

# Partial Matricectomy and Foldplasty for the Management of Ingrown Toenails: Surgical Technique

## Tırnak Batması Tedavisinde Kısmi Matrisektomi ve Foldplasti

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**ABSTRACT** Ingrown toenails are common and lead to significant morbidity. Many treatment modalities of ingrown toenails are reported in the literature, often associated with unacceptable high recurrence rates. This retrospective study aimed to evaluate our new surgical technique of partial matricectomy and foldplasty for the management of ingrown toenails with a low recurrence rate. Sixteen patients with 18 ingrown toenails were included in this study. The presenting complaints were pain, foul-smelling discharge, deformity, and difficulty in walking. Four patients had an infectious process. The infected cases were treated with antibiotics prior to surgery. Partial matricectomy and foldplasty were performed in 18 ingrown toenails. Postoperative recurrence rate, local infection rate, neurovascular complications (such as numbness), immobilization periods and patient satisfaction for the cosmetic results were evaluated. The mean follow up period was 24 months (20-26 months). Recurrence was noted in one patient (5.5%) within four months. This patient was re-operated and had no relapses afterwards. None of the patients had local infection or neurovascular complications. The cosmetic appearance of the nail did not cause any dissatisfaction in the patients treated with this procedure. All patients returned to their daily life one day after the operation.

**Key Words:** Nails; surgery

**ÖZET** Tırnak batması sık görülen bir rahatsızlıktır ve ciddi morbiditeye sebep olmaktadır. Literatürde tırnak batmasına ilişkin birçok çalışma mevcuttur ve sıklıkla kabul edilemeyecek düzeyde rekürrens hızları bildirilmektedir. Bu retrospektif çalışma ile tırnak batması tedavisinde düşük rekürrens gösteren yeni cerrahi tekniğimiz kısmi matrisektomi ve foldplastinin değerlendirilmesi hedeflenmektedir. Bu çalışmaya 16 hastada toplam 18 tırnak batma vakası dahil edilmiştir. Başvuru yakınmaları ağrı, kötü kokulu akıntı, deformite ve yürümede zorlanma idi. Hastaların dördünde enfeksiyon süreci mevcuttu ve bu hastalar antibiotik ile tedavi edildi. On sekiz tırnak batma vakasının her birine kısmi matrisektomi ve foldplasti ameliyatı yapıldı. Olgularda postoperatif rekürrens ve lokal enfeksiyon hızları, nörovasküler komplikasyonlar, immobilizasyon periyodu ve kozmetik açıdan hasta tatmini gibi veriler irdelendi. Ortalama takip süresi 24 aydı (20-26 ay). Dört ay içerisinde rekürrens sadece bir olguda (%5,5) görüldü. Bu hasta tekrar ameliyat edildi ve daha sonra tırnak batması tekrarlamadı. Hastaların hiçbirinde lokal enfeksiyon veya nörovasküler komplikasyon gelişmedi. Bu yöntem ile tedavi, hastaların hiç birinde tırnağın kozmetik görünümü ile ilgili memnuniyetsizliğe sebep olmadı. Tüm hastalar operasyondan bir gün sonra günlük aktivitelerine döndüler.

**Anahtar Kelimeler:** Tırnaklar; cerrahi

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**I**ngrown toenail, also known as onychocryptosis, is a result of growing of the nail into the lateral nail fold. Ingrowing toenails, common in healthy children and young adults, cause severe discomfort, disability, and absences from school and work. Among young adults, the most common

causes are poor-fitting shoes, obesity, high-heeled footwear, and improper nail trimming. It is more common in males in their second and third decades, and the lateral fold of the hallux is affected more. It becomes difficult for a patient to walk and subsequently it impairs the quality of life. It is usually considered to be a minor surgical condition but can be a source of great discomfort.

Heifetz and Mogensen classified the severity of ingrown toenails into three stages according to signs and symptoms. Treatment recommendations were made for every stage of this classification system.<sup>1</sup> Stage I, indicates swelling and erythema at the nail fold, Stage II indicates acute and active infection, Stage III indicates chronic inflammation with granulation tissue neighbouring the nail fold.

Severe cases of ingrown nails (stages 2-3) are usually resistant to conservative therapy, and surgical therapy is preferred.

Many treatment modalities of ingrown toenails are reported in the literature, often associated with unacceptable high recurrence rates. Among procedures commonly used are debridement of the lateral nail groove or trimming of the lateral edge of the nail plate; incision and drainage of an abscess of the lateral nail fold; nail plate avulsion (partial or complete); wedge excision of the lateral nail fold; partial nail matricectomy; complete matricectomy; and radical excision (Syme procedure). The first three methods are most commonly used surgical approaches. However, all these methods tend to have high recurrence rates.<sup>2</sup> This retrospective study was aimed to evaluate our new surgical technique of partial matricectomy and foldplasty for the management of ingrown toenails that has a low recurrence rate.

