





Fungal nail infection: diagnosis & management

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FUNGAL NAIL INFECTIONS

Fungal Disease




Tinea pedis

Fungal Nail Disease

- What causes onychomycosis?
- Who is at risk?
- How does it present?
- How is it diagnosed?
- How and when do you treat topically?
- What systemic options are available?
- What is the role of nail avulsions?

Fungal Nail Disease

- Is there a role for combination treatments?

Fungal Nail Disease

- What about yeasts and non-dermatophyte moulds?
- What are the treatment options for Children?
- Do patients with diabetes or immunosuppression require different treatment?
- How do I know if treatment is successful?

Fungal Nail Disease



Tinea unguium (onychomycosis)

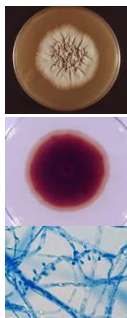
MEDICAL PARADYM

- Friable nail plate and nail spikes (yellow hyperkeratotic bands) suggest onychomycosis
- Histopathology of nail clippings can be done easily and quickly and is an economical way to establish a pathogenic role of fungi; specimens can be sent without fixative to a mycology laboratory and are available in 3-5 days
- Treatment should not be started before confirmation of infection by mycology
- False negative rates for culture are 30% therefore a negative test result cannot exclude infection and should be repeated if clinical suspicion is high
- Consider non-dermatophyte moulds if onychomycosis is unresponsive to antifungals, and if microscopy provides a positive result but cultures give negative results

Fungal Nail Disease

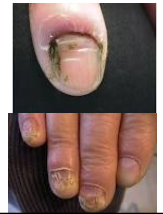
What causes onychomycosis?

- Onychomycosis is most commonly caused by infection with dermatophyte moulds.
- Around 90% of cases are related to *Trichophyton rubrum* followed by *Trichophyton mentagrophytes* var. *interdigitale*.



What causes onychomycosis?

- Onychomycosis can also be caused by non-dermatophyte moulds and by yeasts, commonly *Candida albicans*.
- The distribution of these pathogens is determined by geography, climate, and migration.



Who is at risk?

- Onychomycosis is a multifactorial disease.
- Fungi are ubiquitous and damaged nail increases the risk of infection.
- Diabetes is an independent risk factor with one third of patients with diabetes affected.
- In patients with diabetes, diseased nail can injure surrounding skin, which may go unnoticed because of sensory neuropathy, and this can predispose to osteomyelitis, gangrene, and diabetic ulcers.



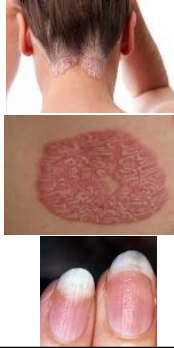
Who is at risk?

- Increasing age also poses a risk, and in elderly people damaged nail can traumatise the skin and provide an entry point for bacteria or other pathogens, causing cellulitis.



Who is at risk?

- The odds of patients with psoriasis having onychomycosis was 56% greater than in those of the same age and sex without psoriasis, and prevalence of pedal onychomycosis was 13%.



Who is at risk?

- The prevalence of onychomycosis in people with HIV was 23.2%
- In one large series of patients with onychomycosis, 83.3% smoked two or more packets of cigarettes a day compared with 14.8% who were non-smokers (peripheral arterial disease was a confounding risk factor).



Who is at risk?

- External risk factors reported are increased participation in physical activity, increased exposure to wet work, ill fitting shoes, commercial swimming pools, working with chemicals, walking barefoot, and nail biting



How does it present?

- Onychomycosis may involve a single nail or, in exceptional circumstances, all nails.
- The first and fifth toenails are the most commonly affected and usually following an episode of tinea pedis.
- Toenails are seven times more likely to be affected than fingernails



White Superficial Onychomycosis



Proximal Onychomycosis



Total Dystrophic Onychomycosis



Differential Diagnosis

Psoriasis

- onycholysis,
- subungual hyperkeratosis
- splinter haemorrhages
- leuconychia
- dystrophy
- Pitting
- Oil drop sign
- Cutaneous features of psoriasis



Psoriasis



Differential Diagnosis

Lichen planus

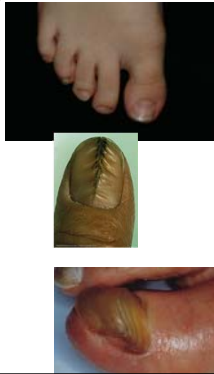
- Cutaneous disease at other sites
- Thin nail plate and ridging
- Dorsal pterygium—scarring at proximal aspect of nail



Differential Diagnosis

Trauma

- Nail plate can appear abnormal
- Nail bed should be normal
- Distal onycholysis with repeated trauma
- Single nail affected
- Shape of nail changed
- Homogenous alteration of nail colour



Differential Diagnosis

Eczema

- Irregular buckled nails with ridging
- Coarse nail pits
- Cutaneous signs of eczema



Differential Diagnosis

Yellow nail syndrome

- Nail plate is discoloured green-yellow
- Nails are hard with elevated longitudinal curvature
- Nails may be shed, painful
- Loss of cuticle
- Associations with bronchiectasis, lymphoedema, and chronic sinusitis



Differential Diagnosis

Alopecia areata

- Pits,
- longitudinal ridging,
- brittleness
- Hair loss



Differential Diagnosis

Lamellar onychoschizia (lamellar splitting)

- History of repeated soaking in water
- Usually distal portion of nail



Differential Diagnosis

Periungual Bowens disease

- Single nail,
- warty changes of nail fold,
- ooze from edge of nail



Differential Diagnosis

Malignant melanoma

- Black discolouration of nail plate or nail bed
- Pigment can extend onto nail fold
- Can get associated bleeding



How is it diagnosed?

