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# New surgical technique for the treatment of onychocryptosis

Nova técnica cirúrgica para tratamento de onicocriptose

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## ABSTRACT

**Introduction:** Ingrown toenail is the leading cause of nail surgery. Techniques have been described for better exposure of the nail matrix in Grade III treatment, such as block excision of the hypertrophic skin margins and the subcutaneous nail blade involved, removing a semi-elliptic wedge and or L-incision, both advocating closure by suturing the skin and the nail blade. Authors describe the application of an incision technique at the intersection of the lateral and proximal nail fold to expose the matrix and the performing of a wedge in the cutaneous hypertrophy. At the site of the nail blade removal a fragment is left by second intention.

**Objective:** To assess the comfort and effectiveness of the new surgical technique for onychocryptosis.

**Methods:** Observational and retrospective study through the analysis of 29 patients with onychocryptosis who underwent the new technique.

**Results:** Of the 34 nail folds (5 patients had 2 affected nail folds) submitted to surgery using the new technique, only one patient had recurrence in one of the folds and underwent a new intervention. No complaints of postoperative discomfort or complications were observed.

**Conclusions:** The applied technique was satisfactory, with a low recurrence rate, and also easy to perform, presenting no discomfort complaints from patients.

**Keywords:** onychocryptosis; ingrown toenail; operative treatment; surgical technique

## RESUMO

**Introdução:** Unha encravada é a principal causa de cirurgia do aparelho ungueal. Técnicas têm sido descritas para melhor exposição da matriz ungueal no tratamento Grau III, como exérese em bloco da borda de pele hipertrófica e da lâmina subcutânea acometida, retirando-se uma cunha semi-elíptica e/ou incisão em L, na qual ambas preconizam fechamento suturando a pele e a lâmina. Autores descrevem a aplicação de técnica de incisão na intersecção da prega ungueal lateral com a proximal, para expor a matriz, e realização de uma cunha na hipertrofia cutânea. A área cruenta do defeito resultante do local onde o fragmento da lâmina foi retirado é deixada cicatrizar segunda intenção.

**Objetivo:** Avaliar o conforto e a eficácia da nova técnica cirúrgica para onicocriptose.

**Métodos:** Estudo observacional e retrospectivo por meio de análise de 29 pacientes com onicocriptose que foram submetidos à nova técnica.

**Resultados:** Das 34 dobras ungueais (cinco pacientes tinham duas dobras acometidas) submetidas à cirurgia pela técnica, houve apenas uma recidiva em uma das dobras de uma paciente que passou por nova intervenção. Não se observaram queixas de desconforto ou complicações no pós-operatório.

**Conclusões:** A técnica aplicada mostrou-se satisfatória com baixo índice de recidiva, de fácil execução e sem queixas de desconforto pelos pacientes.

**Palavras-chave:** Onicocriptose; Unha encravada; Tratamento cirúrgico; Técnica cirúrgica

## Original Article

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## INTRODUCTION

Subcutaneous onychocryptosis (SO), onychocryptosis, or ingrown toenail (IT) results from penetration of the nail blade into the underlying soft tissue.<sup>1,2</sup> SO is prevalent in young and adult males (3:1), can present high morbidity, and may be disabling.<sup>2,3</sup> The etiology is multifactorial, featuring: heredity, overly convex nail blade, disproportion between the width of the plate and the nail bed, chronic trauma, use of narrow-tipped or overly tight shoes, and inadequate trimming of toenails.<sup>1-3</sup>

Ingrown toenail can be classified by degree of severity (Heifetz, 1937):<sup>2,3</sup> 1) Grade I, presence of inflammatory signs (erythema, mild edema, and pain on compression of the lateral nail fold; 2) Grade II, when the inflammation increases with the emergence of exudate, secondary infection, and local drainage; 3) Grade III, with the formation of granulation tissue and lateral nail fold hypertrophy.<sup>1-3</sup>

The literature cites different forms of management for SO, both conservative and surgical. Conservative techniques are recommended in grade I, such as the use of bracing. In grades II and III, surgical treatment offers the best results. The techniques used are matricectomy, phenolization, nail blade excision,<sup>1-3</sup> correction of hypertrophy in U,<sup>4</sup> radiofrequency electrosurgery, and cryosurgery.<sup>2</sup>

In surgical matricectomy of grade III ingrown toenail, the literature cites the semi-spindle wedge and L-incision approach, which corrects the hypertrophies in the same incision.<sup>1</sup> These techniques allow visualizing the nail matrix to be removed, but it is recommended to place sutures between the skin and the preserved nail blade for closure of the large open area.<sup>1,5</sup>

The monofilament nylon sutures are left in place until removal at about two weeks. During this time, the current authors heard reports from patients of both discomfort in the visualization of the sutures involving the nail blade and in removal of the stitches.