## PATIENTS AND METHODS

Sixteen patients with 18 severe ingrown toenails, 12 males and four females aged 13 to 65 years; mean age 30, were included in this study (Table 1). They were referred to our clinic between January 2005 and August 2008. The presenting complaints were pain, foul-smelling discharge, deformity, and difficulty in walking. Four patients had an infectious process. The patients with active infection were treated with

**TABLE 1:** 16 patients with 18 ingrown toenails were treated in this study.

No	Age and sex	Effectuated nail	Result	Pre-op morbidities and post-op problems
1	23,M	Right	Good	-
2	65,F	Right	Good	Infection (preoperative)
3	13,M	Bilateral	Good	-
4	27,M	Left	Recurrence	Incomplete matrix destruction
5	32,F	Left	Good	-
6	30,M	Right	Good	-
7	45,F	Right	Good	Infection (pre-op), DM +
8	21,M	Bilateral	Good	-
9	38,M	Left	Good	-Infection (preop)
10	19,M	Right	Good	-
11	28,F	Left	Good	-
12	37,M	Right	Good	-Infection (pre-op)
13	27,M	Right	Good	-
14	29,M	Right	Good	-
15	34,M	Right	Good	-
16	17,M	Right	Good	-

F: Female, M: Male.

an antibiotic regimen (Sodium Fusidic Acid 1500 mg/day, Stafine™; Koçak Farma, Üsküdar, İstanbul, Türkiye) for five days. One patient had a history of diabetes which was under control. Patients with pincer nails or other types of dystrophic nails were not included in the study. The patients without active drainage were selected to undergo surgery.

All male patients were playing football regularly and ingrown nails were mostly observed on the right feet.

Partial matricectomy and foldplasty was performed in 18 ingrown toenails. Postoperative recurrence rate, local infection rate, neurovascular complications, immobilization periods and patient satisfaction for the cosmetic results were evaluated. The mean follow up period was 24 months (20-26 months).

## SURGICAL TECHNIQUE

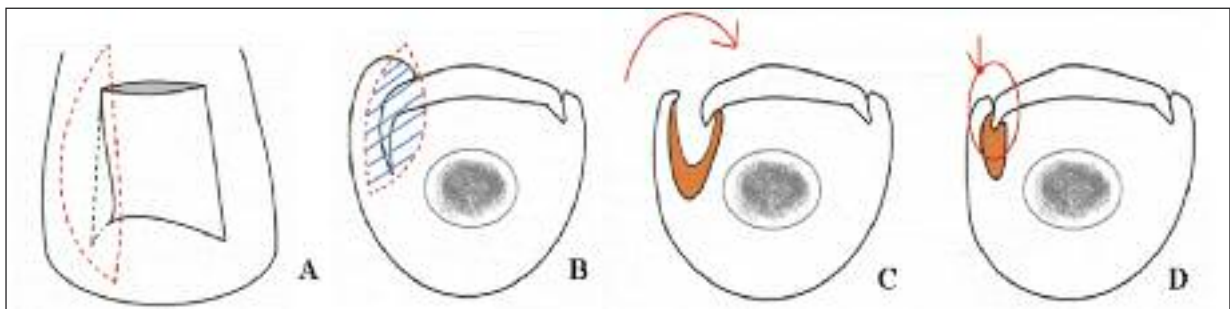
All patients were treated with the same surgical protocol under local anesthesia in the outpatient clinic. A standard digital block was performed with 1% levobupivacaine (Chirocaine™; Abbott. Scandinavia AB, Solna, Sweden) without epinephrine.

The toe and the neighbouring area were disinfected with povidone-iodine solution. A digital tourniquet was applied at the toe base to stop any bleeding during surgery. The nail plate was then cut longitudinally about one-fifth to one-fourth of the distance from its lateral margin with a No:15 blade. The lateral strip of the nail was then freed from the nail bed and nail matrix, and all the hypertrophic tissues were excised with an elliptically. The inner nail plate and nail matrix below the proximal nail fold were scraped off with a blade. With excision of the granulation tissue and the hypertrophic fold, we obtained a thin fold that could easily be inserted underneath the nail plate (Figure 1 and 2). It is important to excise the soft tissue more than the nail plate and nail matrix. This gives a more anatomical and better cosmetic result with less pain. After the incision of the hypertrophic fold, the tourniquet was released to check and perform the hemostasis. The fold was then sutured underneath the nail plate with simple interrupted 3-0 prolene sutures which were removed 10 days later. Com-

pression was applied on the toe with a Coban™ cohesive bandage (3M, St Paul, Minnesota). Non-steroid anti-inflammatory drugs, elevation and antibiotics were prescribed after surgery. The dressings were not removed until postoperative fifth day. The follow-up period was 24 months (range 20 to 26 months).

