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Classification of Retronychia: A Narrative Clinical Review

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Mini-Summary

- An understanding of the full course of retronychia needs to consider acute, ongoing, and chronic forms.
- There are clinical signs of early retronychia and late-stage nail unit remodeling. Awareness of a less-inflammatory chronic form may increase diagnostic acuity, refine research, reporting, and state the need for newer and tailored treatment strategies.

Keywords
Retronychia · Polymeronychia · Nail unit remodeling · Malalignment · Disappearing nail bed

Abstract

Background: A retronychia classification system is overdue considering the most recent publications. Using the keyword "retronychia", publications with a narrative literature review were selected from PubMed/MEDLINE, EMBASE and Google Scholar, adding a few select papers. ***Summary:*** This article proposes a theoretical pathophysiological basis for retronychia. Several factors alter the clinical picture of retronychia: length and periodicity of backward displacement, duration of disease, intensity of paronychia, presence and type of nail stacking (polymeronychia), and remodeling of the nail apparatus (elevation of the proximal nail, nail bed shortening, retroversion of the distal nail fold and acquired malalignment). ***Key Messages:*** With these factors in mind, we propose a new classification system for retronychia: A standing for acute, O for ongoing, and C for chronic. We believe this easy system may increase the diagnostic acuity for the disease and its understanding.

Introduction

The Pathophysiological Basis of Retronychia

Retronychia is a backward displacement of a nail and synonymic with proximal ingrown nail [1–3]. Onychomadesis (defluvium unguium) refers to a nail shedding that starts from the proximal edge [4–6]. Its appearance has led to the use of "proximal onycholysis" as a clinically synonymous term. A relationship between onychomadesis, Beau's lines, and retronychia has been proposed under Braswell's unifying hypothesis [7]. In short, the authors state that a slowing or disruption of nail matrix growth can lead

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Fig. 1. Unilateral retronychia. Stage A. Severe paronychia and absence of visible underlying nail plates. The distal ends of the lateral nail sulci are visible. No remodeling of the nail apparatus.

Fig. 2. Bilateral retronychia. Stage O. The progression of the underlying nail plate as proximal xanthonychia or as a fake yellow lunula can place the beginning of this episode at about the same time. The severity of inflammation differs considerably because the right toenail has been pushed further backwards.

to Beau's lines formation, whereas a similar pathophysiological process characterized by complete nail matrix arrest leads to an abrupt halt in nail plate production and causes onychomadesis. An emphasis on cessation of nail matrix activity is amply theorized [4–6, 8]. The authors make notice of similarities between retronychia and onychomadesis, highlighting a vertical growth of new nail plate into the proximal nail fold (PNF) or a repetitive disruption of matricial growth that may lead to nail stacking, also acknowledging that one single nail plate might be pushed back as a result of shearing forces.

Onychomadesis has been associated with very different causes [4, 7]. However, if an isolated, even repeated, traumatic episode is excluded; all other causes appear to have a relationship with a nail matrix activity arrest as an intrinsic nail unit event. For doubtful cases, the terms "idiopathic," "sporadic," onychomadesis, sometimes "seasonal," or "recurrent" have also been advanced [9, 10]. A majority of causes of onychomadesis is extrinsic to the nail apparatus (e.g., systemic disease, infectious disease, medications, etc.) [7] where onychomadesis remains the primary intraungual manifestation.

We agree that a proximally shed nail may lead to retronychia, whenever such a nail is misplaced backwards or remains held back into the nail pocket [11, 12]. However, retronychia will almost never lead to onychomadesis. After the nail plate is proximally dislocated, the ensuing inflammation purportedly impinges on matrix activity [13, 14]. Regrowth of a new nail will try to shed distally the old misplaced nail plate [2]. In actuality then, onychomadesis is a second intraungual phenomenon that follows retronychia by a cause extrinsic to the nail apparatus.

The Clinical Manifestations of Retronychia

Retronychia has been clinically described by a typical triad: paronychia, xanthonychia, and nail growth slowing/arrest [15]. Retronychia is one cause of paronychia often associated with the worst cases of proximal ingrowing of the nail (Fig. 1) [16]. Pain intensity is subject dependent and not necessarily correlated with the intensity of inflammation. Very severe cases may present with exuberant pyogenic granuloma formation, fistulae or the nail can even pierce through the PNF [17, 18]. However, some authors have put forward the term chronic noninflammatory retronychia, by noticing severe dystrophic nail lamellae being shed and discrete to absent PNF inflammation. Such cases have been most often noted in the setting of forefoot anatomical deformities (such as hallux valgus, hallux valgus interphalangeus, dynamic hyperextension of the hallux, or congenital toenail malalignment) [19–22].

