Original Article

Surgical treatment of onychocryptosis: excision of the soft tissue surrounding the nail bed using radioelectrosurgery and cryosurgery

Tratamento cirúrgico da onicocriptose: excisão do tecido mole circunjacente ao leito ungueal utilizando radioeletrocirurgia e criocirurgia

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ABSTRACT

Introduction: Onychocryptosis – or ingrown nail – is a painful condition caused by the nail plate's penetration into the soft surrounding tissue. Several surgical or more conservative therapeutic options are employed. In contrast with other invasive treatments, the combined technique of radioelectrosurgery and cryosurgery does not cause permanent damage to the nail matrix or fold, and presents several advantages when compared to more common treatments.

Objective: To evaluate the efficacy and safety of combined radioelectrosurgery and cryosurgery in the treatment of ingrown nails.

Methods: Retrospective observational study. Patients with onychocryptosis (n = 16) were administered radiofrequency-based electrosurgery to remove the granulation tissue to promote the accommodation of the nail plate, followed by freezing with liquid nitrogen.

Results: Ten days after treatment, patients described improvement in the discomfort caused by the condition and could start wearing shoes again. Only one patient presented a recurrence in one nail extremities during the 24-month follow-up period, and was treated again using the technique.

Conclusions: This technique is convenient for its easy execution, cost effectiveness, good cosmetic results and patient satisfaction

Keywords: nails, ingrown; cryotherapy; radiosurgery; electrosurgery; cryosurgery

RESUMO

Introdução: *A onicocriptose ou unha encravada é processo doloroso originário da penetração da lâmina ungueal no tecido mole circunjacente. Várias opções terapêuticas, cirúrgicas ou conservadoras são utilizadas. Em contraste com outros tratamentos invasivos, a técnica combinada da radioeletrocirurgia com criocirurgia não causa dano permanente à matriz ou prega ungueal, tendo várias vantagens em relação aos tratamentos usuais.*

Objetivo: *Avaliar eficácia e segurança da associação de radioeletrocirurgia e criocirurgia no tratamento da unha encravada.*

Métodos: *Estudo retrospectivo observacional. Dezesseis pacientes com onicocriptose, foram submetidos à eletrocirurgia com radiofrequência para remoção do tecido de granulação promovendo a acomodação da lâmina ungueal, seguida de congelamento com nitrogênio líquido.*

Resultados: *Após 10 dias os pacientes relataram melhora do desconforto causado por sua patologia, podendo retomar o uso de sapatos. Durante o seguimento, de 24 meses, apenas um paciente apresentou recidiva em uma das unhas, sendo repetida a técnica.*

Conclusões: *A técnica descrita mostrou-se conveniente devido à fácil execução, ao baixo custo, aos bons resultados cosméticos e à satisfação do paciente*

Palavras-chave: *unhas encravadas; crioterapia; radiocirurgia; eletrocirurgia; criocirurgia*

INTRODUCTION

Onychocryptosis, or ingrown nail, is a painful condition caused by the penetration of the nail plate into the surrounding soft tissue.[1,2] This condition frequently occurs in the big toes and is more prevalent in men, with a ratio of 3:1. It occurs mostly between the ages of 10 and 30.[3] It is a multifactorial disorder and the most important causes are a convex nail plate, wearing tight shoes, excessive external pressure, chronic trauma, and improperly trimmed nails.[4]

According to Heifetz, [5] the three clinical stages of ingrown nails are characterized as follows: (1) the corner of the nail penetrates into the surrounding soft tissue, inducing inflammation with erythema, edema, and pain; (2) the nail spicule acts as a foreign body and aggravates the inflammation, frequently causing bacterial infections; and (3) exuberant granulation tissue then forms. The patient experiences pain in the lateral or medial portion of the toe, which is accompanied by purulent drainage and difficulty in walking.

The literature discusses several therapeutic options: surgical treatments such as matricectomy, phenolization, and complete excision of the plate, or more conservative approaches such as the use of acrylic braces.[3,6] The efficacy of the treatment should be evaluated on the basis of the improvement of the symptoms, the preservation of the appearance of the nail, and the reduction in the rate of recurrence.[1,3] This study evaluated the effects of combined radioelectrosurgery and cryosurgery in treating ingrown nails.

