Dermatology and Skin Conditions for Hand Surgeons

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Learning Objectives

Upon completion of this CME activity, the learner will understand:

- Skin conditions that should be optimized before surgical intervention.
- Dermatologic conditions that mimic surgical pathology.
- Dermatologic pathology that should be referred promptly for further evaluation and treatment.

Deadline: Each examination purchased in 2022 must be completed by January 31, 2023, to be eligible for CME. A certificate will be issued upon completion of the activity. Estimated time to complete each JHS CME activity is up to one hour.

The hand surgeon must be familiar with all aspects of hand pathology, and while faced with dermatological pathology in daily practice, a comprehensive understanding of skin pathology is often lacking. Dermatological pathology may have an impact on the hand surgeon in multiple ways—before surgery (requiring optimization), after surgery, or by mimicking

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surgical pathology (whereby surgical management may be contraindicated). Adequate knowledge of the basics of dermatology allows for optimal patient care. This review article highlights the common (and the not so common) skin conditions that hand surgeons may encounter in their practice. *(J Hand Surg Am. 2022;47(6):562−572. Copyright © 2022 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Dermatology, nail, skin, skin condition, skin lesion.

DERMATOLOGICAL CONDITIONS AFFECT the hand, and the hand surgeon must be aware of common and clinically notable pathologies. Some dermatological conditions may need to be optimized before surgery to minimize the risk of infection. Other conditions may mimic surgical pathology and require an index of suspicion to allow appropriate medical treatment because surgical intervention may worsen the condition. We attempt to highlight some of the common and serious dermatological conditions that hand surgeons should be familiar with. Many conditions mentioned in this article require a timely dermatological referral and review, and the treating hand surgeon must be aware of these conditions.

DERMATOLOGICAL CONDITIONS THAT MAY NEED OPTIMIZATION BEFORE SURGERY

When assessing patients requiring hand surgery, coexistent hand dermatoses may be encountered. A thorough clinical history and physical examination of the skin can prevent the development of perioperative complications. The nature and severity of the skin pathology and the urgency of surgery will dictate the need for preoperative therapy to optimize patient safety and surgical outcomes. Although little evidence exists regarding the exact risk of hand surgery in patients with skin lesions, the following is a summary of the available literature.

Skin infections

Ideally, all bacterial, viral, fungal, and mycobacterial infections should be treated before surgery. Most represent absolute contraindications to elective hand surgery because of the risk of regional or systemic invasion. However, the need to treat chronic superficial infections, which are often overlooked, may be the subject of controversy.

Recurrent herpetic whitlow: In the presence of active lesions, surgery is contraindicated because of the risk of systemic infection and meningoencephalitis.[1] However, there are no guidelines regarding delaying hand surgery after an acute episode or the need for herpes simplex virus (HSV) prophylaxis in patients with a previous history of herpetic whitlow.

Patients with a history of herpetic keratitis are advised to wait 1 year from their most recent episode to undergo ocular refractive surgery.[2] Prophylaxis in these patients is not standardized, but acyclovir 400 mg twice daily or valacyclovir 500 mg once daily for 2 weeks before and after surgery have been proposed.[2] Similarly, in the context of facial dermatological procedures, antiviral prophylaxis has been recommended in patients with more than 3 spontaneous HSV outbreaks in the treatment area in the last year, patients with a history of HSV outbreak triggered using a procedure, patients undergoing lip augmentation or facial resurfacing with a previous HSV eruption at any time, and in immunosuppressed patients.

Thus, we suggest the consideration of HSV prophylaxis in patients with a history of herpetic whitlow if previous lesions have affected the planned operative site, if the patient has experienced several outbreaks in the preceding 12 months, or if the patient is immunocompromised (Fig. 1).

