

# Diagnosis of nail disorders: a literature review

## Diagnóstico de afecções ungueais: uma revisão de literatura

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### Abstract

The nail apparatus performs essential functions, such as protection and assistance in fine touch, making its integrity crucial for daily activities. The loss of its functionality can hinder routine tasks, directly impacting the quality of life. However, diagnosing nail disorders presents significant challenges due to the complexity of conditions affecting the nails and the overlap of features among different diseases. Diagnostic difficulty is further aggravated by professionals' lack of familiarity with techniques, such as dermoscopy, microscopy, microbial culture, and nail biopsy. In this study, we conducted a narrative literature review of articles indexed in PubMed from 2000 to 2024 that address the diagnosis of nail diseases. Selected studies were appraised according to methodological rigor and practical applicability, with an emphasis on the clinical relevance of their findings. Our review provides dermatologists and general practitioners with critical clinical insights that enhance understanding and management of patients with nail disorders.

**Keywords:** Nail disorders. Differential diagnosis. Nail dermoscopy. Nail biopsy.

### Resumo

O aparelho ungueal exerce funções essenciais, como proteção e auxílio no tato fino, sendo sua integridade fundamental para as atividades cotidianas. A perda de sua funcionalidade pode comprometer tarefas diárias, impactando diretamente a qualidade de vida. No entanto, o diagnóstico das afecções ungueais é um desafio devido à complexidade das condições que envolvem as unhas e à sobreposição de características entre as doenças. A dificuldade diagnóstica é agravada pela limitada familiaridade dos profissionais com técnicas como dermatoscopia, microscopia, estudos microbiológicos e biópsia ungueal. A metodologia do estudo envolveu uma revisão narrativa da literatura, com artigos publicados na plataforma PubMed entre 2000 e 2024, que abordam o diagnóstico de doenças ungueais e a análise dos artigos seguiu critérios de rigor metodológico e aplicabilidade prática, com foco na relevância clínica dos achados. Diante disso, essa revisão oferece insights clínicos importantes para a prática clínica de dermatologistas e médicos generalistas, auxiliando na melhor compreensão dos pacientes com patologias ungueais.

**Palavras-chave:** Afecções ungueais. Diagnóstico diferencial. Dermatoscopia ungueal. Biópsia ungueal.

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## Introduction

The nail apparatus performs essential functions for the organism, such as mechanical protection, assistance in fine tactile discrimination, object grasping, and contribute to the esthetics. Loss of nail integrity compromises various daily activities, directly affecting quality of life<sup>1</sup>.

Diagnostic gaps in nail disorders in clinical practice are particularly attributable to insufficient familiarity with diagnostic methods, such as dermoscopy, dermatopathology of the nail, microbiological cultures, and, especially, nail biopsy. In dermoscopy, for example, nail signs are magnified and, together with physical examination, may enable diagnosis<sup>2</sup>. Proper use of this tool –as well as the others– requires thorough knowledge of nail anatomy, since the presentation of pathologic changes depends the affected area of the nail apparatus.

Among the nail diseases encountered in office practice, 50% are fungal, while the other 50% include neoplastic, inflammatory, traumatic, and systemic-related conditions<sup>3</sup>. The fungal nail disease, termed onychomycosis, employs direct microscopic examination (DME) as its primary diagnostic test, due to its low cost and the provision of immediate information that can be crucial for determining appropriate patient therapy<sup>4</sup>.

Nail neoplasms include both malignant and benign tumors, which are often mistaken for onychomycosis or benign nail pigmentation<sup>5</sup>. Nail biopsy is critically important in this context, being at times both diagnostic and therapeutic. Its performance depends on understanding the surgical anatomy of the nail unit, proper anesthesia and hemostasis, and targeting an abnormality for which histopathology can yield a definitive diagnosis.

Indications and techniques for nail biopsy vary according to the site and type of pathology. Nail bed biopsies can be performed easily with minimal scarring and are most commonly used to diagnose tumors, infectious and inflammatory nail disorders<sup>6</sup>. The principal indication for nail biopsy is to establish or exclude the diagnosis of melanoma<sup>6</sup>.

