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A Comparison of Curettage Only and Curettage with Electrocautery after Partial Matrixectomy for Ingrowing Toenail

Tırnak Batması Cerrahisinde Parsiyel Matrisektomi Sonrası Sadece Küretaj Yöntemi ile Küretaj ve Elektrokoterin Birlikte Kullanıldığı Yöntemin Karşılaştırılması

Ali Şişman[1], Rıdvan Öner[1], Özgür Avci[2], Serdar Kamil Çepni[3]

[1]Adnan Menderes University Faculty of Medicine, Department of Orthopaedic and Traumatology, Aydın, Turkey·
[2]Tavsanlı State Hospital, Department of Orthopaedic and Traumatology, Kütahya, Turkey·
[3]Health Sciences University Umraniye Training and Research Hospital, Department of Orthopaedic and Traumatology, Istanbul, Turkey

Abstract

Aim: Ingrowing toenail is a very common disease which causes workforce losses. Although different techniques have been described in surgical treatment, one of the most frequently preferred methods is partial matrixectomy. The aim of this study was to compare the two techniques of curettage only and curettage together with electrocautery(C&E) used in addition to partial matrixectomy in ingrowing toenail surgery.

Material and Method: Patients who were operated for ingrown nails between 2018 and 2022 were evaluated retrospectively. Two groups were formed of 43 patients applied with curettage only and 35 patients applied with C&E. The groups were compared in respect of operating time, postoperative complications and clinical results.

Results: No significant difference was determined between the groups in respect of age, gender, affected side, classification, follow-up time, surgical duration and recovery time. Recurrence rate was higher in the curettage group (p=0.020) It occurred in 9 (20.9%) cases in the curettage group, while it occurred in 1 (2.9%) case in the C&E group. In the curettage group, the duration of erythema was observed to be significantly longer (p<0.001) and there was a need for more dressings (p<0.001). In the C&E group, serous exudate was seen for a longer period (p=0,007).

Conclusion: The disadvantages of curettage applied in addition to partial matrixectomy in ingrown toenail surgery are, a higher rate of recurrence, longer duration of erythema, need for more dressings while the disadvantage of C&E is the longer duration of serous exudate. In respect of infection rates and time to recovery, no difference was determined between the two techniques.

Keywords: ingrown nail, matrixectomy, currettage, electrocautery

Öz

Amaç: Tırnak batması iş gücü kayıplarına neden olan çok yaygın bir hastalıktır. Cerrahi tedavide farklı teknikler tanımlanmış olsa da en sık tercih edilen yöntemlerden biri parsiyel matriksektomidir. Bu çalışmanın amacı; tırnak batması cerrahisinde parsiyel matriksektomiye ek olarak kullanılan sadece küretaj tekniği ile küretaj ve elektrokoterin (C&E) birlikte kullanıldığı tekniği karşılaştırmaktır.

Gereç ve Yöntem: Bu retrospektif çalışmada 2018-2022 yılları arasında tırnak batması nedeniyle ameliyat edilen olgular değerlendirildi. Sadece küretaj uygulanan 43 olgu ve C&E uygulanan 35 olgu çalışmaya dahil edilerek iki grup oluşturuldu. Gruplar; operasyon süresi, operasyon sonrası komplikasyonlar ve klinik sonuçlar açısından karşılaştırıldı.

Bulgular: Gruplar arasında yaş, cinsiyet, etkilenen taraf, batık ayak tırnağı sınıflandırması, takip süresi, ameliyat süresi ve iyileşme süresi açısından fark saptanmadı.. Küretaj grubunda nüks oranı daha yüksekti. (p=0,020) Küretaj grubunda 9 (%20,9), C&E grubunda 1 (%2,9) olguda nüks görüldü. Küretaj grubunda eritem süresinin daha uzun olduğu (p<0.001) ve daha fazla pansuman ihtiyacı olduğu görüldü (p<0.001). C&E grubunda daha uzun süre seröz eksüda görüldü (p=0,007). Takip süresince hiçbir olguda enfeksiyon saptanmadı.

Sonuç: Bu çalışmaya göre; tırnak batması cerrahisinde parsiyel matriksektomiye ek olarak uygulanan küretajın dezavantajları daha yüksek nüks oranı, daha uzun eritem süresi ve daha fazla pansuman ihtiyacı olması iken C&E'nin dezavantajı daha uzun süre seröz eksüda görülmesidir. Enfeksiyon oranları ve iyileşme süresi açısından iki teknik arasında fark yoktur.

