

RATIONAL THERAPY FOR INGROWN TOENAILS A PROSPECTIVE STUDY

A. M. BOSSERS¹, I. M. C. JANSEN², W. F. EGGINK³

Partial phenolization of the germinal matrix is described as a simple and effective procedure for the treatment of ingrown toenails. It is illustrated in a summary of anatomy and pathophysiology as well as in a randomized prospective trial.

Keywords : ingrown toenail ; therapy.

Mots-clés : ongle incarné ; traitement.

INTRODUCTION

The ingrown toenail or unguis incarnatus is generally considered to be a "minor problem" in surgical practice. For the patient, however, it often means a lasting nuisance. During the past decade, many procedures for its treatment have been described, a fact that in itself shows that none of them is satisfactory.

In many clinics the so-called wedge excision is used as a standard operation, in spite of a 30% recurrence and a poor cosmetic and functional outcome (1, 2, 3). Following a review of the literature (1, 4, 5, 6, 7) we felt that two methods, partial matrix excision and partial matrix phenolization, were particularly promising and worthy of a prospective study.

ANATOMY AND PATHOPHYSIOLOGY

The nail complex consists of a horny plate, embedded between the nail walls on the nail bed, and proximally bordered by the eponychium (fig. 1). The nail bed is made of firm connective tissue, ending at its base in the soft lunular matrix, where production of nail tissue takes place ; the nail bed itself does not contain germinative cells.

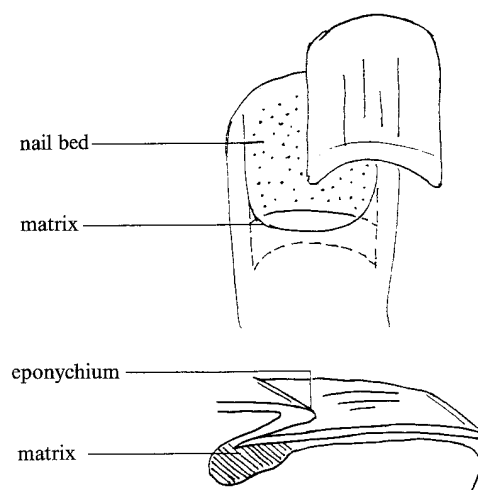


Fig. 1. — Anatomy of nail, nail bed and matrix.

Increased pressure between nail and nail wall is essential for ingrowth. Ulceration of the nail gutter and inflammation follow. This results in edema of the nail walls, and the vicious circle is complete (1) (fig. 2). It is generally accepted that chronic trauma due to tight shoes is the main factor in the etiology of ingrown toenails. This can be complicated by intrinsic nail deformities e.g. caused by fungal infection, or by "picking", or other maltreatment of the nail, like cutting it too short. Subcutaneous spiculae can cause irritation and infection (fig. 3a, b). Another factor

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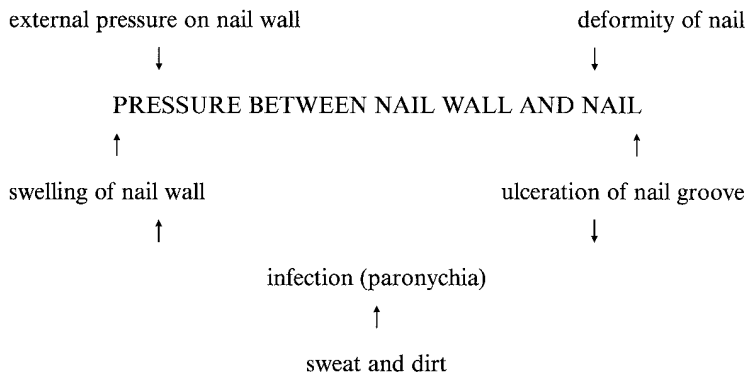


Fig. 2. — Vicious circle in the pathogenesis of ingrown toenails.

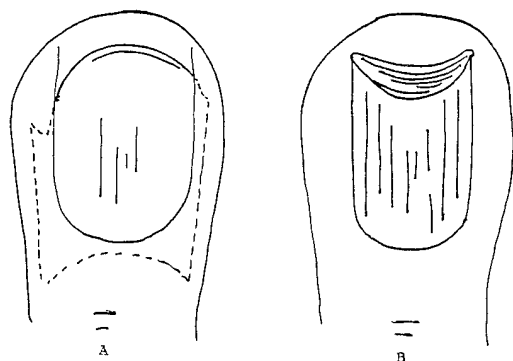


Fig. 3. — Different forms of ingrown toenails.
 A. nail cut too short with subcutaneous spiculae.
 B. onychogryphosis.