Diagnosing nail conditions can sometimes be a challenging task, not only because of the large number of cutaneous and systemic diseases involving the nails, but also due to their shared clinical features. Therefore, understanding the peculiarities of each pathology, as well as the anatomy and physiology of the nail apparatus, is essential for a more correct diagnosis and for delivering more targeted and effective treatment.

## Anatomy and physiology of the nail

The nail unit is one of the principal skin appendages, functioning as a mechanical and sensory protective organ<sup>7</sup>. Nail anatomy comprises five components: the nail plate, commonly known as the nail; the matrix, which produces the nail plate and lies beneath the proximal nail fold, and can be visible on the thumbs and great toes through the nail plate as the lunula, the proximal, distal, and lateral nail folds; and the nail bed, which supports the nail plate. Beneath the nail bed lie connective tissue and the phalanx with its ligaments that attach the nail to the underlying joint structures<sup>8</sup>.

The nail plate is a modified form of the stratum corneum and is curved along both the longitudinal and transverse axes. This curvature allows anchorage into the proximal and lateral nail folds, ensuring stability. The nail folds assist in securing the plate to the nail bed; when diminished, there is a tendency for onycholysis (nail detachment), and when thickened, pathological ingrowth may occur<sup>9</sup>. The proximal nail fold, together with the cuticle and the plate, protects the matrix from radiation and chemical irritants that could impair its function<sup>10</sup>.

Maturation and differentiation of matrix keratinocytes proceed along a distally oriented, oblique axis. Thus, keratinization of distal matrix cells forms the ventral aspect of the nail plate, while keratinization of proximal matrix cells forms the dorsal aspect<sup>11</sup>. Nail plate abnormalities generally result from pathologies affecting the matrix or from space-occupying lesions beneath the nail fold<sup>11</sup>.

Fingernail growth takes approximately 6 months to completely replace the nail plate, whereas toenail growth takes about 12 months<sup>12</sup>. Nail growth rate decreases with age and may be partially or fully halted by systemic diseases, trauma, or certain medications<sup>12</sup>.

The objective of this study is to describe the main nail pathologies in terms of their clinical and etiological characteristics, as well as to establish objective criteria and the main diagnostic tools for recognizing these most prevalent nail conditions.

## Methods

This study is a structured narrative literature review, guided by the principles of Preferred Reporting Items for Systematic Reviews and Meta-Analyses rather than by the full protocol of a systematic review, which employed the terms “nail diseases,” “nail disorders,” “diagnosis,” “nail neoplasm,” “melanonychia,” “pigmentation

disorders,” “nail surgery” and “histopathology” in combination with the Boolean operators “and” and “or.” Priority was given to articles addressing the diagnosis of nail conditions, including original articles, literature reviews, meta-analyses, guidelines and consensus statements, and case reports focusing on nail diseases diagnosed by clinical, dermoscopic or histopathological methods. Inclusion criteria comprised articles published in the PubMed database between 2000 and 2024, in portuguese, spanish or english, and relevant to the research objectives. Exclusion criteria included studies without an available abstract, published outside the specified period, or not focused on the diagnosis of nail diseases.

## Results

A total of 9526 articles were retrieved from PubMed for analysis. Of these, 3253 articles were excluded due to platform filtering based on language and publication period, and 6263 articles were excluded for not meeting the inclusion criteria or for not being related to the research objective (Fig. 1).

After exclusions, the remaining articles consisted of one prospective study and nine review articles, which were thoroughly analyzed for this research. In this regard, the article analyses adhered to criteria of methodological consistency, scientific evidence, and practical applicability, and were categorized by the type of nail condition addressed (inflammatory, neoplastic, infectious, traumatic), the diagnostic method utilized, and the clinical relevance of the findings (Table 1).

