

# Comparison of Trichloroacetic acid and Phenol application after partial nail extraction in the treatment of ingrown toe nails

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## ABSTRACT

**Aim:** To compare the efficacy of 90% Trichloroacetic acid and 88% phenol in Matrixectomy (extraction of partial nail) for the management of ingrown toenails.

**Methods:** This was a single center prospective randomized clinical study, conducted in the General surgery department of Pakistan Institute of Medical Sciences Hospital, Islamabad, from July 2018 to July 2019. Out of all study participants 50% patients treated with 88% Phenol and the remaining 50% treated with 90% Trichloroacetic acid. Postoperatively patients were followed for 48 hours, 1, 4, 12 weekly up to 3 months. Efficacy was defined in term of pain wound bleeding, allergic reaction, wound infection and recurrence. Data was collected on self-designed Proforma.

**Results:** Total 100 patients of ingrown toenails were selected. Average age of patients was 26.31±8.74 years. Severity of the pain was statistically insignificant among both groups, p-value 0.472. Wound infection was higher in 88% Phenol group in contrast to 90% Trichloroacetic acid group, while statistically insignificant, p-value 0.306. Recurrence was only among 2 patients of 90% Trichloroacetic acid group.

**Conclusion:** Both treatment options are equally effective in treating the ingrown toenails with lower rate of postoperative pain, complications and recurrences.

**Keywords:** Matrixectomy, 90% Trichloroacetic acid, 88% phenol, effectiveness

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## INTRODUCTION

Ingrown toenail (IGTN) (or onychocryptosis), is prevalent among young adults and is threefold more prevalent among males than among females<sup>1</sup>. This condition's etiology is not yet well established. The risk factors correlated with the advancement of this disease include: male gender, low quality or close-fitting shoes, inappropriate nail cutting especially in the elderly, triggered by decreased skills of nails care, ischemia infections, unusual walking habits, sublingual neoplasms, circulatory insufficiency, obesity, arthritis, onychomycosis, and trauma. Hyperhidrosis exacerbates any inclination to macerate the skin. Nail fold hypertrophy also tends to lead towards this prevalent problem of the foot. Most popular assumption is that onychocryptosis happens when the nail plate's edge penetrates the paronychium<sup>2</sup>. The injured skin of the nail tries to repair itself by generating highly vascular granulation tissue that extends beyond the nail plate over time and microbes can easily penetrate the traumatized skin, which leads into developing of cellulitis.

Onychocryptosis is frequently an agonizing clinical condition, usually manifests as inflammation of soft tissue. The great toe nails' lateral side, the most frequently affected part, carries substantial socio-economic inferences. The affected toenail is examined for the type and stage of onychocryptosis and condition of nail structure. In stage-1 there is only mild edema or erythema with pain on put pressure; in Stage-2 there is significant edema or erythema with sero-purulent drainage from the

affected nail fold and in Stage-3 there is significant drainage, granulation formation and hypertrophy of lateral wall<sup>5</sup>. A simple avulsion associates with high likelihoods of recurrence<sup>5</sup>. Obliteration of the matrix's lateral edge obtained through surgery or, more frequently, a chemical (lateral Matrixectomy) is an important part in the onychocryptosis management. Phenol is a useful denaturant of proteins. Phenol cauterizes in the matrix and adjacent soft tissues by generating a coagulation necrosis. It has local anesthetic and antibacterial effects that provide additional benefit. Phenol Matrixectomy, with elevated success rate (91-100 percent) has been the therapy preference for many researchers, for many years<sup>2,14</sup>. The disadvantages of carrying out this operation, however, include unexpected tissue damage due to chemical exposure induced by phenol, excessive drainage, constant infection and prolonged healing times. In relation to local side effects, hemoglobinuria, dizziness, abdominal pain, cyanosis and sometimes serious systemic responses like cardiac arrhythmia can appear after phenol application<sup>14</sup>. Trichloroacetic acid is used for chemical peeling. Trichloroacetic acid is among the most frequently used chemical peeling agents. It achieves chemical peeling of superficial to medium depth as per the concentration. TCA, such as phenol, is a corrosive chemical agent, which triggers necrosis of coagulation by substantial protein denaturation and the resulting structural cell death. It causes both dermal and epidermal necrosis and after that neutralizes itself without severe systemic toxicity. It is reported that TCA may be utilized for chemical matrixectomy, instead of phenol<sup>14</sup> Partial nail extractions with TCA chemical Matrixectomy routinely performs in most of the centre worldwide but insufficient data available in

