

Ingrowing toenails: a treatment algorithm

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Abstract

Ingrowing toenails (IT) are a common disorder in which the nail penetrates into the surrounding tissues, causing inflammatory reaction, pain and interference with daily activities. The aim of the study is to provide an algorithm treatment. Patients were divided into three groups according to the stage of IT at presentation. A total of 161 patients with 173 IT's were treated conservatively initially and then surgically if no recovery was documented. The surgical treatment included removal of the nail with the spicules which penetrate the soft tissues, excision of the nail wall, and curettage of the granulation and inflamed tissues. Ablation of the germinal matrix using phenol solution was performed only in recurrent IT's. Using our algorithm recurrent IT's were noticed in 13% and 19.4% of the patients who had stage II and III respectively. For optimal results IT should be staged and treatment tailored according to the algorithm. © 1997 Elsevier Science B.V.

Keywords: Ingrowing toenail; Treatment; Algorithm

1. Introduction

Ingrowing toenails (IT) are a common disorder in which the distal corner of the nail penetrates the surrounding tissues, causing inflammatory reaction and infection. It affects mainly the lateral side of the first toe and is most common in young males [1]. IT can cause considerable debilitating pain and discomfort, and be accompanied by signs of local infection [2]. Many patients, especially blue collar workers, are temporarily incapacitated in performing their daily activities leading to IT's becoming a significant socio-economic burden.

Several modalities have been used to treat IT, ranging from conservative therapy to radical excision of the nail and ablation of its germinal matrix [3,4]. Results are extremely variable and failure rates high [1] Because

not all treatment options were administrated in a methodical fashion failure rates vary in the various reports and it is difficult to compare results. Therefore a well-organized approach is recommended and an algorithm of treatment options based on the stage of the IT is needed in order to achieve optimal results.

We describe an algorithm for the management of IT. The algorithm is based on our staging of IT and the treatment of 173 IT's.

2. Patients and methods

Patients were referred to our clinic by their general practitioners, and were all treated by both authors. Only patients with ingrowing toenails were recruited. Individuals with onychogryposis, onychomycosis and traumatic nail injuries were excluded. Patients were divided into three groups according to the stage of IT at presentation [1,5]. Patients in Stage I suffered mostly

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from pain and there were only minimal signs of infection, patients in Stage II had swelling, erythema and granulation tissue around the nail, and in Stage III these features were more marked, with suppuration, discharge and notable hypertrophy of the granulation tissue.

2.1. Conservative treatment

The initial treatment for all patients included soaking the affected foot in warm diluted povidone solution twice a day and elevating the affected corner of the nail when possible. The patients were instructed to avoid trimming the nail or digging into the inflamed surrounding tissues. The use of sandals or loose shoes was recommended. Systemic antibiotics (Cephalexin, 0.5 g. t.i.d) were administered to patients with IT in stage III. The stage III patients were examined within 48 h following the initiation of the treatment. All patients were re-examined after 7–10 days. Surgery was recommended for patients with either persistence of significant pain interfering with their daily activities or the presence of active infection.

2.2. Surgical treatment

All operations were performed on an outpatient basis with digital block anesthesia. Two injections (2 ml each) of 1% lidocaine (Xylocaine) without epinephrine were given on both sides at the base of the affected toe. When only one side of the toe was affected, a narrow wedge (around 1/4) of the nail was cut longitudinally as proximal as possible and removed. The nail wall was cut with scissors, and the granulation tissues and nail spicules were removed with a curette up to the periosteum. Thus, a wide open groove between the cut edge of the nail and the lowered nail wall was created (Fig. 1). Hemostasis with diathermy was used rarely. When both sides of the nail were affected, the whole nail was removed and the nail wall on both sides was cut. Ablation of the germinal matrix was recommended only to patients who suffered from recurrent ingrowing toenails. In these patients, after the nail was removed, the surrounding skin was protected by petroleum jelly, and liquefied phenol (70%) was applied with cotton

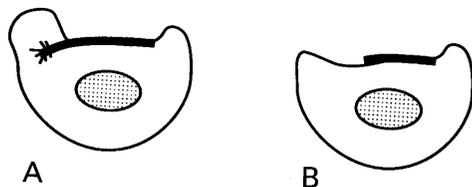


Fig. 1. Cross-section view of the distal toe phalanx. (A) Ingrowing toenail with nail spicules, and inflamed edematous nail fold with abundant granulation tissue; (B) after wedge resection.

buds beneath the cuticle for 3 min and then washed with alcohol solution. The toe was dressed with povidone ointment and Vaseline gauze, and the wound was observed for 30 min for signs of bleeding. The patients were instructed to rest for 24 h with the foot elevated. The dressing was changed once daily by a nurse. Patients resumed their regular activities within 48–72 h.

2.3. Follow-up

Patients were reexamined in the clinic 1 and 3 weeks postoperatively. When the nail started to grow back, they were instructed how to cut the nail properly. Follow-up examinations were carried out monthly for any signs of recurrence. The patients were discharged if there was satisfactory healing for 6 months after the operation. The patients who were not examined at the clinic for more than 3 months were contacted by telephone at the time this survey was performed and were asked to attend the clinic for follow-up examinations. Patients who declined to do so were interviewed via the telephone.