Anahtar Kelimeler: Tırnak batması, matrisektomi, küretaj, elektrokoter

Corresponding *(İletişim)*: Özgür Avci, MD, Tavsanlı State Hospital, Department of Orthopaedic and Traumatology, 34764, Kütahya, Turkey
E-mail *(E-posta)*: zgravc88@gmail.com
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INTRODUCTION

Ingrowing toenail is one of the most frequently seen foot problems.[1] As a result of the nail plate growing towards the periungual skin, it is a disease in which problems such as pain, inflammation, and infection develop.[2] Treatment is generally planned according to the stage of the disease.[3] Techniques have been described such as the application of chemical substances to the nail bed,[4] partial excision of the nail bed,[5] and matrixectomy with carbon dioxide laser application.[6] One of the most widely used methods in current surgery is partial matrixectomy.[7] The main aim of this method is the removal of the germinal matrix. Various additional methods have been described for the removal of matrix remnants after matrixectomy, of which two often used methods are curettage and electrocautery.[8,9] Few publications have compared these two techniques.[10] No study could be found in literature that has compared the curettage only method with the method of curettage together with electrocautery (C&E). The aim of this study was to compare the results of the application of the curettage only technique and C&E after partial matrixectomy.

MATERIAL AND METHOD

Patient Selection

The study was carried out with the permission of Adnan Menderes University Non-interventional Clinical Researches Ethics Committee (Date: 02.08.2022, Decision No: E.210031). Informed consent was obtained from all patients. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

A retrospective examination was made of 116 cases who underwent surgery for ingrowing toenail between 2018-2020. The grading of the ingrowing toenails was made as described by Heifetz et al.[11] The cases included in the study were those who underwent partial matrixectomy because of ingrowing nail in the thumb. Those who were operated on due to ingrown nails other than the thumb (n=4), those who could not be followed (n=5), those who were operated on both the medial and lateral sides of the same nail (n=7), those who had their nail totally removed (n=11), those who were operated for recurrence (n=8) and those with diabetes (n=3) were excluded from the study.

Surgical Technique

Ingrowing toenail operations are applied in our clinic with the partial matrixectomy technique. Surgical treatment was applied to Stage 2 and Stage 3 ingrowing toenails. The two different techniques of curettage only or curettage together with electrocautery were used according to the preference of the surgeon. All the cases were operated on by the same surgeon.

Antibiotics of the amoxicillin-clavulonic acid group were administered for one week preoperatively at a dose appropriate to the age of the patient. The operation was performed on completion of the antibiotherapy. Surgery was applied to all the cases under digital block, for which 2% lidocaine was used. Following block anaesthesia and sterile draping, an elastic band tourniquet was applied to the toe.

After the routine preparation, a no. 15 scalpel was used to make a 5-8 milimeter vertical cut to the eponychium to be at the border of the nail resection. With the sharp side of the scalpel uppermost, the cut was made from the distal nail as far as the proximal germinal matrix border. Using a Freer elevator, the nail plate was dissected with blunt dissection to include the periostium. Sharp dissection was continued with a scalpel between the medial skin layers and the ingrowing toenail. The visalisation of fatty tissue was accepted as a sufficient margin. By raising in a wedge-shaped pattern from the distal, the germinal matrix was dissected as far as the proximal and removed. The remaining matrix tissues were excised with curettage to include the periostium. In patients to be applied with electrocautery, preparation was made in 35W coagulation mode, and the germinal matrix and nail bed were destroyed for 5-9 seconds, as described by Zuber et al.[12] Cautery was not applied to the medial flap and other regions. (**Figure 1**) After both methods, the wound was closed with nylon suture material. A 3/0 polypropylene suture was applied to the eponychium and the medial flap side. Postoperatively, amoxicillin-clavulonic acid group antibiotics were prescribed at a dose appropriate to the age and body weight of the patient and it was recommended to use it for one week.

Figure 1. Electrocautery after curettage

Postoperative Evaluation

Two groups were formed for this study as the curettage only group and the C&E group. The same clinical protocol was applied to all the patients in the postoperative follow-up period. In cases with no wound site problems, the sutures were removed on the 15th day. The patients were called for follow-up examination every day for the first 7 days, then every other day. They were advised to return to the

hospital immediately if the dressing was contaminated. After complete wound healing, follow-up examinations were made at 2, 6, and 12 months. After the first year, annual control was done. The healing criteria were defined as being able to wear shoes without pain and being able to perform daily living and work activities without experiencing pain. During the follow-up period, inward growth of the nail edge or the formation of spicula was evaluated as recurrence.

