

Comparative Evaluation of Segmental Matrictomy vs Partial Nail Plate Excision in Treatment of Ingrown Toe Nail

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ABSTRACT

Introduction: Ingrowing toe nail is a common condition which causes lot of discomfort and morbidity. Though recognized since long, a satisfactory treatment remains elusive. The range of treatment is from conservative management to amputation of distal part of big toe, The numerous methods used for treating ingrowing toe-nails are testimony to the lack of a generally acceptable procedure with a low failure rate. Aim of the study was to compare the results of Partial Nail plate excision alone or in combination with segmental matrictomy

Material and methods: Total of 60 patients with ingrowing toe nail were included as part of study and randomly allocated to group 1 or 2 or surgery after informed consent Group 1 – Partial Nail Plate Excision and Group 2- Partial nail plate excision with segmental matrictomy. Patients were evaluated in terms of post operative pain, healing time, post op infection and Recurrence rate.

Results: Recurrence rate in group undergoing segmental matrictomy with partial nail plate excision was very low as compared to group undergoing only partial nail plate excision. Healing time and post operative pain were found to be similar in both groups.

Conclusion: Segmental matrictomy is a better method of treating ingrowing toenail as compared to partial nail plate excision alone

Keywords: Ingrown toe nail, Partial nail plate excision, Segmental matrictomy, Recurrence

INTRODUCTION

Ingrowing toenail known by different names such as 'onychocryptosis', 'unguis incarnatus', is a common problem among the general population. Most commonly, the big toe is involved, but it may also involve the lesser toes.¹ Ingrowing toenails occur when one of the distal sides of nail plates cause pressure or actually punctures the periungual skin. This leads to irritation and infection with body trying to repair the damage. The person develops a painful and draining lesion, with the formation of granulation tissue at the side of the puncture.² These can cause pain and discomfort and hamper daily activities.³ Based on clinical experience, a number of causes have been suggested, including improper trimming of the nail, tearing nails off, or wearing constricting footwear.³ In barefoot populations, a lower incidence of onychocryptosis has been found, so it is assumed that wearing shoes is a possible risk factor.⁴ It has been suggested that thin and flattened nails increase the risk of ingrown toenails, but this has never been properly studied. Various risk factors that may increase the likelihood of ingrowing toenails are diabetes and obesity; as well as cardiac, renal, and thyroid disorders that may predispose people to lower extremity oedema.² In younger age excessive usage of closed footwear lead to excessive sweating which in

turn causes soft skin and nails which may pierce the skin. In older people inadequate care of the nails seems to be the main cause.¹

Many treatment modalities of ingrown toenail are reported in the literature, often associated with unacceptably high recurrence rate.⁶ Soaking the toe in warm water for 15 minutes can reduce inflammation.⁵ Today, the most popular conservative therapies include warm water soaks, topical or oral antibiotic therapy, proper nail trimming and elevation of the nail corner with a cotton wick.^{5,7} The numerous methods used for treating ingrowing toe-nails are testimony to the lack of a generally acceptable procedure with a low failure rate. Study was done to compare the results of partial nail plate excision alone or in combination with segmental matrictomy.

MATERIAL AND METHODS

We conducted a prospective randomized study at Punjab Institute of Medical Sciences, Jalandhar, after obtaining clearance from ethical committee in which 60 patients of ingrowing toe nails were studied. All patients with ingrown toe nail with infection were treated with antibiotics for one week prior to procedure. Patients were randomly allocated to group 1 or 2 for surgery after informed consent

- Group 1 – Nail Plate Excision
- Group 2- Partial nail plate excision with segmental matrictomy.

Surgical Procedure

Surgery is carried out under ring block using 2% lignocaine. In Group 1 Partial Nail Plate Excision was done by separating it from nail-bed and pulling it out on side of ingrown nail.

In Group 2, in addition to partial nail plate excision⁸, an oblique incision was made at the junction of the proximal and distal nail folds and the folds were reflected allowing the deep part of the lateral matrix to be seen. The matrix horn with about 2 mm of the adjacent nail bed was meticulously dissected from the bone. One must go upto midway between lunular line and distal interphalangeal joint with readiness to go more proximally. On the deeper aspect, the terminal phalanx should be bared of soft tissue. A suture was placed to approximate the skin edges. We inserted small paraffin gauze impregnated with ointment into the wound cavity to keep the space open to allow the wound secretion to escape. A padded dressing finished the intervention.