Cutaneous viral warts: These result from human papillomavirus infection of basal epithelial cells. Human papillomavirus can only complete its life cycle in fully differentiated squamous epithelia; thus, systemic dissemination during surgery is not a concern.[3] However, surgery increases the risk of autoinoculation and disease spread. Additionally, the use of electrocautery in the proximity of a wart increases the risk of airborne transmission of human papillomavirus particles to the oral and respiratory mucosa. Therefore, patients and staff should be provided with adequate protective equipment. The decision to treat cutaneous viral warts on the hands before surgery balances the above factors, the lengthy duration required to treat, and the risks and benefits of postponing the proposed surgery. If treatment is deemed

FIGURE 1: Herpetic whitlow (on a great toe).

necessary, numerous therapeutic modalities are available.

Goldman-Fox or green nail syndrome: This is a superficial and localized infection caused by the opportunistic Gram-negative bacterium *Pseudomonas aeruginosa*. It is typically seen in patients with pre-existing nail diseases, such as onychotillomania, psoriasis, onychomycosis, and chronic paronychia in conjunction with wet water work.[4] It manifests with green discoloration of the nail plate, often with proximal paronychia and distal onycholysis.[4] Contiguous infection of the surgical site and postoperative infection of the surgical wound because of manipulation with an involved fingernail have been reported.[5] Thus, preoperative treatment is strongly recommended. The most commonly used treatment options include antiseptic soaks (1% acetic acid or 2% sodium hypochlorite [eg, household chlorine bleach diluted 1:4 in water]); topical aminoglycosides (0.3% gentamicin solution) daily for 3 months; or oral quinolones (ciprofloxacin 500 mg) daily for 2−3 weeks.[4] Additionally, patients should be advised to keep their nails dry, with the treatment of any underlying nail disorder also considered. Removing the affected nail plate has also been described (Fig. 2).[4,6]

Pitted keratolysis: Pitted keratolysis is a chronic bacterial infection, confined to the stratum corneum, caused by various species—*Corynebacterium, Actinomyces, Dermatophilus* and *Kytococcus sedentarius.*[7] It usually involves the soles but can affect the palms, particularly under orthoses, plasters, bangles, or wristbands.[7] Predisposing factors include hyperhidrosis, occlusive clothing, and prolonged immersion in wet environments.[7] It manifests as punctate erosions, often with

FIGURE 2: Green nail syndrome. Image adapted from Müller et al.[6]

associated malodor.[7] Although rare, some of the causative agents of pitted keratolysis have resulted in bacteremia and systemic disease. Thus, preoperative treatment is recommended. Topical treatment options, used between 2 weeks and 2 months before surgery, include daily use of antiseptics (4% chlorhexidine) and twice daily use of topical antibiotics (4% erythromycin or 2% fusidic acid).[8,7] Oral antibiotics, such as azithromycin 500 mg once daily for 3 days, have also been used.[7] Preventive measures, such as keeping the hands and feet dry, need to be encouraged to avoid recurrence. The treatment of any underlying hyperhidrosis should be considered and can often result in the resolution of pitted keratolysis (Fig. 3).

Dermatophytes: Dermatophytes (most commonly of the trichophyton genus) usually cause superficial infections involving fully keratinized tissues (stratum corneum, hair, and nails). However, on rare occasions, they can invade the dermis, subcutaneous tissue, and even internal organs, such as lymph nodes, bones, and brain.[9] The predisposing factors for invasive dermatophytosis include long-standing superficial dermatophytosis, solid organ transplantation, the use of topical immunosuppressant, specific gene mutations, diabetes, and trauma.[9] Thus, surgery represents a risk. In addition, superficial dermatophytosis, particularly tinea interdigitale and onychomycosis, increases the risk of secondary