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local studies. Phenol (88% solution) is among the most widespread agents, which is being used effectively for decades<sup>5</sup>; though, even with cautious usage, it can result in delay of recovery process with protracted postoperative drainage. To reduce postoperative morbidity, alternate agents have frequently been assessed. Trichloroacetic is efficacious and safe alternative chemical with less drainage after surgery; though data regarding long-term efficacy is lacking<sup>16</sup>. The purpose of this study was to compare the effectiveness and outcomes of 90% trichloroacetic and 88% phenol application in partial Matrixectomy in the management of onychocryptosis.

**MATERIAL AND METHOD**

This was a prospective randomized clinical study, conducted in the General surgery department of Pakistan Institute of Medical Sciences hospital Islamabad (PIMS), from July 2018 to July 2019. In this study both gender with age range of 16 to 60 years and having ingrown toenail (IGTN) were enrolled. Subjects with fungal infection, significant peripheral arterial disorder, severe systemic disease, and known allergy to the agents used, those who had a contraindication to local anesthesia and diabetes mellitus were excluded.

Patients were divided in two groups. Group A patients were treated with chemical matrixectomy with phenol (88%), while Group "B" subjects underwent application of 90% Trichloroacetic. Procedures were done by experienced surgeon under local anesthesia. If the nail was diagnosed as having been infected prior to the operation, systemic antibiotic therapy was applied for 7 days, through some people assumes pre-operative antibiotics as unnecessary whoever their value remains unproven. We also applied tourniquet (elastic catheter) following cleaning the operative site with the solution of povidone-iodine, which was attached around the largest part of the toe to reduce bleeding in the operative site. Proximal digital block was carried out with 1% Xylocaine and epinephrine was not used after that patients underwent partial avulsion of the nail. The onychocryptosis was removed from the nail bed, proceeding at the bottom using septum elevators. The onychocryptosis edge was longitudinally sliced 2 to 4 mm apart and separated from the impacted side of the nail. Nail skin fold's granulation tissues were separated. The matrix was curated and if there were any nail spicules remaining, the region was inspected. In the examined group, Vaseline pomade usage protected the adjacent region from thermal injuries and chemical.

The nail matrix was cauterized for 60 seconds in 50% of the investigated group with 88 percent phenol and in remaining group 90% trichloroacetic was applied for 60 seconds. After dressing of bandage and polyfax gauze patients were advised to keep their foot in rest and at an elevated position for the remaining part of the day, in addition they were suggested to avoid tight fitting shoes, and to apply antiseptic solutions locally for the wound except painkillers if there is severe pain. Patients were followed for 48 hours; first week for 4 weeks or until complete healing was achieved. For the initial 2 weeks, the site of operation was cleaned and the re-dressing was done by the surgeon. Then, patients were suggested to re-

dress the site in case of continuous drainage. Effectiveness of drugs was assessed in terms of postoperative pain, wound discharge, wound infection and recurrences. Data was collected on self-designed Performa and analyzed by SPSS version 20.

**RESULTS**

Total 100 patients of ingrown toenails were selected for this study and 9 patients were not come in follow-up. Though out of remaining 91 patients, the sex ratio of male female was almost equal having 45 male and 46 female. The average age of patients in years was 26.31±8.74. The site of disease was recorded 50 in right, 37 in left and 4 patients having the disease bilateral (Table 1).

