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Case Report

A case study of onychomycosis caused by aspergillus glaucus

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Abstract

Onychomycosis is a fungal condition that targets the nails and is caused by superficial fungi, yeasts, or non-dermatophyte molds. It often manifests as nail discoloration, thickening, and detachment of the nail plate. While dermatophytes, especially *Trichophyton* species, are the primary organisms responsible for such infections, non-dermatophyte molds have increasingly been identified as significant causative agents. One such mold, *Aspergillus glaucus*, has become noteworthy for its involvement in nail disorders.

Aspergillus glaucus is known for its adaptability and saprophytic lifestyle, thriving in a variety of environments, such as soil, decomposing organic matter, and indoor surroundings. Its widespread presence makes it a potential risk factor for individuals with damaged nails or weakened immune systems. The symptoms caused by *Aspergillus glaucus* often resemble those seen in dermatophyte infections, including changes in nail color, texture, and structure.

This case study examines a 3-year-old girl with no underlying health issues who developed multiple fingernail infections due to *Aspergillus glaucus*. The fungus was identified based on its distinct macroscopic and microscopic features observed in cultured samples

Keywords: Aspergillus glaucus, fingernail, Non-dermatophyte infection & Onychomycosis

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1. Introduction

Onychomycosis is a fungal infection that primarily affects the nails and can be caused by dermatophytes as well as non-dermatophyte molds.[1] Non-dermatophytic onychomycosis accounts for approximately 1.45–17.6% of all fungal nail infections. Among the most commonly identified non-dermatophyte pathogens are *Scopulariopsis spp.*, *Aspergillus spp.*, *Alternaria spp.*, *Acremonium spp.*, and *Fusarium spp.*, which together constitute 2–25% of onychomycosis cases.[2,3]

The recovery of *Aspergillus spp.* from nail infections is relatively uncommon, largely due to its ubiquitous presence in the environment and frequent identification as a contaminant in laboratory analyses.[4] The genus *Aspergillus* is vast, comprising more than 250 species, which are further classified into seven subgenera containing numerous closely related species groups. Clinical identification in microbiology laboratories predominantly relies on morphology-based techniques for distinguishing *Aspergillus* species.[5]

Colonies of *Aspergillus spp.* on Sabouraud Dextrose Agar typically grow rapidly, displaying colors that range from white, yellow, and green to shades of brown or black. The fungal structure features a conidiophore that terminates in a vesicle. This vesicle may bear uniseriate phialides (arranged in a single layer) or biseriate phialides (supported by metulae cells). The conidial head, observed using a Lactophenol Cotton Blue mount, is composed of vesicles, phialides, metulae, and conidia. The conidia are single-celled, hyaline or pigmented, and can have smooth or rough surfaces. They are produced in long, dry chains, which may radiate outward or form compact columns. Additionally, some species, such as *Aspergillus nidulans*, can form specialized structures like Hülle cells or sclerotia.

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The diagnosis of *Aspergillus* onychomycosis is established through microscopic examination and fungal culture. Onychomycosis itself is a condition where fungal pathogens invade the nails. When dermatophytes are the causative agents, the infection is referred to as *tinea unguium*.[6] Onychomycosis, as a broader term, includes infections caused by dermatophytes, molds, and other saprophytic fungi.

While onychomycosis can affect both fingernails and toenails, it is significantly more prevalent in toenails.[7,8,9] The infection typically begins at the nail bed, where an initial mild inflammatory reaction occurs. Over time, this develops into a chronic phase, often leading to total dystrophic onychomycosis characterized by extensive damage to the nail bed.

2. Case Report

A 3-year-old girl from an economically disadvantaged family presented to the Dermatology Outpatient Department (OPD) with skin lesions affecting her nails, scalp, and body. These symptoms had been persistent for the past year and were accompanied by itching. The family reported a history of tinea infections lasting three years, for which treatment had been sought. The child had no preexisting medical conditions and no history of trauma, such as injuries caused by thorns or wooden splinters.

2.1. Family history

The patient's mother had a history of recurrent tinea infections over the past five years, treated intermittently with topical antifungal creams. No other family members were reported to have fungal infections or similar symptoms. There was no family history of chronic illnesses or conditions predisposing to fungal infections.

2.2. Past history

The child had no history of hospitalization, immunosuppressive therapy, or significant medical issues. She had been treated for mild upper respiratory tract infections in the past but had no history of severe infections or allergies.

Upon clinical examination, her fingernails exhibited a yellowish-green discoloration, thickening of the distal nail plates, and subungual debris (**Figure 1**). Nail clippings were collected in a sterile container and sent to the microbiology laboratory for processing. The sample was treated with 40% potassium hydroxide (KOH) solution and examined under a microscope. Microscopic analysis revealed numerous fungal hyphae that were hyaline, septate, and branched.