High frequency radioelectrosurgery is a tissular cutting and/or coagulation process performed by administering an alternate electric current. It is easy to apply and is available in most dermatological practices. Its advantages are: fast healing, minimal bleeding, reduced scar formation, and shorter operative time.[7]

Low temperatures are used to destroy tissues in cryosurgery. This therapy targets four of the main characteristics of onychocryptosis: pain, secondary infection, excess of granulation tissue, and prominent folds of the nail plate.[8]

Both techniques are described in the literature as possible (separate) treatments for onychocryptosis. The authors propose combining these techniques in order to investigate their effectiveness in treating this condition.

METHODS

Patients with onychocryptosis in clinical stages 2 and 3,5 who were being treated in the Dermatology Service of the University Hospital of the Universidade de Brasília, were included in this observational retrospective study. Patients with vascular disorders, diabetes mellitus, and over the age of 60 were excluded.

Sixteen patients, seven women and nine men, aged 15–27, were selected. A total of 31 ingrown nails were treated: one big toe (n = 3), both big toes (n = 12), big toes plus index and middle toes (n = 1). Eight patients had never received any other treatments. The remaining patients had been treated with surgical techniques, such as nail plate avulsion and matricectomy, but without improvement.

Before the procedure, patients underwent the following biochemistry tests: hemogram, coagulogram, glycemia, urinary sediment, and mycological examination. If the latter was positive, antimycotic agents were administered concomitantly. The above protocol adhered to the rules of good clinical practice, according to the Declaration of Helsinki, 2000 revision.

The technique used in the study involved several steps, as outlined below:

- Asepsis and antisepsis with polyvinylpyrrolidone-iodine (PVP-I) were carried out.
- The region was stained with 1% gentian violet (Figure 1).
- Nerve block anesthesia of the top one-third of the affected toes with an epinephrine-free solution of 2% lidocaine was performed.
- Radiofrequency-based equipment (Wavetronic 5000 LLEP Master; Loktal, São Paulo, Brazil), with cut at 80%, coagulation at 20%, and power at 3 mV was used. A cutting loop (round handle MR1) (Figure 2) and a neutral electrode in direct contact with the patient's skin were employed. The granulation tissue and nail spicule were removed; the nail plate's superior line of insertion was carefully delimited. The lateral nail borders were then leveled to better accommodate the plate.
- Liquid nitrogen (using a bottle standardized for cryotherapy) was then sprayed with the nozzle B in open spray, using one application lasting 5–10 s (until the tissue was completely frozen) (Figure 3).
- Sutures were not needed in this technique. Fusidic acid was applied, and the toe was wrapped in gauze and a compression bandage.

All patients were examined 24 and 72 h after the procedure, and weekly until complete healing occurred. The following events were evaluated: granulation tissue formation on the lateral border of the nail, presence of secondary

Figure 1: Initial clinical presentation– bilateral onychocryptosis

Figure 2: Removal of granulation tissue with cutting electrode

infection, pain, and exudate. Patients received oral cephalexin (2 g/day) for 10 days, and were instructed to rest for 48 h and apply daily curatives at home. Post-surgical control was performed weekly with the removal of tissular debris and cauterization with 36% policresulen solution (Albocresil®, Nycomed Pharma Ltd, São Paulo, Brazil).

RESULTS

All 16 patients completed the study. Each subject presented with the condition in clinical phases 2 and 3. According to the clinical evaluations, the re-epithelialization of the surgical wound occurred around the 10th day; however, a protective bandage was kept in place until the 30th day, due to the fragility of the nail plate.

Patients resumed daily activities and started wearing closed shoes again after 10 days, and began to engage in sports activities after 30 days. The average duration of pain after the procedure was 72 h (controlled with common analgesic or codeine-based painkillers). After that period, patients did not report the presence of pain, and only felt discomfort during the weekly removal of necrotic tissue. Patients were followed up after 3, 6, 12, and 24 months to evaluate the efficacy of the technique (Figure 4). Recurrence was defined as renewed penetration of the nail spicule, local pain, and granulation tissue formation. Only one patient experienced a recurrence, and the technique was repeated.

