

# Partial Matricectomy with Curettage vs Partial Matricectomy with Phenolization in the Treatment of Ingrown Toe Nail; A Randomized Controlled Trial

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## Introduction

Ingrown toe nail is a painful condition in which the distal-lateral corner of the nail, mostly of hallux grows into surrounding soft tissue and can lead to inflammation, ulceration, infection and as a result restricting personal activities. It is known most due to bad trimming of nail in accompany with tight shoes, poor hygiene of the foot, hazardous shapes of nail and very fleshy paronychia<sup>1-4</sup>.

Failure of conservative therapy and those complicated with abscess or recurrence are indications for surgical interventions. There are now many procedures available in practice. An optimal treatment of ingrown toe nail may be considered as the most efficient and safest with earlier remission of symptoms, more satisfaction of patients and lower recurrence rate.

## Abstract

**Background:** Ingrown toe nail (IGTN) is a painful condition in which the distal-lateral corner of the nail grows into its surrounding soft tissue leading to inflammation and infection. Failure of conservative therapy is an indication for surgical interventions. The aim of this study is to compare matricectomy by curettage with chemical matricectomy with phenol 88% in terms of post procedure remission and complications.

**Methods:** A number of 18 patients with IGTN were selected and divided randomly into 9-subject groups. The first group underwent matricectomy by curettage and the second underwent chemical matricectomy with phenol 88%. Patients were assessed after 2, 7 days and 1, 4 months after surgery for pain, oozing, soft tissue inflammation, cellulitis or purulent discharge and recurrence in both of the groups and the results were statistically compared.

**Results:** On the third post procedure day, pain and oozing discharge occurred less in curettage group with significant difference ( $P = 0.016$  and  $0.009$ ). In our next visit, one week after procedure, there was no significant difference in recovery and post procedure complications ( $P = 0.475$ ). In our visit, 4 weeks after procedure, all cases in both groups were completely healed for all parameters and no complication was found.

**Conclusion:** Curettage partial matricectomy is superior to phenol matricectomy in achieving earlier release of post procedure symptoms and complete recovery. (*Iran J Dermatol 2009;12: 74-78*)

**Keywords:** ingrown toenail, matricectomy, phenolization

Surgical therapy with only complete or partial nail extraction without matricectomy has high recurrence rate ranging between 64% and 83%<sup>5-8</sup> while matrix ablation, chemical or surgical, has urged significant drop in recurrence rate in many studies<sup>6-18</sup>. Several studies have evaluated recurrence rate, post-procedure recovery and complications of matricectomy, with either surgical or chemical method (including randomized clinical trials too), most showing preference of phenol matricectomy to surgical matricectomy with better cosmetic results, less pain, shorter duration of post-operative symptoms, earlier return to daily or sporting activities and less recurrence rate<sup>17-20</sup>. However, these studies have mainly considered wedge excision (removal of affected nail's area, matrix and small part of paronychia), as a surgical method<sup>14,17,18,20</sup> which is more aggressive than

exclusive ablation of lateral horn matrix (without excision of paronychia). Surgical partial matricectomy with recurrence rates comparable to phenol matricectomy<sup>12,13</sup>, if it is demonstrated to have less complications can replace phenol matricectomy. There are a few studies that have compared partial matrix surgery with phenol matricectomy in a controlled condition<sup>13,15</sup>. In this study, we aimed to compare curettage partial matricectomy with phenol partial matricectomy in a randomized clinical trial.

## Patients and Methods

Of all patients with ingrown toe nail referred to our dermatology clinic in 2004, eighteen patients were selected. Patients with ingrown toe nail, grade 2 and 3 and with need to surgery confirmed by a dermatologist were included. The Heifetz grading was used: grade 1 indicates swelling and redness at the nail fold, grade 2 indicates acute and active infection and grade 3 indicates chronic inflammation with granulation tissue neighboring the nail folder<sup>21</sup>. Patients with surgery intolerance, phenol contact reactions, diabetes mellitus and peripheral artery disease were excluded. Patient's information such as age, gender, disease duration and patient's sign and symptoms were noted. After we obtained inform consents, 18 selected patients were randomly divided into 2 nine-subject groups. One underwent surgical matricectomy by curettage and the other underwent chemical matricectomy with phenol 88%.

### Partial matricectomy with phenol

The toe was iodized, the local anesthesia was inserted at the base of the toe and thereafter a tourniquet was applied. The nail was cut longitudinally on the affected site. The skin side of the eponychium was not incised. The ingrowing segment of the affected nail was removed. The corner under the eponychium was curetted until all remnants of the nail were removed. Petroleum jelly was applied to protect the surrounding skin. A cotton ball soaked in 88% phenol was applied to the nail bed underneath the nail fold for 30 seconds. This was repeated once.

