RESEARCH ARTICLE / *Araştırma Makalesi*

Retrospective Comparison of Matricectomy and Electrocauterization in the Treatment of Ingrown Toenail

Batan Ayak Tırnağı Tedavisinde Matrisektomi ve Elektro-koterizasyonun Retrospektif Karşılaştırılması

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Abstract

Objective	Although ingrown toenails are a common health problem, there is no consensus about a standard first-choice treatment. Different non-surgical and surgical interventions for ingrown toenails are available. Our aim was to compare two surgical treatment methods for ingrown toenails; matricectomy with electrocauterization (ME) and surgical matricectomy (SM).
Materials and Methods	A total of 111 patients with ingrown toenail were randomized into two groups: surgical matricectomy and matricectomy with electrocauterization. All cases were evaluated 1 day, 1 week, 3 and 6 months after treatment. Recurrence rates, visual analog scale (VAS) scores were compared.
Results	Postoperative 1st day mean VAS score in ME group was higher than SM group (1.94 vs 0.93), and our result was statistically significant, but there was no difference in 8th day VAS scores. Mean recurrence rate was higher in ME group compared to SM group (33.96% vs 1.72%) and this result was also statistically significant.
Conclusion	SM is more effective method compared to ME method in terms of postoperative pain and recurrence in the treatment of ingrown toenail.
Keywords	Ingrown Toenail; Matricectomy; Treatment

Öz

Amaç	*Batık ayak tırnakları yaygın bir sağlık problemi olmasına rağmen, standart birinci seçenek tedavi konusunda fikir birliği yoktur. Batık ayak tırnakları için farklı cerrahi olmayan ve cerrahi müdahaleler mevcuttur. Amacımız batık ayak tırnaklarında iki cerrahi tedavi yöntemini karşılaştırmaktı; elektro-koterizasyonlu matrisektomi (EKM) ve cerrahi matrisektomi (CM).*
Gereç ve Yöntemler	*Ayak tırnağı batmış toplam 111 hasta randomize olarak iki gruba ayrıldı: cerrahi matrisektomi ve elektro-koterizasyonlu matrisektomi. Tüm olgular tedaviden 1 gün, 1 hafta, 3 ve 6 ay sonra değerlendirildi. Nüks oranları, görsel analog skala (GAS) skorları karşılaştırıldı.*
Bulgular	*ME grubunda postoperatif 1. gün ortalama GAS skoru SM grubundan daha yüksekti (1.94'e karşı 0.93), ve istatiksel olarak anlamlıydı, ancak 8. gün VAS skorlarında fark yoktu. Ortalama nüks oranı ME grubunda SM grubuna göre daha yüksekti (% 33.96'ya karşı % 1.72), ve bu sonucumuza istatiksel olarak anlamlıydı.*
Sonuç	*SM, batık ayak tırnağının tedavisinde postoperatif ağrı ve nüks açısından ME yöntemine göre daha etkili bir yöntemdir.*
Anahtar Kelimeler	*Tırnak Batması; Matrisektomi; Tedavi*

INTRODUCTION

An ingrown toenail is a common nail disorder causing discomfort and morbidity. Patients usually present with pain, drainage, infection, difficulty in walking, and discomfort.[1-4]

The etiological factors are various and include poor foot hygiene, improper nail trimming, genetic factors, inadequately fitting shoes, pregnancy, obesity, direct trauma to the toe or nail, fungal infections of the nail are some of the reasons.[5-9]

Three clinical stages of this entity have been described by Heifetz.[10] Stage 1 ingrown toenail, characterized by erythema, slight edema, and pain with pressure to the lateral nail fold. Stage 2 ingrown toenail marked increased symptoms, drainage and infection. Stage 3 ingrown toenail, magnified symptoms, granulation tissue, and lateral nail-fold hypertrophy.

Treatment techniques can be divided into two categories: non-surgical and surgical interventions.[11] Currently many surgical interventions for treating ingrown toenail have been described such as nail avulsion, wedge excision, reduction and removal of the lateral nail fold, excision of the nail bed, amputation of the tip of the toe, surgical segmental matrix excision, and segmental matrix horn cauterization using phenol, sodium hydroxide, and trichloroacetic acid.[12,13] Conservative treatment includes methods to protect the lateral nail fold from the offending distal nail edge. In the context of conservative treatment taping, packing with cotton or dental floss, gutter treatment, or nail braces or similar devices are available, but these treatment methods require excellent patient compliance.[2,12,13] Partial or complete nail avulsion is successful in treatment of the disease only 30% of patients.[14,15] Incision of nail matrix and nail fold was first described by Winogard in 1936. This procedure describes partial D-excision of the nail, nail fold, matrix and nail plate with granulation tissue. Surgical intervention is generally recommended for stage 2 and 3 diseases, and the optimal surgical therapy for ingrown toenail is still controversial.[1,3,12,16-19] The main objective of this study was to compare the two methods of surgical matricectomy (SM) and matricectomy with electrocauterization (ME), particularly in terms of recurrence and postoperative pain.

