

# Nail and Skin Disorders of the Foot

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## KEYWORDS

• Onychomycosis • Onychocryptosis • Subungual tumors • Tinea pedis

## KEY POINTS

- The dermal layers of the foot along with the nail possess properties that make the foot vulnerable to an array of disorders.
- These maladies are unique to the foot because of the extreme contact stresses it endures as well as the regular use of footwear, which maintains a moist environment.
- This damp climate allows for opportunistic infections and maceration of the skin.
- The foot is also prone to vascular disease given its distance from the heart and ascending venous drainage.

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## NAIL DISORDERS

Nail disorders include disease that can be common and innocuous to subtle yet lethal. In this article we discuss some of the common disorders afflicting the nail and its supporting structures and a few conditions that should always be on the physician's differential.

The anatomy of the nail on the toe is similar to that of the finger. The nail is constructed of keratinized squamous cells.<sup>1,2</sup> The nail plate is a 3-layered keratin shield<sup>3</sup> that protects the distal pulp of the digit dorsally. It also acts to enhance the 2-point discrimination at the tip of the digit.<sup>1</sup> It is generated chiefly from the germinal matrix,

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which involves tissue lining the invaginated socket at the proximal aspect of the nail plate. The nail plate grows at a rate of 1 to 1.5 mm per month.<sup>2</sup> The germinal matrix gives rise to the more superficial layers of the nail. The nail is also created in part by the lunula and the sterile matrix, the former generating the middle portion and the latter interdigitating and supporting the deep surface.<sup>2,3</sup> The lunula is the white half circular structure deep to the nail plate and is the distal extent of the germinal matrix. When surgically ablating the nail, it is essential to excise the germinal matrix and lunula entirely to prevent remaining nail growth.

The eponychium is the area of the finger just proximal to the nail plate and includes the cuticle. The cuticle is the distal edge of the eponychium that lies over the nail at the proximal aspect and acts as a seal to the root of the nail.<sup>2</sup> The sterile matrix is a thin tissue just deep to the nail plate, which is adherent to not only the nail plate but also the deeper distal phalanx. Because of the intimate relationship between the sterile matrix and the distal phalanx, crush injuries that cause distal phalanx fractures also cause lacerations to occur at the sterile matrix. The nail plate can be dissected away from the nail plate in the case of a subungual hematoma and can be painful because of the pressure on the sterile matrix. The lateral edges of the nail plate are rolled into the tissue of the finger called the *paronychium*. This structure is prone to infection when it is disrupted due to trauma. It can also be involved in the case of onychocryptosis, commonly referred to as an *ingrown nail*. The distal nail plate is bordered by the hyponychium. The hyponychium creates a seal between the nail plate and the deeper, sensitive sterile matrix at the onychodermal band or solehorn.<sup>2,3</sup> The distal phalanx possesses a distal tuft that supports the sterile matrix and the adjacent nail plate.

### **Onychomycosis**

Among the most chronic and common conditions at the nail is onychomycosis or fungal infestation of the nail. This affects approximately 6% to 13% of individuals (Figs. 1 and 2).<sup>4</sup> This fungal infestation leads to a thickened and brittle nail that is cosmetically disfiguring, particularly in middle-aged and elderly individuals. Functionally, it also can limit footwear and catch when pulling socks over the foot. The nail is discolored and can have white and yellow components. The dermis surrounding the nail is also hyperkeratotic. Rarely, this disorder can affect children and the hands. Risk factors include diabetes, family history, trauma, male sex, advanced age, tinea pedis, smoking, prolonged water exposure, and immunocompromised hosts.<sup>5</sup> The disorder is caused by a cast of fungal species, most commonly dermatophytes such as *Trichophyton rubrum* and *Trichophyton mentagrophytes*.<sup>2,4,6</sup> Less frequently, this infection can be caused by nondermatophytes and *Candida* species.<sup>2</sup>



**Fig. 1.** Onychomycosis (From Hay R, Baran R. Onychomycosis: a proposed revision of the clinical classification. *J Am Acad Dermatol* 2011;65(6):1219–27.)

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