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Treatment of ingrown toenail with proximolateral matrix partial excision

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Abstract
Introduction: Ingrown toenail is a common condition. Although many methods for treatment are available, there is no consensus on the optimal treatment. Aim of the study was to evaluate the long-term efficacy of proximolateral matrix partial excision in the treatment of ingrowing toenail.
Materials and Methods: In this study a total of 60 patients with ingrowing toenail were enrolled, who were managed with proximolateral matrix partial excision. The patients were evaluated 1 day, 1 week, 1 month, 3 months and 6 months after the surgery. Patients' satisfaction with the general appearance of their nails was investigated at the 6-month follow-up. Visual analog scale (VAS) was used for pain evaluation.
Results: The healing time and recurrence were the primary indicators described before. In this study we did not record any postoperative complications or complaints about the cosmetic outcome. The mean healing period was 9.2 (6-15) days. There were only 2 recurrence of ingrown toenail, observed 6 months after treatment. The success rate after 6 months was thus 97%.
Conclusion: Proximolateral matrix partial excision for the treatment of ingrown toenails is highly effective and the treatment of choice at our clinic because of its high success rate.

Keywords: Toenail, ingrown, management, proximolateral matrix partial excision

Introduction

Ingrown toenails are a common condition of school children and young adults but may be observed at virtually any age, with a male predominance of 3:1 [1, 2]. The disorder generally occurs in the big toes [3, 4]. It is painful, often chronic and affects work and social activities. Most patients initially complain of pain; later drainage, infection and difficulty in walking occur [5]. An ingrowing toenail develops when the proper fit of the nail plate in the lateral nail groove is altered [7]. Several factors contribute to the occurrence and worsening of ingrowing toenail: incorrect cutting of nails; hyperhidrosis; poor foot hygiene; excess external pressure, including poor stance and gait, ill-fitting footwear and excess trauma; excess internal pressure caused by over curvature of the nail plate; arthritis; subungual neoplasms; skeletal abnormalities and inflammatory processes; associated systemic diseases, including diabetes; obesity; and nail changes in the elderly [6-8]. Congenital malalignment is another cause, especially in infants [9].

A staging system has been developed to grade the severity of ingrown toenails [10, 11]. Stage 1 is characterized by erythema, slight edema, and pain, particularly with pressure. Stage 2 consists of the same symptoms but of greater severity; the wound may become locally infected and start to drain. In stage 3, all signs and symptoms are amplified, and there is associated formation of granulation tissue and lateral nail fold hypertrophy.

There are many options for the treatment of ingrowing toenail, ranging from simple conservative approaches to relatively extensive surgical procedures requiring considerable surgical experience [12]. Surgical management is time-consuming, demands a high level of patient cooperation and requires patience from both doctor and patient. Because of the intensive support necessary, it is not a cheap method of treatment [13, 14]. However, conservative treatment of ingrowing toenail can be successful, especially in patients with stage 1 disease [1, 2].

Stage 2 disease can be managed conservatively but recurrences are frequently seen [1, 2]. Stage 2 and 3 ingrowing toenails are best treated surgically [1, 2, 5, 15]. Several surgical procedures have been described for the treatment of ingrowing toenails. The majority have a moderate success rate and significant morbidity, as manifested by patient discomfort and missed working days.

The proximolateral matrix partial excision in the treatment of ingrowing toenail achieves the lowest recurrence rate and provides the best cosmetic outcome. We chose this technique as it is more invasive than simple partial nail avulsion and easier to perform than wide wedge excision. Also, excising the lateral and proximolateral matrices, in addition to avulsing the nail may further reduce the recurrence rate.

Materials and Methods

This study was conducted in Govt. Bone and Joints Hospital, Barzulla an associated Hospital of Govt. Medical College Srinagar for the period of one year from January 2019 to December 2022. In this study a total of 60 patients with ingrowing toenail were enrolled, who were managed with proximolateral matrix partial excision. The inclusion criteria were any patient aged 16-50 with stage II or stage III ingrown toenail and patients willing to participate in this study. Patients with vascular disease were excluded, diabetes mellitus were excluded, having wound healing disorders and to have had previous ingrown nail surgery. Demographic characteristics, healing times, recurrences, pain scores were recorded. Patients who had infected ingrown toenails were initially treated by antibiotics.

Surgical technique

A nail elevator was inserted under the ingrown lateral strip of the nail to free it from the nail bed and then from the over lying proximal nail fold. The plate was cut straight back to the cuticle and under the nail fold to the proximal end of the matrix. An oblique incision was made at the junction of the proximal and distal nail folds, and the folds were reflected allowing the deep part of the lateral matrix to be seen. When the nail strip was taken out, the nail edge very often shows a sharp spike resulting from the improper nail cutting of the patient. The matrix horn with about 2mm of the adjacent nail bed was meticulously dissected from the bone. The little wound was left open, but the nail walls were brought together either by simple stitches or suture strips. We insert small tapered antibiotic tablets into the wound cavity that also contain lidocaine (Leukase Kegel) both for local antibiotic treatment, to reduce postoperative pain and above all to keep the space open to allow the wound secretion to escape. A padded dressing with an antibiotic ointment finishes the intervention.

