THE SURGICAL TREATMENT OF INGROWING TOENAILS

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Two prospective studies of ingrowing toenail management were conducted. In the first, 163 patients (204 ingrowing nail edges) who had not had previous surgery were randomised and treated by total nail avulsion, nail edge excision, or nail edge excision with phenolisation of the germinal matrix; recurrence rates one year postoperatively were 73%, 73% and 9% respectively.

In the second study, 63 ingrowing nail edges which had recurred after previous operations underwent nail edge excision and phenolisation. There was a 5% recurrence rate and a 5% incidence of dystrophy of the nail one year after operation.

The results of ingrowing toenail treatment are extremely variable. The review by Sykes in 1986 of 32 published studies quoted recurrence rates which ranged from 0% to 86%. Most of these studies were retrospective, without independent assessment of the results, and the populations studied were inadequately defined. There have been few reports of the management of recurrent ingrowing toenail.

We have assessed three forms of surgical treatment in patients who had not previously had surgery and also reviewed the effectiveness of nail edge excision and germinal matrix phenolisation for those which recurred after a previous operation.

PATIENTS AND METHODS

Study 1

We included all patients with ingrowing toenails in whom conservative treatment had failed, and who were referred to Hairmyres Hospital and Glasgow Royal Infirmary between August 1986 and July 1987. Recurrent ingrowing or onychogryphotic toenails were excluded. Patients were randomised to receive one of three treatments: group 1) total nail avulsion; group 2) excision of the ingrowing nail edge; group 3) nail edge excision and germinal matrix phenolisation.

Operative techniques. The distal circulation was checked pre- and postoperatively. The toe was anaesthetised by a digital block with 5 to 10 ml of 0.5% Marcaine. Bacteriological swabs were taken pre-operatively from discharging nail beds and excess granulation tissue was curetted. The following operations were carried out by one or other of three surgical trainees.

Group 1) Total avulsion: the whole nail was removed by avulsion with a pair of artery forceps.

Group 2) Nail edge excision: artery forceps were introduced deep to the nail edge, separating it from the matrix. At least 0.5 cm of the nail was then removed by cutting down its longitudinal axis.

Group 3) Nail edge excision and phenolisation: a tourniquet was applied and nail edge excision was performed as for group 2. The toe was compressed and the gutter dried to control venous ooze. Paraffin jelly was applied to the skin around the nail to protect it. Liquified phenol (80%) was applied in drops from a pipette onto the nail bed and along the gutter. It was left for four minutes and then removed with swabs. Any remaining phenol was neutralised with methylated spirit.

Study 2

Consecutive patients who presented over the same period with a recurrent ingrowing toenail after one previous surgical operation were entered in this study. They were treated by nail edge excision and phenolisation as described above.

In both studies, dressings were changed after three days and subsequent postoperative care was provided by the general practitioner. Patients were assessed by the surgeon two weeks later when bacteriological cultures were taken if appropriate. Infection was defined as growth of a pathogenic organism from the wound; antibiotic treatment was guided by reported sensitivities. Patients were advised on wound care, footwear and hygiene.
The patients were reviewed one year later by an independent assessor who did not know which procedure had been performed. Recurrence was defined as evidence of ingrowth of the nail edge or spicule formation; the presence or absence of symptoms was noted.

The statistical methods used were the chi-squared and the Bonferroni comparison tests.

RESULTS

Study 1
There were 168 patients in this study. Five were lost to follow-up, leaving 163 patients in whom the results of surgery were assessed. The sex distribution and mean ages of the three groups were similar (Table I).

The incidence of pre- and postoperative infection is shown in Table II. In group 2, the one patient who developed a postoperative infection had an infected toenail pre-operatively. Patients undergoing nail edge excision and phenolisation had more wound infections (seven postoperatively in whom only two had pre-operative infection) than did those in the other two groups. All infections settled rapidly on appropriate antibiotic therapy.

A total of 204 ingrowing nail edges were treated in the 163 patients. The incidence of recurrence was 73%, 73% and 9% respectively for the three groups (Table III). The results were not surgeon-dependent. All recurrences

<table>
<thead>
<tr>
<th>Procedure (group)</th>
<th>Sex</th>
<th>Mean age in years (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total avulsion (1)</td>
<td>Male</td>
<td>41</td>
</tr>
<tr>
<td>Nail edge excision (2)</td>
<td>33</td>
<td>14</td>
</tr>
<tr>
<td>Nail edge excision and phenolisation (2)</td>
<td>39</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure (group)</th>
<th>Infection</th>
<th>Pre-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total avulsion (1)</td>
<td>n = 59</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Nail edge excision (2)</td>
<td>n = 47</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Nail edge excision and phenolisation (3)</td>
<td>n = 57</td>
<td>15</td>
<td>26</td>
</tr>
</tbody>
</table>

Table III. Recurrence rates after three operations for ingrowing toenails (204 procedures)

