



# Treatment of nail disorders

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There are several reasons that make the nail unit difficult to treat. It is necessary to wait for several months before seeing the results of treatments in nail disorders, as the nail plate grows very slowly (average nail growth is 3 mm/month in fingernails and 1–1.5 mm/month in toenails). It is very important to give the patients this information, as they may otherwise discontinue the treatment feeling it to be ineffective. Delivery of topical drugs through the nail is difficult, as vehicles utilized for enhancing penetration of drugs through the skin are not effective in the nail. Most topical drugs are therefore ineffective in the treatment of inflammatory nail disorders, since the nails are largely exposed to environmental hazards and nail disorders are commonly precipitated or worsened by physical traumas. Thus, clinicians often do not prescribe systemic treatment when the disease is limited only to the nails.

## Brittle nails

Nail brittleness is a common complaint characterized by weak nails that split, flake and crumble. It may be a consequence of factors that alter the nail plate production and/or factors that damage the already keratinized nail plate [1–3]. Since environmental and occupational factors that produce a progressive dehydration of the nail plate play a main role in the development of idiopathic nail brittleness [4], the management of brittle nails includes protective measures that prevent nail plate dehydration. Patients should be instructed to pursue the following rules:

- Avoid repeated immersion of the hands in soap and water
- Avoid repeated use of nail polish removers that decrease nail content in water
- Keep nails short and squared, and leave cuticles uncut
- Protect hands with rubber gloves worn over light cotton gloves during housekeeping

## Cosmetic treatment

Nail hardeners, nail strengtheners and fortifying nail builders are commercially available to enhance the appearance of nails but there are no data proving their efficacy. Nail varnishes may be useful to protect the nail plate from environmental hazards but they always need to be removed with nail polish removers. For this reason, nail polishes should be applied once a week. In recalcitrant fragility, nail wrapping limited to the distal portion of the nail plate as well as preformed artificial nails and sculptured nails may afford protection and camouflage [5].

## Topical treatment

Nail moisturizers are useful. They may contain occlusives such as petrolatum or lanoline and humectants, such as glycerin and propyleneglycol. Proteins, fluorides and silicium can also be useful. Urea and  $\alpha$ -hydroxy acids increase the water binding capacity of the nail plate [5].

## Systemic treatment

- Biotin 2.5–5 mg/daily for 6 months [6]
- Iron supplementation is useful only when ferritin levels are below 10 ng/ml
- Colloidal silicic acid has been reported effective at the dosage of 10 ml/day [7]

## Onycholysis

Onycholysis describes the detachment of the nail plate from the nail bed. It may be idiopathic, traumatic or may be a symptom of numerous diseases that affect the nail bed. The onycholytic area appears whitish due to the presence of air under the detached nail plate. It may occasionally present a green or brown discoloration due to colonization of the onycholytic space by chromogenic bacteria (*Pseudomonas aeruginosa*), molds or yeasts. A waterborne environment facilitates the development of this condition.

## Topical treatment

- The detached nail plate should be clipped away and this should be repeated at 2-week intervals until the nail plate grows attached
- The exposed nail bed should be carefully dried after each hand washing

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- Application of a topical antiseptic solution (4% thymol in chloroform, or in 95% ethanol) and/or a topical antifungal on the exposed nail bed may be useful
- *Pseudomonas* colonization can be treated with sodium hypochlorite solution or 2% acetic acid
- Treatment of the causative condition is required in all cases of onycholysis secondary to nail bed diseases

### Acute paronychia

Acute paronychia is an acute inflammatory disorder affecting the proximal and lateral nail folds. It is usually caused by *Staphylococcus aureus*, although other bacteria and herpes simplex virus (HSV) 1 and 2 may be responsible for this condition. The affected digit is painful, with erythema, swelling and pus discharge. Nonpurulent vesicles are typical of HSV infection. Treatment should commence as early as possible to avoid deeper infections and progression to chronic paronychia with or without permanent nail plate damage.

#### Topical treatment

Drainage of the abscess and local medications with antiseptics (4% thymol in chloroform or in 95% ethanol) are useful to obtain relief of inflammation and pain.

#### Systemic treatment

Whenever possible, cultures should be taken. Treatment includes penicillase-resistant antibiotics or systemic acyclovir (Zovirax®, GlaxoSmithKline) in case of HSV infection.

### Chronic paronychia

Chronic paronychia is a chronic inflammatory reaction of the proximal nail fold due to irritants or allergens. Secondary colonization with *Candida albicans* and/or bacteria occurs in most cases, causing self-limited episodes of painful acute inflammation.

Clinically, the proximal and lateral nail folds show mild erythema and swelling. The cuticle is generally lost. Beau's lines (transverse superficial depressions of the nail plate) and onychomadesis (a transverse whole thickness sulcus that splits the nail plate into two parts) may occur as a consequence of nail matrix damage. Management of chronic paronychia requires avoidance of wet environment, chronic microtrauma and contact with irritants or allergens.