### Partial matricectomy with curettage

The ingrowing segment of nail plate was cut longitudinally to nail wall and then removed (as described above). The granulation tissue and debris of the nail were then curetted away back to healthy tissue. A size 4 blade (Ethicon) was then used to curette the lateral horn of the germinal matrix underneath the eponychium down to the

periosteum until complete removal of germinal matrix was clinically believed.

After these two methods, the toe was dressed with a standard bandage (with vaseline gauze and firm crepe bandage).

Patients were assessed after 2, 7 days and 1, 4 months after surgery for pain, oozing (discharge), soft tissue inflammation, cellulitis or purulent discharge and recurrence. Complete recovery was defined as the recovery of all these parameters. Recurrence was defined as the new growth of the nail edge into the surrounding soft tissue.

This study was designated to cover all Helsinki and Norenberg criteria as possible and patients entered the study after inform consents were obtained. No health or economic injury was made. Both of the methods are now available in many clinics.

Data were analyzed in SPSS ver.15 and by chi-square and Fisher's exact test.

## Results

Eighteen Patients with ingrown toe nail, covering our criteria enrolled in this study. They had the mean age of  $24.03 \pm 5.91$  years (ranging from 17 to 32). Seven patients (38.9%) were men and 11 others (61.1%) were women. Four Patients (22%) were positive for a family history of IGTN and 14 others (78%) were not. Three Patients (16.7%) had a positive history of previous surgeries for IGTN and 15 patients (83.3%) did not. In curettage group, 3 cases (33.3%) were IGTN grade 2 and 6 cases (66.7%) were IGTN grade 3. In phenolization group, 4 cases (44.4%) were IGTN grade 2 and 5 cases (55.6%) were IGTN grade 3.

The average duration of disease was  $9.81 \pm 9.04$  months in curettage group and  $7.31 \pm 6.2$  months in phenolization group.

On the second post procedure day, pain was seen in 1 case (11.1%) of the curettage group and in 6 cases (66.7%) of the phenolization group and this difference was significant ( $p = 0.016$ ). Oozing (discharge) occurred in 4 cases (44.4%) of the curettage group and in 9 (100%) of the phenolization group and this was again significantly different between 2 groups ( $p=0.009$ ). Cases with surrounding soft tissue inflammation were 7 cases (77.8%) in the curettage group and 8 ones (88.9%) in phenolization group. This small difference was not significant ( $p = 0.527$ ). There were 3 cases with peri-ungual cellulites in the curettage group and 3 cases (33.3%) in the phenolization group and there was no significant difference. Purulent discharge did not occur in any case.

**Table 1.** Clinical evaluation 1 week after procedure

	Clinical evaluation after 1 week				Total
	Complete recovery	Redness without pain or discharge	Healing of peri-ungual without discharge	Partial recovery	
<b>Phenol</b>	2 (22.2%)	1 (11.1%)	1 (11.1%)	5 (55.6%)	9 (100%)
<b>Curettage</b>	4 (44.4%)	0	2 (22.2%)	3 (33.3%)	9 (100%)

In our next visit, one week after procedure there was no significant difference in the recovery rates and post procedure complications as are shown in table 1.

In our visit, 4 weeks after procedure, all cases in both groups were completely healed for all parameters and no complication was seen.

In a follow-up for 4 months there was no recurrence in either group.

## Discussion

To date, several treatments have been described and administered for the treatment of ingrown two nail. Phenol and sodium hydroxide have been introduced for the chemical ablation of the nail germinal matrix<sup>22</sup>. Application of phenol for ingrown toe nail has been reported as early as 1901 by Porter and formally introduced in 1945 by Boll. Partial matricectomy by phenolization has lower reported recurrence rates rather than other methods ever described ranging between 4-10% (table 2)<sup>5,9,10,13,14,18,23</sup> but its toxicity on soft tissue and chemical burns are the main problems by this method. Amputation of distal phalanx of the hallux has been reported in one case<sup>24</sup>.