MATERIALS and METHODS

Our prognostic cohort study included a total of 111 patients with ingrown toenails at Sakarya University Training and Research Hospital between June 2018 and December 2018. Ingrown toenail approaches of two different general surgeons were compared in this study (one surgeon, surgical matricectomy and the other matricectomy via electrocauterization). Our study complied with research and publication ethics. Informed consent was obtained from all patients included in the study. Ethics committee approval of this study was obtained from Sakarya University Ethics Committee (Ethics Committee number:71522473/050.01.04/82 date: 02/10/2019-E.12315). Patients were assigned into one of the two groups according to their hospital protocol number (odd numbers as SM group (n=58) and dual numbers as ME group (n=53)). Patients were staged according to Heifetz's staging system.[5] Fifty-seven patients were stage III, 54 patients were stage II. The selection criteria included any patient aged 16-50 with stage II or stage III ingrown toenail admitted to the General Surgery Clinic of Sakarya University Education and Research Hospital.

Demographic characteristics, healing times, recurrences, pain scores were recorded, and 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 with a mean follow up period of 22 months. Visual analog scale (VAS) was used for pain evaluation. Patients who had infected ingrown toenails were initially treated by antibiotics.

Surgical technique

All patients were treated with the same surgeons and with the same surgical procedures. The toe and nearby area were disinfected with povidone-iodine solution. Digital ring block was performed with 1% lidocaine without epinephrine (Figure 1). A tourniquet was applied at the base of the toe to ensure hemostasis. A vertical incision was made along the effected side of the nail. Incision line has been extended up to 4-5 mm above the nail-skin border including nail bed.

Figure 1. Ring block of the toe

For SM group, starting from the upper end of the nail fold an oblique incision performed to remove nail fold, nail matrix and granulation tissue. The white colored germinal matrix at the lateral fold and over the distal phalanx completely excised (Figure 2).

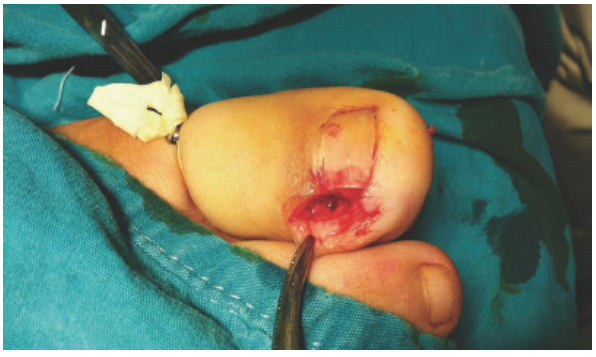

Figure 2. Excision of nail matrix

For ME group, no nail fold was removed just the nail matrix was destructed with electrocautery and effected side nail was removed. Flat electrode was placed over the matrix where the nail plate has been removed. About 30 W of electrocoagulation current was applied for 3 to 8 seconds since a white appearance of nail matrix was detected (Figure 3).

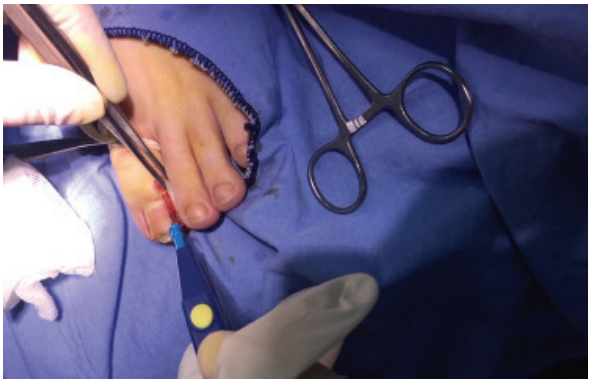

Figure 3. Nail matrix destruction with electrocautery

The defects were not closed with sutures in both groups. The tourniquet was released and a compression bandage with antibiotic ointment was applied to the patient's toe. On the second day this bandage was removed, a simple dressing with povidone-iodine was used. The dressing was changed daily for 10 days. Patients were called on the first and eighth day after the surgery and other follows were made with telephone questionnaire or with direct reference.