Yellowing of the nail can be evident: (1) distally, as accompanying onycholysis [3, 19, 23, 24]; onycholysis is a

Fig. 3. Unilateral retronychia. Stage C. Stacked polymeronychia with accompanying nail unit remodeling alterations such as shortening of the nail bed and slight DNF retroversion.

Fig. 4. Unilateral retronychia. Stage C. Columnar polymeronychia. Severe nail bed shortening along with prominent retroversion of the DNF leaves the successive generations of nail lamellae prone to short rearward movements, stagnant growth and piling up.

potential predisposing and maintenance factor that leads to the retronychia by reducing the anchorage surface of the nail to nail bed [15, 24–26]. Similarly, concomitant disappearance (shrinkage or shortening) of the nail bed lastingly reduces this attachment, destabilizing nails and favoring backward displacement due to shearing forces [25]; (2) As a proximal yellow lunula (sometimes from an evident new nail growing beneath – Fig. 2); (3) As a nail that becomes diffusely yellow or even brownish due to underlying oozing or pachyonychia [14, 21, 25, 27].

An apparent nail growth slowing/arrest is part of the clinical triad as this a common patient complaint [15, 23, 28–30]. However, one can eventually observe a new nail growing underneath the old one, pushing on its underside and displacing it in a lifting motion. In some instances, it can grow underneath and intimately with the older nail or finally several nail lamellae can stack underneath the previous, as these are periodically pushed back in different ranges of motion (dependent of the forces applied) [6, 24, 31, 32].

Nail stacking observed in different contexts has received several different descriptive terms: shrimp nail, "armadillo nail," and horseshoe crab nail with retronychia sometimes going unmentioned [10, 21, 33, 34]. To use but one word for these nails that have several proximal nail lamellae, we are proposing the clinical term polymeronychia (from the Greek polumeros "having many parts," from polu- "many" + meros "a share"; and onyx "claw, nail").

Not all nail stacking looks the same. Some case reports show avulsed nails composed of two or more stacked proximal nail lamellae [17]. These nail lamellae may even be promptly visible as the nail grows – nail stacking or stacked polymeronychia (Fig. 3) [10]. We have seen cases characterized by a merely thickened proximal nail resulting from fusion of nail lamellae – fused polymeronychia [35]. We have also seen post-avulsion cases with no apparent nail lamella, when the retronychia episode was so promptly treated that no new nail had yet began to form [14, 36, 37]. In short, polymeronychia may also be apparently absent.

Lastly, the observance of the undulating nail surface has been explained as caused by recurrent onychomadesis (only implying periodic lamellar shedding), application of forces that cause a physical torque motion or by the repetitive backward pushing of successive generations of nail back into the nail pocket [10, 17, 20, 38]. The regular succession of these suggests repeated trauma, nail lamellae that are periodically pushed back and again produce stacked polymeronychia. The range

Table 1. Clinical classification system of retronychia

Stage A	Stage O	Stage C
Paronychia severity variable	Paronychia variable – may subside (but acute flares possible)	Paronychia usually mild or absent
Polymeronychia absent or fused as apparent yellow lunula	Polymeronychia visible as broad yellow lunula or shedding of nail lamellae (these can be stacked or overlying the previous)	Polymeronychia evident: stacked, fused, columnar; pachyonychia; onychogryphosis
Nail remodeling starts but is inapparent, at best discrete exposure of the DNF is seen and the ends of the lateral nail sulci are visible	Nail remodeling continues; Lateral nail sulci may be evident; Shortening of nail bed	Nail remodeling sequelae may settle in different degrees: shortened nail bed; transversely narrow nail bed; retroversion of the DNF; acquired malalignment

of motion can be so minute that the nails stack imperceptibly giving rise to a thickened, columnar, or packed polymeronychia (Fig. 4).

Resulting from distal onycholysis, the shortened nail bed plays several contributing roles. First, lack of firm adherence to a wide and healthy nail bed facilitates movement of the nail [24]. Second, shortening of the nail bed is often accompanied by retroversion of the distal nail fold (DNF). This may act as a transmitter of force between the toe box of a shoe and the distal nail edge, or of the ground and nail during walking or running [39, 40]. Furthermore, a taller proximal end may orient the nail obliquely toward the distal fold, further contributing to this [26]. Third, not only has the bed shortened longitudinally but also transversally, oftentimes giving the nail a triangular shape with a wide proximal base.