The patient was asked to elevate the foot for 24 to 48 hours. Patients were advised to take acetaminophen when they had pain. The patients were evaluated 1 day, 1 week, 1 month, 3 months and 6 months after the surgery. All patients were followed up for a minimum of 6 months. Presence of pain, infection and drainage was investigated at the 6-week follow-up. Recovery time was accepted when improvement of edema in the toe, loss of inflammatory changes, and epithelization in the wedge resection were observed and patients were able to wear their usual shoes. Repeating ingrown nails, painful nail edge dystrophies. Patients' satisfaction with the general appearance of their nails was investigated at the 6-month follow-up. Visual analog scale (VAS) was used for pain evaluation.

Results

In this study the mean age of the patients was 26.6 (range 19-47) years. There were 41 (68%) male patients and 19 (32%) females in this study. 36 (60%) patients presented with stage II toenail and 24 (40%) patients with grade III.

The healing time and recurrence were the primary indicators described before. In this study we did not record any postoperative complications or complaints about the cosmetic outcome. The mean healing period was 9.2 (6-15) days. There were only 2 recurrence of ingrown toenail, observed 6 months after treatment. The success rate after 6 months was thus 97%.

Table 1: Outcome measurements

Healing time (Mean/range)	9.2 days	6-15 days
Recurrence rate (NO./%)	2	3
VAS score (Mean/Range)		
1 day	1.8	1-3
1-Week	0.5	0-2

Discussion

Nail plate which causes ingrown nails develops from the nail matrix due to a process called onychokeratinization. The matrix consists of 2 cell layers. The lower layer is the basal compartment, which contains germinative cells. The plate which grows here and extends to the distal adheres tightly to the nail bed beneath [16]. Unfitting footwear and improper cutting of the nail destructs the lateral nail fold. With continuous toe movements, nail spicules are formed. The lateral nail fold is punctured with spicules, which move like foreign objects by burying themselves in the lateral nail fold [17].

Mild erythema, edema, sensitivity, and pain along the lateral nail bed can be observed in early stages. This stage is called the inflammatory stage, in which success can be achieved with conservative treatments. With increasing erythema, edema, sensitivity, and pain, infection manifests itself. Protuberance develops on the lateral nail fold and nail plate, and with drainage development, the abscess stage follows. Granulation tissue covers the lateral nail fold preventing drainage. In this stage, the granulation stage, the epithelium begins to spread over the granulation tissue l [17]. Successful results can be obtained with conservative treatment during the inflammatory stage and at the beginning of the abscess stage of ingrown nails. Treatment can be applied with appropriate foot care and correct nail cutting, systemic antibiotic use, and by lifting the lateral nail edge with cotton, acrylic balls, or nail splints [17].

Surgical treatment is the best option available for stage 2 or 3 ingrown nails, as conservative approaches have high rates of failure and recurrence. Many surgical techniques have been proposed. Conventional surgical treatment of ingrown toenails has been associated with an unacceptably high recurrence rate, substantial postoperative pain, and poor cosmetic results [13, 18]. Simple nail edge excision has a recurrence rate of 39% [13, 19] and total nail avulsion has a recurrence rate of 83%, [20, 21] whereas soft tissue resection has a cure rate of 60% [5]. The reported recurrence rate after wedge resection ranges from 12% to 30% [3, 12].

Total nail bed ablation using the Zadik procedure is associated with considerable postoperative pain and recurrence rates ranging from 16% to 28% [22]. More-over, patients, particularly young women, often object to the inadequate cosmetic results [13]. Cryotherapy is associated with a high recurrence rate (36%) [23]. Newer methods of segmental nail bed ablation, including

electrodessication, sodium hydroxide treatment, negative galvanic current therapy, and carbon dioxide laser treatment, provide good results, but are more expensive than phenol ablation [24-28]. Excision of the proximolateral matrix segment is effective, and cure rates exceeding 95% have been reported, but this technique is technically difficult, and the associated over aggressive bone destruction can lead to osseous infection and complications [29]; however, if the technique is performed correctly, the risk of complications is very low. None of the patients in our study had evidence of osseous infection during follow-up, nor did any need analgesics beyond postoperative day 3.

In this study we obtained a 97% success rate. We believe that our technique, using several treatments in a single procedure, ranks as one of the best for preventing recurrence and achieving a high success rate. We did not have a control group, however. Controlled studies comparing our technique with others are needed to determine which is most efficacious.

Conclusion

Proximolateral matrix partial excision for the treatment of ingrown toenails is highly effective and the treatment of choice at our clinic because of its high success rate. We believe that the surgical technique is the most important determinant of the success rate. Removing a sufficient width of nail (3 mm) and appropriate curettage after proximolateral matrix excision are the most critical factors for avoiding nail spicules in the sulcus or under the eponychium.

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