

CLINICAL VIGNETTE

Aspergillus in Onychomycosis

Mina Ma, MD and Jessica Liao, MD

Case Presentation

A 43-year-old female was obtaining acupuncture treatment and including trigger point injections in the East West medicine clinic for her neck, shoulder and upper back pain. Her past medical history includes fibromyalgia syndrome, neck dystonia, temporomandibular joint syndrome, occipital neuralgia, irritable bowel syndrome, and Hashimoto's thyroiditis and ongoing problems with poorly controlled migraine headaches. She mentioned that her right great toenail was deformed and a toenail scraping was sent to the lab. A preliminary result suggested *Aspergillus* and the patient was referred back to her primary care physician.

Discussion with patient revealed she may have had some trauma to the toenail via extensive walking in shoes that may have been too small. Initially, she noted some discoloration and a slight lifting of the nail in the right distal corner which eventually spread inwards. There was no other toenail or surrounding skin involvement. Patient goes to nail salons, but states no gym exposures and does not walk outside barefoot. She denies toenail pain but states the nail catches on fabric when she is in bed leading to discomfort. She is an environmental law attorney who lives in San Francisco but frequently visits her home in Southern California. She is single, exercises regularly, and does not smoke, but does drink wine occasionally if out with friends.

Her medications include rizatriptan roughly twice a month, microgestin daily, and occasional famotidine. She takes many supplements, including B complex vitamins, diclofenac powder, vitamin D supplements, Traumeel homeopathic tablets, magnesium supplements, probiotics, and selenium. She has allergies to codeine, nickel, and thimerosal.

One month later final results identified *Aspergillus terreus*.

Discussion

Classic signs of onychomycosis commonly include nail discoloration, brittleness, thickening, and lifting away from the nail bed. As the nail changes worsen over time, affected nails can cause local pain in surrounding skin. Onychomycosis is typically caused by dermatophyte infections, estimated to account for 60 to 70% of infections. Dermatophytes are fungi that require keratin for growth and usually cause superficial infections of the skin, hair, and nails. Dermatophytes are not known to cause invasive disease, except in immunocompro-

mised hosts. They are aerobic and are commonly of three genera of fungi, *Trichophyton*, *Microsporum*, and *Epidermophyton*. These organisms are often acquired by contact with infected humans or animals, or from exposure to contaminated soil or fomites (e.g., combs, brushes).¹ Common causes and risk factors include hyperhidrosis, local trauma, underlying diabetes, peripheral circulatory disease, immunosuppression, and contact with infected household members.²

Often microbiologic confirmations are not made, the onychomycosis is presumed to be due to dermatophyte. However, it turns out that onychomycosis can also be caused by non-dermatophyte (saprophytic) molds (NDM) or yeasts such as *Aspergillus* spp., *Scopulariopsis* spp., *Alternaria* spp., *Acremonium* spp., and *Fusarium* spp. It is now thought that these species are responsible for 2-25% of all the causes of onychomycoses. Making the diagnosis of these agents is often difficult due to the fact that NDMs are common contaminants of the nails and of the mycology laboratory.³

Aspergillus spp. have been shown to be emerging causative agents of NDM onychomycoses. Interestingly, even newer *Aspergillus* spp. have recently been described to cause nail infections. A review of 42 epidemiological studies showed that onychomycosis due to *Aspergillus* spp. varies between <1% and 35% of all cases of onychomycosis in the general population. Toenails are more frequently involved than fingernails. Amongst the *Aspergillus* spp., *A. flavus*, *A. terreus* and *A. niger* are the most common forms.⁴

In this patient, the results came back as somewhat of a surprise, as she did not appear to have significant risk factors to suggest an infection, let alone a type that is less common. Her presumed trauma to the toenail from ill-fitting footwear was likely the only predisposing factor. It is important to note that direct microscopy cannot identify the specific pathogen involved in onychomycosis. Typical screening would be with a 20% potassium hydroxide (KOH) preparation in dimethyl sulfoxide (DMSO) to rule out the presence of fungi. Before obtaining a specimen, the nail must be clipped and cleansed with an alcohol swab to remove bacteria and debris.⁵ While the KOH may suggest infection, a fungal culture is necessary to positively identify the species of organism.

Summary and Treatment

This patient was found to have onychomycosis of right great toe due to *Aspergillus terreus*. While dermatophytes are the most common cause of onychomycosis, yeasts and nondermatophyte molds including *Aspergillus* can also cause this condition. It appears that onychomycosis due to *Aspergillus* spp. is more prevalent than previously thought. As an emerging cause of onychomycosis, clinicians need to be aware that the treatment is different from standard onychomycosis treatment. Topical therapy, such as efinaconazole and ciclopirox nail lacquer, requires long term daily use and has low efficacy, so it is not recommended for nondermatophyte mold onychomycosis. Oral terbinafine, the usual treatment for dermatophytes, is also not as effective in *Aspergillus* either. Since her nail is infected with *Aspergillus terreus*, treatment with oral itraconazole was advised, as it has been shown to be more effective in vitro. Usual duration for fingernail treatment is 6 weeks, while toenails are thought to require a longer duration. Both continuous itraconazole 200mg PO daily x 3 months or pulse therapy itraconazole 200 mg PO twice daily x 1 week per month for 3 months are accepted oral regimens. Resistance to itraconazole can occur, and inadequate treatment may result in a recurrence of the infection.

REFERENCES

1. **Piggot C, Friedlander S.** Dermatophytes and Other Superficial Fungi. In: Long S, Editor. *Principles and Practice of Pediatric Infectious Diseases*. 4th ed. Philadelphia, PA: Elsevier Inc.; 2012. p. 1246-1249.
2. **Moreno G, Arenas R.** Other fungi causing onychomycosis. *Clin Dermatol*. 2010 Mar 4;28(2):160-3. doi: 10.1016/j.clindermatol.2009.12.009. PMID: 20347658.
3. **Gupta AK, Drummond-Main C, Cooper EA, Brintnell W, Piraccini BM, Tosti A.** Systematic review of nondermatophyte mold onychomycosis: diagnosis, clinical types, epidemiology, and treatment. *J Am Acad Dermatol*. 2012 Mar;66(3):494-502. doi: 10.1016/j.jaad.2011.02.038. Epub 2011 Aug 4. PMID: 21820203.
4. **Bongomin F, Batac CR, Richardson MD, Denning DW.** A Review of Onychomycosis Due to *Aspergillus* Species. *Mycopathologia*. 2018 Jun;183(3):485-493. doi: 10.1007/s11046-017-0222-9. Epub 2017 Nov 16. PMID: 29147866; PMCID: PMC5958150.
5. **Tosti A, Elston D.** Onychomycosis Workup. *Medscape*. July 31, 2018.