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CLINICAL REPORT

Chemical Matricectomy with Phenol for the Treatment of Ingrowing Toenail: A Review of the Literature and Follow-up of 172 Treated Patients

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There are many options for the treatment of ingrowing toenail, ranging from simple conservative approaches to extensive surgical procedures. Although conservative treatment modalities are helpful in patients with stage 1 disease, stage 2 and 3 ingrowing toenails are best treated surgically. The aim of this study was to evaluate the efficacy of chemical matricectomy with phenol for the treatment of ingrowing toenail. A total of 350 phenol ablations were performed on 172 patients with stage 2 and 3 disease. Each patient was reviewed weekly until full wound healing was achieved and afterwards, to assess the long-term efficacy of the treatment, they were followed up for a mean period of 25 months. The healing period after the operation ranged from 2 to 4 weeks and no postoperative complications were seen. Only two recurrences (0.57%) were observed, after 9 and 17 months, respectively, and nail spikes had developed in only two toes (0.57%). The success rate was found to be 98.8%. We conclude that phenol cauterization is an excellent surgical method for the treatment of ingrowing toenail because of its simplicity, low morbidity and high success rate. ***Key words: matrix cauterization; ingrowing toenail.***

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Ingrowing toenail is a common problem affecting mainly adolescents and young adults, with a male predominance of 3:1 (1–5). The disorder generally occurs in the big toes (3, 6). It is painful, often chronic and affects work and social activities. Most patients initially complain of pain; later drainage, infection and difficulty in walking occur (7).

In stage 1, there is erythema, slight edema and pain, particularly with pressure. In stage 2, there is an increase in the severity of symptoms, the wound becomes locally infected and starts to drain. In stage 3, all of the signs and symptoms are amplified and there is associated formation of granulation tissue and lateral wall hypertrophy (7).

An ingrowing toenail develops when the proper fit of the nail plate in the lateral nail groove is altered (7). Several factors contribute to the occurrence and worsening of ingrowing toenail: incorrect cutting of nails; hyperhidrosis; poor foot hygiene; excess external pressure, including poor stance and gait, ill-fitting footwear and excess trauma; excess internal pressure caused by overcurvature of the nail plate; arthritis; subungual neoplasms; skeletal abnormalities and inflammatory processes; associated systemic diseases, including diabetes; obesity; and nail changes in the elderly (7–11). Congenital malalignment is another cause, especially in infants (12).

There are many options for the treatment of ingrowing toenail, ranging from simple conservative approaches to relatively extensive surgical procedures requiring considerable surgical experience (4). Conservative approaches include: soaking the foot in warm water; use of topical or oral antibiotics; silver nitrate cauterization of the granulation tissue; proper nail-trimming technique; elevation of the corner of the nail with a small wisp of gauze or a plastic gutter; improvement of foot hygiene; and filing or clipping a notch into the central third of thick nails (1, 2, 8, 9, 11, 13). This form of management is time-consuming, demands a high level of patient cooperation and requires patience from both doctor and patient. Because of the intensive support necessary, it is not a cheap method of treatment (1, 14, 15). However, conservative treatment of ingrowing toenail can be successful, especially in patients with stage 1 disease (1, 2, 7, 11). Stage 2 disease can be managed conservatively but recurrences are frequently seen (1, 2). Stage 2 and 3 ingrowing toenails are best treated surgically (1, 2, 7, 8).

Several surgical procedures have been described for the treatment of ingrowing toenails (7, 14–28). The majority have a moderate success rate and significant morbidity, as manifested by patient discomfort and missed working days (7, 13, 14–17, 19, 22, 24, 29).

Boll (30), in 1945, described a chemosurgical technique for permanent matricectomy. The technique was easy to perform, was associated with little morbidity and had a success rate of 98%. Today, phenol cauterization is the treatment of choice for most podiatrists and physicians (5, 31–33). Long-term follow-up is needed because symptoms may recur 1–2 years after the operation (34). We have now completed a retrospective study of all the patients treated with this method at our clinic over a period of 4.5 years. To assess the long-term efficacy of these treatments, patients are followed up for a mean period of 25 months.

MATERIAL AND METHODS

Between January 1996 and July 2000, 350 phenol ablations were performed on 172 patients with stage 2 and 3 ingrowing toenails. Patients with vascular disease were excluded. If infection was present before the operation, it was treated initially by topical and oral antibiotics and daily warm soaks with dilute povidine iodine (Betadine®) solution. Surgical treatment was instituted as soon as the nail and skin fold became dry.

Surgical technique

The toe was firstly cleaned with povidine iodine solution. Anesthesia was obtained with a standard digital block employing 2% prilocain

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without epinephrine. The toe was exsanquinated by rubber operating glove tourniquet (the cut end of a rubber finger being rolled back towards the big toe base). A dry field is important for the optimum cauterizing effect of phenolization. A 2–3 mm lateral nail segment was cut free along the length of the lateral fold and removed with a straight hemostat, taking care to ensure nail removal lower than the basal lateral matrix. Hypertrophied granulation tissue was curetted. The phenol was applied with partially stripped cotton applicators, saturated with 88% liquefied phenol (distilled water was used as solvent), by vigorously massaging it into the matrix area. Care was taken to prevent spillage of phenol onto the surrounding skin. The cotton applicator was changed twice during a total application time of 3 min. After completion of this procedure, the area was lavaged with 70% isopropyl alcohol to neutralize the residual phenol. The tourniquet was removed and the wound was dressed with an antibiotic ointment, followed by longitudinal and circumferential gauze wrapping. The dressing was then secured with adhesive tape. The procedure took approximately 20 min to perform.

