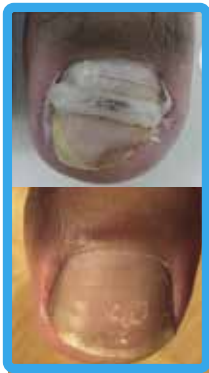


NAIL BRACES: the non-surgical alternative



By Gaynor Wooldridge
Chair of the Executive Committee
of the Institute of Chiropractors
and Podiatrists

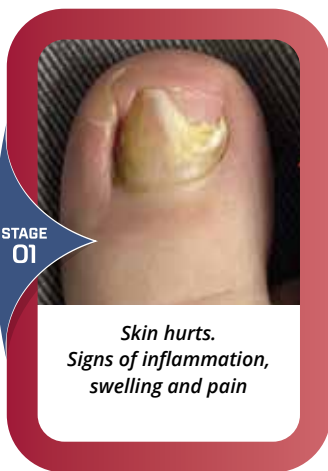


Introduction

Ingrown toenails are one of the most frequent nail disorders and one of the most common reasons for patients visiting a foot health practitioner or podiatrist. Fortunately, there are various conservative and surgical approaches that can usually lead to a successful outcome. Patients with ingrown toenails suffer with a painful, swollen and inflamed toe, often with recurrent infection.

This article will discuss what an ingrown toenail is and, specifically, assess the newer nail correction treatment methods using the non-invasive nail brace. We will take a glimpse at the history behind orthonyxia (nail brace), and also how they can offer a safe and pain free solution for many patients.

What exactly is an ingrown toe nail?



An ingrown toenail (IGTN) usually starts its life at the distal end of the toe when the tip of the toe is compressed in a tight shoe, by a tight sock, accidentally damaged or when the nail is cut too short. There can also be a genetic predisposition, hyperhidrosis or a possible fungal infection/ psoriasis creating a wider or thickened nail plate (Chiriac, Soloven and Brzezinski, 2014).

The pathogenesis is simple. If a tiny nail spicule is created, it cuts into the lateral nail groove and pierces the epidermis. This results in a foreign body reaction with inflammatory cells, granulation tissue formed and secondary infection (Brzezinski, 2011).

The term 'ingrowing toenail' was first defined in 1845 as "a nail which grows towards the inside of the flesh" as a consequence of curvature (Marquez- Reina, 2020), although Paulus Aegineta described the excision and cautery of granulation tissue as far back as 650 CE. During colonial times, British soldiers were responsible for their own foot care, and they were punished if an ingrowing toenail caused them to hobble during marching. Civil army manuals instructed soldiers to cut a 'V' into the middle of their nail (Hecht, no date).

Phenol matrixectomy was first described by Boll in 1945, and is now considered the gold standard non-incisional surgical option (Muriel-Sanchez et al. 2020).

Current treatment methods



There are a variety of non-conservative (surgical) treatment options for IGTNs. The first-line treatment, as previously mentioned, is wedge resection with phenol application (Mitchel, Jackson and Wilson, 2011). Winograd (1929)

Frost and Zadik (1950) are typically indicated in patients allergic to phenol, when phenol has

failed to prevent regrowth of an IGTN or when there is a defect to the nail or excessive hypergranulation tissue that needs to be removed.

Patients undergoing surgical interventions can develop complications which include paronychia, hypertrophy of the skin folds and sidewall hypertrophy that can cover the entire nail plate. Pyogenic granuloma can also develop in a longstanding, chronically infected IGTN. Keloid formation can also result from chronic inflammation, especially in cases of recurrent IGTNs (Lee, Burn and Yang, 2013). Post surgical infection can often occur (Haneke, 2012).

Let's look at nail braces

Nail braces were created and patented in 1872 and 1873 by E. E. Stedman (Scholl, 1915), but their use really began during the 1960s in Europe and Australia. Ross Fraser, a Scottish chiropodist, invented his own nail brace during this time and termed it 'orthonyxia'. Nail bracing became established in Europe during the 1980s. The Ross-Fraser nail brace is still in use today.