DISCUSSION

Onychocryptosis is a painful condition that causes the patient much inconvenience and temporary absence from work.[2–4] Several different treatments have been described in the literature according to the clinical phase of the condition. Treatment in the initial phases is conservative. Patients are instructed to wear comfortable shoes and open sandals and to correctly trim their nails, filing the lateral borders to prevent them from perforating the surrounding soft tissue.[3, 9]

For the other clinical phases, a recent review of the literature describes the nail as the cause of the condition, suggesting that all treatments should involve the partial or total removal of the nail plate.[10] Pearson et al.[11] did not find differences in the shape of the nail between patients with onychocryptosis and control groups, suggesting that treatment should not be based on correcting an existing nail deformity.

In general, the pain and inflammation result from the penetration of the nail plate into the subcutaneous cellular tissue (SCT); the 'foreign body' triggers inflammation of the tissue.

Traumatized SCT produces granulation tissue that grows on the nail plate. However, it is necessary to maintain the proportions between the nail and the adjacent tissue.[12–14] Vandenbos and Bowers[12] were the first to describe the technique of resection of a wide portion of the soft tissue surrounding the nail without injuring the nail plate and matrix.

Figure 3: Vaporization with liquid nitrogen after the removal of granulation tissue

Figure 4: Final result after 3 months

Currently there is no consensus on the best surgical treatment – the ideal technique should be easy to administer, low cost, with good cosmetic results and few recurrences.[1]

Nail plate avulsion has an immediate result, with a reduction in pain and secondary infections. However, its rate of recurrence is around 70%.[1, 15, 16] The combination of avulsion technique with ablation of the nail matrix also presents low rates of cure.[10] Phenolization of the nail matrix also shows good results. However, this technique requires a skilled surgeon, since phenol can leak out and damage the surrounding tissue. [1–3, 10, 15, 17, 18]

This study adopted the technique of leveling the lateral nail borders without destroying the nail plate and matrix.[12] We obtained excellent results by combining radioelectrosurgery and cryosurgery. In the literature, radioelectrosurgery is widely used since its hemostatic action minimizes operative time and reduces bleeding.[7] Cryosurgery presents many advantages in the treatment of onychocryptosis due to its action in all phases of the pathology: using the functional reversible alterations in the peripheral nerves, it keeps the treated lesions free from pain; the bactericidal property of liquid nitrogen reduces the incidence of secondary infections; and it helps to destroy granulation tissue, as shown by the success of the technique in the treatment of pyogenic granuloma.[8]

The proposed new technique combines efficacy with high rates of cure and has the following additional advantages:

• Leveling the lateral nail borders provides enough space for the natural growth of the nail plate without the inconvenience of elevated folds – which work as true 'walls,' interfering in the accommodation of the nail plate.

• The nail matrix is protected, preserving the morphological characteristics of the nail plate and the esthetic aspect of the nails. The uniformity in relation to the other nails is preserved, providing the patients with the freedom to expose their nails.

• The healing period progresses smoothly: patients take care of their own recovery; there are no sutures or dehiscence.

• Post-operative pain is of short duration. Granulation tissue is completely removed, together with any nail fragments contained in it, thereby reducing inflammation and pain.

• Little bleeding occurs, with the surgical field remaining clean during the removal of granulation tissue through radioelectrosurgery. Coagulation of the small vessels takes place concomitantly, facilitating the surgeon's work.

• The procedure is easily accessible and cost effective, and can be performed in small operating rooms by the majority of dermatologists who have access to radioelectrosurgery and cryosurgery equipment.

CONCLUSION

This study confirms that the surgical technique in question is low cost, easy to perform, and produces good cosmetic results with low recurrence rates. It has proven to be an effective therapeutic option for onychocryptosis. The authors consider the results convenient regarding patients' well-being and satisfaction. ●

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