The two groups were compared in respect of operating times, and clinically, whether or not there was erythema around the wound when changing the dressings in the first 7 days, and if so, for how many days it lasted postoperatively. The presence of serous exudate was checked on the daily dressings in the first 7 days. After that time, evaluation was made according to patient presentation because of soiling of the dressing and it was noted for how many days it lasted after the operation. Comparisons were also made of how many dressing changes were required postoperatively, the time to healing, and recurrence rates at 6 and 12 months.

Statistical Analysis

Conformity of numerical variables to normal distribution was assessed with the Kolmogorov-Smirnov test. Independent groups were compared with the Mann Whitney U-test. Relationships between qualitative variables were examined with Chi-square analysis. Numerical variables were stated as median (25^{th}-75^{th} percentile) and categorical variables as number (n) and percentage (%). A value of $p<0.05$ was accepted as statistically significant.

RESULTS

The curettage group included 43 patients with a mean age of 22.06±8.82 years and the C&E group included 35 patients with a mean age of 21.22±8.03 years. No significant difference was determined between the groups in respect of age, gender, affected side, classification and follow-up time (0.932, p=1.000, p=0.911, p=1.000, p=0.394) (**Table 1**).

Table 1. Comparison of baseline parameters between groups.

	Group		p
	Curettage (n=43)	C&E (n=35)	
Age	22.06±8.82	21.22±8.03	0.932
Gender			
Male	18 (41.9)	14 (40)	1.000
Female	25 (58.1)	21 (60)	
Side			
Lateral	25 (58.1)	19 (54.3)	0.911
Medial	18 (41.9)	16 (45.7)	
Stage			
Stage 2	24 (55.8)	20 (57.1)	1.000
Stage 3	19 (44.2)	15 (42.9)	
Follow-up time (month)	27.23±8.07	25.57±9.02	0.394

Abbreviations: C&E, curettage together with electrocautery

The duration of surgery was determined to be mean 17.23±1.29 minutes in the curettage group and 17.35±1.48 minutes in the C&E group (p=0.800). Postoperatively, erythema was observed for mean 3.84±0.93 days in the curettage group and for mean 2.31±0.99 days in the C&E group (p<0.001). While serous exudate was observed for a mean of 3.81±1.42 days in the Curretage group, a mean of 4.40±1.12 days postoperatively in the C&E group (p=0,007). Dressings were required for mean 5.20±0.86 days in the curettage group and for mean 3.40±0.55 days in the C&E group (p<0.001). Recovery time was similar between groups (p=0.258). The mean recovery time was 15.39±2.70 days in the curettage group, while it was 15.18±2.84 days in the C&E group. Infection was not observed in any case during the follow-up period (**Table 2**).

Table 2. Comparison of clinical results between groups.

	Group		p
	Curettage (n=43)	C&E (n=35)	
Surgical duration (minute)	17.23±1.29	17.35±1.48	0.800
Erythema (day)	3.84±0.93	2.31±0.99	<0.001
Serous exudates (day)	3.81±1.42	4.40±1.12	0.007
Number of dressings	5.20±0.86	3.40±0.55	<0.001
Recovery time (day)	15.39±2.70	15.18±2.84	0.258
Recurrences			
Yes	9 (20.9)	1 (2.9)	0.020
No	34 (79.1)	34 (97.1)	

Abbreviations: C&E, curettage together with electrocautery

Recurrence was determined in 9 (20.9%) of the curettage group and in 1 (2.9%) of the C&E group (p=0. 0,020) (**Table 2**). The recurrence was determined at the 12-month postoperative follow-up examination. All the cases with recurrence were operated on with the protocol applied in the initial treatment. No chemical methods were used in addition to partial matrixectomy in any of the cases with recurrence.

DISCUSSION

There is no consensus in literature on the selection of treatment for ingrowing toenails. Partial or full nail avulsion is a widely used traditional treatment method.[14] However, as these procedures cannot completely eliminate the germinal matrix, they result in high recurrence rates.[15] Therefore, different techniques have been described in the surgical treatment of ingrowing toenails, which aim for a rapid recovery without damaging the soft tissue or increasing infection rates and that try to reduce recurrence rates by eliminating matrix remnants.[4,6,10,13,16-19] However, superiority of any one of these methods over another has not been clearly shown.

