Foot and Ankle Surgery xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Foot and Ankle Surgery

journal homepage: www.elsevier.com/locate/fas

Review

Toenail paronychia

Adam Lomax *, James Thornton, Dishan Singh

Royal National Orthopaedic Hospital, Brockley Hill, Stanmore, Middlesex HA7 4LP, United Kingdom

ARTICLE INFO

Article history:
Received 25 February 2015
Accepted 10 September 2015

Keywords:
Paronychia
Ingrowing toenail
Onychocryptosis

ABSTRACT

Paronychia is an inflammation of the tissues alongside the nail. It may be acute or chronic and can be seen in isolation or in association with an ingrowing toenail. Acute paronychial infections develop when a disruption occurs between the seal of the nail fold and the nail plate, providing a portal of entry for invading organisms.

The treatment of paronychia associated with an ingrowing toenail is aimed at treating the causal toenail. In paronychia not associated with an ingrowing toenail, antibiotics may cure an early infection but surgical drainage of an abscess is often required. In this case, an intra-sulcal approach is preferable to a nail fold incision.

Chronic paronychia is less common in the feet than in the hands. It is a form of contact dermatitis and is frequently non-infective, however the chronically irritated tissue may become secondarily colonised by fungi. A dermatology consultation should be obtained for suspected chronic paronychia. Patients with chronic paronychia that is unresponsive to standard treatment should be investigated for unusual causes, such as malignancy.

An algorithm for the treatment of paronychia is presented in this review.

Contents

1. Introduction

Paronychia is defined as an inflammation of the folds of tissue (proximal or lateral) surrounding the nail of a toe or finger (Fig. 1) [1]. Infective paronychia usually results from a breakdown of the protective barrier between the nail and the nail fold. Subsequent entry of organisms into the sulcus between the nail and nail fold leads to bacterial or fungal infection of that area. Paronychia may be acute or chronic, and the aetiology and treatment are different for each. The two forms should be considered as completely separate entities.

Much of the literature reviewed here concerns paronychia of the finger, reflecting the paucity of literature relating to paronychia in the toe. The presentation and treatment in the upper and lower extremity does have many similarities. This literature is therefore, undoubtedly relevant and transferable in general terms. However,

* Corresponding author. Tel.: +44 20 8954 2300.
E-mail address: 1adamlomax@gmail.com (A. Lomax).

http://dx.doi.org/10.1016/j.fas.2015.09.003
1268-7731/

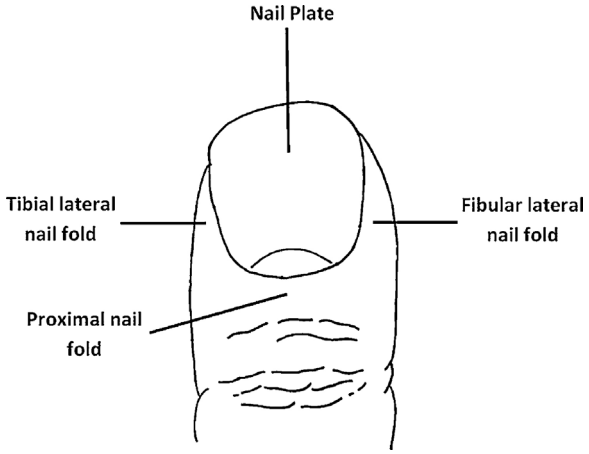

Fig. 1. Nomenclature of the nail and nail folds. The sulcus between the nail plate and the nail fold is invaded by organisms when the protective seal between them is broken, resulting in an acute paronychial infection.

there are important considerations specific to the foot that must be appreciated when managing this condition. This review presents an overall summary of toenail paronychia along with a proposed treatment algorithm (Fig. 2).

2. Anatomy of the nail complex

The nail complex is composed of modified cutaneous structures: nail plate, nail matrix, nail bed, proximal nail fold, lateral nail folds. Fig. 1 illustrates the standard nomenclature used when describing the nail complex in relation to paronychial infections. The paronychial tissues refer generally to the lateral nail folds (tibial and fibular) as well as the proximal nail fold (also termed eponychium). The nail folds help to hold the nail plate in place and provide a waterproof seal protecting against external irritants and pathogens.

Confusingly, both the tibial and fibular nail folds are commonly termed lateral nail folds. When performing surgery on an isolated lateral nail fold such as for an ingrowing toenail, it is preferable to use the term tibial or fibular nail fold to accurately specify the site.