We have observed cases of almost "stagnant nails" that do not grow out and are mentioned to never being cut by the patient. There is no need to believe that there is strong adherence to lateral sulci, to the nail matrix horns (the matrix actually has little adherence to the newly formed nail) or that inflammation retains the nail in place. Repetitive trauma, disruption of longitudinal nail growth and repetitive push back are simpler explanations for a nail that cannot progress forward.

A Classification Proposal of Retronychia

More than representing one single clinical picture, retronychia can be seen as a pathophysiological mechanism subdivided into different stages of a potential continuum, where repetitive nail pushbacks and progressive change of the perionychium modifies the clinical appearance (Table 1; Fig. 5) [32].

Stage A represents an early acute retronychia characterized by nail growth slowing/arrest, paronychia of different grades, inapparent polymeronychia (ideally absent or only with a discrete milky lunula) with or without onycholysis (Fig. 1) [41, 42]. Stage O occurs later on and is an ongoing or episodic retronychia, with paronychia that can slowly subside or worsen. Polymeronychia becomes evident as the nail unit tries to shed the old nail plate: (1) it is fused if the new nail creeps underneath the older (Fig. 2); (2) it is stacked if the different nail generations have been sufficiently separated by growth activity disturbance and/or by the presence of intervening inflammatory tissue that facilitates upward displacement of the older nail. Lastly, stage C for chronic longstanding retronychia presents with stacked polymeronychia, pachyonychia from packed columnar polymeronychia, or onychogryphosis, as disease sequelae such as a shortened nail bed sequel and retroverted DNF evolve (Fig. 3, 4) [43].

A relationship between severity and nail apparatus changes has been characterized by ultrasound [26]. Inflammation pushes the nail matrix and PNF upwards, favoring an obliquely orientated thicker nail, opposed by the DNF, made unstable by weaker anchorage to the underlying shortened nail bed, repeated back and forth motion and/or torque, and the clinical picture of stage C remodeling settles. Recognition of this chronic stage may in fact increase awareness of this diagnosis among age groups less reported upon [19]. Also, we believe the prognosis is worsened by the complications associated with this stage, warranting treatment in the other two stages.

Of course, any of these clinical signs may be shared in different stages, and no one's to say that some of these clinical signs might not resolve as the condition progresses or is adequately treated. The use of letters for each stage is not meant to isolate these stages within a specific time frame but to associate them with a clinical picture and potentially guide treatment. These stages help illustrate the interplay between the phenomenon of retronychia (that should include not only a nail that is