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The patient was asked to elevate the foot for 24 to 48 hours. First dressing change was done after 48 hours in both groups. Subsequently alternate day dressings were done till healing. Patients were followed weekly till complete healing and then at 6 months and 1 year. Following parameters were noted during visits.

Time to healing

Pain

Infection/bleeding

Recurrence

STATISTICAL ANALYSIS

Results of the study were based on descriptive statistics. Mean and SD were calculated to infer results. Tables were made with the help of Microsoft office 2007.

RESULTS

The male to female ratio and mean age is shown in table-1. Males were affected more than females with 2nd decade being the commonest age group

The time to healing when compared was almost similar in both treatment groups (table-2).

Post op infection occurred in 1 out of 30 patients (3.33%) in group 1 while it occurred in 2 out of 30 patients in group 2 (6.67%) (table-3). Recurrence was more in group 1 (33.3%) (table-4).

Post Op Pain was analysed using VAS (visual analogue scale). None of the patients reported a score of more than 2 in both groups which also subsided after 1st week.

DISCUSSION

Ingrown toe nail, a small but significant problem has had controversies both in the aetiopathogenesis as well as treatment. Some physicians believe nail plate to be the cause hence the name ingrown or ingrowing nail (unguis incarnatus),⁹ others believe that it is the hypertrophic nail wall tissue covering the nail so like to call it onychocryptosis.¹⁰

Types and aetiopathogenesis of ingrown nails

There are several different types of ingrowing nails. The most common form is distal-lateral ingrowing. The aetiopathogenesis is usually a wide, relatively markedly curved nail plate, the distal lateral corners of which have been cut obliquely leaving a tiny spicule that digs into the lateral nail groove and finally pierces the epidermis when the nail grows forward. This leads to inflammation, followed by bacterial colonization and eventually infection.¹⁰ Precipitating factors are narrow pointed shoes, tight socks, hyperhidrosis, juvenile diabetes mellitus, and many more.⁹

Ingrowing starts at the distal end of one or both of the lateral nail grooves. Wrong cutting of the nails leads to baring of distal nail bed which shrinks with time and when the nail regrows there is not enough space for it. It pushes on the soft tissue which may first react with a circumscribed, usually painful hyperkeratosis called onychophosis. The patient tries to relieve the discomfort by cutting more of the nail corner; however, in order to cut the nail smoothly one would have to insert the tip of the scissors far deeper, which in turn would mean to pierce into the soft tissue. This being painful is not done completely. Once the nail grows again it pushes the leftover part further into soft tissue leading

Treatment Groups	Total Number	Male	Female	Mean age
Group 1	30	20	10	18.1
Group 2	30	23	07	17.9

Table-1: Age and Sex Distribution??

Treatment Group	Time to healing (days)	SD
Group 1	12.1	1.82
Group 2	12.23	1.71

Table-2: AverageTime to healing

Treatment Groups	Post op Infection (no. of patients)
Group 1	1
Group 2	2

Table-3: Post op Infection

Treatment Groups	Recurrence
Group 1	10
Group 2	2

Table-4: Recurrence

to a vicious cycle.

In the older age groups, the nail may be sharply curved at one of its margins pressing on the nail groove. The nail may break the integrity of the nail groove epidermis with resultant inflammation. Due to wrong footwear many people develop a progressive transverse overcurvature that pinches the nail bed – hence the term pincer nail or unguis constringens – and heaps its distal part up. The nail may form a complete tube and yet remain painless in some cases. The phalangeal bones may be at fault for the development of the overcurvature in some cases with a complex genetic trait.¹¹ Since the nail matrix is intimately attached to the base of the terminal phalanx, its widening leads to uncurving proximally causing overcurving distally. The heaped up distal portion of the nail bed pulls the soft tissue up resulting in a traction osteophyte.¹²

There are three stages during the course of ingrown toe nail.

