

SHORT REPORT

Finger retronychias detected early by 3D ultrasound examination

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Abstract

Background A new pattern of ingrown nail, called retronychia is involved in the posterior translation of the whole nail unit producing paronychia.

Objective To demonstrate an unusual case of paronychia that affected three of the fingers on the right hand.

Methods We used 3D ultrasound to study the whole nail unit in the fingers of both the affected (right) and non affected (left) hand.

Results Backward motion of the nail unit with decreased distance between the origin of the nail plates and the distal interphalangeal joint was clearly demonstrated by 3D ultrasound in the affected fingers.

Conclusion 3D ultrasound provides non invasive and more understandable information about the physiopathological changes in retronychia.

Received: 15 January 2011; Accepted: 4 March 2011

Conflicts of interest

None declared.

Funding sources

None.

Retronychia is rarely diagnosed early, especially in polydactylous fingers.

We present the case of a 28-year-old woman who had experienced a trauma during a car accident 3 months before. One month after the injury, she noticed a swelling deformity in the index, middle and ring fingers of the right hand (Fig. 1a) that were associated with tender paronychia when pressure was placed on the proximal nail fold (PNF). There was obviously a link between this triple paronychia and the accident; the left hand had no injury (Fig. 1b).

Methods

We have compared 3D sonography of distal phalanges from normal patients (Fig. 2a) with our patient and we have detected some abnormalities (Fig. 2b) confirming diagnosis of the presumed retronychia that is a proximal ingrowing of the nail plate.

There has been a gain of interest in this condition, which affects the toes much more often than the fingers, since the poster¹ and the article of De Berker *et al.*² who termed this abnormality 'retronychia' and presented a series of 19 cases which were described during meetings of the European Nail Society. This entity adds to

our understanding of the concept of onychomadesis and paronychia.

Retronychia is characterized by the posterior embedding of the nail plate producing a mild to moderate paronychia due to two to four new nail plates being superimposed on each other, and which create a multilayer sandwich of proximal nail beneath the nail fold causing pain, inflammation and varying degrees of granulation tissue reaction. These symptoms subsided rapidly in our patient after avulsion followed by normal nail regrowth. A transitory growth arrest produces a Beau's line. If this arrest ranges from 4 to 8 weeks, the nail plate separates from the subungual tissue leading to latent onychomadesis with secondary nail shedding.³ Important sonographic criteria for diagnosing retronychia are the decreased distance between the origin of the nail plates and the base of the distal phalanx (level of the distal interphalangeal joint compared with the contralateral fingernail), thickening, decreased echogenicity and increased blood flow in the dermis of the posterior nail fold and proximal nail bed (colour Doppler ultrasound).⁴ Apart from our article on retronychia detected by ultrasound,⁵ we have not found any other imaging techniques which clarify this surgical cutaneous problem with total objectivity.



Figure 1 (a) Swelling deformity with tender paronychia, after injury of the three middle fingers of the right hand. (b) The three middle fingers of the left hand, without injury.

It is interesting to note the pathogenesis suggested by the few authors who have dealt with retronychia. In most cases affecting the big toes, it is likely that the precipitating event is pressure against the free edge, which pushes the nail backwards.² This force could be repetitive as in jogging or hiking. Poorly fitting or tight-toed footwear, such as high heels, can also be a causal factor.

In an effort to correlate the experience of surgical avulsion with the pathogenesis and explain why these nails are not just shed in a typical manner following trauma or in instances of onychomadesis, De Bercker *et al.* noted in their patients that the uppermost nail appeared to be firmly attached to the nail bed and nail folds. As a result of the unusual adherence, the normal nail shedding process progresses abnormally.²

According to Dahdah *et al.*⁶ complete onychomadesis does not always occur following trauma, as the nail plate may remain held in the lateral wings of the nail matrix due to the curvature of these areas. With the growth of a new nail plate, the old one is pushed upwards and backwards leading to the embedding of the top nail into the ventral aspect of the proximal nail fold and secondary paronychia.

