A hand surgeon's guide to common onychodystrophies

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Abstract The human fingernail contributes to the precise dexterity of the fingers, enhances sensibility, allows manipulation of fine objects, and shields the fingertip from traumatic injury. Nail abnormalities are a common incidental finding in the course of a hand surgeon's daily practice. These abnormalities may be clues to systemic, dermatologic, traumatic, and infectious processes that would benefit from further evaluation and treatment. The purpose of this review is to discuss common nail dystrophies and their related diagnoses.

Keywords Fingernail · Onychodystrophies

Introduction

The fingernail offers protection to the fingertip by shielding it from traumatic injury, contributes to enhanced sensation and discrimination, and allows manipulation of small objects with refined and precise dexterity [6]. Healthy-appearing nails are an important aspect of body image, play an important role in interpersonal relationships, and affect social functioning and work ability [15, 18, 27]. A variety of traumatic, infectious, dermatologic, and systemic disorders are associated with common nail findings. With every patient encounter, the hand surgeon has the opportunity to examine the fingernails of each patient. A basic knowledge of common onychodystrophies will allow timely referral to the proper specialist, if necessary, for definitive management and prevent unnecessary surgical

procedures. The purpose of this review is to discuss common nail dystrophies and their related diagnoses.

Onychia—Inflammation of the Nail Unit

Psoriasis (Fig. 1) is a disorder of skin keratinization, affecting 1–2 % of the general population [4], most commonly presenting as white, scaly, erythematous plaques over the elbow, knees, gluteal cleft, and scalp [4]. The most common nail changes associated with psoriasis are related to pitting [6], although pitting is variably present, ranging from 10 to 78 % of cases [11, 18]. Nail pits are thought to represent involvement of the proximal nail matrix, giving rise to the lesions in the outermost layers of the nail plate. These lesions consist of parakeratotic cells which interfere with the normal keratinization of the nail plate and are then sloughed, leaving the characteristic “pit” in the nail plate [7]. Pitting is also seen in several other disorders, including eczema, alopecia areata, and lichen planus [6].

The pits in psoriasis are large, deep, and randomly scattered within the nail plate [27]. In contrast, pitting in alopecia areata is more regular, shallow, geometric, and produces fine pits [4]. There may also be onycholysis, distal separation of the nail plate from the nail bed, and erythematous borders [27, 30]. Subungual hyperkeratosis, a result of the deposition of cells under the nail plate, presents with a yellow greasy appearance and separation of the nail plate from the nail bed [6]. It occurs in a variety of conditions, but often manifests a white-silvery color in psoriasis [6].

Localized pustular psoriasis (Acropustulosis of Hallopeau) (Fig. 2) involves the nails and palms or soles. Nail-only involvement is common, producing nail bed pustules, onycholysis, periungual erythema, and pain [14]. Pustules may be visible through the nail plate and there may be purulent appearing discharge and scales that form thick yellow

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Fig. 1 Nail psoriasis

fluid in severe cases. Concurrent underlying psoriatic arthritis may affect the distal phalanges. These changes are often misdiagnosed as acute bacterial infections.

Onycholysis—Nail Separation

Onycholysis is distal separation of the nail plate from the underlying nail bed (Fig. 3) [3]. The differential for onycholysis is extensive, including trauma, maceration, chemicals, nail cosmetics, infection, medications, dermatologic diseases, neoplasm, and systemic diseases [8]. The most common causes are allergens and irritants. In psoriasis, onycholysis is commonly surrounded by an erythematous margin that marks its proximal border [3]. Idiopathic onycholysis has an absence of hyperkeratosis and is more common on the dominant hand and in women [27]. Drug-induced onycholysis results from acute toxicity to the nail bed with destruction of the nail plate/nail bed adhesion. It typically involves all the nails and has a temporal association with the drug intake [12]. Onycholysis is common in patients being treated with the chemotherapeutic drugs paclitaxel and docetaxel [13]. The tetracycline class of medications is associated with phototoxic onycholysis [8]. Hyperthyroidism is associated with nail findings in 5 % of cases and may result in onycholysis, most commonly of the fourth and fifth

Fig. 2 Localized pustular psoriasis of nail bed with secondary plate destruction

Fig. 3 Drug-induced onycholysis

digits but all nails can be affected at the same time and is called Plummer's nails [1, 9].