The authors propose a technique with the incision of the intersection of the lateral and proximal nail folds to expose the matrix, and a wedge in the middle of the hypertrophic skin (without removing it entirely), in the same surgical intervention. The site where the blade fragment is removed is allowed to heal by second intention, since it results in a small open strip. The advantage is a slightly less invasive treatment, without the negative sensation of seeing the blade sutured and the discomfort of removing the stitches from the toenail (Figure 1).

## METHODS

This was a retrospective observational study of patients over 12 years of age of both sexes who appeared spontaneously to the Clinical Specialties Outpatient Clinic (AHEC) of the State University of Londrina (UEL), Paraná State, Brazil, in the minor surgery clinic of the Dermatology Department on Tuesday afternoons, with diagnosis of onychocryptosis grades II and III. All cases were authorized by informed consent, including photographs of the cases (by parents or guardians in cases of minors), as part of the Department's protocol. The sample excluded cases with bilateral and anterior hypertrophy in the same patient (due

to the need for correction in U), diabetes mellitus, peripheral artery disease, and coagulation disorders.

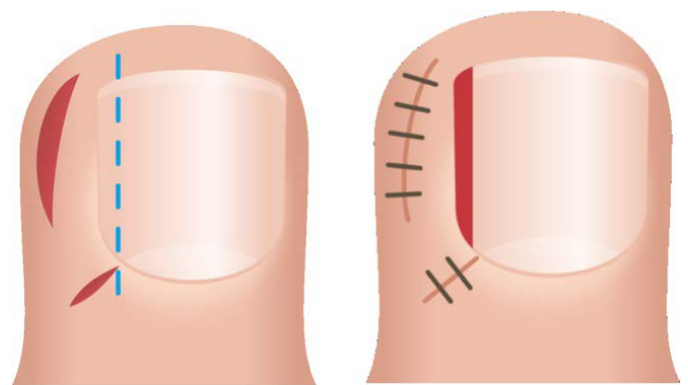
The data were analyzed and processed with the GraphPadInstat package and Excel 2007. Statistical significance was analyzed with the chi-square test with significance set at 5% ( $p < 0,05$ ), applied to compare sex and relapses. A convenience sample was used (all patients with onychocryptosis who underwent the surgery according to the Department's technique from January 1, 2011, to November 30, 2018, were followed during the study period).

Patients kept the dressing in place for 24 hours. The following medications were prescribed: common analgesics (paracetamol or dipyrone), azithromycin 500mg for three days or sulfamethoxazole and trimethoprim 400/80mg, two pills every 12 hours for ten days, according to the Department's protocol.

Patients were reassessed on the 3rd day post-op and on the 14th day, when the sutures were removed. Patients were assessed for history of pain, discomfort, annoyance with the stitches, bleeding, and/or secretions during the postoperative period, and clinical assessment of the operatory wound was performed in the same session. In addition to the preoperative photos, photos were taken in the postoperative period (day 3, day 14, three months, and six months) and used to compare improvement after the procedure.

### Sequence and details of the technique (Figure 2):

1. Patient in horizontal supine position with leg flexed over the thigh on the side of the affected toe;
2. Marking with methylene blue or surgical pen;
3. Antisepsis with 10% topical polyvinyl iodine;
4. Placement of surgical drapes;
5. Trunk block anesthesia with 2% lidocaine, without vasoconstrictor;



**FIGURE 1:** Incision of the bisector between the lateral and proximal nail folds, and wedge correction of hypertrophy

6. Tourniquet at the base of the toenail;
7. Incision at the bisector between the lateral and proximal nail folds (diagonal incision) for better visualization of the matrix;
8. Excision of granulation tissue via linear incision from proximal nail fold to anterior edge (about 3mm of blade width);
9. Undermining of the nail plate from the free edge to the matrix;
10. Sectioning of the nail plate from the free edge to the lateral horn of the matrix;
11. Removal of the nail plate;
12. Curettage of the lateral nail bed;
13. Suturing of the diagonal incision with simple 4.0 monofilament nylon stitches;
14. Wedge incision in the center of the lateral skin hypertrophy, maintaining the edges of the hypertrophy;
15. Removal of the hypertrophic wedge;
16. Suturing of the wedge with simple 4.0 monofilament nylon stitches;
17. Removal of tourniquet;
18. Occlusive dressing.