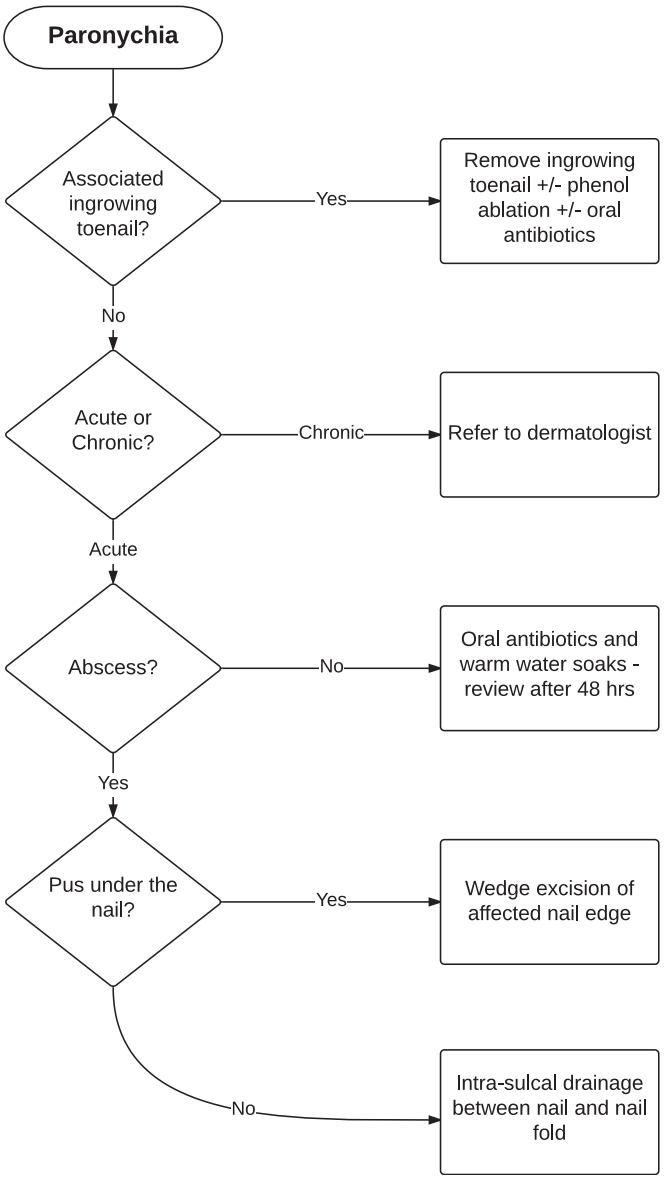

Fig. 2. Algorithm for the management of paronychia.

3. Acute paronychia

In acute paronychia there is a rapid onset (over 2–5 days) of discomfort, redness, swelling and tenderness of one of the nail folds (Fig. 3a) due to a breakdown of the nail plate/nail fold barrier. Acute paronychia of the toes is often due to ingrown nails. This is not usually true of paronychia of the fingers, where a history of minor nail trauma is more common. The initial inflammation may progress to a frank bacterial infection with subsequent accumulation of pus (Fig. 3b). An untreated infection may also eventually lead to the formation of granulation tissue around the nail fold (Fig. 3c). The most common causative infective organism is *Staphylococcus* aureus, but *Streptococcus*, *Pseudomonas* species, gram-negative bacteria and Candida albicans have all also been isolated [2–4]. Anaerobes are more frequent in patients with exposure of the nail to oral flora [2].

The initial abscess formation in between the nail plate and nail fold (Fig. 4a) may track around the nail plate (Fig. 4b), becoming a subungual abscess. This separates and elevates the nail plate from its bed (germinal matrix in the proximal nail fold or sterile matrix in the lateral). If the abscess tracks beneath the proximal nail plate, it can generate enough pressure to elevate the nail plate from the germinal matrix. Pus will then be visible underneath the nail plate (Fig. 5a) and the nail becomes ballotable. This pressure can cause permanent damage to the germinal matrix (Fig. 5b).

An untreated abscess in one nail fold may also track around to involve all of the nail folds resulting in the so-called "run-around" infection (Fig. 6). In more advanced cases, pus may theoretically track into other tissues of the digit. We have not however, found any documented case of acute paronychia leading to digit pulp abscesses, tenosynovitis or osteomyelitis in the literature.

3.1. Acute paronychia in association with an ingrowing toe nail

The term ingrowing toenail is a misnomer, since the nail plate does not "grow" into the lateral nail folds. However, the term ingrowing toenail remains in regular use both in common and medical language. Associated factors include improperly trimmed nails, poorly fitted shoes, tight socks, excessive sweating, soft tissue abnormalities of the toe and inherent nail deformity [5]. It can occur both in normal and abnormal (wide or incurvated) toenail morphology. A common scenario is the use of fingernail clippers to cut a relatively wide or incurvated toenail in a rounded fashion. There is subsequent avulsion of the toenail edge, causing

Please cite this article in press as: Lomax A, et al. Toenail paronychia. Foot Ankle Surg (2015), http://dx.doi.org/10.1016/j.fas.2015.09.003