3. Results

Between January 1, 1994 and December 31, 1996, 161 patients were treated for IT. Their age range was 11–56 years (average 22.4), 87 (54%) were males and 74 (46%) were females. In 76 patients (47.2%) the right foot was affected, 73 (45.3%) had left IT, and 12 (7.5%) patients presented with bilateral IT, leaving a total number of 173 nail sides treated for IT.

There were 42 (24.3%) stage I IT, 86 (49.7%) stage II IT, and 45 (26.0%) stage III IT. The results of treatment are presented in Table 1.

3.1. Conservative treatment

Of the 42 stage I ITs, 37 were treated conservatively. Follow-up data were available in 30 of them: 26 (86.7%) are symptom free.

Of the 86 stage II ITs, 33 were treated conservatively. Follow-up data were available in 29 of them: 21 (72.4%) are symptom free.

Of the 45 stage III ITs, only six were treated conservatively. Follow-up data were available for four of them: two (50%) are symptom free.

3.2. Surgical treatment

Five (11.9%) of the 42 stage I ITs were treated by surgery. All these operations were wedge resections.

Fifty three (61.6%) of the 86 stage II ITs were treated by surgery; 39 (73.6%) procedures were wedge resections, and 14 (26.4%) involved removal of the whole nail.

Table 1
Treatment results of ingrowing toenails

Stage	Number of IT	Conservative treatment	Surgical treatment	Number of ITs (follow-up after surgery)	Recurrence
I	42 (24.3%)	37 (88.1%)	5 (11.9%) ^a	4	0
II	86 (49.7%)	33 (38.4%)	53 (61.6%) ^a 39 (73.6%) ^a 14 (26.4%) ^b	46	6 (13%)
III	45 (26%)	6 (13.3%)	39 (86.7%) ^a 24 (61.5%) ^a 15 (38.5%) ^b	36	7 (19.4%)

^a Wedge nail resection.

^b Removal of the whole nail.

Thirty-nine (86.7%) of the 45 stage III ITs were treated by surgery. Twenty-four (61.5%) procedures were wedge resections, and 15 (38.5%) involved removal of the whole nail.

3.3. Short-term results

Of the total 97 ITs which were surgically treated, 91 (93.8%) reported a striking improvement in symptoms after 1 or 2 days. The six remaining patients had either painful hematoma (two patients) or persistent infection and discharge (four patients). Analgesics were seldom used, and almost all patients resumed their work and daily activities within 2–3 days.

3.4. Long term follow-up

The follow-up period was 4–40 months and 139 (86.3%) patients with ITs either remained to the end of this period or updated data on them are available. Therefore of the 173 treated IT's follow-up information was available on 149 (86%)

3.5. Long term results

Four of the five patients with stage I ITs treated by surgery were available for long-term follow up, and there was no recurrence in any of them. Among the 53 patients with stage II ITs, 46 had long-term follow-up during which IT recurred in six of them (13.0%). In patients with stage III ITs, follow-up data were available on 36 out of the 45 ITs which were treated by surgery: it recurred in seven cases (19.4%).

The overall recurrent IT rate was 15.1%, and the time of recurrence was 2–10 months. It is noteworthy that all the patients who did not have a recurrent IT were symptom free. Patients who suffered from recurrent IT were recommended to undergo surgery again, with ablation of the germinal matrix, and ten patients underwent this procedure. Six patients underwent wedge resection, and four patients underwent removal of the whole nail, with phenol application. There were no

recurrences following the second operations. Three patients refused a second operation.

4. Discussion

Although IT may appear to be a trivial health problem, it can be very troublesome and painful, and invariably interferes with the patient's daily activities. Treatment should be prompt upon diagnosis since, as we have shown, conservative treatment often suffices when the condition is mild in degree.

Several factors are associated with the developments of IT. There may be an inherent congenital tendency, as it is often associated with a specific shape of the tip of the toe and the nail [6], in which the nail is situated deeply below high nail folds. In these patients there is often a family history of IT. Among the acquired factors, the most important are improper trimming of the nails and pressure from shoes, especially among adolescents whose feet grow rapidly [5].

Numerous conservative and surgical therapeutic methods for IT have been suggested. The latter includes: (1) nail and nail fold excision with thorough removal of the granulation tissue; and (2) the addition of ablation of the germinal matrix together with nail removal. The second technique prevents regrowth of the nail, but may lead to deformity and a poor cosmetic result, an outcome which may be problematic especially in adolescents.