Onychorrhexis—Nail Ridging

Longitudinal ridging and thickening of the nail plate, giving it a rough, textured appearance, characterize onychorrhexis (Fig. 4) [4, 28]. It commonly occurs with aging and is a major feature of brittle nail syndrome [28]. Onychoschizia (Fig. 5) is a dry nail that results in lamellar splitting and distal peeling of layers of the surface of the nail. This is often related to exposure to harsh solvent/household chemicals and nail polish removers, although the exact mechanism is poorly understood [29]. It may also be seen in patients with hypothyroidism [28]. Although nail abnormalities are present in about 10 % of patients with skin or mucosal lichen planus, nail lichen planus most commonly occurs in the absence of skin or mucosal involvement [24, 26]. Diagnosis is suggested by large midline, longitudinal ridging (onychorrhexis) (Fig. 6) and fissuring of the nail plate [19]; however, this can be a normal finding in elderly patients [4]. Patients may develop a pterygium, a dorsal extension of the proximal nail fold, which adheres to the nail bed. The extension has a V-shaped appearance and often splits the nail in two portions. The pterygium is an indication of nail matrix scarring and is irreversible [27].

Fig. 4 Onychorrhexis

Fig. 5 Onychoschizia

Onychomalacia—Soft Nails

Trachyonychia is characterized by fine striations of the nail that give the surface of the nail plate a rough appearance but are soft in texture (Fig. 7) [23]. The rough, opaque, and lusterless appearance of the nail plate has led some to describe the nails as “sandpapered nails” [27]. One to 20 nails can be affected, which is why it has also been called “twenty-nail dystrophy.” It can be seen in alopecia areata, lichen planus, psoriasis, and eczema [27].

Onychomadesis—Proximal Nail Shedding

Onychomadesis is defined as the proximal separation of the nail plate from the nail bed with shedding of the nail as a new nail grows beneath it (Fig. 8) [3]. This can be seen in eczema, atopic dermatitis, nail fold infections, and rarely in association with carpal tunnel syndrome. In acute eczema, periungual involvement leads to acute paronychia and development of onychomadesis [27]. More commonly, chronic eczema is associated with chronic swelling of the proximal nail fold and loss of the cuticle [27]. Patients with carpal tunnel syndrome may have onychomadesis affecting only the thumb, index, and middle fingers [25]. Atopic dermatitis may present with shiny nails (ebonation—becoming bone-like from chronic scratching) and

Fig. 6 Lichen planus (before pterygium formation)

Fig. 7 Trachyonychia

onychomadesis [25]. A variant of onychomadesis, Beau’s lines, are horizontal linear (Fig. 8) depressions in the nail plate, often found on multiple adjacent nails that progress distally as the nail grows [20]. These depressions represent a traumatic or systemic event that disrupts the growth of the nail plate [20]. These lines grow out with the nail over time.

Onychophagia

Onychophagia describes the changes associated with chronic nail biting. It is estimated that nearly one-third of elementary age children and 45 % of teenagers are nail biters [16]. The incidence decreases in adulthood. The most common findings are shortening of the nail plate (Fig. 9) and secondary bacterial infections [16]. Pica, the compulsive eating of nonnutritive substances, may be part of the obsessive–compulsive disorder spectrum of diseases [17]. While most cases involve ingestion of nonfood items such as ice, dirt, clay, or chalk, the compulsive ingestion of the nail plate may fall within this disorder [17].

Onychotillomania

Onychotillomania is a psychodermatologic disorder caused by repetitive self-manipulation of the proximal nail fold, resulting

Fig. 8 Onychomadesis (Left) and Beau’s lines (Right)

Fig. 9 Onychophagia

in damage to the nail matrix, causing horizontal depressions in the nail plate (Fig. 10) [20]. These horizontal depressions are similar to Beau's lines, paralleling the edge of the lunula and progressing distally as the nail grows out [20]. Onychotillomania has been associated with obsessive–compulsive disorder, anxiety, and major depressive disorder [2]. The differential diagnosis includes median canaliform dystrophy (a central longitudinal split in the nail with associated lateral splits, creating the appearance of a fir tree) (Fig. 11) and elkonixis (irregular punched out defect at the lunula that progresses distally) (Fig. 12) are idiopathic midline onychodystrophies [2, 5].