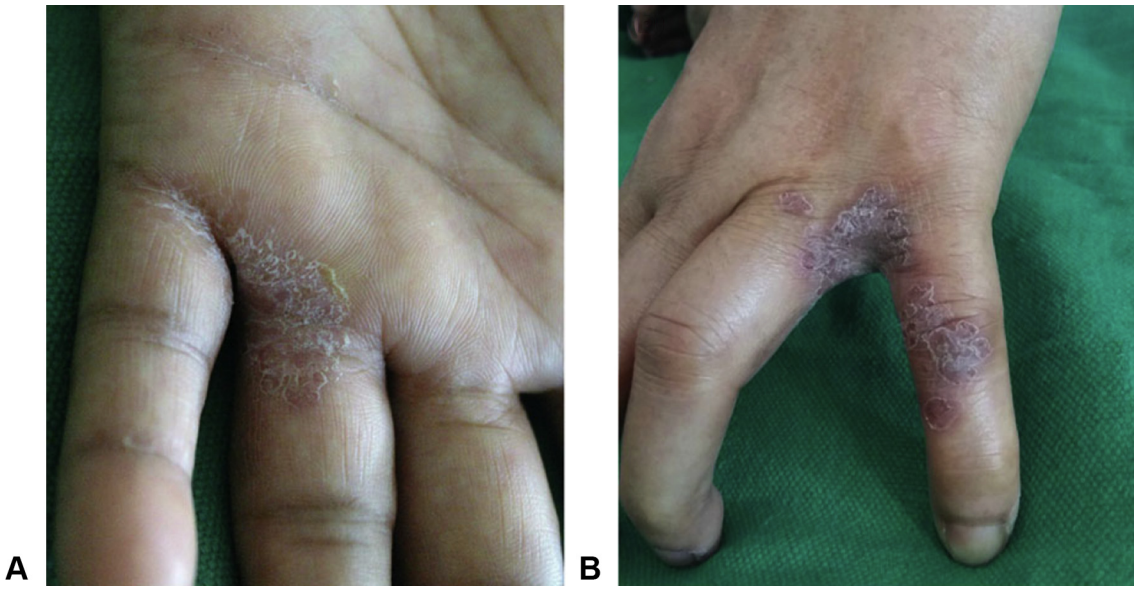

FIGURE 3: A, B Pitted keratolysis. Image adapted from Makhecha et al.[7]

bacterial infection. Ideally, dermatophytosis, which involves the operative area, should be treated before surgery. Topical antifungals can be used to treat tinea manuun (terbinafine 1% twice daily for up to 2 weeks). Fingernail onychomycosis usually requires oral treatment with terbinafine (250 mg daily for 6 weeks) or a systemic azole (eg, itraconazole 200 mg daily for 12 weeks) (Figs. 4, 5).

Inflammatory dermatosis

Koebner phenomenon: The Koebner phenomenon refers to the extension of a cutaneous disease along the areas of trauma, in previously uninvolved skin. It can occur during active or unstable phases of many skin conditions, including psoriasis, lichen planus, and vitiligo.[10] Therefore, patients should be informed about the risk of developing new lesions of the pre-existing dermatosis within the surgical scar, which usually occurs after 10−20 days (Fig. 6).[10]

Psoriasis: Hand surgeons may be reluctant to undertake surgery in patients with active psoriasis, with concern regarding surgical site infection and poor wound healing.[11] Unfortunately, the relevant literature is scarce and of poor quality, providing low-strength evidence and conflicting results.[12] For example, 2 retrospective studies with small cohorts assessing knee and hip arthroplasty in patients with psoriasis showed an increased risk of postoperative complications, including skin necrosis, hematoma, psoriasis exacerbation, and infection.[13,14] Conversely, when assessing similar cohorts, others have reported no increased risk of infection or impairment in wound healing.[12]

Although a recent review of 25,954 patients showed no difference between infection rates in upper and lower limb orthopedic procedures, the implications of a prosthetic joint infection may explain the reluctance of lower limb surgeons in undertaking elective surgery in the presence of psoriatic lesions.[15]

It is worth noting that a relative increase in the load of *Streptococcus* and *Staphylococcus* in psoriatic skin has been described.[16] Conversely, an excessive production of antimicrobial peptides in the lesional skin may protect from wound infections. Similarly, when considering wound healing in patients with psoriasis, the upregulation of inflammatory cytokines (ie, transforming growth factor β, tumor necrosis factor α, interleukin 10, and interferon γ) and the proinflammatory effects of antimicrobial peptides are suspected to augment tissue repair and remodeling, resulting in accelerated wound healing.[17]

The systemic medications for the treatment of psoriasis (infliximab, adalimumab, etanercept, methotrexate, and cyclosporine) appear safe in low-risk operations. For moderate and high-risk surgeries, the decision to continue treatment should be individualized (Figs. 7, 8).