Descriptive analyses were performed to provide information on general characteristics of the study population. Kolmogorov-Smirnov test was used to evaluate whether the distributions of numerical variables were normal. Accordingly, Kruskal Wallis test were used to compare the numeric variables. Mann Whitney U test were used to compare the numeric variables between two groups. The numeric variables were presented as mean standard deviation. Categorical variables were compared by Chi-Square test. Categorical variables were presented as a count and percentage. A p-value <0.05 was considered significant.

Analyses were performed using SPSS statistical software (IBM SPSS Statistics, Version 23.0. Armonk, NY: IBM Corp.).

RESULTS

Seventy of patients were (63.06%) male and 41 (36.94%) were female and mean age was 24.36 ±1.56 years. Demographic characteristics of patients in groups were shown in table 1. Frequency of ingrown toenail in males was more common. There was no intra-operative surgical complication. None of the patients developed postoperative complications such as neurovascular, or deep tissue infection. Postoperative first day mean VAS scores were significantly higher for ME group compared to SM group (1.94 vs 0.93, <0,001) (Table 2). The wounds were checked on the first and the eighth days postoperatively. There was 1 recurrence in SM group (1.72 %) and 18 recurrences in ME group (33.96 %) and this difference was statistically significant (Table 2).

Table 1. Demographic characteristics of Surgical Matricectomy and Matricectomy with electrocauterization group

Parameters	SM group (n=58)	ME group (n=53)
Age	24,57 ± 1.58	24,13 ± 2.53
Sex, n (%) (41 F, 70 M)		
Male	36 (62.06%)	34 (64.20%)
Female	22 (37.94%)	19 (35.80%)
Grade, n (%)		
2	29 (50.00%)	27 (50.94%)
3	29 (50.00%)	26 (49.06%)

SM: Surgical Matricettomy, ME; matricectomy via electrocauterization,

Table 2. Comparison of Surgical Matricectomy and Matricectomy via Electrocauterization group in terms of pain duration and recurrence rates

	SM group (n=58)	ME group (n=53)	p
Mean VAS score, 1st day	0.93	1.94	<0,001
Mean VAS score, 8th day	0.83	0.91	0,101
Recurrence rate	1 (1.72%)	18 (33.96%)	<0.001

SM: Surgical Matricectomy, ME: Matricectomy via Electrocauterization, VAS: visual analog scale

DISCUSSION

Ingrown toenail is an important soft tissue disease that discomforts patients in their daily lives. Young adults mostly affected, but it may affect every age range.[5,9,20] In our study, the mean age of the affected patients was 24.36 ±1.56 years and it was found to be compatible with literature.

There is still no consensus on the best technique to threat ingrown toenail. Surgical or conservative therapies are available.[21,22] In the technique of Winograd the recurrence rates of this technique was reported to be 1.7% - 27%.23-26 One of our most important findings at this point is that the recurrence rate in the SM group was 1.72% which was significantly different from ME group. It is also important to completely and reliably remove the ingrown nail to avoid recurrence. The significant decrease in the recurrence rate in the SM group may be due to the fact that electrocautery cannot produce sufficient destruction in the nail matrix.

Surgical therapy with phenol treatment is reported to be more effective than other invasive surgical procedures.[27] Damaging the surrounding tissues thus delayed postoperative healing is the main disadvantage of phenol usage.[28-30] Almost the same therapeutic results have been obtained with laser matricectomy, but it is too expensive.[10,31] When VAS scores were evaluated on the first postoperative day, we think that inflammation in the nail matrix induced by electrocauterization caused an increase in the VAS score. Neither phenol, electrocautery, nor laser matricectomy can perform a sharp confined matricectomy and may cause uncontrolled damage to surrounding tissues in a confined space. In this context, SM stands out in the treatment of ingrown toenail.

Although many techniques described recurrences in ingrown toenail, the rate remains almost the same. We believe that surgical skills and training are important factors. We had 1.72% recurrence at SM group and 33.96% recurrence at ME group. Optimal visualization of nail matrix is important and while cauterization of the matrix

to distinguish cauterized and non-cauterized areas may avoid recurrences. Some authors described techniques for visualizing the nail matrix.[32-34] Even we retracted the nail fold to visualize the nail matrix, difficulties to understand enough penetration of electrocauterization to the nail matrix might cause higher recurrence rates at the ME group.

As a result, ingrown toenails can easily be treated with surgical and non-surgical techniques. Applying technique must be selected due to patient's stage. We recommend SM with partial nail avulsion as a treatment of stage 2-3 ingrown toenails.

Conflict of Interest

None

Ethics Committee Approval

Sakarya University non-interventional ethics committee approval number:71522473/050.01.04/82 date: 02/10/2019-E.12315

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