Severity of the pain was statistically insignificant among both groups, p-value 0.472, as mild pain was in 23 patients of 88% Phenol group and 19 were in 90% Trichloroacetic acid group, moderate pain was equal quantity of patients in both groups while severe pain was only among 2 patients in 88% Phenol group. Wound infection was higher in 88% Phenol group in 14 patients and 09 patients of 90% Trichloroacetic acid group, which was statistically insignificant, p-value 0.306. Wound discharge was higher in 88% Phenol group among 5 patents as compared to 90% Trichloroacetic acid group only 2 patients, while recurrence was only among 2 patients of 90% Trichloroacetic acid group. All above findings were statistically insignificant with p values 0.472, 0.306, 0.436 and 0.495 respectively (Table 2).

Table 1. Descriptive analysis of demographic variables n=91

Variable	Categories	Frequency%
Gender	Male	45 (49.5)
	Female	46 (51.5)
Site	Right	50 (54.9%)
	Left	37 (40.7%)
	Both right and left	04 (4.4%)

Table 2: Comparison of post treatment infection, pain and recurrences n=91

Variable	Categories	88% Phenol	90% Trichloro-acetic acid	P value
Pain	No pain	18	21	0.472
	Mild pain	23	19	
	Moderate pain	4	4	
	Severe pain	2	0	
Wound Infection	Yes	14	09	0.306
	No	33	35	
Wound Discharge	Yes	5	2	0.436
	No	42	42	
Recurrence	Yes	0	2	0.495
	No	47	42	

**DISCUSSION**

A common painful nail conditions in-growing toenail that influences quality of life. The big toe is most frequently affected, and the most commonly involved part is the lateral border. For the treatment of ingrown toenails, the agreement is controversial to the choice of therapy. Partial Matrixectomy diminishes impairment to the neighboring soft tissue and normal skin in regulating and to accelerate the

time of healing and to obtain an appropriate cosmetic outcome. This condition mainly affects young adults. As this study shows that the mean age was  $26.31 \pm 8.74$  years and both gender almost equally affected. Similar result detected in a study conducted by Barreiros H et al,<sup>13</sup> as patients' mean age was 27 years (range, 11-80 years). In this study the site of disease were recorded 50 patients (54.9%) in right toenail, 37 patients (40.7%) in left foot toenail and 4 (4.4%) patients having presented the disease in both right and left feet toe. Almost similar results observed in a study conducted Tabowei I et al<sup>17</sup>.

In this study both drugs showed almost equal efficacy as mild pain was in 23 patients of 88% Phenol group and 19 were in 90% Trichloroacetic acid group, moderate pain was equal quantity of patients in both groups while severe pain was only among patients in 88% Phenol group. While Grover C et al<sup>19</sup> reported that NaOH is as efficacious as compared to phenolisation, with the advantage of faster tissue normalization. In a study, Barreiros H et al<sup>18</sup> applied TCA (80 %) in 133 cases with a success rate of 94%. They showed that side effects like postoperative pain, infection and drainage were mild, generally postoperative drainage subsidizing within 10 to 15 days<sup>11</sup>. Similar results were observed from the study of Terzi et al., who carried out chemical Matrixectomy with TCA (90%) in 39 patients<sup>12</sup>.

In our study, two patients (2.2%) observed with recurrence of IGTV in TCA group while no patient present with IGTV recurrence in phenol group. Similar results observed by Terzi E et al. at<sup>14</sup> months follow-up ( $P < 0.001$ )<sup>13</sup>. Bostanci S et al<sup>16</sup> reported 95.8% of success rates with phenol Matrixectomy and recurrence in 10 months following treatment<sup>14</sup>.

## CONCLUSION

We concluded that both TCA and phenol matrixectomies are nearly equally effective in treating the ingrown toenails subjected to postoperative pain, inflammation of surgical site and recurrence. TCA and phenol systemic effect should consider before using in partial or complete matrixectomy and long term needed for observation of recurrence.

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