<table>
<thead>
<tr>
<th>Procedure (group)</th>
<th>Number of ingrowing nail edges</th>
<th>Recurrences</th>
<th>Symptomatic</th>
<th>Patient satisfaction (%)</th>
<th>Time to recurrence (months) mean and range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total avulsion (1)</td>
<td>81</td>
<td>59</td>
<td>73</td>
<td>46</td>
<td>57</td>
</tr>
<tr>
<td>Nail edge excision (2)</td>
<td>56</td>
<td>41</td>
<td>73</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>Nail edge excision and phenolisation (3)</td>
<td>67</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

in group 3 were symptomatic but not all recurrences in groups 1 and 2 produced symptoms. Using the Bonferroni comparison test, there was no significant difference in recurrence rates between groups 1 and 2. However, in the other two comparisons the results were significantly different: between groups 1 and 3 (p < 0.01) and groups 2 and 3 (p < 0.01).

When asked about their treatment, 27 of 59 (46%) patients in group 1 said that they were satisfied, 23 of 47 (49%) in group 2 and 48 of 57 (84%) in group 3 (Table III).

Study 2
There were 42 patients in this study, 29 male and 13 female, with an average age of 22 years (range 11 to 63). They had 64 recurrent ingrowing toenail edges. Previous treatments included: total nail avulsion alone (51); nail edge excision with germinal matrix phenolisation (11); and total nail avulsion with germinal matrix phenolisation (2). At the time of the revision operation 17 edges (27%) were infected.

Two weeks postoperatively, four patients had nail bed infections. Three were cured with oral antibiotics but one required nail avulsion to eradicate the infection. Two of the infected nails had been infected pre-operatively.

One year later 63 edges were assessed (one patient
was lost to follow-up). There were three recurrent ingrowing nail edges; all were painful and they had recurred three to four months postoperatively. Two patients (three edges) developed painful dystrophy of the nail at the site of phenolisation, eight and 12 months postoperatively.

Of the 42 patients, 37 were satisfied with their treatment. The five patients who developed ingrowing or dystrophic nails were dissatisfied. Out of 63 nail edges, 57 (90%) were asymptomatic one year after surgery.

**DISCUSSION**

Sykes' 1986 survey of orthopaedic and general surgeons found that more than half advocated procedures which did not ablate the nail bed. The high incidence of recurrence (73%) for simple avulsion in the present study is similar to that reported by him. Nail edge excision alone has been advocated because it can be performed without local anaesthesia and was said by Cameron (1981) to have a lower recurrence rate (39%). However, we found it no better than nail avulsion. We recommend that neither simple avulsion nor nail edge excision alone should be practised unless phenolisation is contraindicated.

The reported recurrence rates following surgical ablation of the nail bed have varied widely: for Zadik's operation, 1% to 50% (Fowler 1958; Townsend and Scott 1966; Andrew and Wallace 1979); for segmental excision 16% to 30% (Wallace, Milne and Andrew 1979; Morkane, Robertson and Inglis 1984). These figures should be compared to the recurrence rates after nail edge excision and phenolisation in the present report of 9% and 5% (studies 1 and 2). Other reports of the method have also shown low failure rates (3% to 25%) (Cameron 1981; Robb and Murray 1982; Varma, Kinninmonth and Hamer-Hodges 1983). However, in wider practise the results may be worse, as was suggested by a three-year retrospective audit of the treatment of ingrowing toenails in a general hospital where the responsibility for treatment of patients was often delegated to inexperienced junior staff (Greig 1989). Their recurrence rate after total avulsion and phenolisation was 53%, although only half the recurrences were symptomatic. Issa and Tanner (1988) showed that combined wedge resection and segmental phenol ablation was better than phenol ablation alone.

The reasons for recurrence after phenol ablation have included: failure to remove all nail fragments, particularly in the angular fold; the use of insufficient phenol, or for too short a time; inadequate control of venous ooze; inappropriate postoperative footwear. If meticulous attention is paid to technique and good advice is given to the patient, recurrences can be minimised. Postoperative infection did not predispose to recurrence.

The management of recurrent ingrowing toenails has received little attention though it is so common. Murray and Bedi (1975) demonstrated that after a second toenail avulsion there was an even higher recurrence rate (86%). Radical ablative procedures are often disfiguring. Previous studies of nail edge excision and phenolisation have either failed to state how many patients had undergone previous operations or failed to exclude them from consideration (Cameron 1981; Robb and Murray 1982; Varma et al 1983). The importance of adequate primary treatment is emphasised by the high failure rate (47%) reported after total nail bed excision and phenolisation for multiple recurrences (Anderson et al 1990).

In group 2 of our study 1, 34% of the recurrences happened six months or more after the operation, and in study 2, symptomatic dystrophic nails developed after eight and 12 months. Follow-up in this type of study should therefore be for at least one year.

We suggest that nail edge excision with phenolisation is a logical and effective treatment for ingrowing toenails in which conservative treatment has failed and for those in which recurrence has followed a previous surgical procedure.

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**REFERENCES**