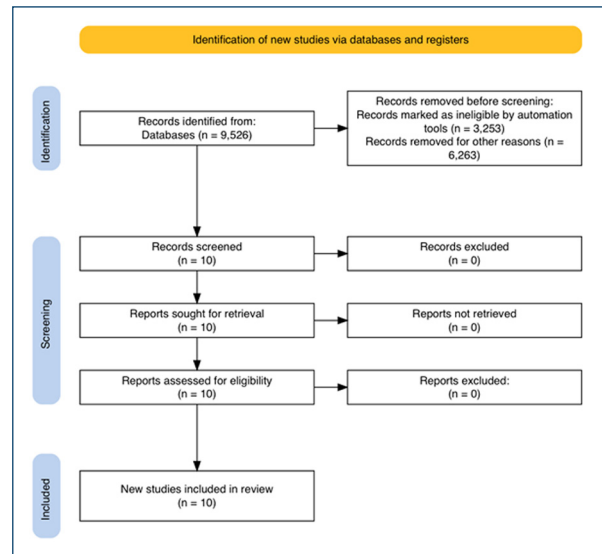
The selection of nail diseases was based on the clinical significance of the results and the volume of information available in each included article; two nail conditions were discussed within each category (Table 2).

## Discussion

### Inflammatory nail disorders

#### NAIL PSORIASIS

The diagnosis of nail psoriasis can be based solely on cutaneous and/or osteoarticular signs and symptoms if a confirmed diagnosis of psoriasis vulgaris exists<sup>13</sup>. In the absence of these signs, diagnosis can be complex and must rely on complementary examinations. Hyperkeratosis, onychorrhexis, nail plate discoloration, and nail plate thickening generally resemble onychomycosis, which occurs in up to 60% of patients<sup>13</sup>.



**Figure 1.** Flow diagram of the literature review according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Nail unit involvement is characterized by pitting, rough and brittle nail plates, and pronounced transverse (Beau’s) lines<sup>14-16</sup>. Signs of nail bed involvement include distal onycholysis with a proximal yellow-orange margin and serrated border, splinter hemorrhages, oil-drop (salmon) patch, subungual hyperkeratosis, and red or black hemorrhagic spots<sup>14-16</sup>.

Nail pitting, distal onycholysis (separation of the nail plate from the underlying nail bed), oil-drop (salmon) patches, and splinter hemorrhages are key dermatoscopic features of nail psoriasis<sup>16,17</sup>. The formation of depressions, the characteristic nail pitting, is the most frequent finding and typically appears irregular on dermatoscopy, representing an indicative signal of nail psoriasis involvement (Fig. 2). This feature arises from parakeratosis of the nail matrix, leading to extrusion of parakeratotic cells as they emerge from beneath the proximal nail folds, thereby creating indentations on the nail surface<sup>14-16</sup>.

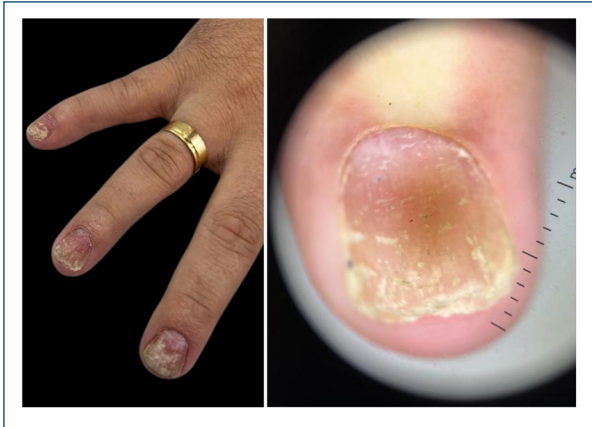
The biopsy technique ideally indicated for the diagnosis of nail psoriasis is a punch biopsy without prior nail plate avulsion, as it preserves the morphology of the superficial tissue. However, it is difficult to introduce the punch through the nail plate while maintaining adhesion of the plate to the nail bed/matrix during instrument rotation without shear<sup>18</sup>. To reduce technical difficulty, the digit is soaked in warm water for a few minutes or the nail plate may be thinned by gentle abrasion<sup>19</sup>. Delay in performing the procedure and in specimen

