

# Case Report. Complicated chronic ingrowing toe nails

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## Referral

A 23-year-old male patient made a self referral into the podiatry nail surgery clinic complaining of painful bilateral hallux ingrowing toe nails (IGTNs). The patient was in good general health, and was taking no regular medication. The condition had been present for 6 years and in that time the nail plate had become engulfed by the surrounding skin and soft tissue (Figure 1). The patient complained of repeated bouts of pain, inflammation and occasional discharge.

### Clinical examination

The patient reported that he had originally attended his GP 6 years earlier, aged 17. His GP at the time diagnosed bilateral hallux IGTN and recommended nail surgery. Unfortunately, at that time, the patient was needle phobic and chose to decline surgery. In the intervening period the condition of the hallux nails gradually deteriorated, forcing the patient to once again seek treatment.

On examination, both first nails had become almost completely enveloped and were visible only at the apex of each toe due to over growth of the surrounding skin. The patient's foot health was otherwise satisfactory: pedal pulses were strong and regular, there was no sensory loss and no evidence of local infection to either hallux. Both great toes were also free from signs of inflammation or active hypergranulation.

Chronic IGTNs are reportedly associated with an increased risk of phalangeal osteomyelitis<sup>1</sup> and so an X-ray was ordered to rule out bony abnormality; no significant bony pathology or osteomyelitis was detected. A diagnosis was made of chronic IGTN with gross deformation of the medial and lateral skin folds. Observing that both nail plates were engulfed in skin and soft tissue, it was felt that a standard nail avulsion and phenolisation was contraindicated and so an opinion was sought from the podiatric surgery team.

### Management

Two surgical options were considered; the first option was a Zadik incisional nail procedure, which was first described by Quenu in 1887; this approach would remove the offending nail plates and nail matrix.<sup>2-4</sup> In addition to the Zadik procedure, the surrounding soft tissue would also require excision. The second option was a terminal Syme amputation, as described by Thompson & Terwilliger in 1951, which would remove the nail plate, dorsal soft tissues and part of the distal phalanx.<sup>5,6</sup> On examination there was no apparent clinical or radiographic sign of bony involvement at the distal phalanx and so amputation was disregarded and the patient consented for bilateral Zadik nail excisions.

The patient was admitted to a community hospital day surgery unit. The surgical site was classified as contaminated and so antibiotic prophylaxis with flucloxacillin was administered pre operation. Digital anaesthesia was achieved with a combination of 3% mepivacaine plain solution and 5.0g/ml levobupivacaine. Both feet were



**Figure 2. Intraoperative appearance demonstrating intact nail plate**

exsanguinated and haemostasis achieved with an ankle tourniquet.

A midline incision was made dorsally over the distal dorsal surface of each hallux and the tissue flapped open to reveal an apparently anatomically normal nail plate beneath (Figure 2). The nails were avulsed and the overlying tissue flaps were excised. The proximal nail fold was incised medially and laterally, then flapped back to expose the proximal nail matrix, which was then removed to bone as per the Zadik procedure. The toes were flushed with copious saline and sutured with 4/0 Prolene (Figure 3). The toes were bandaged and the patient was advised to rest and elevate for the next seven days.

He was seen in outpatients at 5, 9 (Figure 4) and 12 days post operation. At this point, the sutures were removed and the patient was advised on a gradual and cautious return to normal activities. Six weeks following surgery, both wounds had healed (Figure 5).

The patient attended again for a final check up at 6 months post operation, at which time he reported that he was delighted with the results of surgery. Objective assessment revealed a PASCOM patient satisfaction score of 96 out of a possible maximum of 100 and there was a clinically significant improvement in his foot health related quality of life as measured with the Manchester Oxford Foot Questionnaire.

### Learning outcomes

To understand why this patient attended with such an unusual presentation of chronic IGTN, a review of wound healing and the pathophysiology of IGTN is required. All wounds are characterised by three stages of healing: inflammatory;



**Figure 3. Closure of wound with simple interrupted suture**

proliferative; and maturation.<sup>7,8</sup> The three phases are continuous, and considerable overlap may be apparent.<sup>7,8</sup>

The inflammatory phase is characterised by attempted haemostasis, a defensive immune response, increased vascularity and increased capillary permeability.<sup>7,8</sup> Macrophages, platelets, epithelial cells, lymphocytes, neutrophils and fibroblasts accumulate in the acute wound, stimulated by growth factors and mediated by numerous pro and anti-inflammatory cytokines.<sup>7,8</sup> Chronic or infected wounds often become delayed at the inflammatory phase.

The proliferative phase is characterised by the rapid influx of fibroblasts, the synthesis of a matrix (or scaffold), revascularisation, the formation of granulation tissue and re-epithelialisation.<sup>7</sup> Granulation tissue is found at the base of the wound and is usually covered by a fibrin clot. Granulation tissue is a prominent feature of healing by secondary intention and comprises a capillary bed, fibroblasts, macrophages, collagen, fibronectin and hyaluronic acid.<sup>7,9</sup> Mesenchymal cells, which are present in the acute wound, take up to 5 days from the point of injury to form fibroblasts, which in turn synthesise collagen, strengthening the wound; this process continues for up to 4 weeks.<sup>7</sup>



Figure 4. Post-operative appearance



Figure 5. Appearance at 6 weeks post-operation

Epithelialisation begins within hours of an injury with migration and proliferation of epithelial cells from the wound margins and with migration of keratinocytes from the base of the wound or skin appendages.<sup>7</sup>

The maturation phase follows and is characterised by scar contracture, collagen cross linking and reduction of oedema.<sup>7</sup> Collagen maturation may continue for months or years.<sup>7,8</sup>

As an IGTN develops, a wound propagates in the medial or lateral soft-tissue folds.<sup>6,10</sup> External pressure on the nail folds or pressure from a nail spicule may cause a small puncture wound and subsequent inflammation as per the first phase of wound healing.<sup>1,4,6,11</sup> Left untreated, a poorly draining abscess may occur with erythema, hyperhidrosis and pain.<sup>12</sup>

If allowed to become a chronic wound, hypertrophic granulation tissue may form, which may with time become re-epithelialised.<sup>12</sup> Granulation tissue in this context should be considered as a sign of attempted wound healing (Phase 2), and should not be mistaken for a pyogenic granuloma.

IGTN can be characterised by three distinct but deteriorating stages: inflammation; abscess formation; and granulation.<sup>2,12</sup> When an IGTN reaches the granulation stage it can become relatively asymptomatic because epithelialisation will result in some degree of re-modelling of the affected soft-tissue folds.<sup>12</sup> However, a more typical presentation is for the IGTN to cycle repeatedly through the three

stages.<sup>6,12</sup>

It is clear then that the current case represents an IGTN that entered the granulation stage, followed by dramatic re-epithelialisation. There is no doubt that this presentation could have been avoided had the patient's needle phobia been addressed at original presentation. Cases of needle phobia are often encountered in younger patients. However, few patients present with true needle phobia (belonephobia); more often patients will be suffering from procedural anxiety.<sup>13</sup> Counselling before the procedure to inform the patient of what is going to happen can help, as can distraction techniques and topical local anaesthetics.<sup>13</sup> For those patients with true belonephobia, a prompt referral to the appropriate department offering alternative anaesthetics such as oral sedation techniques or general anaesthesia could prevent delayed treatment of simple IGTNs.

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