## RESULTS

Using this procedure, 17 out of 18 (94.4%) nails were successfully treated. There were no intra-operative surgical complications. The whole procedure took approximately 15-20 minutes. None of our patients had local infection after surgery. Almost all patients were free of pain after 10 days and were able to wear usual shoes. Furthermore, all patients were back to their work in the postoperative first day. Recurrence was seen in one patient (5.5%) within four months due to inadequate deep nail matrix destruction. This patient was re-operated and had no relapse afterwards. All patients were considered to be cured and no additional surgical



**FIGURE 1:** The procedure used in this study. A. Ingrown toenail and incision line of partial matricectomy. Note that the nail plate and the nail matrix are minimally excised B. Excision of ingrown nail and hypertrophic fold. The fold is excised extensively to obtain a thin margin which can be inserted under the nail. C. Foldplasty after the excision D. A simple suture inserted through the fold and the normal nail plate.



**FIGURE 2:** Unilaterally ingrown nail. A. Preoperative ingrown nail. B. Unilateral approach. Note the minimal excision of the nail and nail matrix. C. Uppermost is the ingrown nail. The middle one is the nail matrix. The piece at the bottom is the periosteum. D. Postoperative 4th month.



**FIGURE 3:** A case with an ingrown toenail. A. Preoperative B. Lateral matricectomy after tourniquet application C. Medial excision of the nail matrix D. Early post-operative view.

interventions were necessary. There were no post-operative nail dystrophies. This technique was used with 100% satisfaction rate.

## DISCUSSION

Ingrown toenail is a common disorder that affects the daily life. Among the causative factors are poor-fitting shoes, obesity, high-heeled footwear, and improper nail trimming. We observed that ingrown nails mostly occurred in right handed male patients (male to female ratio is 4:1, however it is reported as 2:1 in the literature). In addition, surprisingly all male patients had a history of repetitive trauma (regularly playing football). Therefore, according to our study, trauma is the main etiological factor of ingrown toenail in men. Another reason is that pedicure is not as common in men as it is in women.

Almost all medical specialties including general practitioners, orthopedics, dermatologists and plastic surgeons are involved in the treatment of this problem. This is why there is no defined consensus on the best operative procedure to treat an ingrown toenail.

Many treatment modalities of ingrown toenails are reported in the literature, often associated with unacceptable high recurrence rates. Non-surgical methods are generally based on the use of various devices (such as curettes) which are valid only in stage 1 disease. Surgery is needed in stage 2 and 3 ingrown nails.

Surgical procedures may be listed as debridement of the lateral nail groove or trimming of the lateral edge of the nail plate, incision and drainage of an abscess of the lateral nail fold, nail plate avul-



**FIGURE 4:** A. Preoperative view of a case with an ingrown toenail. B. Post-operative view of the nail-fold relation on 20th month. There is no sign of recurrence with a good cosmetic result.

sion (partial or complete), wedge excision of the lateral nail fold, partial nail matricectomy, complete matricectomy and radical excision (Syme procedure). The first three methods are the most commonly used surgical approaches. However, all of them tend to have high recurrence rates.<sup>2</sup>

The surgical approach used in this study was successful to treat severe cases of ingrown nail. There is no consensus as to the best surgical technique for treatment of ingrown toenails. Surgical techniques can target the nail, the fold, or both, as we did in this study. Partial excision of the matrix with surgical procedures seems to be more advantageous than chemical ablation agents. Incomplete excision or destruction of the lateral germinal matrix results in postoperative spicule formation and recurrence. The reported recurrence rates after lateral matricectomy vary from 5% to 40.7%.<sup>3,4</sup> Partial matricectomy (in Winograd technique) has a recurrence rate of 6% which needs 48 hours of feet elevation and not wearing shoes for 5-7 days.<sup>5</sup> There was only one recurrence in our study (5.5%) which was a result of incomplete destruction of the germinal ma-

trix. So if partial matricectomy could be done completely, the recurrence rates could be much lower.

We excise mostly the hypertrophic fold and the granulation tissue. Excision of the nail plate and nail matrix is minimum. By thinning the fold, we are enabled to insert it under the nail plate and suture it to the nail. This provides minimum pain with the maximum cosmetic and anatomic outcome. In case of bilaterally ingrown nails, the procedure can be applied bilaterally. Bilateral approach is performed to obtain a better cosmetic result and to prevent the possible recurrence of the ingrown nail (Figure 3). Unilateral method can be chosen if a bilateral intervention is not required, depending on the surgeon's choice.

The nail to soft tissue proportion is highly achieved. The high satisfaction rate shows us the suc-

cess of this procedure (Figure 4). Furthermore, in this technique, patients do not have a problem such as wound dressing which remains unchanged until postoperative fifth day and return to normal life the day after surgery.

Disposing the necessity for any special instrument or chemical ablative agent are the main advantages of this technique. Partial matricectomy and foldplasty can be easily learned and performed in a short period of time. It has low recurrence rates with high patient satisfaction, it is simple, inexpensive and it takes a short time to return to normal activities. In comparison with other techniques in the literature, this procedure is less complex and invasive than the others. Besides, it has a low incidence of recurrence and has good cosmetic results.

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