In this study, the results were compared of cases applied with curettage only in addition to partial matrixectomy and cases applied with curettage together with electrocautery after partial matrixectomy. We did not find any studies reporting the results of combining these two techniques. In literature there are few studies that have compared the applications of curettage only and electrocautery only after partial matrixectomy.[10,20] One of those studies by Ozan et al.[10] reported that no recurrence was seen in the electrocautery group, and in 2 cases in the group applied with curettage after

partial matrixectomy . Kim et al.[20] determined recurrence in 2 of 32 patients applied with curettage only after partial matrixectomy, and in 4 of 29 patients in the electrocautery group. Although recurrence was seen in both groups, it could not be shown which of the two methods was more advantageous for sole use. It was stated that curettage is an easy-to apply method which only requires simple equipment, but it may not be sufficient to completely remove the matrix.[20] In our study, we found that the recurrence rates were significantly reduced by comparing these two techniques.

It is known that recurrence rates increase when adequate matrix resection is not achieved with partial matrixectomy.[21,22] It can be thought that combining these two methods will reduce the probability of the matrix remaining. It is clear that the results of this study strengthen this view. It showed that recurrence was seen only in 9 cases in the curettage group and in 1 case in the C&E group. In other words, by combining the two techniques, more matrix destruction can be achieved and recurrence rates can be reduced. In addition, as seen in this study, there was no increase in the operation time with the combination of the two methods.

Successful results have been reported following chemical matrixectomy, which is another frequently used method in the treatment of ingrowing toenails.[13] There are also studies stating that phenolisation following partial matrixectomy is a safe method with low recurrence rates.[18] Misiac et al.[23] compared the application of phenol and cauterisation after partial matrixectomy and determined recurrence at the rate of 16% in the phenol group and 26% in the cauterisation group. Despite the antiseptic and anaesthetic effects of chemicals such as phenol, it is known that as in other agents used in chemical matrixectomy, they can lead to various complications such as tissue damage, delayed wound healing, pain and allergic reactions.[24] Despite the excellent hemostasis of electrocautery used in the combined method of the current study, there is known to be thermal damage to tissues.[25]

It has been reported that necrotic areas emerging with the use of electrocautery can create wound problems and may be a cause of infection.[12] In the current study cases operated on with the method that combined curettage and electrocautery, serous exudate was seen for a longer period postoperatively. However, as no infection was seen in any case of either group, it can be said that the serous exudate spontaneously recovered without any adverse clinical effect.

In another method, Turan et al.[26] could not obtain a response to treatment in approximately 20% of patients treated with cryotherapy, and recurrence was determined at a high rate after 6 months of follow up. Although the sole use of cryotherapy is effective symptomatically, high recurrence rates have been seen when it is used alone. In a study aiming to destroy the matrix by Yilmaz et al.[19] cryotherapy was applied after partial matrixectomy and recurrence was determined at the rate of 2.6%. In that study, intense serous accumulation was observed in the cryotherapy region. However, the serous fluid regressed during follow up without the development of infection, as in the current study, and it was emphasized that cryotherapy was a method that can be used to eliminate matrix remnants after partial matrixectomy. In this study, in which the combination of the two methods was evaluated for the first time after partial matrixectomy, recurrence developed in 2.9% of the cases with the combined use of curettage and electrocautery. This rate was considerably lower than the group in which curettage was added as the only method.

This study had some limitations, primarily its retrospective design and the low number of patients included in the groups. In addition, comparisons were made with the curretage method, which is one of the two most commonly used methods. It would be more beneficial to make a triple comparison by forming a separate group from patients who were operated on only with electrocautery.

CONCLUSION

This study compared cases with curettage applied in addition to partial matrixectomy with cases applied with C&E in addition to partial matrixectomy in the surgical treatment of ingrowing toenails. The disadvantages seen in the curettage group were the longer duration of erythema, the need for more dressings, and a higher rate of recurrence, while the disadvantage of C&E was the longer duration of postoperative serous exudate.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Adnan Menderes University Non-interventional Clinical Researches Ethics Committee (Date: 02.08.2022, Decision No: E.210031).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

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