Reijnen [1] used silver nitrate to treat the granulation tissue, with 60% alcohol-soaked cotton packed under the nail as a conservative measure. This method is time consuming and expensive, and a high recurrence rate (62%) was noted in patients with stage III IT. Some surgeons prefer a combination of wedge resection of the nail with application of Phenol [7]. Simple avulsion of the toenail is quick but has a recurrence rate as high as 70% [8]. Excision of the lateral sulcus and removal of the entire nail bed may disable the patient for longer periods than using a less aggressive approach [8]. Laser matricectomy never gained popularity due to a reported

high failure rate (50% for total matricectomy) and the need for special equipment [9]. Repeated nail abrasion was proposed by Maeda et al. with rapid relief from pain in all patients, but only 23% of their patients remained problem free for more than 1 year [10]. Cryotherapy with liquid nitrogen spray was proposed by Sonnex as being a quick, simple, inexpensive outpatient procedure [2]. Their reported rate of success was comparable with that of other nail-sparing techniques. Fishman reported on his experience with the use of iodine tincture into the affected sulcus and application of silver nitrite on the granulation tissue, stating that this technique worked effectively on about 80% of ITs [11].

The multiplicity of the surgical approaches to this problem which appear in the medical literature is a testimony that there is no ideal one and, indeed, recurrence rates are significant in all reports. Thus, the treatment of ingrowing toenails should not be dogmatic and similar in all patients. Indeed, the surgical option is not always the preferred one. We present here an algorithm that individualized the treatment according to the stage of the IT upon presentation.

In order to customize treatment according to our proposed algorithm (Fig. 2) several features of our surgical technique are worth highlighting. It is our opinion that the main objectives in the surgical treatment of ingrowing toenails are to remove both the spicules of nails which penetrate the soft tissues in the nail walls and the abundant granulation tissue which accumulates around the embedded nail and prevents adequate healing. In order to achieve these goals, it is imperative to excise the nail wall and lay open the groove between the nail and the nail walk and to remove all the granulation and chronically inflamed tissues by curettage (Fig. 1). The granulation tissue is characterized by abundant small blood vessels and tends to bleed easily. Nevertheless, we found that after

its removal bleeding was minimal and tourniquets were not required, thus eliminating the hazards of ischemic damage and necrosis to the affected toe. It is also vital to use minimal diathermy in order to reduce the amount of necrotic tissue. We prefer phenol cauterization of the germinal matrix, because its efficacy is comparable to surgical excision of the germinal matrix with lower morbidity. Postoperative management is no less important than the surgery itself. Regular check-ups in the clinic for removal of any crusts, new granulation tissue and follow-up of the regrowth of the nail are mandatory in the first few postoperative weeks. In stage I and even stage II IT, conservative treatment is often curative in that growth of the nail out of the nail fold and thereafter clearing the inflammatory process may be successfully achieved. Meticulous hygiene and daily baths with antiseptic solution, administration of antibiotics and refraining from cutting or digging around the nails should be the initial treatment for IT of all stages. In patients with severe infectious signs (stage III), such as purulent discharge, marked erythema of the skin of the toe swelling of the entire toe or septic foot, systemic antibiotic administration is indicated and surgery should be postponed if possible until these signs subside. If marked improvement is noted, conservative treatment should be continued. Surgery is indicated when conservative measures fail and the pain and discomfort lead to interference with the patient's regular daily activities. The essential element of the surgical treatment of IT is the radical removal of all the granulation and chronic inflammatory tissues which accumulate between the nail and the nail wall together with the nail spicules.

During the follow-up period the importance of preventing ingrowing of the toenails by proper trimming needs to be emphasized, and all patients in all stages are instructed in the proper techniques of nail trimming.

In conclusion, treatment of ingrowing toenails should be individualized. Based on our experience, we recommend that the initial step of the treatment is to stage the condition at the first visit to the clinic. In cases in which no surgery had been performed, the conservative approach is to be preferred. Radical excision with destruction of the germinal matrix is relatively contraindicated because of the consequent unfavorable cosmetic outcome. However, should the lesion recur, and especially when the shape of the toe with 'deep' nail and 'high' nail wall predisposes to an ingrowing toenail, a more aggressive approach is justified. Our algorithm (Fig. 2) is a structural approach to the treatment of IT with good results.

Since the early and milder stages of this condition are amenable to resolution by conservative treatment, primary care physicians and nurses should include examination of the toes in a patient's regular check-up. We

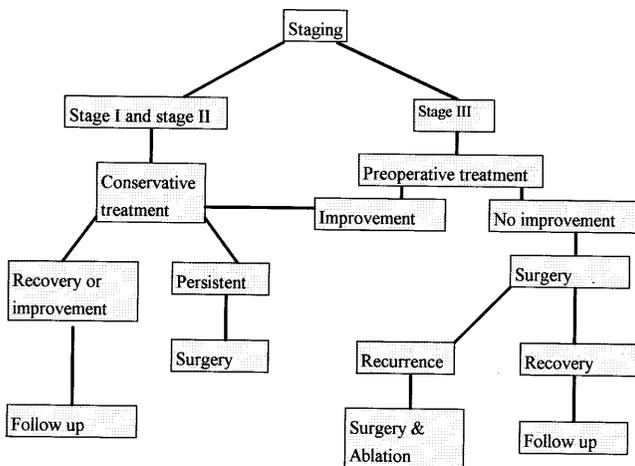


Fig. 2. A treatment algorithm for ingrowing toenails

recommend that adolescents should be instructed how to properly trim their toenails in order to prevent this condition.

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