The nail clippings were cultured on Sabouraud Dextrose Agar (SDA) and incubated at both 25°C and 37°C under aerobic conditions for seven days. Rapid fungal growth was observed within 24–48 hours. The colonies displayed a fine to woolly texture with a pale blue-green surface coloration and a cream-colored reverse side (**Figure 2**, **Figure 3**).

Microscopic examination of the fungal colonies revealed small, round-to-oval conidia measuring 4–8 µm, with slightly rough surfaces. Detailed observation also identified non-pigmented, round ascospores ranging in size from 80 to 250 µm (**Figure 6**). Based on these findings, the fungal isolate was identified as *Aspergillus glaucus* through manual morphological analysis.

The patient was prescribed oral terbinafine, administered once daily for 12 weeks, along with topical terbinafine cream. Weekly applications of amorolfine nail lacquer were recommended for local therapy. Additionally, the patient was started on oral griseofulvin at a dose of 250 mg daily for a 60-day course to ensure effective resolution of the infection.

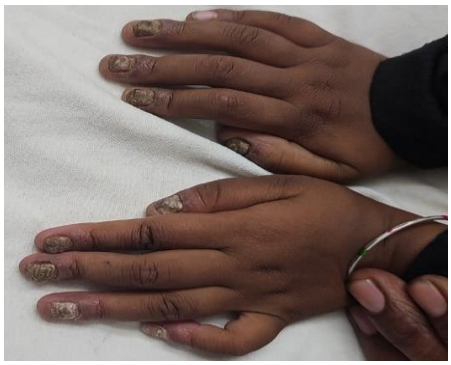

Figure 1: Clinical presentation of patient with suspected onychomycosis

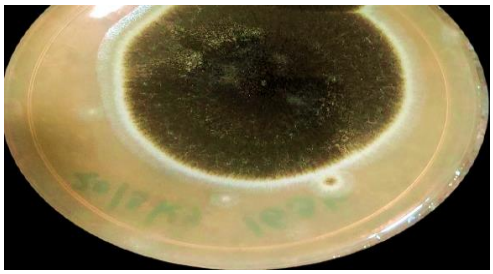

Figure 2: Macroscopic appearance of aspergillus glaucus on SDA agar (front side)

Figure 3: Macroscopic appearance of aspergillus glaucus on SDA agar (Reverse side)

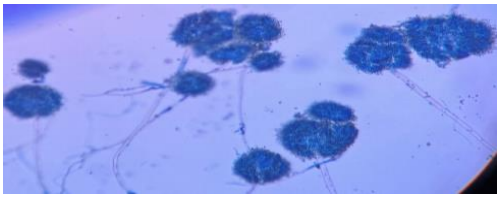

Figure 4: *Microscopic* finding of aspergillus glaucus in LPCB mount (40x)

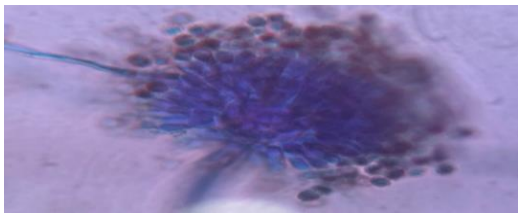

Figure 5: Microscopic finding of aspergillus glaucus in LPCB mount (100x)

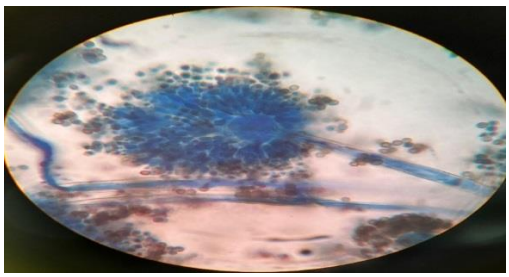

Figure 6: *Microscopic* finding of aspergillus glaucus in LPCB mount (100x)

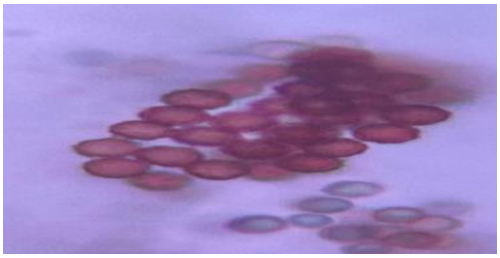

Figure 7: Conidia round to oval, 4–8 µm, usually slightly roughened

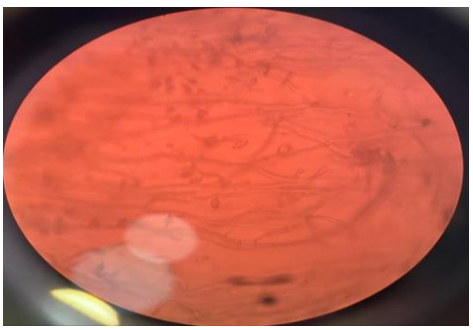

Figure 8: Lacto phenol cotton blue (LPCB) shows characteristics of Ascocarps non-pigmented, round, 80–250 µm. (At 100X field)