Onychomycosis

Onychomycosis, fungal infection of the nail, affects approximately 8–13 % of the population [21, 22]. The differential diagnosis for onychomycosis is extensive, with one series finding that 50 % of onychomycosis diagnoses were later shown to be incorrect [10]. The primary clinical criterion for diagnosis of onychomycosis is white/yellow or orange/brown patches or streaks in the nail [21]. Secondary clinical criteria include nail plate thickening, subungual hyperkeratosis, and onycholysis [21]. The definitive diagnosis is made from microscopic examination of potassium hydroxide mounts and

Fig. 10 Onychotillomania

Fig. 11 Median canaliform dystrophy

culture [21]. Dermatophytes account for the majority of infections, representing 91 % of cases in one series [22].

Onychomycosis can be divided into three main types: proximal and distal subungual, superficial white, and candidal [10, 31]. Proximal and distal subungual onychomycosis is most commonly caused by dermatophytes (Fig. 13) [10]. Distal subungual is the most common type, starting distally and progressing proximally, causing nail plate thickening, onycholysis, subungual hyperkeratosis, and discoloration [10]. *Trichophyton rubrum* is the most common dermatophyte responsible for distal subungual onychomycosis [10]. Proximal subungual onychomycosis, also caused by *T. rubrum*, is the least common form [10]. It begins proximally, progressing distally as a white spot under the lunula. It may be associated with immunosuppression and Human Immunodeficiency Virus (HIV) [10].

Superficial white onychomycosis is almost always found in toenails and is most commonly caused by *Trichophyton mentagrophytes*. White patches appear on the nail plate and may eventually cover the entire surface. The nail plate may become brittle with the consistency of plaster [31]. *Candida* species may also produce onychomycosis that is distinct from the dermatophyte infections, where the *Candida* invades the

Fig. 12 Elkonixis

Fig. 13 Distal onychomycosis

Fig. 14 *Candida* onychomycosis

nail plate directly (Hay *Candida* Onychomycosis). In contrast to dermatophyte infections that almost universally involve toenails, the majority of *Candida* infections involved the hands (Fig. 14). A primary *Candida* onychomycosis is also a sign of underlying immunodeficiency. Differentiating the type of onychomycosis infection by culture is important as it guides treatment with anti-yeast or anti-dermatophyte medications [10].

Conclusion

Nail abnormalities are a common incidental finding in the course of a hand surgeon's daily practice. These abnormalities may be clues to systemic, dermatologic, traumatic, and infectious processes that would benefit from further evaluation and treatment. A basic knowledge of terminology and appearance of these common abnormalities will allow appropriate reassurance, patient education, and referral.

Conflict of Interest The authors declare that they have no conflicts of interest to disclose.

References

- Burman KD, McKinley-Grant L. Dermatologic aspects of thyroid disease. *Clin Dermatol*. 2006;24(4):247–55.
- Colver GB. Onychotillomania. *Br J Dermatol*. 1987;117(3):397–9.
- Gregoriou S, Argyriou G, Larios G, et al. Nail disorders and systemic disease: what the nails tell us. *J Fam Pract*. 2008;57(8):509–14.
- Holzberg M. Common nail disorders. *Dermatol Clin*. 2006;24(3):349–54.
- Hoy NY, Leung AK, Metelitsa AI, et al. New concepts in median nail dystrophy, onychomycosis, and hand, foot, and mouth disease nail pathology. *ISRN Dermatol*. 2012;2012:680163.
- Jiaravuthisan MM, Sasseville D, Vender RB, et al. Psoriasis of the nail: anatomy, pathology, clinical presentation, and a review of the literature on therapy. *J Am Acad Dermatol*. 2007;57(1):1–27.
- Kaur I, Saraswat A, Kumar B. Nail changes in psoriasis: a study of 167 patients. *Int J Dermatol*. 2001;40(9):601–3.
- Kechijian P. Onycholysis of the fingernails: evaluation and management. *J Am Acad Dermatol*. 1985;12(3):552–60.