Microscopy and Culture.

- Clean the nail and surrounding skin with 70% ethanol before sample collection
- Clip distal nail plate and scrape subungual debris with number 15 blade
- Divide the sampled material divided into two portions, one for microscopy and the other for culture.
- Transport the samples in commercially available packs
- OR SEND PATIENT TO PATH COLLECTION CENTRE



How and when do you treat topically?

Indications for topical treatment include:

- up to 50% involvement of the distal nail plate with lack of matrix involvement,
- Fewer than three or four nails affected,
- superficial white onychomycosis
- prophylaxis in those at risk of recurrence,
- oral treatment is contraindicated

What topical options are available?

- **Amolilfene**
- **Cicloprox**
- **Miconazole**
- **Tioconazole**
- **Efinoconazole**
- **Salicylic acid**
- **40% urea cream with Bifonazole**

Urea 40% for nail removal

- Chemical ablation of fungally infected nails with urea 40%
 - First reported in 1978¹
 - Established by
 - Numerous clinical trials
 - Large-scale medical experience
- Adverse events generally mild and transient
 - Most commonly irritation of surrounding skin

1. Farber EM; South DA. Urea ointment in the nonsurgical avulsion of nail dystrophies. *Cutis* 1978; 22 (6): 689-692

Bifonazole 1% cream

- Imidazole derivative with broad spectrum of activity against dermatophytes, yeasts, moulds, dimorphic fungi and some Gram-positive bacteria
- Extensive clinical experience in the treatment of skin mycoses and treatment of the nail bed after removal of infected nail parts with urea-bifonazole ointment
- Adverse events usually mild and transient
 - mostly local skin reactions e.g. irritation, reddening, peeling, burning

Fungal Nail Treatment Set components

- 10g Urea ointment in a tube
 - Active: urea 40%
 - Other ingredients: soft white paraffin, woolfat, white beeswax
- 20g Bifonazole cream in a tube
 - Active: bifonazole 1%
 - Other ingredients: benzyl alcohol, cetostearyl alcohol, cetyl palmitate, octyldodecanol, polysorbate 60, sorbitan stearate, purified water
- 22 waterproof hygiene plasters
- 1 scraper

What systemic options are available?

- **Terbinifne**
- **Itraconazole**
- **Fluconazole**
- **Griseofulvin**

What is the role of nail avulsions?

- Nail avulsion (complete removal) or debridement (partial removal) can be useful in severe onychomycosis, extensive nail thickening, or longitudinal streaks or spikes.
- With dermatophytoma, avulsion and debridement can help reduce fungal mass and increase the penetration of antifungal treatment.
- Chemical avulsion involves dissolving the bond between the nail plate and the nail bed, and softens the nail plate

Is there a role for combination treatments?

- Topical ciclopirox, amorolofine, and imidazoles have been used in combination with systemic antifungal agents.
- In toenail onychomycosis an open randomised trial showed mycological cure rates of 83% for oral itraconazole combined with amorolofine lacquer compared with 41% for itraconazole alone for 12 weeks
- Similar benefits were shown with terbinafine

What about yeasts and non-dermatophyte moulds?

- *Candida* accounts for 5-10% of all cases of onychomycosis.
- Itraconazole and fluconazole should be considered as the first line agent for *Candida* species,
- Terbinafine is an effective agent, with cure rates of 70-85% after 48 weeks treatment with 250 mg daily with onychomycosis caused by *C albicans*, *C parasitosis*, or *S brevicaulis*
- Non-dermatophyte moulds are difficult to treat. May require systemic and topical treatment combined with periodic chemical or surgical debridement or avulsion.

What are the treatment options for Children?

- Topical treatment of onychomycosis is often advocated but not licensed in children and no clinical trials show efficacy in this population.
- Griseofulvin is licensed for children but is no longer recommended as first line treatment owing to long treatment duration and poor efficacy.
- Terbinafine is licensed in some countries for use in tinea capitis and can be used in children older than 2 years and with a body weight of more than 12 kg.
- Children should be referred for specialist review and initiation of treatment.

Do patients with diabetes or immunosuppression require different treatment?

- In patients with diabetes, terbinafine is the treatment of choice and is preferred over itraconazole, which is contraindicated in heart failure.
- Itraconazole can induce hypoglycaemia in patients with diabetes.
- Topical treatments should be considered to avoid the potential for drug interactions with antidiabetic drugs.
- Terbinafine and fluconazole are the agents of choice in patients with HIV as they interfere least with antiretrovirals.

How do I know if treatment is successful?

- Cure of onychomycosis has been defined as the absence of clinical signs or the presence of a negative culture result, with or without negative microscopy results
- 25% to 30% of patients will relapse after initial cure.
- After three months of treatment, most toenails will still look abnormal after systemic treatment.
- If normal nail is emerging proximal to the dystrophic nail, a scratch can be made with a scalpel blade at the base of the dystrophy. If the dystrophic nail remains distal to the scratch as it grows out no further treatment is required, but if the dystrophy moves proximal to the scratch then this indicates ongoing infection and further treatment.
- Serial photography is a helpful additional monitoring tool.



Herringbone nails



Pincer Nail



Fungal Nail Dystrophy



Fungal Nail Dystrophy



White Superficial Onychomycosis



Twenty Nail Dystrophy (trachyonychia)



Twenty Nail Dystrophy (trachyonychia)





Ingrown toenail



Lister corn, left foot



Corn and callus