**Table 1.** Articles selected for review

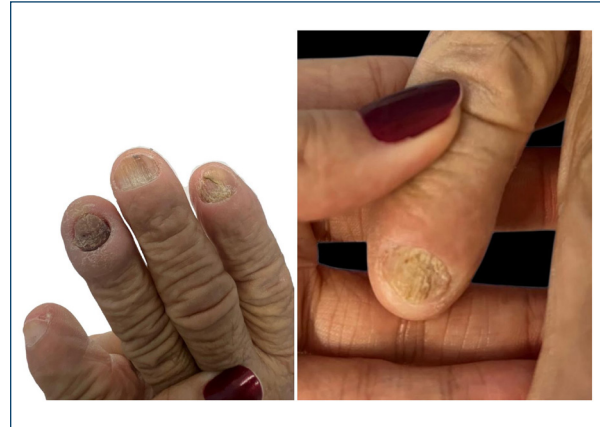
Title of article	Authors/year	Content	Category
“Optimal diagnosis and management of common nail disorders”	Lee and Lipner, 2022	Etiology, clinical presentation, diagnosis, and treatment of infectious and inflammatory nail diseases	Infectious, traumatic, and inflammatory
“Dermoscopy in the Evaluation of Nail Disorders”	Starace et al. 2021	Clinical presentation, diagnosis, and dermoscopy of nail lesions	Infectious, neoplastic, and traumatic
“Role of tangential biopsy in the diagnosis of nail psoriasis”	Bertanha et al. 2024	Clinical presentation and biopsy-based diagnosis of inflammatory nail diseases, such as nail psoriasis	Inflammatory
“Nail neoplasms”	Park et al. 2017	Clinical presentation, diagnosis, and histopathology of benign and malignant nail neoplasms	Neoplastic
“Nail Biopsy: A User’s Manual”	Grover and Bansal, 2018	Techniques and types of nail biopsy for the diagnosis of nail diseases	Infectious and neoplastic
“Diagnosis and Management of Malignant Epithelial Nail Unit Tumors”	Iorizzo et al. 2024	Clinical presentation, diagnosis, dermoscopy, treatment, and prognosis of malignant epithelial tumors of the nail	Neoplastic
“Differential diagnosis of pigmented nail lesions”	Bertanha et al. 2024	Clinical presentation, dermoscopy, and diagnosis of pigmented nail disorders.	Infectious, neoplastic, and traumatic
“Histopathology of the nail unit”	Fernandez-Flores et al. 2014	Clinical presentation, histopathology, and diagnosis of nail unit diseases	Infectious, neoplastic, and inflammatory
“Nail surgery: General principles, fundamental techniques, and practical applications”	Queirós et al. 2022	Techniques and types of nail surgery for the treatment of nail lesions	Infectious, neoplastic, and traumatic
“Diagnosis of Melanonychia”	Starace et al. 2021	Clinical presentation, dermoscopy, histopathology, and diagnosis of pigmented nail disorders	Infectious and neoplastic

**Table 2.** Diagnostic tools to assist in each nail condition

Condition	Dermoscopy	Microscopy	Fungal culture	Nail biopsy
Nail psoriasis	X	-	-	X
Nail lichen planus	X	-	-	X
Onychomycosis	X	X	X	-
Paronychia	-	-	-	-
Glomus tumor	X	-	-	X
Onychopapilloma	X	-	-	X
Subungual melanoma	X	-	-	X
Squamous cell carcinoma	X	-	-	X
Onychocryptosis	-	-	-	-
Subungual hematoma	X	-	-	-



**Figure 2.** Clinical and dermoscopic image of nail psoriasis.



**Figure 3.** Nail lichen planus.

fixation can damage elements of the nail bed/matrix and compromise diagnostic accuracy<sup>20</sup>.

In this regard, tangential excisional biopsy has gained prominence in the diagnosis of inflammatory nail diseases. In the tangential technique, the nail plate is carefully removed with a scalpel blade, preserving epithelial integrity and enabling artifact-free histopathological processing<sup>18</sup>. When bed and matrix alterations are present, a nail bed specimen is always preferable, both for technical ease and for a lower risk of scarring.

In a recent study by Bertanha *et al.* on tangential biopsy in nail psoriasis, good clinic-histopathological correlation was obtained using the following criteria: a mandatory criterion, dilated dermal papillary vessels, and at least three secondary criteria, namely, absence of spongiosis, presence of parakeratosis, psoriasiform epidermal hyperplasia, focal thinning of the granular layer and suprapapillary epidermis, and intra- or sub-corneal neutrophilic exudate<sup>18</sup>.