#### Topical treatment

Application of a mild potency topical steroid at night and a topical preparation containing a steroid and an imidazole derivative in the morning.

#### Systemic treatment

- Systemic steroids (methylprednisone 20 mg/day for a few days) can be prescribed in severe cases when several digits are affected
- Systemic antifungals are often useless as chronic paronychia is not a mycotic infection

*Candida* is a colonizer of the proximal nail fold that disappears when the proximal nail fold barrier is restored. Eradication of *Candida* is not associated with clinical cure [8].

#### Surgical treatment

Paronychia that is not responding to medical therapy should be treated by the excision of a crescent-shaped, full thickness piece of the proximal nail fold, including its swollen portion.

### Onychomycosis

Onychomycosis is the most common nail disease and describes the infection of the nail by fungi. Approximately 85% of cases of onychomycosis result from dermatophytic invasion of the nail. Nondermatophytic molds (NDM) account for 15% of cases, while onychomycosis due to yeasts are rare.

Onychomycosis affects toenails more frequently than fingernails. Different clinical patterns of infection depend on the method by which fungal colonization of the nail occurs. Distal subungual onychomycosis (DSO), proximal subungual onychomycosis (PSO), white superficial onychomycosis (WSO), endonyx onychomycosis (EO) and total dystrophic onychomycosis (TDO) are the pattern currently described by the literature.

Treatment of onychomycosis depends on the responsible fungi, the type of onychomycosis, the number of affected nails and the patient's age and general health. Since differential diagnosis of onychomycosis includes a large number of different diseases, treatment should only be commenced when the diagnosis is confirmed by a positive microscopy and/or culture [9].

#### Onychomycosis due to dermatophytes

The affected digit demonstrates subungual hyperkeratosis with onycholysis in DSO; proximal leukonychia in PSO; superficial friable leukonychia in WSO. Onychomycosis due to dermatophytes are most commonly due to *Trichophyton rubrum*.

*Topical treatment*

- In WSO dermatophyte colonization is limited to the most superficial layers of the nail plate. Treatment requires scraping of the affected area followed by the application of a topical antifungal nail lacquer for 6–12 months (amorolfine [Loceryl<sup>®</sup>, Galderma] 5% nail lacquer 1–2 times/week or cyclopiroxolamine 8% nail lacquer once a day)
- DSO usually requires systemic antifungals, however, an exception may be represented by DSO limited to the distal nail of a few digits. This can be treated with a nail lacquer as for WSO

*Systemic treatment*

Terbinafine (Lamisil<sup>®</sup>, Novartis Pharmaceuticals Corp.) and itraconazole (Sporanox<sup>®</sup>, Janssen-Cilag) have been demonstrated to reach the distal nail soon after therapy is commenced and to persist in the nail plate for a relatively long time (1 to 6 months) after interruption of treatment. The persistence of high post-treatment drug levels in the nail permits a short treatment period with fewer incidences of relapses and side effects.

- Terbinafine is an allylamine derivative administered at the dosage of 250 mg per day for 6 weeks (fingernail infections) to 3 months (toenail infections). Terbinafine can also be administered as pulse therapy at a dosage of 500 mg daily for 1 week every month for 2 to 4 months [10]. Interactions with other drugs are extremely rare. Hepatobiliary diseases and white blood cell disturbances may occur rarely and patients should be assessed before commencing treatment.
- Itraconazole is a triazole derivative administered as pulse therapy at a dosage of 400 mg daily for 1 week every month. The duration of treatment ranges from 2 (fingernail infections) to 3–4 months (toenail infections). The drug should be administered with a high-fat meal to improve its absorption. Due to its pharmacological interactions, it should be used cautiously in elderly patients who are taking multiple drugs.
- Patients treated with systemic antifungals should be followed up for 4 to 12 months after discontinuation of therapy to evaluate efficacy. Cure rates of onychomycosis with systemic antifungals are of 98% for fingernail infections and 80% for toenail infections, with terbinafine being the most effective treatment.

- Recurrences and reinfections are not uncommon (up to 20% of cured patients). Weekly application of antifungal nail lacquers on the previously affected nails and antifungal nail creams on the plantar and interdigital skin can be performed to attempt to maintain cures.
- Sequential treatment with itraconazole and terbinafine has been utilized to increase cure rates [11]: the suggested regimen is two pulses of itraconazole 400 mg per day for 1 week a month followed by one or two pulses of terbinafine 500 mg/day for 1 week a month.

*Onychomycosis due to NDMS*

Although the list of NDM that have been isolated from nails is relatively long, only a few species are regularly identified as causing onychomycosis. These include *Scopulariopsis brevicaulis*, *Fusarium* sp., *Acremonium* sp., *Aspergillus* sp., *Scytalidium* sp. and *Onychocola canadensis*. The presence of periungual inflammation with or without purulent discharge usually strongly suggests a mold onychomycosis.