## RESULTS

The sample included 29 patients with 34 affected nail folds (five patients presented two affected sites). Of these folds, seven had undergone some form of prior treatment (patients were unable to report what kind of surgery had been performed), with no improvement.

There were 17 men (59%) and 12 women (41%), but without statistical significance in the distribution by sex ( $p=1.0$ ). Age ranged from 12 to 65 years, with a mean of 31,86 years.

All the affected nail folds were on halluces (34/34), statistically significant when compared to the other toes (0/34),  $p=0.0001$ . There were 15 folds on the right hallux and 19 on the left hallux, with no statistically significant difference between the two sides ( $p=0.88$ ).

The sutures were removed at two weeks, during which time the patients were excused from their daily work or school activities. The patient charts showed no reports of local infection,

bleeding, or intense pain during the postoperative period, major discomfort with the stitches during this period, or relevant pain during removal of the stitches. The surgical sites were described as having a good appearance, and there were also postoperative photographs.

Although we obtained no information on the previous techniques used, the patients with the seven prior surgeries (relapsed onychocryptosis) reported less discomfort with the technique applied in the current study.

The initially recommended follow-up was 12 months, but the patients abandoned follow-up after six months, for undisclosed reasons. However, this did not result in their exclusion from the study, since they were all clinically well.

One patient who had two affected nail folds on her left hallux had to undergo a procedure on the medial fold due to relapse (1/34 folds or 2.9% relapse rate), three months after the first surgery at our clinic.

## DISCUSSION

Ingrown toenail is a painful condition with relevant morbidity, a frequent cause of work absenteeism.<sup>2</sup> Conservative treatment is still recommended for grade I, with bracing, orientation on filing lateral nail edges, and use of comfortable footwear. However, grades II and III show better results with surgical treatment.<sup>2,3</sup>

The pain and inflammation result from penetration by the nail blade into the adjacent tissue, causing a foreign body reaction. Partial or total removal of the blade is necessary.<sup>2</sup>

The literature also cites matricectomy (surgical or chemical), together with partial removal of the nail blade, to avoid relapses.<sup>1,6,7,8-10</sup> Wedge and L-incisions are used to improve visualization of the matrix. However, the open defect is large, requiring closure with suturing between the skin and the remaining blade. This may cause patients some discomfort, including when removing their shoes.

The current study found that the condition was more prevalent in males, and that the hallux toenail was the most frequently affected, in agreement with the literature.<sup>2,3</sup> Postoperative pain was well tolerated with common analgesics, as with other techniques,<sup>2,3,7</sup> but with satisfactory results (without in-



FIGURE 2: Intraoperative step-by-step



FIGURE 3: Clinical case A



FIGURE 4: Clinical case B



FIGURE 5: Clinical case C

- a) simple to perform;
- b) for better visualization of the matrix, an incision is made at the bisector between the lateral and proximal nail folds (diagonal incision), where the open area is smaller;
- c) only a thin strip of the nail blade (about 3mm) is removed from one of the folds;
- d) Adjacent tissue is spared, since a wedge is removed from the center of the hypertrophic area, without removing everything, which also leaves less open area;
- e) not suturing the blade produces less negative sensation for the patient, both in the postoperative period and when removing the stitches.

#### CONCLUSION

Although the number of patients is small, the results show that the technique is easy to perform, low-cost, well-tolerated by patients, and with good cosmetic results (Figures 3, 4, and 5).●

fection or bleeding, for example) and a low relapse rate (2.9%), although the study sample was small.

Although various techniques for suturing the surgical wound have been described,<sup>3,5,8-10</sup> the new technique proposed here has the following advantages:



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