### **NAIL LICHEN PLANUS (LP)**

Nail involvement occurs in 10% of patients with LP. Early recognition is crucial, as the disease can inflict extensive damage to the nail matrix, resulting in onychia and proximal pterygium<sup>21</sup>. Clinical features of nail LP include brittle, roughened nail plates, a red or mottled lunula, onychorrhexis (vertical ridging of the nail plate), and longitudinal striations<sup>22,23</sup> (Fig. 3).

Onychoscopy may aid in detecting early LP changes<sup>22,23</sup>. Nail-bed involvement is manifested by plate fragmentation, chromonychia (discoloration of the nail plate or subungual tissue), splinter hemorrhages, onycholysis, subungual hyperkeratosis, and longitudinal grooves<sup>22,23</sup>.

Twenty-nail dystrophy, or trachyonychia, is regarded as a variant of nail LP; its uniform appearance and the absence of proximal pterygium distinguish it from classic nail LP<sup>21</sup>. The idiopathic atrophic form presents acutely and typically progresses to diffuse nail destruction within a few months<sup>21</sup>.

The diagnosis of nail LP requires biopsy with clinic-histopathological correlation. Key histopathological features include hyperkeratosis, hypergranulosis, a band-like inflammatory infiltrate, basal cell degeneration, and pigment incontinence<sup>24</sup>. In rare instances, subepidermal blister formation with prominent aggregates of colloid bodies may be observed, corresponding to the uncommon bullous variant of nail LP<sup>24</sup>.

### **Infectious nail disorders**

#### **ONYCHOMYCOSIS**

Onychomycosis is the most prevalent nail disease and can sometimes be confused with a variety of benign and malignant nail conditions<sup>2,25</sup>. This nail disorder represents all fungal infections of the nails and may involve the nail bed, plate, and matrix. It is the most prevalent nail disorder, affecting toenails more frequently than fingernails due to slower growth, reduced blood supply, and prolonged exposure to dark, humid environments<sup>25,26</sup>.

Typical physical examination findings include hyperkeratosis of the nail bed, which often causes varying degrees of nail plate onycholysis<sup>26</sup>. A white or yellow discoloration of the nail plate is common, as well as subungual debris<sup>26</sup>. Trauma is a risk factor for onychomycosis, and violaceous/brown/black nail plate discoloration may also be present<sup>26</sup>. In longstanding or



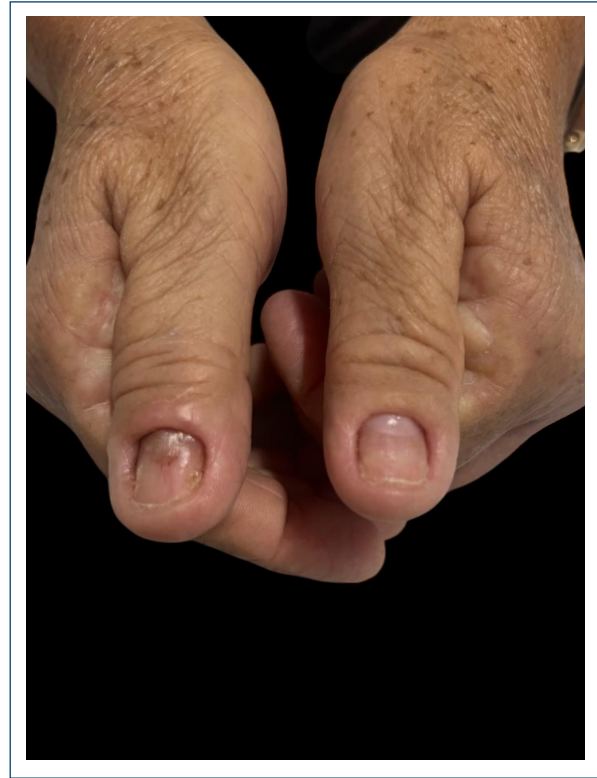
**Figure 4.** Onychomycosis involving finger nails.

severe cases, there may be extensive onychodystrophy with nail plate thickening, crumbling, ridging, onychocryptosis, and partial or complete nail loss<sup>26</sup> (Fig. 4). A dermatophytoma, or fungal abscesses, is a white/yellow or orange/brown longitudinal streak in the nail plate and is quite specific for onychomycosis<sup>26</sup>.

