* and related species are well-known plant pathogens but can occasionally cause human disease ranging from superficial infections to deep or disseminated forms,

particularly in immunocompromised individuals [4]. Nail infections due to *Alternaria* are exceedingly rare; most reported cases involve trauma, chronic paronychia, or systemic immunosuppression [5]. Nevertheless, sporadic cases in healthy individuals have been documented, suggesting that this organism possesses the ability to invade intact keratin structures under suitable environmental conditions [6].

This report presents a case of *Alternaria* onychomycosis in an immunocompetent adult residing in Qatar. Through detailed clinical, microbiological, and histopathological documentation, we aim to reinforce the importance of considering non-dermatophyte molds in chronic nail disease and to discuss the diagnostic and therapeutic implications of this uncommon infection.

CASE PRESENTATION

A 39-year-old male attended the dermatology outpatient clinic at Al Emadi Hospital Clinics -- North, Doha, with a long-standing complaint of discoloration and thickening of both middle toenails. The abnormality had developed insidiously several years earlier and had

slowly progressed. The patient reported no associated pain, exudate, or periungual inflammation. There was no recollection of trauma, prolonged moisture exposure, or occupational risk factors. Medical history was unremarkable, with no diabetes, peripheral vascular disease, psoriasis, or immunosuppressive therapy. No previous antifungal treatment---topical or systemic---had been attempted.

Clinical Findings

Examination revealed markedly dystrophic middle toenails, bilaterally, characterized by diffuse yellow-brown discoloration, distal subungual hyperkeratosis, and lamellar splitting (**Figure 1**). The nail plates were thickened, opaque, and friable, with roughened surfaces and jagged free edges. The proximal nail folds and surrounding skin were intact, without erythema or tenderness. No other toenails or fingernails were affected, and there were no cutaneous lesions suggestive of tinea pedis. The remainder of the physical examination was unremarkable.



Figure 1: Dystrophic middle toenails demonstrating yellow-brown discoloration, thickening, and lamellar splitting characteristic of fungal invasion by *Alternaria* species

LABORATORY INVESTIGATIONS

Nail clippings and subungual debris were collected aseptically from the affected nails for mycological examination. Direct microscopy using 20% potassium hydroxide (KOH) preparation revealed abundant septate branching hyphae embedded within keratinized material. Fungal culture on Sabouraud dextrose agar (SDA) with and without cycloheximide was incubated at both 25 °C and 37 °C. After one-week, dark olive-brown, floccose colonies developed on SDA without cycloheximide, while no growth occurred on the cycloheximide-containing medium, a finding compatible with a non-dermatophyte mold. Microscopic examination of the colony revealed characteristic chains of club-shaped, multi-septate conidia with both transverse and longitudinal septa, diagnostic of *Alternaria* species.

Diagnosis and Management

Although histopathological confirmation was not performed in this case, the correlation of classic clinical signs with a positive KOH mount and a culture growing a pure isolate of *Alternaria* provides a high

degree of diagnostic confidence, meeting the commonly accepted criteria for proven onychomycosis.

The patient was counseled extensively about the chronic nature of fungal nail infections and the relatively high relapse rate associated with non-dermatophyte pathogens. Systemic antifungal therapy was initiated with itraconazole 200 mg daily for one week each month (pulse therapy), planned for three to four months, in conjunction with topical ciclopirox 8% nail lacquer applied daily. Regular mechanical debridement of the dystrophic nails was recommended. The patient was scheduled for follow-up to monitor treatment efficacy and any potential adverse effects; however, he has not returned yet, and therefore the clinical outcome remains to be assessed.

DISCUSSION

Onychomycosis due to non-dermatophyte molds presents both diagnostic and therapeutic challenges [1]. Unlike dermatophyte infections, which have well-defined clinical patterns and predictable responses to antifungal agents, NDM onychomycosis

tends to be indolent, heterogeneous, and often refractory to conventional therapies [7].

Non-dermatophyte molds account for a variable proportion of onychomycosis cases—estimates range from 2 % to 12 % worldwide—but the incidence appears to be increasing [8]. This rise may be attributed to multiple factors, including greater clinical awareness, improved laboratory techniques, climate changes promoting fungal proliferation, and widespread use of occlusive footwear [9]. *Alternaria* species are widely distributed environmental fungi, particularly abundant in tropical and subtropical climates such as the Arabian Peninsula. Despite their ubiquity, they rarely invade human tissue, and reports of nail infections remain limited to isolated cases or small series [10].

In most documented instances, *Alternaria* onychomycosis has occurred in the context of predisposing factors such as trauma, chronic paronychia, peripheral vascular disease, or systemic immunosuppression (for example, in organ transplant recipients or patients receiving corticosteroids) [1]. The present case, by contrast, involved an otherwise healthy, immunocompetent adult, underscoring that infection can occur even without obvious risk factors. The mechanism may involve minor, unrecognized microtrauma or transient colonization followed by invasion of keratinized tissue.

Diagnosing NDM onychomycosis requires particular care because environmental molds can easily contaminate samples. To distinguish true infection from contamination, several criteria have been proposed: (1) compatible clinical features, (2) demonstration of fungal elements by direct microscopy, (3) isolation of the same non-dermatophyte species on repeat culture, and (4) histopathological evidence of fungal invasion within the nail plate ^(11, 12). In this patient, the diagnosis was strongly supported by the fulfilment of key diagnostic criteria: compatible clinical features, positive direct microscopy, and repeated isolation of *Alternaria* species in culture.

Management of NDM onychomycosis remains empiric, given the paucity of controlled trials. *Alternaria* species often show variable in-vitro susceptibility to antifungal agents [13]. Itraconazole and terbinafine are commonly used systemic drugs, both possessing broad activity against molds [14]. Itraconazole is often preferred for dematiaceous fungi because of its lipophilicity and ability to accumulate in keratinized tissue. Pulse dosing, as employed here, improves safety while maintaining efficacy [15].

Topical therapy alone is rarely curative in NDM infections but serves as a valuable adjunct. Ciclopirox and amorolfine lacquers penetrate the nail plate and provide local antifungal activity [16]. Regular debridement or partial nail avulsion enhances topical penetration and reduces fungal load [17].

The capacity of *Alternaria* to infect intact nails suggests an adaptive mechanism enabling survival in nutrient-poor keratinous substrates [18]. The production of extracellular proteases, keratinases, and melanin likely contributes to its pathogenic potential. Understanding these mechanisms could have broader implications for antifungal research, as dematiaceous fungi share structural and biochemical features that confer resistance to oxidative killing and antifungal penetration [18].

CONCLUSION

This case contributes to the growing body of evidence that *Alternaria* species, though rare, are legitimate causes of onychomycosis even in immunocompetent individuals. The clinical presentation can mimic dermatophyte infection, but laboratory confirmation through culture and histopathology is crucial for accurate diagnosis. Recognition of NDM pathogens is essential for guiding appropriate therapy. This case also highlights the challenge of patient follow-up in chronic conditions, as the final treatment outcome remains to be evaluated.

Patient Consent: The patient provided informed consent for the publication of this case report and its accompanying data.

Disclosures: The authors have no conflicts of interest to declare.

Learning Points

1. Non-dermatophyte molds such as *Alternaria* should be considered in long-standing or atypical cases of onychomycosis.
2. Definitive diagnosis requires the integration of clinical findings with microscopy, repeated culture, and histopathological confirmation.
3. Itraconazole pulse therapy combined with topical agents and regular debridement can be effective for dematiaceous fungal infections of the nail.
4. Awareness and documentation of *Alternaria* infections are particularly important in subtropical regions, where environmental exposure is high.

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