Postoperative care

After the operation paracetamol was given for pain control. The patient was allowed to walk immediately after the operation and directed to elevate the affected foot whenever possible. Most patients returned to normal ambulation and activity as early as 1 day after the operation. It was not necessary to admit the patient to the hospital. The dressing was removed after 48 h in the clinic. Following this, antiseptic soaks with dilute povidine iodine solution for 15 min once a day, followed by the application of an antibiotic ointment were started and continued usually for a period of approximately 2–4 weeks, until the drainage ceased. Patients were reviewed in the clinic weekly until full wound healing was achieved. Postoperative follow-up periods ranged from 9 to 48 months, with a median time interval of 25 months. Recurrence was defined as evidence of ingrowth of the nail edge or spicule formation.

RESULTS

A total of 350 ingrowing nail edges were treated in 172 patients. The male:female ratio was 100:72. The mean age of the patients was 25 years (range 9–66 years). Two hundred and forty-five procedures were performed on the lateral side of the nail and 105 procedures on the medial side. Fourteen procedures were done on the second to fifth digits whereas all others were done on the hallux. All patients had previously been treated using conservative measures and 63 of them had previously been treated with nail avulsion.

No postoperative complications occurred after the operation. The healing period ranged from 2 to 4 weeks. There were two (0.57%) recurrent ingrowing nail edges, both of which were painful. Recurrences were observed after 9 and 17 months, respectively. These patients were treated again using exactly the same technique and no failures were recorded after a follow-up period of 2 years. Nail spikes were seen in two toes (0.57%), both of which were asymptomatic. The surgical success rate was found to be 98.8% and no patient complained about the cosmetic appearance of the toenail after the operation.

DISCUSSION

Surgical treatments are often used in patients with stage 2 and 3 ingrowing toenails. Conventional surgical treatments of ingrowing toenails have been associated with high recurrence rates, considerable postoperative pain and poor cosmetic results (14, 16). Simple nail edge and total nail avulsion have unacceptably high recurrence rates of 39% and 83%, respectively (13, 14–16, 29, 35). Soft tissue resection has a better cure rate than simple avulsion, with a reported success rate of 60% (7, 24). The use of cryotherapy also results in high recurrence rates (36%) (22). Total nail bed ablation using the Zadik procedure (19) is associated with significant postoperative pain and with recurrence rates ranging from 16% to 28%. Many patients, particularly young females, also object to the ugly cosmetic results (4, 14, 16). The recurrence rate following wedge resection is 12–30% (3–5, 13, 14, 17). Excision of the proximolateral matrix segment is safe and effective, with cure rates > 95%, but the major disadvantage is that the procedure is technically difficult and overaggressive bone destruction can lead to osseous infections and complications (7, 25, 26). Amputation of the terminal part of the distal phalanx is now rarely used and has no acceptable cosmetic results (7, 8, 20, 23).

Segmental matrix cauterization with liquefied phenol has been shown to be highly successful in permanently destroying the lateral matrix (4, 5, 26, 31–37). Phenol (C_6H_5OH) is a colorless crystal derived from coal tar. Liquefied phenol (carbolic acid) has antibacterial, anesthetic and in its concentrated form, escharotic properties. For matricectomies, liquefied phenol is used at a saturated concentration of 88%. The acid mediates its injury via denaturation of the matrix as well as any other soft tissue proteins with which it comes into contact (7, 31).

There are numerous reports in the literature describing the effectiveness, cure rates and complications of matrix cauterization with phenol for the treatment of ingrowing nails (4–6, 17, 26, 31–36). The follow-up periods and recurrence rates for some of these studies are summarized in Table I. We believe that the results of the studies with long-term follow-up periods are more important for evaluating the success of this procedure as recurrence may occur even 1 or 2 years later.

Our success rate was 98.8% in 350 phenol cauterizations followed up for a mean time interval of 25 months. There were two recurrent ingrowing nail edges which occurred 9 and 17 months, respectively after the operation.

Surgical technique is an important factor in the success of this method. To avoid recurrence after phenol cauterization:

- Sufficient width of nail must be removed (a full quarter) (32);
- Care must be taken not to leave nail spicules in the sulcus or under the eponychium (32);

Table I. *Follow-up periods and recurrence rates (ingrowing nail and/or spicule formation) for different studies after phenol cauterization*

Reference no.	No. of patients	Follow-up period (months)	Recurrence rate (%)
17	28	6	11
35	280[a]	6	3
4	45	6	7.7
38	24	8	5.8
31	30	11	0
6	379	12	5
26	[b]	15	0
36	54 [a]	14	7.4
32	623[a]	13	4.5
5	125	19	9.6
33	60	36	9.2
34	32	23	28

[a]Total number of phenol cauterizations.
[b]The number of patients is not described in this study.

- Phenol must be applied using sterile cotton-tipped applicators by vigorously massaging it into the matrix area for a sufficient time (application for < 3 min results in high recurrence rates) (38); and
- Absolute hemostasis must be obtained as blood partly neutralizes the cauterizing effect of phenol (5, 8).

Newer methods of segmental nail bed ablation, including electrodesiccation, sodium hydroxide treatment, negative galvanic current therapy and carbon dioxide laser treatment need further evaluation (3, 27, 28, 37, 39).

We conclude that phenol cauterization for the treatment of ingrowing toenail is excellent because of its simplicity, low morbidity and high success rate. It can easily be done as an outpatient procedure. Phenol cauterization is the treatment of choice in our clinic.

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