Dermatoscopic features of onychomycosis include the “ruin appearance,” “longitudinal streaks,” and “spikes” at the proximal margin of the onycholytic area<sup>27,28</sup>. The “aurora borealis” sign (defined by the combination of multicolored chromonychia with longitudinal streaks, spikes, and onycholysis) demonstrates the highest sensitivity and specificity for this disorder<sup>27,28</sup>. The irregular, spiked proximal border corresponds to distal-to-proximal invasion of the nail bed’s longitudinal ridges by dermatophytes<sup>27,28</sup>.

Direct microscopy and fungal culture are the gold-standard methods for diagnosing onychomycosis<sup>29</sup>. Microscopic examination is performed after the nail is cleaned with 70% isopropyl alcohol, and then subungual debris samples are obtained, typically 8-10 fragments, to improve diagnostic accuracy. In a positive direct examination and fungal culture, hyphae, pseudohyphae, and spores are identified, confirming infection, although the specific organism is not identified in direct microscopy only in culture examination<sup>25,29</sup>.

Nail biopsy is performed by obtaining a sample from the active site of infection, approximately 4 mm from the free edge<sup>30</sup>. After paraffin embedding, the material is stained with hematoxylin and eosin and special fungal stains, periodic acid-Schiff and methenamine silver, to visualize fungal structures under microscopy<sup>30</sup>. However, as with direct microscopic examination, histopathology should always be complemented by culture.



**Figure 5.** Paronychia involving both thumbs.

## PARONYCHIA

Paronychia is defined as inflammation or infection of the proximal or lateral nail folds<sup>31,32</sup>. Clinically, it presents with an acute onset of discomfort, tenderness, erythema, and edema. The acute form is characterized by disruption of the nail fold’s protective barrier and pathogen invasion<sup>31,32</sup> (Fig. 5). Secondary infections often follow trauma, such as nail-biting or manipulation of ingrown nails, the latter being the most common etiologic factor<sup>31</sup>.

If left untreated, infection may progress to the formation of granulation tissue around the nail fold and abscess development<sup>31</sup>. An untreated abscess in one fold can extend to involve all nail folds and may even spread into adjacent soft tissues of the affected digit<sup>31,32</sup>. *Staphylococcus aureus* is the primary pathogen, although *Streptococcus* spp., *Pseudomonas* spp., other Gram-negative bacteria, and *Candida albicans* can also invade the nail folds<sup>31,32</sup>.

Diagnosis of paronychia is primarily clinical, based on patient history and physical examination, which helps differentiate it from other nail disorders<sup>31-33</sup>. For diagnostic confirmation, the digit-pressure test may be employed: when firm pressure over the affected fold



**Figure 6.** Glomus tumor before and following nail-plate avulsion.

produces an area of blanching larger than expected, an underlying abscess is likely present<sup>31-33</sup>.

Paronychia can be classified as acute or chronic<sup>31,33</sup>. In the acute form, physical examination may reveal a tender, erythematous, and edematous lateral nail fold, and if an abscess is present, a fluctuant area may be palpable<sup>31</sup>. In chronic paronychia, the nail fold may be red and swollen, but fluctuation is uncommon; the nail plate may become thickened and discolored, and proximal nail fold retraction, nail dystrophy, and cuticle loss can occur<sup>31</sup>.

## **Benign neoplastic nail disorders**

### **GLOMUS TUMOR (GT)**

GT is a benign vascular hamartoma originating from glomus cells, specialized smooth muscle cells concentrated around dilated vessels and this tumor present as red, purple, or blue lesions beneath the nail plate, classically characterized by the triad of pain, tenderness, and cold sensitivity<sup>34,35</sup>.

Clinical characteristics of GT typically appear as a small reddish-to-bluish macule under the nail plate or as longitudinal erythronychia with distal notching or fissuring of the nail plate<sup>34</sup> (Fig. 6). The predominant symptom is intense nail pain, which may be throbbing or pinpoint in nature; it can occur spontaneously or be provoked by pressure or cold exposure<sup>5,34,35</sup>.