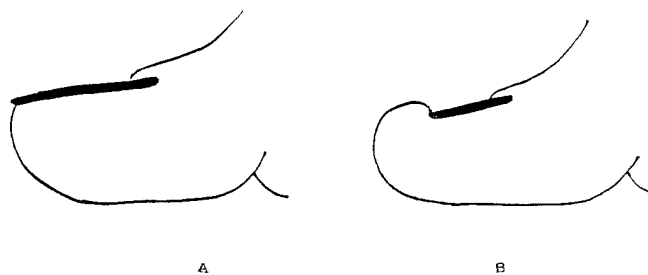


Fig. 4. — A. normal nail supporting the nail bed.
 B. too short nail (after avulsion) does not support nail bed and tends to grow in.

may be nail avulsion, as the nail bed is pushed upward because of lack of support (fig. 4) (1, 8).

disorders as well as recurrences after previous treatment were treated in the same way.

PATIENTS

METHODS

Between 1985 and 1987 we treated 135 ingrown toenails in 94 patients, randomized by their date of birth : patients with an even birthdate underwent a partial matrix excision ; those with an odd birthdate, a partial matrix phenolization (table I). Age or sex were not taken into account. Primary

All operations took place on an outpatient basis. They were carried out under local anesthesia and mini-tourniquet by two of the authors following standard procedures :

— Partial matrix excision :

The nail is incised with a small pair of scissors at approximately a quarter of its width and partially extracted. The eponychium must also be incised to get good exposure of the matrix. A small angle of matrix tissue is meticulously excised using a number 15 scalpel. Care is taken not to damage the nail bed (fig. 5).

— Partial matrix phenolization :

Phenolization is done basically following the same procedure, only the eponychium is not incised, as it

Table I. — Groups of patients

	excision	phenolization	total
patients	43	51	94
treatments	64	71	135

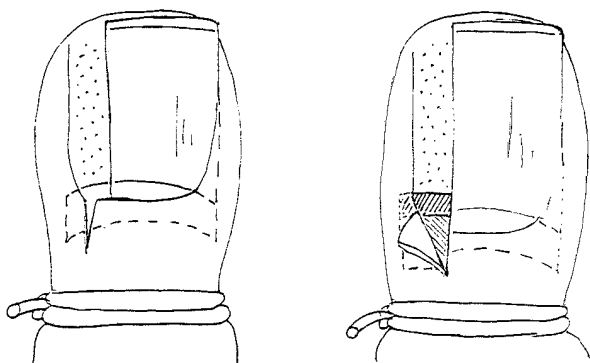


Fig. 5. — Partial matrix excision: tourniquet and clear exposure of the deep corner of the matrix.

is of less importance to fully expose the matrix. Instead of being excised, the angular matrix is rubbed with an 80% phenol solution for 3 minutes. Every minute, a fresh cotton bud is used (fig. 6). Spilled phenol is neutralized with a 70% ethanol solution. After 3 minutes, the matrix is rinsed with the ethanol solution to wash away the remaining phenol.

After the procedure, the toe is wrapped in paraffin gauze and the patient is advised to elevate his leg for the first 6 postoperative hours.

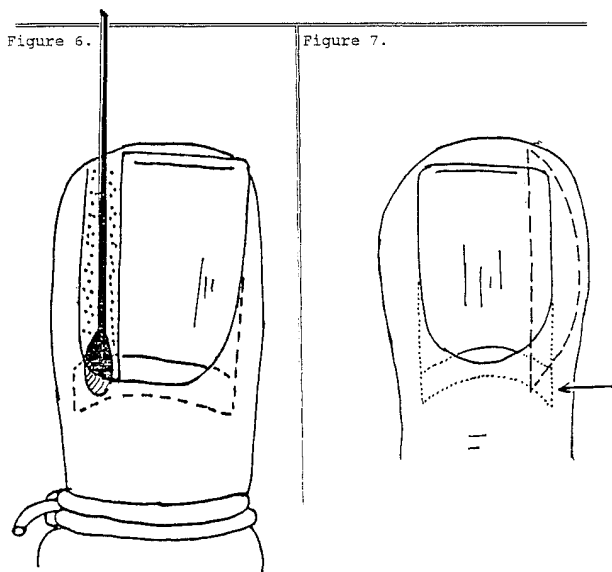


Fig. 6. — Partial matrix phenolization: the eponychium stays intact. Application of phenol on a cotton bud during 3 × 1 minute.

Fig. 7. — “Classical” wedge excision. The matrix is not exposed. There is a chance that part of it remains in situ.

Follow-up visits took place on the first day (to change dressings), and after 1, 2 and 3 weeks. The following parameters were checked: pain, ability to walk or work, and infection. After 6 to 12 months all patients were seen again to evaluate the final result.

The resulting data were statistically analyzed using a simple test according to the rules of normal distribution (10).

PHENOL

We used an 80% phenol solution. It is a caustic agent that produces denaturation of the skin; an additional increase in permeability is attributed to the resulting damage to the epidermis. There certainly is some absorption even by the intact skin; however general side effects as nausea, vomiting, paralysis, coma or burning of the gastrointestinal tract are only seen after ingestion. Fatal poisoning has been described only in two cases, after application of phenol to the umbilicus of newborn infants. As it is absorbed, it should not be used on large areas of the body (11, 12). The amounts of phenol used in our method were very small, and therefore no side effects were seen.