Dermatitis: The pathogenesis of atopic dermatitis includes dysfunction of the epidermal barrier, immune dysregulation, and an altered cutaneous microbiome with a high prevalence of *Staphylococcus aureus* colonization, increasing the incidence of secondary skin infections.[18] Contact dermatitis, either irritant or

FIGURE 4: Dermatophyte. Image courtesy of Dr Deshan Sebaratnam, The Skin Hospital Westmead, New South Wales, Australia.

FIGURE 5: Dermatophyte. Image courtesy of Dr Deshan Sebaratnam, The Skin Hospital Westmead, New South Wales, Australia.

FIGURE 6: Koebner phenomenon. Image courtesy of Dr Deshan Sebaratnam, The Skin Hospital Westmead, New South Wales, Australia.

allergic, involves a similar disruption of the epidermal barrier and predisposes to skin infections. Thus, preoperative treatment of all hand dermatitis is strongly recommended. Potent or superpotent topical steroids represent the first-line treatment (eg, betamethasone dipropionate 0.05%) once to twice daily for up to 2 weeks or until clinical resolution. The addition of topical or oral antibiotics deserve consideration in clinically infected skin or with microbiological confirmation of pathogen growth. General measures, including the avoidance of irritants or allergens and the application of a bland emollient, should be actively encouraged.

In addition, atopic dermatitis is considered a risk factor for developing keloid scars.[19] Patients need to be appropriately informed and prevention measures considered (Fig. 9).

DERMATOLOGICAL CONDITIONS THAT MIMIC SURGICAL PATHOLOGY

As hand surgeons, we must remember the words of Abraham Maslow, who stated that "to a man with a hammer, everything looks like a nail." Indeed, not all hand pathology necessitates surgical intervention—some would be better treated medically, whereas others will deteriorate further with unnecessary surgery.

FIGURE 7: Psoriasis.

FIGURE 8: Nail psoriasis.

FIGURE 9: Contact dermatitis.

Neutrophilic dermatoses

Neutrophilic dermatoses are a spectrum of skin diseases that are unified by an inflammatory infiltrate consisting of polymorphonuclear leukocytes and may be somewhat differentiated by the location of this infiltrate.[20,21] The continuum includes acute febrile neutrophilic dermatosis (also known as Sweet's syndrome), subcorneal pustular dermatosis, neutrophilic eccrine hidadrenitis, erythema elevatum diutinum, Behcet disease, and pyoderma gangrenosum (Figs. 10–13).[20]

Neutrophilic dermatosis of the hand is a variant of acute febrile neutrophilic dermatosis and often poses a diagnostic conundrum for the treating clinician. Therefore, a high index of suspicion is required. It typically presents with violaceous papules, nodules, and plaques on the dorsum of the hands (although the volar aspect can more rarely be involved) and may be associated with epidermal changes such as necrosis or ulceration.[20] A proportion of patients have a preceding history of local trauma, which may indicate pathergy—the process whereby skin injury may precede inflammatory skin disease at that site.[20]

Acute febrile neutrophilic dermatosis is characterized by pyrexia and infiltration of the papillary and upper reticular dermis. It may be associated with upper respiratory or gastrointestinal infections, inflammatory bowel disease, malignancies, or a dermatosis-inducing medication.[21] Hence, patients with a new diagnosis of neutrophilic dermatosis should be reviewed by a dermatologist or physician for full medical workup. The implicated drugs include trimethoprim-sulfamethoxazole, minocycline, and granulocyte colony-stimulating factors. In comparison, pyoderma gangrenosum typically presents with painful, enlarging purulent ulcers with advancing zones of erythema and is frequently associated with rheumatoid arthritis and inflammatory bowel disease.[21] Histologically, early pyoderma gangrenosum reveals a dermal perivascular lymphocytic infiltrate with endothelial cell swelling; later, a dense polymorphonuclear leukocyte infiltrate and thrombosis of vessels with extravasated erythrocytes may be seen.