GT are generally small and rarely palpable, rendering clinical examination inadequate for precise localization<sup>36</sup>. Imaging studies facilitate accurate tumor localization and size assessment, critical factors in selecting the



**Figure 7.** *Onychopapilloma*.

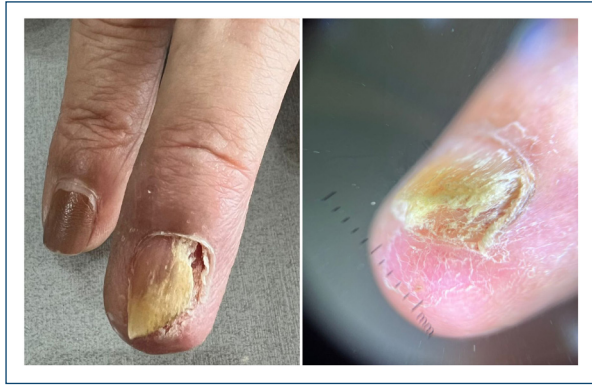
optimal surgical approach<sup>36,37</sup>. Nail-plate dermatoscopy may reveal vascular structures; however, these can sometimes be subtle or absent<sup>36</sup>. Therefore, dermatoscopy of the nail bed and matrix before tumor excision is recommended, as it assists both in tumor localization and in visualizing the lesion's vascular pattern<sup>36</sup>.

Definitive diagnosis is established by performing a nail bed biopsy with nail plate avulsion. Histopathological examination demonstrates a variable admixture of glomus cells, vascular channels, and smooth muscle<sup>38</sup>. GT are subclassified into three types: glomangiomas, marked by an abundance of vascular channels; solid GTs, composed predominantly of glomus cells; and glomangiomyomas, which show a predominance of smooth muscle elements<sup>38</sup>.

### **ONYCHOPAPILLOMA**

Onychopapilloma is a benign neoplasm of the distal matrix and nail bed, typically presenting as a longitudinal band of splinter hemorrhages associated with subungual hyperkeratosis<sup>39</sup> (Fig. 7). The most common dermatoscopic finding is longitudinal erythronychia, although melanonychia and a V-shaped distal nail-plate notch may also be observed<sup>39</sup>.

Histopathological examination features include subungual hyperkeratosis with or without focal hemorrhage; in excisional specimens, there is papillomatosis of the nail bed and acanthosis of the nail matrix with layers of subungual parakeratosis and focal parakeratosis<sup>39</sup>.



**Figure 8.** Clinical and dermatoscopic images of squamous cell carcinoma.



**Figure 9.** Onychocryptosis.

## Malignant neoplastic nail disorders

### SUBUNGUAL MELANOMA (SM)

SM is a distinct subtype of cutaneous malignant melanoma that arises from the nail matrix. It is usually a variant of acral lentiginous melanoma, a form of melanoma originating in the palmoplantar region<sup>40,41</sup>. In two-thirds of cases, SM presents as a longitudinal brown-to-black band on the nail plate, known as longitudinal melanonychia, but it may also be amelanotic and manifest as a red nodule<sup>40,41</sup>. During its progression, periungual pigmentation may develop, known as Hutchinson's sign, which, while not pathognomonic, is highly suggestive of melanoma, nail dystrophy may also occur, indicating more advanced disease<sup>40</sup>. SM is often mistaken for an infection and initial misdiagnosis of SM occurs in 85% of cases<sup>41</sup>. Dermoscopy assists in distinguishing SM from benign melanocytic pigmented lesions, but biopsy remains the gold standard for diagnosis<sup>41</sup>.

Dermoscopy can reveal a gray-brown to black background with longitudinal lines that are irregular in thickness, spacing, and color, as well as fine pigmented granules, features indicative of a melanocytic origin<sup>40</sup>. The width of the pigmented bands can vary and may progress to total melanonychia<sup>40</sup>.

Histologic features suggestive of malignancy include lesion asymmetry, infiltrative margins, a markedly increased number of melanocytes in the basal and suprabasal layers with a high propensity to form compact aggregates, presence of cytologic atypia, and dermal inflammation. Malignant melanocytes have large, atypical nuclei with increased mitotic activity. Identification of melanocytes in the nail plate is diagnostic of melanoma<sup>42</sup>. Invasive SM also exhibits irregularly dispersed dermal nests composed of atypical melanocytes<sup>42</sup>.