RESULTS

The results of this study are illustrated in table II. In the group of patients (n = 43) that underwent a partial matrix excision (n = 64 operations), the majority (84%) were able to walk and work on the first postoperative day. Five patients suffered pain for longer than one week. After 6 months there were 10 recurrences (15%).

Table II. — Results of treatment
* statistically significant (p < 0.05)

Follow-up	excision (n = 43 patients)	phenolization (n = 51 patients)
walking 1st day	35 (84%)	49 (96%)*
walking 2nd-7th	8	2
pain > 1 week	5	4

After ½ year	n = 64 treatments	n = 71 treatments
Successful	54 (85%)	68 (96%)*
Recurrence	10 (15%)	3 (4%)

Of the 51 patients whose matrix was phenolized (n = 71 operations), 49 could walk and work without pain on the first day. Only 4 out of 51 had pain after the first week. Most patients experienced some drainage from the wound, which could always be managed by a simple bandage and never lasted longer than 3 weeks. This was thought to be caused by discharge of necrotic matrix tissue due to phenolization. At 6 months there were only 3 recurrences (4%).

Inflammation or infection was seen in 21 cases (15%), equally distributed between both groups. Treatment with salt baths was invariably successful.

Recurrences were treated with a secondary phenolization, because by that time this had become our standard procedure. In one case of a patient with severe onychogryphosis who had had four ingrown nail edges, and who was initially treated with partial matrix excisions, a total matrix phenolization was eventually performed with a satisfactory result. This case is thought to be the cause of the relatively worse overall results of our matrix excisions compared to the figures found in the literature.

DISCUSSION

The etiological factors as well as the correct treatment for ingrown toenails have been argued about for many years, as witnessed by the endless list of publications on this subject since the early 1800s. A summary of the techniques described is given in table III, together with their recurrence rates. In many clinics the wedge excision is still performed. With this technique not only the ingrown part of the nail and the matrix are excised, but also part of the nail bed. Described in Fowler's very important publication in the *British Journal of Surgery* (1), this procedure must be insufficient, because the reduced nail still does not have enough space on the equally reduced nail bed. Furthermore, the occurrence of spike nails is very likely, as the structure that one aims to remove (i.e. the germinative matrix) is not visualized and resection is often incomplete (fig. 7).

With the partial matrix excision or phenolization, a small piece of the growing matrix is

removed, without reducing the size of the nail bed, resulting in a relatively small nail on a broad bed. Thus the previously described "vicious circle" (fig. 2) is prevented.

Our study shows that both described procedures have a relatively low recurrence and morbidity rate, with the phenolization having the better outcome.

When the toe is considered as a "treatment unit", these differences are statistically significant ($p < 0.05$). The results of the phenolization also compare favorably with the results of other treatments summarized in table III. As we explained above, one case of severe nail deformity gave four recurrences, which should be considered in interpreting the results.

Table III. — Described methods of treatment and recurrence rates

Procedure	recurrence rate	
- conservative	?	
- cryotherapy	30-35%	(10)
- nail extraction	50%	(2)
- "gutter treatment"	33-48%	(2)
- wedge excision (only nail)	65-75%	(3)
- total matrix excision	20%	(3)
- amputation distal phalanx	described !!	(1)
- "classical" wedge excision	10-30%	(2, 3)
- partial matrix phenolization	1-7%	(6, 7, 8)
- partial matrix excision	1-6%	(4, 5)

CONCLUSION

Partial angular phenolization of the germinal matrix is a very simple and quick therapy for unguis incarnatus with little morbidity and a very satisfying result. It has become our treatment of choice in case of primary ingrown toenail as well as for recurrence after other therapy.

In case of severe nail deformity due to such causes as chronic fungal infection, angular treatment seems to be insufficient, and total removal of the matrix may be required.

Acknowledgements

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SAMENVATTING

A. M. BOSSERS, I. M. C. JANSSEN en W. F. EGGINK. Effectieve therapie van ingegroeide teennagel. Prospectieve studie.

Na een inleiding in de anatomie en de pathofysiologie van de ingroeiende teennagel worden in een gerandomiseerd prospectief onderzoek twee behandelingsmethoden, de partiële matrixexcisie en de partiële matrixfenolisatie, getoetst. De partiële matrixfenolisatie blijkt een eenvoudige en effectieve therapie voor de unguis incarnatus.

RÉSUMÉ

A. M. BOSSERS, I. M. C. JANSSEN et W. F. EGGINK. Traitement rationnel de l'ongle incarné. Étude prospective.

Après une revue de l'anatomie et de la physiopathologie de l'ongle incarné, les auteurs présentent une étude prospective randomisée au sujet de 2 méthodes de traitement : la résection partielle de la matrice unguéale ou la phénolisation partielle de cette matrice. Il résulte de cette étude que la phénolisation partielle est un traitement simple et efficace de l'ongle incarné.