Knot Technique: A New Treatment of Ingrown Nails

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BACKGROUND  Ingrown nails are a painful problem that affects all ages, particularly the young, and it may become chronic if not treated.

OBJECTIVE  A new technique was used to treat patients with Stages 2 and 3 ingrown nails in whom conservative and surgical methods were attempted.

MATERIALS AND METHODS  A total of 30 patients presenting with Stages 2 and 3 ingrown nails to the clinic between 2010 and 2012 were included. A wedge excision of the upper and lower soft tissues of the nail was performed. The wound margins were simply sutured with 2/0 polypropylene. Approximately 8 to 10 knots were tied without cutting the stitches under the nail. These knots were used to push the soft tissue down and to raise the nail. This was achieved by placing a knot under the nail after the needle had been passed inside the nail, without cutting the suture before another knot was tied above the nail. Therefore, the ingrown part of the nail was raised.

RESULTS  Patients were followed up for 20 months (range, 10–24 months). Relapse was observed in only 1 patient. No infection was observed, and none of the patients required additional surgery.

CONCLUSION  Stages 2 and 3 ingrown nails can also be safely treated with this technique.

The authors have indicated no significant interest with commercial supporters.
ICD-10CM diagnosis code of the patients was L60.0. Patients with bacterial infection were included after following successful antibiotic treatment (either oral or topical). Patients with fungal infections and patients who refused surgery were excluded from the study. Written consent was obtained from all patients. All operations were performed and data were collected by the same surgeon (B.I.).

Patients were classified according to the staging of ingrown nails as defined by Heifetz:

- Stage 1: slight erythema and swelling of the nail grooves in the nail bed;
- Stage 2: presence of acute infection and suppuration;
- Stage 3: chronic infection, the formation of granulation tissue surrounding the nail groove and hypertrophy of the surrounding tissues.

**Surgical Technique**

Local anesthesia was performed using a mean of 1 mL (range, 0.6–1.3 mL) prilocaine. A wedge excision of the upper and lower soft tissues of the nail was performed after surface cleaning with polyvinylpyrrolidone 10% (Figure 2). The wound margins were simply sutured with 2/0 sharp polypropylene. Approximately 8 to 10 knots were tied without cutting the stitches under the nail (Figure 3). These knots were used to push the soft tissue down and to raise the nail. This was achieved by placing a knot under the nail after the needle had been passed inside the nail, without cutting the suture before another knot was tied above the nail (Figure 4). Therefore, the ingrown part of the nail was raised (Figure 5). The authors were careful during the procedure to avoid passing the stitch through the proximal part of the ingrown nail because in general, this area is weaker and more fragile than other parts of the nail. Stitches were removed after the nail had grown past the ingrown part (approximately 3–5 weeks later). Patients were advised to not cut their nails for 2 months after surgery, to cut their nails straight across, and to avoid wearing tight shoes. Descriptive findings were shown by median (range).
Results

The authors included 34 big toes from 30 patients (16 male and 14 female). Of these, 18 had Stage 2 and 16 had Stage 3 ingrown nails, and 13 of the ingrown nails were in the left foot and 21 in the right foot. Eighteen of the patients had previously undergone surgery for ingrown nails. Thirteen patients with bacterial infection were treated before surgery. Median age of the patients was 32 years (range, 17–51 years). None of the patients had diabetes mellitus, circulatory system problems, anatomic disorders, or history of trauma. Patients were followed up for 14 months (range, 10–24 months). Relapse was observed in only 1 patient who had cut his nail in a curved manner in the second week, and recovery was achieved through conservative treatment. No infection was observed, and none of the patients required additional surgery (Figure 6). All of the patients reported that pain was substantially reduced after surgery, and foot-related quality of life was increased. The median surgical time was 6 minutes (range, 4–8 minutes).

Discussion

This study demonstrated that ingrown nails can be successfully treated using a simple surgical technique with low rates of recurrence. The technique presented here involves forming a mass under the nail after a wedge excision of the soft tissues of the nail bed was performed with primary suturing that excludes the nail matrix.