The clinical and histological findings of the five cases of Baumgartner and Haneke⁵ suggest recurrent injuries as the main cause

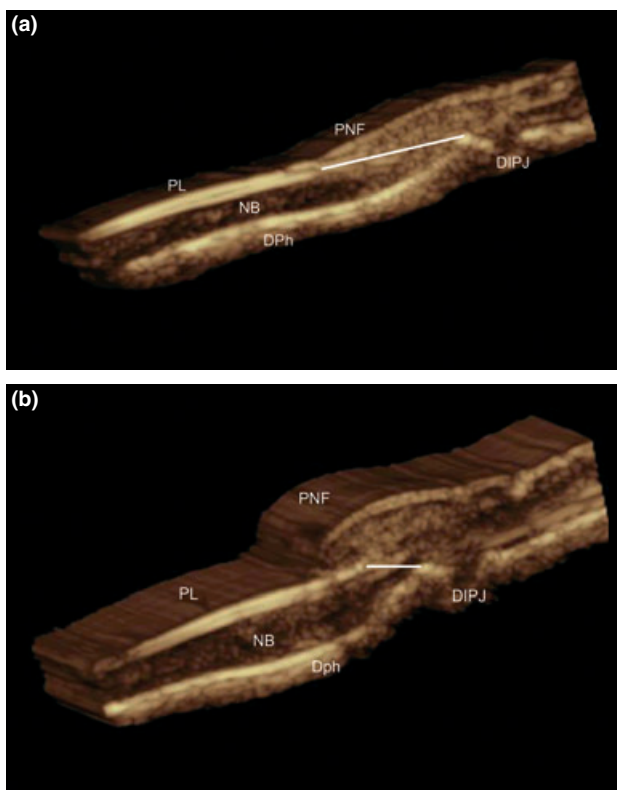


Figure 2 (a) 3D sonographic anatomy of the normal nail. Longitudinal axis reconstruction shows the normal structures that compose the nail unit. The white line indicates the normal distance between the origin of the nail plate and the base of the distal phalanx (distal interphalangeal joint level). (b) 3D sonographic imaging in retronychia. Longitudinal axis reconstruction shows thickening of the proximal nail bed and proximal nail fold. Notice the location of the origin of the nail plate closer to the level of the distal interphalangeal joint. The white line indicating the distance between the origin of the nail plate and the base of the distal phalanx is dramatically shortened. PL, plates; NB, nail bed; Dph, distal phalanx; PNF, proximal nail fold; DIPJ, distal interphalangeal joint.

of retronychia. The trauma leads to onycholysis as the major pathogenic event in the development of this peculiar condition. Therefore, contrary to De Bercker *et al.*² who theorized that the old nail remained firmly attached to the nail bed and could not be pushed out by the new nail plate, these authors found onycholysis in their five patients. This has two interrelated consequences: (i) the nail is no longer fixed to the nail bed and can be pushed back into the nail pocket; (ii) the nail bed in synchrony with the matrix allows the attached nail plate to grow distally, whereas in severe onycholysis, the nail bed does not support this forward growth.

Results

Using ultrasound, we were able to detect the exact anatomical changes in retronychia demonstrating a shorter distance between

the origin of the nail plate and the base of the distal phalanx at the distal interphalangeal joint. Moreover, the addition of 3D ultrasound imaging for studying disorders that affect the nail unit, such as retronychia, offers a new stereoscopic application. These high quality figures contain all axes (length, width and depth) and provide an anatomical and more understandable image for studying nail diseases non-invasively. These 3D images are built by making a five to eight-second sweep across the surface of the nails using the latest generation ultrasound equipment. Furthermore, the reconstructed images from the collected data can be performed across any axis of the nail unit and can detail the whole-structure of the nail anatomy, from the dorsum of the plate down to the bony margin, as well as the lateral and proximal nail folds; 3D ultrasound has revolutionized sonography of the nail.

Comments

The classical distal lateral ingrown toenail is one of the most common nail pathologies and mainly affects the lateral nail folds because of the outward growth of the nail. The previous studies performed without imaging techniques suggested that the pathogenic mechanism for retronychia was the embedding of the old fragment of the nail plate (prepathogenic event) into the proximal nail fold region, which the newly growing nail plate pushed upwards and backwards.^{2,6} This pathophysiology approach implies an indirect mechanism (retrograde transmission of the forward

nail growth motion) to induce retronychia. With the addition of imaging, we demonstrated that retronychia results from a direct mechanism where the whole nail unit is embedded into the proximal nail fold region and is probably caused by the development of traction forces generated by inflammation and scarring.⁴

We, non-invasively, demonstrated that posterior translation (backward motion of the whole nail unit) is responsible for the anatomic changes that occur in retronychia. This article illustrates that 3D ultrasound is a great improvement in the field of imaging of the nail because it provides a more understandable anatomy.

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