FIGURE 10: Neutrophilic dermatosis.

FIGURE 11: Neutrophilic dermatosis.

FIGURE 12: Neutrophilic dermatosis.

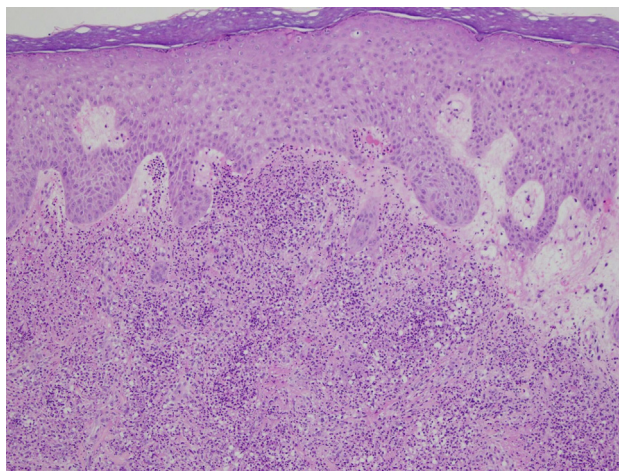

FIGURE 13: Histology of neutrophilic dermatosis (hematoxylin and eosin stain; 20× magnification).

The clinical presentation and systemic features of pyrexia, neutrophilic leucocytosis, and raised inflammatory markers often result in these lesions being incorrectly identified as infectious in origin and may lead to a delay in diagnosis and appropriate management. However, a lack of response to antibiotic therapy should raise the prospect of neutrophilic dermatosis of the hand, and early dermatology consultation and skin biopsy may be useful.[20] Often, a peculiar history is noted of a possible spider or insect bite (without definite confirmation of a bite), an unusual appearing "infection" without a history of local trauma, or a history of similar lesions.

Systemic corticosteroids are the mainstay of treatment for all forms of neutrophilic dermatoses and typically result in prompt symptomatic resolution.[20,21] We recommend 37.5-mg oral prednisone for 3 days, decreasing over the subsequent 3 days, and urgent dermatological referral. Tumor necrosis factor α antagonists and calcineurin inhibitors have been used in the treatment of pyoderma gangrenosum with varying efficacy. It is worth highlighting that surgical debridement of neutrophilic dermatoses exacerbates the condition, and debridement and particularly repeated debridement is contraindicated.

FIGURE 14: Pyogenic granuloma.

FIGURE 15: Pyogenic granuloma.

FIGURE 16: Palmoplantar pustulosis.

If in doubt, a surgical full-thickness biopsy at the junction of normal and abnormal tissue is recommended (either surgically or via punch biopsy) and should be sent for culture (including atypical, mycobacterial, and fungal growths), and the histopathology should be analyzed by a dermatopathologist. The surgeon should avoid being overly aggressive with the biopsy, as not to exacerbate the lesion if it is later confirmed to be neutrophilic dermatosis.

Commencing steroids (with prophylactic antibiotic coverage if appropriate) often results in a rapid improvement in neutrophilic dermatosis lesions and will confirm the clinical suspicion with the rapid improvement. The take-home message is that for any lesion that has a suspicious history or appearance, the diagnosis of neutrophilic dermatoses should be considered, as it will respond poorly to surgical debridement, and medical and/or dermatological review is needed following the histological diagnosis as there is a risk of later malignancies.

Pyogenic granulomas

Pyogenic granulomas are reactive proliferation of blood vessels that often present as a raised raspberry-like papules or nodules. Pyogenic granulomas are benign but can cause pain and considerable bleeding. Although the etiology is unknown, pyogenic granulomas may be associated with trauma, hormonal influences (such as oral contraceptive pills), certain drugs, and pregnancy. Pyogenic granulomas may spontaneously resolve, particularly in pregnancy or when an offending drug is discontinued, and in these situations, observation alone may be the most appropriate treatment.