In this knot technique, the success of the surgery is affected by 3 of the following factors: a wedge excision accompanied by primary suturing, sufficient excision of granulation tissue, and stitches made at the proximal portion of the ingrown part of the nail. In addition, patients should follow...
the standard protocol for protection against infection, avoid tight shoes, and not cut their nails for 2 months.

Majority of surgical techniques aim to prevent ingrowth recurrence by excising or damaging the ingrown nail.\(^2\) However, inflammation, hyperkeratosis, and granulation tissue may develop.\(^1,4,5\) Excision of the hyperkeratotic tissue may halt this process, and to lift the nail, a suture, plastic, or similar may be placed under the nail to form a mass. Thus, ingrown nail recurrence can be prevented. Based on this information, the authors prevented nail ingrowth by excising the hyperkeratotic and the granulation tissue above and below the nail and raised the nail through stitches that formed a mass under the nail. Part of the rationale for this technique was that there was an excess of soft tissue; therefore, it was excised to prevent the process from extending until the proximal nail. Uruc and colleagues\(^1\) claimed that ingrown nail recurrence after surgical intervention is usually because of germinal matrix damage or matrix excision. In this technique, because the surgery is performed only on soft tissues, recurrence is unlikely. The chances of recurrence will be further minimized if patients follow the aforementioned suggestions on appropriate nail care postoperatively.

In this technique, the nail will not become narrow, as is the case with other techniques, because the nail is not involved in any procedure in this technique. The nail retains its natural dimensions; therefore, the aesthetic results will be superior. It has been reported that low recurrence rates can be achieved by excision of the nail without damaging the lateral matrix.\(^6\) The nail may become narrower in both that technique and any technique in which the nail is excised from its lateral margin.

To avoid complications caused by a tourniquet, it was not used for all patients. Local anesthesia was performed to the area to be excised without resorting to a digital block. Therefore, the amount of local anesthesia and the total number of injections was kept to a minimum. In addition, the surgical time was considerably short.

Patients who were treated with the knot technique should be advised to follow the aforementioned suggestions on appropriate nail care and should be informed about the conservative options that are available. In addition, this procedure is not applicable for patients who do not want a foreign substance on their nail during the 3 to 5 weeks of recovery.

Many studies, in which destruction of the nail matrix was performed through phenol ablation, have demonstrated 0.6% to 9.6% recurrence rate after 1 year.\(^7\) In a study where partial nail avulsion and surgical matricectomy were performed, recurrence rates at 1 year were 6.9%.\(^8\) When partial matrix excision and segmental phenolization are compared, there were no statistically significant differences between the postoperative recovery periods, complication rates, and tolerability of the procedures.\(^9\) In another study where the flexible tube was fixed by suture, the recurrence rate was reported as 12.6%.\(^10\) Inadequate excision of granulation tissue may be the reason for this.

Investigation of alternative surgical treatments has demonstrated that successful treatment can be accomplished by excision of the soft tissue without touching the nail.\(^11,12\) Recurrence rates were low, but secondary wound recovery was delayed compared with that in other techniques. Delay in wound healing was also seen in another study where the soft tissue defect is reduced by primary suturing.\(^13\) In contrast, loss of the cutaneous innervation of the operated area in both techniques can be observed.

The knot technique is an easy surgical procedure and has several advantages, including no requirement for specific chemicals or surgical tools, no narrowing of the nail, and no damage to the nail matrix. In addition, patients can resume work after the surgery as there is no direct intervention to the ingrown part of the nail. However, a period of 3 to 5 weeks is needed for the nail to grow beyond the knot. During this period, recurrence can be seen if the patient cuts the nail in a curved manner, as opposed to straight across cutting of the nail.
In conclusion, successful results were obtained from the treatment of 34 ingrown big toe nails in 30 patients. The knot technique for the treatment of ingrown nails is a simple technique with a low complication rate and a short surgical time. It may be used confidently to treat Stages 2 and 3 ingrown nails.

Acknowledgments  The authors thank Mehmet Uyar, MD, for his statistical analysis support.

References


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