Several studies have investigated healing period, post procedure morbidities and complications by this method. A healing period less than 1 month for almost all cases who underwent phenol matricectomy has been mentioned in prior studies that resembles to our study too<sup>9,10,13,18</sup>. Bostanci reported a healing period of 2-4 weeks and no postoperative complications by phenol matricectomy among 172 patients<sup>10</sup>. Arie C. Van Der Ham also reported a mean of 2.2 weeks for healing duration by phenol matricectomy among 125 patients<sup>18</sup>. Herold found severe pain only in 20% of patients on the first post procedure day. Nearly 80% of patients were pain-free within 3 days after procedure, nearly 70% of patients were able to walk within 3 days and 80% within 7 days after procedure and more than half of patients

returned to their work before 4 days after procedure. In that study, all these parameters were statistically lower than those of wedge resection group<sup>14</sup>. Anderassi et al, in a retrospective study on 746 patients involved by ingrown toe nail, over a period of 6 years, showed various advantages of phenol matricectomy. It could be performed in the presence of sepsis (42.8% of patients had sepsis at the moment of the procedure), with less post-surgical visits and without need to specialists. All patients returned to work within 24 hours after procedure and could take part in moderate sport after 10 days post procedure<sup>9</sup>.

A systematic review by Rounding C and Bloomfield concluded an increase in the incidence of infection, when phenolization was added to surgical avulsion<sup>25</sup>. In Greig study, infection rate was significantly lower in the group who underwent surgical avulsion without phenolization<sup>6</sup>.

Total excision of the nail matrix has resulted in significant post procedure pain and poor cosmetic results in addition to its high recurrence of nail spicules<sup>7,8</sup>, but partial matricectomy with excision has mentioned to have a recurrence rate of 0, 1.7 and 21%<sup>12,13,15</sup> in prior studies that is comparable with phenol partial matricectomy and according to its safety and effectiveness can be a good option that allows us to avoid adverse effects of phenol<sup>10</sup>. This excision, underneath the eponychium down to periosteum, is technically difficult and may cause osseous trauma therefore has exerted an interest in the use of curettage instead of excision. In our study, comparing partial matricectomy by curettage with phenol matricectomy, 2 days after procedure, pain and oozing (discharge) was seen more in the phenol group with significant difference. Discharge was seen in all of the patients in the phenol group though only in 4 patients in the curettage group. Pain persisted in only one patient in the curettage group but in 6 patients in the phenol group. Pain and oozing was also more in the phenol group after 7 days though it was not significantly different. This

**Table 2.** Recurrence rates of several procedures

Method	Nail avulsion (partial or complete) without matricectomy	Wedge excision (Winogard)	Partial matricectomy by phenolization	Partial matricectomy via excision	Total matricectomy via excision (Zadic)	Nailfold excision
Recurrence rate	64-83%	10-30%	4-10% (24% by Gerritsma-Bleeker)	0 & 1.7% (21% by Gerritsma-Bleeker)	27% & 28%	0 & 20%

shows earlier recovery and earlier relief of symptoms in the curettage group and might recommend curettage matricectomy in preference to phenol matricectomy. It can be explained by phenol penetration into surrounding soft tissue causing soft tissue damage and necrosis and consequently pain and discharge. Gerritsma-Bleeker also showed a tendency to earlier sparing from pain, redness and purulent discharge and fewer persisting symptoms in excision matricectomy group rather than phenol group although it was not significant. This may be due to the different surgical method while excision is a more aggressive procedure in compare with curettage. In Saleem Islam's retrospective study<sup>15</sup>, comparing phenol matricectomy with excision matricectomy among children, recurrence rate was 42% in excision group while dropped to 4% in phenol group. Such high recurrence rate in excision group compared with adults in other studies may be due to less aggressive incision into nail bed in children or high growth scale in children. In that study, complications, burns and infections were less in phenol group though significantly not different. Less finger's balk in children may explain more complications in excision group. Incidence of infection did not differ significantly between two groups of our study too.

In our study, no recurrence was seen after 4 months in either group. This period is too short for a recurrence to develop and does not enable us to measure recurrence rate properly as to do a comparison. Gerritsma-Bleeker also found no difference in recurrence rate between these two methods for a follow-up duration of 12 months, all relapses occurred after 4 months of follow-up, within months 5-12 in matrix group and within months 4-13 in phenol group<sup>13</sup>.

Small number of referred cases to our clinic was the main problem that restricted our sample size and consequently our results though it does not interfere where p-values are significant. Still our method of study, comparison in a randomized

controlled clinical trial in absence of an exact copy remains of great values in the assessment of complications.

We conclude that curettage partial matricectomy is superior to phenol matricectomy in achieving earlier release of symptoms and complete recovery and recommend more controlled trials with larger sample sizes to be performed. It will be also beneficial to compare recurrence rate between these two methods in a longer duration of follow up.

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