Stage I also known as mild which is characterized by nail-fold swelling, oedema, erythema, and pain, *Stage II* also known as moderate characterized by granulation tissue, accompanied infection; and sometimes ulceration of the nail fold

Stage III also known as Severe form characterized by the formation of epithelialised granulation tissue; and sometimes marked nail-fold hypertrophy.¹⁴

Indications for treatment of ingrowing toenails, therefore, include significant pain or infection or chronic, recurrent inflammation of the nail fold.^{1,13} A large number of interventions are used for ingrowing toenails. These can be divided in two major categories:

Non-surgical (or conservative) interventions

Non-surgical (or conservative) interventions aim to relieve symptoms, prevent the ingrown toenail getting worse, help cure the problem, and prevent recurrence (e.g. in time, repenetration of the nail fold leads again to clinical symptoms). Non-surgical interventions are most likely to be of used when the ingrowing toenail is at a mild or moderate stage of development (stage I and stage II). Many non-surgical or conservative interventions are available, like soaking the toe in warm water or placing a

cotton wisp under the ingrowing nail edge.^{2,15}

Surgical interventions

The aim of surgical intervention is to remove the part of the nail casing symptoms (with or without combination with matrix destruction), thus, relieving symptoms and preventing regrowth of the nail, which prevents recurrence. Surgical interventions are most likely to be of use when the ingrowing toenail is at a more severe stage of development (Stage II and stage III)

There are many surgical interventions. The techniques used nowadays are mostly modifications of the techniques originally described by Winograd,¹⁷ Zadik,¹⁸ and Ross.¹⁶

The following techniques and combinations of techniques are used as surgical interventions.

1. Vandenbos Procedure²⁰
2. Rotational flap technique of the nail folds.²³
3. Wedge excision, Wedge segmental excision, or Wedge resection (also known as 'Winograd')¹⁷
 - i) Combined with application of a caustic liquid, like phenol (Ph) or sodium hydroxide
4. Total nail avulsion alone or Combined with total (chemical or surgical) excision of the matrix (also known as 'Zadik')¹⁸
5. Partial nail avulsion (PNA, also known as 'Ross')¹⁶
 - i) Combined with surgical (partial) matrictomy (removing the matrix of the nail)
 - ii) Combined with chemical (partial) matrictomy with phenol (Ph) or sodium hydroxide
 - iii) Combined with physical (electrofulguration) matrictomy

The plethora of surgical techniques is a pointer to the fact about high rate of treatment failures of various techniques.

In the Vandenbos technique soft tissue of the lateral nail fold down to the bone is removed. Hemostasis is secured and the wound is left for second intention healing. Neither the nail plate nor the matrix or nailbed are touched.^{20,21} The cosmetic results are very good; however, healing takes several weeks.²²

In Wedge excisions lateral nail folds are removed. The healing may take from 3-6 weeks. The esthetic results are poor especially if nail avulsion was also done. The nail growth may be disturbed leading to a narrow, thickened and discolored nail.

In Total Nail avulsion the whole of nail plate is removed. However, the nail bed in the absence of nail plate further shrinks, so that when the nail regrows, it would have further less space and will grow in again. Also the period during which the nail plate is absent can be very painful. This is almost invariably followed by a recurrence. Nevertheless, some patients had to go through this inadequate and torturing procedure six times.¹⁹ Radical nail bed and matrix ablation was suggested by Quénu. This became later known as Zadik's procedure.¹⁸ A comparative study showed 60.5%recurrences with Zadik's procedure.²⁴ In our opinion, this is an inadequate and far too radical method and in no case indicated.

Segmental matrictomy is a much less invasive approach and respects the aetiopathogenesis of ingrown nails. It leads to a narrowing of the nail with a very high cure rate in ingrown nails. The surgical matrix horn resection has a critical point. The most proximal corner of the matrix is usually very deep and dissection may be difficult. This method has very less recurrence rate and good cosmetic result

In this study we compared two commonly used surgical methods of treatment of ingrown toe nail. It was found that segmental matrictomy results in a lesser recurrence rate with similar healing time and similar post op chances of infection and pain (Table 2, 3, 4).

The incidence of ingrown toe nail was more in second decade of life in present study (Table 1) as also reported in literature.^{25,26} A slightly higher incidence in men is observed in our study and has been reported in literature also (Table-1).

CONCLUSION

Segmental matrictomy is a better method of treating ingrowing toenail as compared to partial nail plate excision alone esp with regards to low recurrence rate. As long as proper attention is given to completely remove the targeted portion of germinal matrix, it gives acceptable results in terms of low complication and recurrence rates, cosmetically acceptable toe and patient comfort.

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