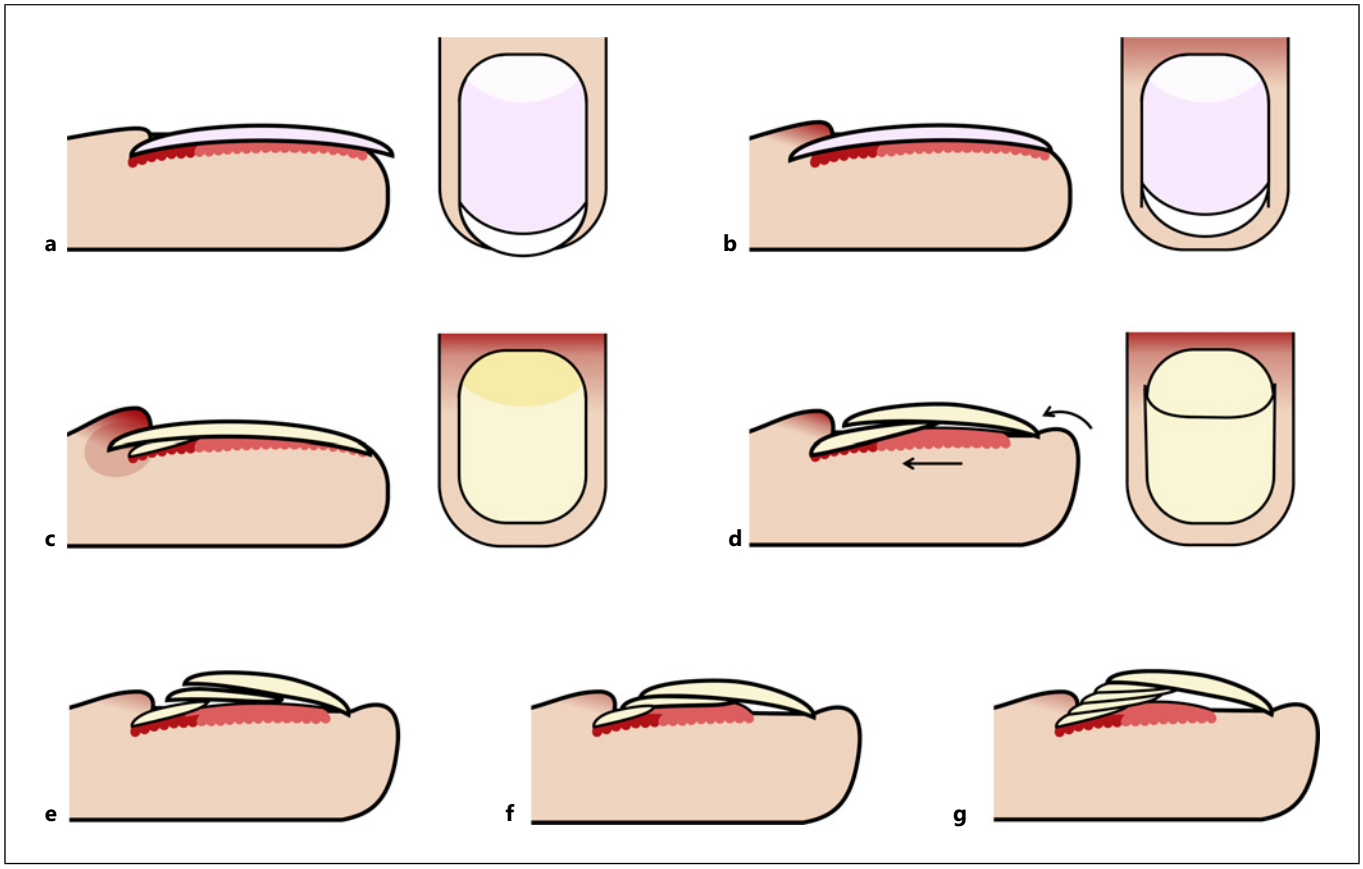

Fig. 5. Schematic representation of different retronychia stages: (**a**) normal nail; (**b**) stage A – paronychia is variable, the nail plate is more or less evidently pushed backwards as seen by exposure of the distal nail fold and the ends of the lateral nail sulci; (**c**) stage O – paronychia severity varies but a new nail has begun to form underneath the older "stagnant" misplaced plate which becomes yellow (placement of the new nail underneath the old gives it a proximally yellow hue and onycholysis the distal xanthonychia); (**d**) stage C – irrespective of the type of polymeronychia, nail unit remodeling sets in and the nail bed is shortened and the distal pulp reverses – arrows; (**e**) stacked polymeronychia; (**f**) fused polymeronychia; (**g**) columnar or packed polymeronychia.

pushed back but also kept back = retention) and a subsequent remodeling of the nail apparatus over time throughout the different phases comprising nail bed shortening, retroversion of the distal fold and even post-traumatic acquired malalignment or worsening of a congenital malalignment with outward rotation of the nail due to torque [24, 38, 40, 44].

Polymeronychia is a clinical sign of each stage and demonstrates the underlying pathogenesis:

- It is absent or barely apparent as a whitish/yellowish lunula, when the lamellae have yet to fuse, in the acute stage. Whatever the length of backwards motion, no new nail has yet been produced or it is beginning to fuse with the overlying lamella.
- Nail shedding can demonstrate fused or stacked polymeronychia as the new nail pushes the older from under the PNF.
- It is stacked in series or fused in the chronic stage. Ample rearward movement will separate the proximal free edges of successive generations of nail lamellae. Discrete movement or impediment of longitudinal growth will lead to columnar or packed polymeronychia.

Reliability of paronychia as a staging criterion as has been proposed [6, 8, 32, 39, 45] may certainly help guide treatment, but paronychia severity can fluctuate irrespective of stage [42, 46].

Conclusion

We believe these theoretical observations may help in better understanding the retronychia mechanism and its subsequent clinical manifestations. This stage approach

may even have different implications with respect to clinician awareness and diagnosis of the disease, selection of additional workup (e.g., imaging), treatment choices, and prognosis.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

A.L. contributed with the main script, clinical pictures review of the literature, devisal of the classification scheme, and corresponding schematic. B.R. contributed to the main script, revised the entire text, and devisal of the classification scheme.

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