1. Nail Appearance: Illustrating a complete dystrophic form of onychomycosis.
2. SDA Medium: Displays fungal growth with a powdery, dense floccose texture, showing pale blue-green pigmentation on the edges and white pigmentation in the center, which is characteristic of *Aspergillus glaucus*.[10]
3. SDA Medium (Reverse View): Exhibits a cream-colored pigment on the underside of the culture plate.
4. Lacto Phenol Cotton Blue (LPCB): Highlights the conidia present on a vesicle, observed under 40X magnification.[11]
5. LPCB: Shows conidia occupying the upper two-thirds of the vesicle, curving parallel. The conidiophore is a wide, thin-walled stalk, and vesicles are either round or club-shaped, with phialides covering the entire surface of the vesicle (observed at 100X magnification).[11]
6. LPCB: Provides a detailed view of the same structure as in **Figure 5**, with conidia over the vesicle (at 100X magnification).[11]
7. Conidia Characteristics: Conidia are round to oval in shape, measuring 4–8 µm and displaying slight roughness on their surface.[11]
8. LPCB: Shows ascocarps that are non-pigmented, round, and range from 80–250 µm (observed at 100X magnification), with arrows highlighting the key features in the image, as referenced in the literature.[11]

3. Discussion

This report highlights a rare case of Aspergillus glaucus as the causative organism of onychomycosis in a pediatric patient who was otherwise healthy, immunocompetent, and from an economically disadvantaged background, with no significant predisposing risk factors. Onychomycosis is more commonly observed in individuals with nail-damaging skin conditions or compromised immune systems. Molds such as Aspergillus spp. are ubiquitous in nature, frequently found in soil, water, and decaying organic matter. However, fingernail infections are about 25 times less prevalent than toenail infections.[12]

Various occupational groups are at higher risk of onychomycosis due to environmental exposure. As noted in a study by Kaur et al., housewives, farmers, laborers, industrial workers, rural residents, and students are frequently affected by this condition.[13] In this particular case, the child had no underlying health issues or comorbidities, underscoring the unusual nature of A. glaucus as a pathogen in fingernail infections.

While A. glaucus is an uncommon cause of onychomycosis, it should not be overlooked as a potential pathogen in nail infections. Previous studies have reported that non-dermatophyte molds account for 59.6% of all onychomycosis cases, with 6.8% attributed to infections caused by various Aspergillus species. Differentiating between a true pathogen and a laboratory contaminant can be challenging, especially in cases involving Aspergillus spp. However, careful diagnostic techniques can aid in accurate identification.[13]

In this case, direct examination of the nail sample with 40% KOH revealed abundant, hyaline, septate hyphae with dichotomous branching, consistent with fungal characteristics of the Aspergillus group. The fungal culture on Sabouraud Dextrose Agar further confirmed the presence of A. glaucus, as did lactophenol cotton blue staining, which highlighted the same fungal structures. Repeated sampling and consistent findings strengthened the diagnosis of infection by this mold in an immunocompetent patient.

4. Limitation of this Study

One key limitation of this study was the use of manual identification techniques, which rely on macroscopic and microscopic observations for fungal species identification. While this approach was effective in this case, it has limitations in terms of sensitivity and accuracy, particularly for distinguishing closely related fungal species. Molecular diagnostic techniques, such as PCR-based assays, could provide more precise identification and differentiation of fungal species. These techniques are especially useful in cases where there is a risk of contamination or difficulty in distinguishing pathogenic fungi from environmental ones.

1. Lack of Molecular Identification: Molecular techniques, such as PCR-based methods, were not used to confirm the fungal species. These methods could enhance the accuracy of identification and differentiate Aspergillus glaucus from other similar species.
2. Absence of Antifungal Susceptibility Testing: Antifungal susceptibility testing was not performed. Although treatment was based on known susceptibility patterns, such testing could provide more specific guidance and ensure the effectiveness of the chooses antifungal agents.
3. Lack of Exploration of New Antibiotics: The case report did not explore the use of new or alternative antibiotics for treating Aspergillus glaucus. Conducting trials with new antifungal agents could help identify more effective options, especially for resistant or recurrent infections
4. Single Case Study: This report is based on a single case, limiting the generalizability of the findings. Larger studies are needed to better understand the prevalence and clinical significance of Aspergillus glaucus in onychomycosis.
5. Limited Follow-Up Data: The follow-up period focused solely on symptom resolution. Long-term follow-up data on recurrence rates or potential complications were not collected, which could be important for assessing the long-term outcomes of treatment.

