THE TREATMENT OF INGROWING TOENAILS

A RANDOMISED COMPARISON OF WEDGE EXCISION AND PHENOL CAUTERISATION

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We treated 249 patients for ingrowing toenails in a prospective randomised study which compared wedge excision with segmental phenol cauterisation. Follow-up of 97% was at a minimum of 14 months.

The analgesic requirement was significantly lower after phenol cauterisation (p < 0.001), and significantly fewer patients needed to miss school or work (p = 0.001). Recurrence of ingrowth was seen in 16% after wedge excision and 9.6% after phenol cauterisation (not significant), but re-operation was significantly less frequent after phenol (p < 0.01). Phenol cauterisation gives better short-term and long-term results than wedge resection.

Ingrowing toenails are common, causing pain, disability and absence from work. The condition occurs most often between the ages of 15 and 40, with a male predominance of 3:1. It is uncertain whether footwear that is too short or too tight is the cause, or whether a congenital predisposition is aggravated by local conditions. The importance of an abnormally shaped nail is uncertain, though an association of wide fleshy nail folds and thin nail plates with medial rotation of the great toe has been reported (Pearson et al 1987; Langford, Burke and Robinson 1989).

Patients are treated for ingrown toenails by a variety of practitioners, including chiropodists, general practitioners, orthopaedic and general surgeons (Sykes and Kerr 1988), using treatments ranging from conservative measures to a number of surgical procedures (Sykes 1986). There is need for larger prospective studies with long follow-up (Miller 1985; Sykes 1986).

The most widely used operation, and until recently our method of choice, is the wedge excision described by Cheyne and Burghard in 1912, but this gives much discomfort and has high recurrence rates (Palmer and Jones 1979; Morkane, Robertson and Inglis 1984; Sykes 1986). Segmental phenol cauterisation is reported to give less discomfort and fewer recurrent nail spikes (Ross 1969; Morkane et al 1984). We have conducted a randomised controlled study to compare these two methods.

PATIENTS AND METHODS

Patients with ingrowing toenails were referred by general practitioners, and we excluded from the trial those with recurrence after previous surgery. Informed consent was obtained, the design of the study having been approved by the hospital ethical committee. Randomisation was performed in the treatment room by opening an envelope containing a form which indicated the treatment, either surgical wedge excision (group I), or segmental phenol cauterisation (group II).

Treatment was carried out by a surgeon or a surgical resident. The toe was cleaned with povidone-iodine solution, a ring block injected at the base of the digit, using lignocaine 1%, and a rubber band tourniquet applied.

Wedge excision. We used the technique described by Winograd in 1929. A longitudinal incision is made through the nail and nail bed 4 mm from the affected margin, then through the skin over the nail matrix and the matrix itself, extending 1 cm proximal to the eponychium. A second incision is made in the skin at the nail fold, completing an ellipse with the first incision. A wedge of tissue is then removed down to the periosteum.
and the wound is curetted. A single haemostatic nylon 3–0 suture is placed proximally across the wound; after applying a sterile dressing the tourniquet is removed.

**Segmental phenol cauterisation.** We used the method described by Boll (1945) and modified by Ross (1969). A 2 to 4 mm segment of nail on the affected side is isolated by a careful cut which is extended under the eponychium without damaging the nail bed. Care is taken not to phenol is applied three times over a minimal total time of three minutes. Care is taken to cover all the germinal epithelium, but to avoid the surrounding skin. After three minutes the wound is wiped clean and rinsed with an alcohol-soaked gauze to neutralise the residual phenol. The tourniquet is removed and the wound dressed with a sterile dry dressing.

**Review and assessment.** All patients received a prescrip-

### Table I. Details of 249 patients with ingrowing toenails

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number</th>
<th>Male</th>
<th>Female</th>
<th>Mean age (yr)</th>
<th>Mean duration of symptoms (mth)</th>
<th>Side</th>
<th>Nail fold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Wedge excision</td>
<td>124</td>
<td>77</td>
<td>47</td>
<td>26 (20 to 80)</td>
<td>5.4</td>
<td>62</td>
<td>57 5</td>
</tr>
<tr>
<td>Group II Phenol cauterisation</td>
<td>125</td>
<td>81</td>
<td>44</td>
<td>28 (3 to 97)</td>
<td>4.9</td>
<td>55</td>
<td>66 4</td>
</tr>
</tbody>
</table>

### Table II. Short-term results of treatment of 249 ingrowing toenails

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number</th>
<th>Yes</th>
<th>No</th>
<th>Mean number of days</th>
<th>Mean time of healing (wk)</th>
<th>Sick leave</th>
<th>Mean number of days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Wedge excision</td>
<td>124</td>
<td>68</td>
<td>56*</td>
<td>1.1 (0 to 7)</td>
<td>2.5 (1 to 14)</td>
<td>73*</td>
<td>46 3.1 (0 to 14)</td>
</tr>
<tr>
<td>Group II Phenol cauterisation</td>
<td>125</td>
<td>25</td>
<td>100*</td>
<td>0.4 (0 to 7)</td>
<td>2.2 (1 to 5)</td>
<td>47*</td>
<td>73 1.8 (0 to 14)</td>
</tr>
</tbody>
</table>