- Leonhardt JM, Heymann WR. Thyroid disease and the skin. *Dermatol Clin*. 2002;20(3):473–81. vii.
- Mahoney JM, Bennet J, Olsen B. The diagnosis of onychomycosis. *Dermatol Clin*. 2003;21(3):463–7.
- Mallbris L, Larsson P, Bergqvist S, et al. Psoriasis phenotype at disease onset: clinical characterization of 400 adult cases. *J Invest Dermatol*. 2005;124(3):499–504.
- Piraccini BM, Iorizzo M, Starace M, et al. Drug-induced nail diseases. *Dermatol Clin*. 2006;24(3):387–91.
- Piraccini BM, Iorizzo M, Tosti A. Drug-induced nail abnormalities. *Am J Clin Dermatol*. 2003;4(1):31–7.
- Piraccini BM, Tosti A, Iorizzo M, et al. Pustular psoriasis of the nails: treatment and long-term follow-up of 46 patients. *Br J Dermatol*. 2001;144(5):1000–5.
- Reich A, Szepletowski JC. Health-related quality of life in patients with nail disorders. *Am J Clin Dermatol*. 2011;12(5):313–20.
- Richert B, Andre J. Nail disorders in children: diagnosis and management. *Am J Clin Dermatol*. 2011;12(2):101–12.
- Rose EA, Porcerelli JH, Neale AV. Pica: common but commonly missed. *J Am Board Fam Pract*. 2000;13(5):353–8.
- Sanchez-Regana M, Umberto P. Diagnosis and management of nail psoriasis. *Actas Dermosifiliogr*. 2008;99(1):34–43.
- Scher RK. Lichen planus of the nail. *Dermatol Clin*. 1985;3(3):395–9.
- Scher RK, Daniel CR. Nails: diagnosis, therapy, surgery. 3rd ed. Oxford: Elsevier Saunders; 2005.
- Scher RK, Tavakkol A, Sigurgeirsson B, et al. Onychomycosis: diagnosis and definition of cure. *J Am Acad Dermatol*. 2007;56(6):939–44.
- Summerbell RC, Krajden S, Kane J. Potted plants in hospitals as reservoirs of pathogenic fungi. *Mycopathologia*. 1989;106(1):13–22.
- Tosti A, Bardazzi F, Piraccini BM, et al. Idiopathic trachyonychia (twenty-nail dystrophy): a pathological study of 23 patients. *Br J Dermatol*. 1994;131(6):866–72.
- Tosti A, Ghetti E, Piraccini BM, et al. Lichen planus of the nails and fingertips. *Eur J Dermatol*. 1998;8(6):447–8.
- Tosti A, Iorizzo M, Piraccini BM, et al. The nail in systemic diseases. *Dermatol Clin*. 2006;24(3):341–7.
- Tosti A, Peluso AM, Fanti PA, et al. Nail lichen planus: clinical and pathologic study of twenty-four patients. *J Am Acad Dermatol*. 1993;28(5 Pt 1):724–30.
- Tosti A, Piraccini BM. Treatment of common nail disorders. *Dermatol Clin*. 2000;18(2):339–48.
- van de Kerkhof PC, Pasch MC, Scher RK, et al. Brittle nail syndrome: a pathogenesis-based approach with a proposed grading system. *J Am Acad Dermatol*. 2005;53(4):644–51.
- Wallis MS, Bowen WR, Guin JD. Pathogenesis of onychoschizia (lamellar dystrophy). *J Am Acad Dermatol*. 1991;24(1):44–8.
- Zaias N. Psoriasis of the nail. A clinical-pathologic study. *Arch Dermatol*. 1969;99(5):567–79.
- Zaias N. Onychomycosis. *Dermatol Clin*. 1985;3(3):445–60.

Statement of Informed Consent

This manuscript does not contain any identifiable patient information or any other identifying details. As this is a review article, no actual patient data was used. Therefore, no informed consent was obtained. The images used in this review article are the personal property of JCE and the verbal consent was given by the subjects for their use.

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