FIGURE 17: Orf. Image courtesy of Associate Professor Samuel Zagarella, The University of Sydney, New South Wales, Australia.

A number of nonsurgical treatments are availble for the treatment pyogenic granulomas, including pulsed dye laser. Medical management with topical or intralesional medications (eg, corticosteroids, imiquimod, bleomycin, or propranolol) have been described, with encouraging outcomes reported. The topical application of silver nitrate following blunt resection in the office setting has also been described.

Complete excision is preferred (when feasible) because it allows for histological confirmation and results in a lower recurrence rate; nevertheless, curettage followed by electrocautery may also be used; however, this does result in a higher recurrence rate (Figs. 14, 15).

Palmoplantar pustulosis

Palmoplantar pustulosis is a rare chronic condition affecting the palms of the hand and soles of the feet. The exact etiology of palmoplantar pustulosis is unknown, but it is believed to be autoimmune. Palmoplantar pustulosis is related to psoriasis and presents with crops of sterile pustules on the palms and soles. Patients may have a predisposition for autoimmune diseases, and palmoplantar pustulosis may be provoked by tumor necrosis factor α inhibitor medications. Treatment involves optimizing the patient's physiology by encouraging smoking cessation and managing associated tonsilitis and celiac disease. Medical management includes topical emollients, steroids, coal tar, acitretin, and phototherapy (Fig. 16).

Atypical infections may also mimic surgical pathology. Sporotrichosis is caused by *Sporothrix schenckii* and is often related to agricultural activities and gardening. Found throughout the world, sporotrichosis usually presents with an infected lesion, followed by lymphocutaneous spread. Occasionally a nonhealing ulcer may be because of sporotrichosis, and deep infections of bone and joint, as well as tendon ruptures, have been described.[22] Itraconazole is the first-line therapeutic agent, and deeper infections require surgical debridement. It is worth noting that other organisms, including some atypical

FIGURE 18: Malignant melanoma.

FIGURE 19: Squamous cell carcinoma.

FIGURE 20: Squamous cell carcinoma Koebner phenomenon. Image courtesy of Dr Deshan Sebaratnam, The Skin Hospital Westmead, New South Wales, Australia.

mycobacteria, can present with a sporotrichoid pattern. The classic surgical management for chronic paronychia involves nail plate removal; however, the dermatological approach involves addressing strict hand hygiene, topical diprosone ointment, and maintenance of digital dryness to counter the underlying chronic irritational dermatitis affecting the nail folds.

Orf

Orf is a zoonotic infection caused by parapoxvirus and is common in sheep, with potential transmission to humans. It is commonly seen in veterinarians, sheep shearers, and butchers who are often aware of its self-limiting nature and do not seek treatment. Orf routinely starts as a single erythematous papule and progresses to a red center with a surrounding white halo. The lesion then discharges, dries, and resolves, with the entire process lasting 1−2 months. Treatment consists of ensuring the lesion is clean to avoid a secondary bacterial infection (Fig. 17).[22]

It is beyond the scope of this article to highlight all benign and malignant skin cancers that affect the hands. Needless to say, common skin cancers, including squamous cell carcinoma, basal cell carcinoma, and melanoma, can all affect the hand, and it is crucial for hand surgeons to be aware of the possibility and biopsy or refer when concerned (Figs. 18−21).

Of the presentations that affect the hands, melanoma and melanonychia are worth highlighting.

Melanonychia is a brownish-black discoloration of the nail plate and can be either transverse or longitudinal. Constitutional melanonychia may be noted in some racial groups without any pathology; however, a pigmented nevus or malignant melanoma can cause longitudinal melanonychia. The signs of malignant longitudinal melanonychia include a width of greater

FIGURE 21: Basal cell carcinoma. Image courtesy of Dr Anna Loch-Wilkinson, Gold Coast University Hospital, Queensland, Australia.

than 3 mm and a greater width at the base of the nail than distally.[23] A biopsy should be sought if there is any doubt. Other causes of longitudinal melanonychia include medications, poor nutrition, thyroid disease, and hemochromatosis. Transverse melanonychia is rare and classically iatrogenic, resulting from some medications or radiation. Subungual melanoma arises from the nail bed and is the prevalent form of melanoma in darker-skinned individuals. The thumb is the most frequently affected digit.