### SQUAMOUS CELL CARCINOMA (SCC)

SCC is the most common malignant tumor of the nail unit, with the *in situ* form (Bowen's disease) occurring more frequently than the invasive variant and usually is associated with the Human Papillomavirus (HPV), mainly type 16, 18, 35, and 56<sup>40,43</sup>. It typically involves a single digit, most commonly the thumb<sup>40,43</sup>. The malignancy is usually indolent and painless, affecting the nail bed and periungual regions or both. Lesions are clinically classified into two main categories: periungual type, arising in the epithelium of the nail fold and sulcus and Subungual type, developing in the epithelium of the nail bed<sup>40,43</sup>.

Dermoscopy of SCC is characterized by brown linear dots or a clustered glomerular vascular pattern<sup>40</sup>. Other features include localized subungual hyperkeratosis, erythrochia or leukonychia irregular, lateral detachment (onycholysis), non-parallel longitudinal melanonychia, and splinter hemorrhages<sup>40</sup> (Fig. 8).

Biopsy with histopathological examination is the gold standard for diagnosing SCC<sup>40,43</sup>. The histopathological characteristic findings of this tumor include loss of normal epidermal stratification, dyskeratosis, clusters of large cells with hyperchromatic nuclei, atypical mitosis, and, when associated with HPV, perinuclear vacuolization is typically observed<sup>40,43</sup>.

## Traumatic nail disorders

### ONYCHOCRYPTOSIS

Onychocryptosis, also known as ingrown toenails, is a condition in which the lateral nail fold is penetrated by the nail plate's edge, causing pain and difficulty ambulating<sup>44-47</sup>. It is most common in adolescents, young adults, and males<sup>44,46</sup>. The penetration is often



**Figure 10.** Clinical and dermatoscopy image of subungual hematoma.

due to nail spicules along the plate's margin, which elicit an inflammatory response<sup>44,46,47</sup>. The great toes are most frequently affected<sup>44</sup>.

The main causes include ill-fitting footwear, improper toenail trimming, abnormalities of the nail apparatus, and excessive perspiration<sup>44,47</sup>. The condition is unilateral in 80 % of cases and predominantly involves the hallux<sup>44</sup>. Diagnosis of onychocryptosis is straightforward and classically based on clinical features, without the need for laboratory, radiographic studies, or dermatoscopy<sup>44,46,47</sup>.

Patients typically present with toe pain that can range from mild discomfort when walking to complete inability to ambulate; depending on lesion progression, there may also be associated swelling, erythema, secondary infection, or seropurulent discharge<sup>44-47</sup> (Fig. 9).

### **SUBUNGUAL HEMATOMA (SH)**

SH is a common nail lesion characterized by the accumulation of blood beneath a fingernail or toenail, typically located between the nail bed and the nail plate<sup>48</sup>. Trauma is the principal etiology, and the migration of the hematoma distally with nail-plate growth serves as a key diagnostic feature<sup>40,48</sup>.

Clinically, the hallmark symptom is sudden, throbbing pain following nail injury, resulting from pressure exerted by the subungual blood collection<sup>48</sup>. SH is the most frequent cause of bluish-red to bluish-black nail pigmentation; unlike melanocytic lesions, it does not form a continuous longitudinal band<sup>40,48,49</sup>.

Dermatoscopic examination often reveals small, round blood globules at the periphery of the hematoma, distal streaking, and localized leuconychia at the trauma site, accompanied by a bluish-red, bluish-black, or brownish color coloration<sup>40,48,49</sup> (Fig. 10).

## **Conclusion**

This study analyzed and discussed the two main types of nail conditions in each classification based on their clinical, etiological features and defined objective criteria to recognize each nail lesion. Diagnostic tools, such as dermatoscopy, microscopy, culture, and nail biopsy were described, highlighting their importance and clinical applicability for the early diagnosis of some frequent nail diseases. In summary, by systematizing clinical and histopathological criteria for the diagnosis of nail lesions, this study may contribute to reducing diagnostic errors, guide more precise therapeutic management, and improve the quality of life for patients affected by nail disorders.

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None.

## **Conflicts of interest**

None.

## **Ethical considerations**

**Protection of humans and animals.** The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

**Confidentiality, informed consent, and ethical approval.** The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

**Declaration on the use of artificial intelligence.** The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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