5. Antifungal Resistance and Similar Studies

Although antifungal resistance has not been widely reported for Aspergillus glaucus in nail infections, resistance to commonly used antifungal agents, such as azoles, has been documented in other Aspergillus species. Similar studies have highlighted the emergence of antifungal resistance, particularly among immunocompromised patients. For instance, a study by Verweij et al. (2016) & Kaur et al. (2008) reported azole resistance in Aspergillus fumigatus strains, which could complicate treatment outcomes. Continuous surveillance and antifungal susceptibility testing are critical to addressing this emerging threat.[14,15]

5.1. Species identification and treatment impact

Accurate species identification was pivotal in tailoring the treatment plan. The identification of Aspergillus glaucus allowed for targeted antifungal therapy with terbinafine and griseofulvin, which are effective against non-dermatophyte molds. Early and precise identification reduced the risk of treatment failure, ensuring successful recovery for the patient.

6. Conclusion

Dermatologists and microbiologists should be aware of *Aspergillus glaucus* as a potential cause of onychomycosis, despite its common misidentification as a culture contaminant. Non-dermatophyte fungi are increasingly recognized as frequent culprits in nail infections. While manual identification was used in this study, external quality control confirmed the accuracy of our findings. Culture remains vital for diagnosing onychomycosis, allowing for early and cost-effective detection of both dermatophyte and non-dermatophyte infections. This approach led to timely treatment and a successful recovery for the patient.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. Welsh O, Vera- Cabrera L, Welsh E. Onychomycosis. *Clin Dermatol*. 2010 Mar 4;28(2):151–9.
2. Gupta AK, Drummond-Main C, Cooper EA, Brintnell W, Piraccini BM, Tosti A. Methodical review of nondermato- phyte earth onychomycosis opinion, clinical types, epi- demiology, and treatment. *J Am Acad Dermatol*. 2012;66(3):494–502.
3. English MP, Atkinson R. Onychomycosis in senior ki- ropody cases. *Br J Dermatol*. 1974;91(1):67-72.
4. Moreno G, Arenas R. Other fungi causing onychomycosis. Clin Dermatol. 2010;28(2):160-3.
5. Sigall D, Tosti A, Arenas R. Tinea Unguium opinion and Treatment in Practice. *Mycopathologia*. 2017;182(1-2):95–100.
6. Karaman BFO, Açıkalın A, Ünal İ, Aksungur VL. Individual values of KOH examination, histological examination, and culture for onychomycosis a idle class analysis. *Int J Dermatol*. 2019;58(3):319-24.
7. Haghani I, Shams- Ghahfarokhi M, Dalimi Asl A, Shokohi T, Hedayati MT. Molecular identification and antifungal vulnerability of clinical fungal isolates from onychomycosis (uncommon and arising species). *Mycoses*. 2019;62(2):128–43.
8. Becker BA, Childress MA. Common bottom Problems untoward Treatments and Home Care. *Am Fam Physician*. 2018;98(5):298–303.

9. Zaikovska O, Pilmane M, Kisis J. Morphopathological aspects of healthy nails and nails affected by onychomycosis. *Mycoses*. 2014;57(9):531–6.
10. Vlahovic TC, Garcia M, Wotring K. Dermoscopy of Onychomycosis for the Podiatrist. *Clin Podiatr Med Surg*. 2021;38(4):505–11.
11. Campbell CK, Johnson EM, Warnock DW. Identification of Pathogenic Fungi. 2nd Edn. Wiley-Blackwell, 2013
12. Rani MS, Kumar BS, Susmitha K. Clinico mycological study of onychomycosis. *J Dermatol*. 2008;53(4):174.
13. Gianni C, Morelli V, Cerri A, Greco C, Rossini P, Guiducci A, Braidotti P, Calcaterra R, Papini M. Utility of histological examination for the opinion of onychomycosis. *Dermatology*. 2001;202(4):283–8.
14. Kaur R, Kashyap B, Bhalla P. Onychomycosis--epidemiology, diagnosis and management. *Indian J Med Microbiol*. 2008;26(2):108-116.
15. Verweij PE, Snelders E, Kema GH, Mellado E, Melchers WJ. Azole resistance in Aspergillus fumigatus: a side-effect of environmental fungicide use?. *Lancet Infect Dis*. 2009;9(12):789–95.

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