Acral lentiginous is the rarest overall melanoma; however, it is the most common in the subungual region.[23] Distal melanomas tend to have a better prognosis.[23] Subungual melanomas may present with nail discoloration (classically longitudinal melanonychia), a nonhealing wound, mass, bleeding, or nail deformity. Confusingly, melanoma can present without the classic dark pigmentation—an amelanotic melanoma. Hutchinson's sign describes the pigmentation of the tissue around the nail, and when accompanied by nail-lifting, is a sign of melanoma.[23] Multiple factors contribute to a delay in the diagnosis of subungual melanoma, resulting in a lower 5-year survival than other melanomas (68.5% to 90.9%).[23] Thus, hand surgeons must possess a high index of

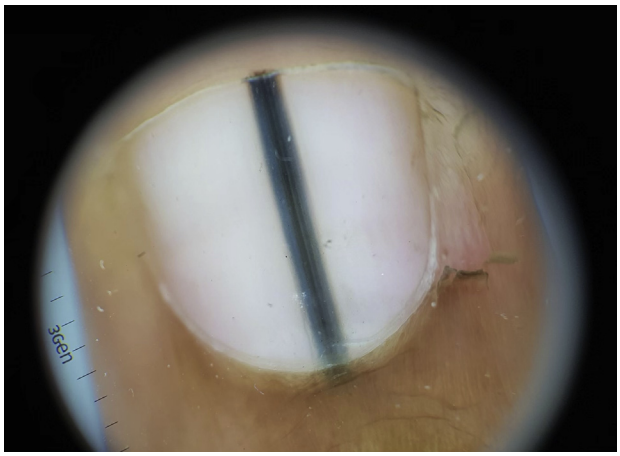

FIGURE 22: Longitudinal melanonychia.

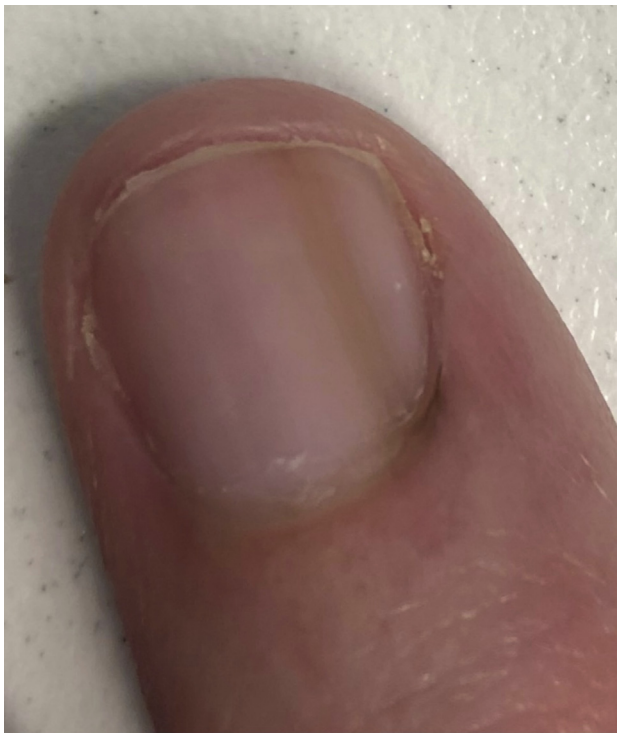

FIGURE 23: Longitudinal melanonychia.

suspicion and biopsy or refer for dermatological opinion when concerned (Figs. 22, 23).

In conclusion, dermatological conditions affecting the hand may need to be optimized before surgery; they can also occur after hand surgery or can mimic other surgical pathology. Therefore, it is important for the treating hand surgeon to be aware of these entities, have an elementary understanding of their diagnosis and management, and know when a prompt dermatological referral and consultation is required.

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