* p < 10^-5
+ difference p < 0.001, chi-square

### Table III. Long-term results of treatment of 249 ingrowing toenails

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number</th>
<th>Average follow-up (mth)</th>
<th>Recurrence</th>
<th>Re-operation</th>
<th>Residual pain</th>
<th>Nail spike</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Wedge excision</td>
<td>124</td>
<td>19.8 (14 to 31)</td>
<td>20</td>
<td>16</td>
<td>14*</td>
<td>11</td>
</tr>
<tr>
<td>Group II Phenol cauterisation</td>
<td>125</td>
<td>19.5 (14 to 31)</td>
<td>12</td>
<td>9.6</td>
<td>3*</td>
<td>23</td>
</tr>
</tbody>
</table>

* difference, p < 0.01, Fisher's exact test
† see text

damage the eponychium or other skin. The nail segment is then lifted from its bed using a small pair of forceps. Hypertrophied granulation tissue is removed with a surgical blade.

The toe is then squeezed to expel blood and obtain a completely dry nail bed. Liquefied phenol (BP), 80% w/w, is applied to the nail bed and the cavity under the nail fold with a small cotton tipped applicator. The

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All patients were reviewed after at least 14 months to assess long-term results. Recurrence was defined as penetration of the nail fold by the nail.

**Statistical methods.** We used the Wilcoxon rank sum test, the chi-square test and Fisher’s exact test as appropriate.

**RESULTS**

During 1985 and 1986, 249 patients were treated for ingrowing toenail as outpatients, nine for both great toes (Table I). Wedge excision was performed on 124 patients (group I) and 125 had phenol cauterisation (group II). The male:female ratio was 158:91. The lateral fold was affected in 171, the medial fold in 65, and both in 13 patients. The average duration of symptoms was 5.4 months in group I and 4.9 months in group II ranging from one week to five years in both groups.

Postoperatively, 54% of group I used analgesics, as against only 20% of group II (Table II). This difference is statistically significant (p < 0.001, chi-square). The average period of use of analgesics was 1.1 days in group I as against 0.4 days in group II. The average times of healing were: group I, 2.5 weeks (maximum 14 weeks); group II, 2.2 weeks (maximum 5 weeks). Sick leave was taken by far fewer patients from group II (p = 0.001, chi-square) and was for a shorter mean period (Table II). Of the 249 patients, 244 (98%) were seen at follow-up at an average of 19 months; three were missing from group I and two from group II (Table III). Recurrence of symptoms was experienced by 20 patients (16%) in group I and by 12 patients (9.6%) in group II (difference not significant). Re-operation had been required for 14 patients (11%) in group I and three (2.4%) in group II (p = 0.004, Fisher’s exact test). At the time of follow-up 22 patients in group I and 23 in group II still had some occasional discomfort and nail spikes were found in 27 and 21 patients respectively.

**DISCUSSION**

A recent review suggested that chemical ablation of a segment of nail bed may be the best treatment, but advised prospective clinical trials with prolonged follow-up (Sykes 1986). Our prospective study had a minimum follow-up of 14 months; the 97% follow-up resulted from an active policy of visiting patients at home when necessary. As in other series, we found more male than female patients and more common involvement of the lateral nail fold (Burssens, Vereecken and Van Loon 1987; Pearson et al 1987).

There is significantly less pain after phenol cauterisation, with a statistically significant reduction in the number of days sick leave. Although not statistically significant, we did find a lower incidence of recurrence after phenol (9.6%) than after wedge resection (16%); both figures are lower than other authors have reported (Cameron 1981; Varma, Kinninmonth and Hamer-Hodges 1983; Morkane et al 1984; Perry et al 1984; Burssens et al 1987).

Re-operation for recurrence was significantly less frequent after phenol cauterisation, and the method of choice was phenol. In contrast to Morkane et al (1984) we found that residual minor symptoms or nail spikes were no less common with phenol than with wedge resection. This may be influenced by the fact that both operations were performed by a changing group of surgeons including trainees.

Surgical technique is an important factor in the success of both methods. To avoid recurrence after phenol, absolute haemostasis and very careful application to the nail matrix is necessary. However, segmental phenol cauterisation is easily learnt; it can be performed very well by general practitioners.

We conclude that segmental phenol cauterisation gives less discomfort and better long-term results than wedge resection. Phenol is now the treatment of choice in our clinic.

The authors wish to thank Professor Dr J. Jeekel for his advice and critical reading of the manuscript.

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**REFERENCES**