Nail bracing is a simple, safe and inexpensive treatment option that avoids more aggressive and painful surgery (Chiriac, Soloven and Brzezinski, 2014). Application requires no anaesthetic, usually provides an immediate relief from pain, with no recovery period. Onychonychia can be constructed from polyethylene, steel wire, plastic, resin or a combination usually of plastic and steel wire. They are safely attached to either the nail plate itself, or gently guided under one, or sometimes both, edge of the nail, where the brace slightly elevates and corrects the nail shape as it grows; this decreases the pressure on the nail folds. Davis's law states that soft tissue will model along the lines of stress (Cyron and Humphrey, 2017), and will heal in the manner in which they are mechanically stressed.

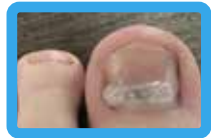
Patients who could benefit

Nail braces are designed to restore the natural shape of a nail. They are particularly suitable for children, anxious patients, patients with diabetes mellitus and those who are needle phobic. In fact, they are a safe and painless conservative option for many patients who would prefer a less aggressive approach. Marquez-Reina et al (2020) concluded that a nail brace reduces the reoccurrence rate of onychocryptosis, following a randomized clinical trial and, 12 months after the beginning of the study, the change in the nail achieved with the nail brace technique was statistically significant.



Before nail brace

16-year-old young man with repeated, chronic IGTN with infection. Grade 2, recurrent antibiotics



After 2nd nail brace.



Patient presented with onychomycosis and onychocryptosis. Following removal of entire nail plate and treatment for the fungal nail infection, the nail plate grew wider. Due to the time taken for the nail to regrow, there was some atrophy of the nail folds which also reduced the space for the nail to regrow. A nail brace was attached and assessed every 2 months, and

after 6 months there was resolution of the ingrowing toenail (as well as the fungal infection).

The future

The use of toenail braces in the UK is a very recent and novel practice. European chiropodists and podiatrists have widely used orthonychia for a long time following their development in 1980s by the Institute for Orthonychia in Erlangen, Germany. They have been used as a conservative treatment for all patients, including those presenting with recurrent

severe infection, for many years. Harrer et al. (2005) compared the use of nail braces with Emmert's procedure (Rammelt et al, 2003). Their findings concluded that in all aspects of treatment, the toenail brace proved to be an excellent alternative. These results were also supported by Effendy et al. (1993) who stated that the correction of pincer nails by the attachment of a plastic brace was successful in 100% of subjects.

Erdogan and Erdogan (2008) followed patients with diabetes for 2 years following toenail brace treatments. They concluded that nail brace application is a safe, simple and inexpensive treatment option for patients with diabetes who suffer from IGTNs. Shih et al. (2019) stated that nail braces were a simple, safe, and non-invasive procedure that caused less pain, had a quick recovery time and led to high patient satisfaction during their research with paediatric patients. They stated that surgical interventions are unpleasant and stressful, and post operative infection, pain, haemorrhage, delayed healing and reoccurrence can be problematic.

Mao, Nie and Wang (2018) reported that the nail brace is a safe and successful alternative treatment for ingrown nails, with the sides of the nail gently lifted and the nail forced into a flatter shape over time.

Conclusion

Conservative toenail bracing is a fairly new and exciting development in the UK. No treatment provides a one-size-fits all solution, but for many patients this offers a safe and effective alternative. Statistically, it appears many patients self-medicate and attempt at-home treatments for a variety of ailments, and for a variety of reasons. IGTNs definitely fall into this category. As foot health practitioners and podiatrists, being able to offer a non-surgical treatment such as nail bracing can hopefully alleviate some of the fears and concerns that prevent many patients to seek the professional help that they need.

At the beginning of this article, the photo indicating stage 3 onychocryptosis was a patient who had suffered for more than 10 years, self-treating and medicating due to his absolute terror of needles. Unfortunately, by the time he finally was persuaded to attend clinic, the only treatment option realistically was a total nail avulsion with matrix phenolisation. It was a hugely traumatic experience for patient and practitioner.

We now have the fantastic option of a non-surgical nail bracing treatment, which hopefully will prevent the progression of an IGTN to a stage 2 or 3 and avoid many additional potential difficulties along the way.

A gentle solution for a brutal problem.

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