*Systemic treatment*

Systemic treatment is scarcely useful for onychomycosis due to *Acremonium* sp., *Fusarium* sp., *S. brevicaulis* and *Scytalidium* sp. Itraconazole and terbinafine are effective in nail infections due to *Aspergillus* sp.

*Topical treatment*

Nail lacquers are quite effective in PSO or DSO due to *S. brevicaulis*, *Fusarium* sp. and *Acremonium* sp. (Figure 1a & 1b). Chemical nail avulsion with 40% urea in white petrolatum greatly increases the chance of cure. *Scytalidium* sp. infections are usually unresponsive to treatment.

*Candida onychomycosis*

Onychomycosis due to *C. albicans* usually indicates an underlying immunosuppression and the condition is almost exclusively seen in chronic mucocutaneous candidiasis (CMCC), in HIV-positive patients and patients undergoing long-term steroid treatment. However, isolation of *Candida* in onychomycosis can be occasionally observed in immunocompetent individuals.

*Systemic treatment*

- Itraconazole 200 mg per day and fluconazole (Diflucan<sup>®</sup>, Pfizer) 150 mg weekly are

Figure 1 (A–B). Distal subungual onychomycosis.

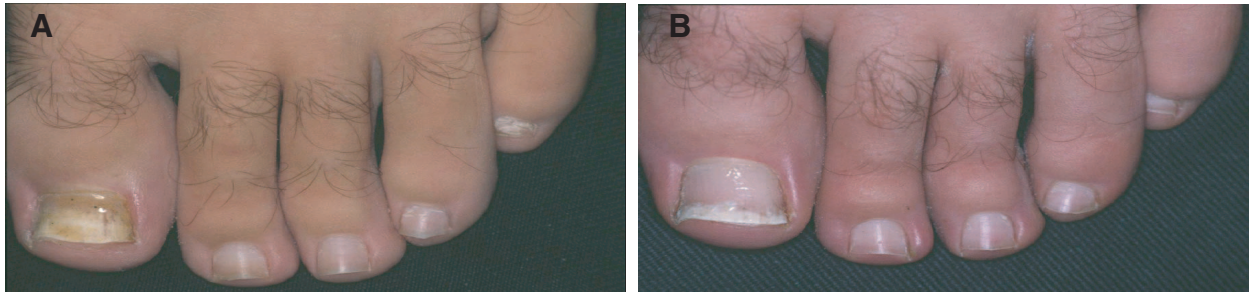


Figure 1 (A–B). Distal subungual onychomycosis due to *Fusarium solani* improved by 12 months of treatment with ciclopiroxolamine 8% nail lacquer.

effective. Duration of treatment is 6 weeks for fingernails and 3 months for toenails

- Recurrences are common if the underlying predisposing disease persists

### Ingrown toenails

Ingrown toenails are a common complaint that usually affect the big toe of young adults but they may occur at any age. They may be caused by an incorrect nail trimming, traumas, podiatric abnormalities or hyperhidrosis. The condition is due to a spicule that breaks off from the lateral edge of the nail plate and penetrates into the tissues of the lateral nail fold. Conservative treatment is indicated for early stages but advanced disease often requires surgical treatment for definite cure.

### Topical treatment

- Stage I: the embedded spicule must be removed and a package of nonabsorbent cotton soaked in a disinfectant (povidone iodine) is placed under the lateral corner of the nail plate to separate it from the distal and lateral nail folds. This medication should be repeated daily.
- Stage II: high potency topical steroid (clobetasol propionate 0.05% ointment [Temovate®, GlaxoSmithKline]) should be applied for a few days to promptly reduce the overgrowth of granulation tissue. Infection is always present requiring application of topical mupirocin.

### Surgical treatment

Stage III: selective destruction of the lateral horn of the nail matrix is mandatory and may be achieved by phenol cauterization or by surgical lateral matrix excision [12].

- Phenol cauterization: after removal of the lateral strip of the offending nail, hemostasis is achieved with a tourniquet. Then, the surrounding skin is protected with petrolatum and a saturated solution of phenol 88% is rubbed to the lateral matrix horn on a small cotton pack for 3 min, followed by neutralization with alcohol. The first dressing is performed with an high potency topical steroid (clobetasol propionate 0.05% ointment) and changed after 24 h. The patient should be instructed to soak the foot twice daily in a quart of warm water containing three capsules of povidone-iodine. This accelerates healing and prevents possible secondary infections [12].

- Lateral matrix excision: this may be obtained by dissecting and excising the lateral matrix horn [12].

### Distal nail embedding

Distal nail embedding is a common complication of total nail plate avulsion. An overgrowth of distal soft tissue may occur and the new nail may penetrate into this, producing inflammation with pain. Sculptured artificial nails may be useful to override the distal nail wall.

### Surgical treatment

In severe cases, a crescent wedge tissue excision is performed around the entire distal phalanx.

### Congenital malalignment of the big toenail

Congenital malalignment of the big toenail is characterized by lateral deviation of the nail plate with respect to the longitudinal axis of the

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