Does phenolisation for one minute provide the best outcome for patients undergoing matricectomy ?

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Introduction

Onychocryptosis affects adults and children with varying degrees of severity and disability (Pettine et al, 1998). It has significant morbidity, interfering with work, schooling and sporting activities (Serour, 2002), and therefore requires interventionist treatment as a matter of urgency. The most frequent treatment of choice is the phenol matricectomy technique, which is simple to perform, with a fairly predictable course of healing.

However, there is much debate regarding the length of time required for the destruction of nail matrix cells, with variations between 30 seconds and five minutes (Boberg, 2002, Brown 2003). Perhaps because of this lack of consensus, re-growth rates vary, as do rates of healing and post-operative infection.

The move towards Evidence Based Medicine in today's health economy encourages the investigation of these variations so that a consensus may be reached, assisting in the development of a cost-effective service, with recommended phenolisation times based on valid and reliable evidence. This could provide a base-line from which acceptable healing time 'norms' could be established, as well as acceptable rates of re-growth. With this in mind, the objective of this study was to look at healing rates in relation to the appearance of recognised markers in the healing process, and to establish whether a standard phenolisation time of one minute would provide the optimum outcome for patients.

Materials and methods

Patients attending for nail surgery were assessed for suitability using a standard pre-surgical assessment protocol. For the procedure, analgesia was achieved using 3% mepivacaine, and the digit exsanguinated using a Tournicot®. The nail plate/section was elevated, and separated using Thwaite's nippers if a partial avulsion was to be performed. After removal of the section/nail plate, the area was checked visually and with a sterile probe for remaining nail pieces before being dried with sterile gauze. The application of 89% phenol for one minute was standardised using EZSwabs®, giving application of a measured amount of phenol

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Figure 1. EZSwab phenol applicator showing cotton bud carriage mechanism

The area was then flushed with 10% povidone iodine in alcohol (Betadine®) before removal of the tourniquet. A dressing of chlorhexidine gluconate gauze was applied, followed by two layers of plain sterile gauze, secured with tubular bandage and hypoallergenic tape. Patients were given post-operative advice verbally and in writing.

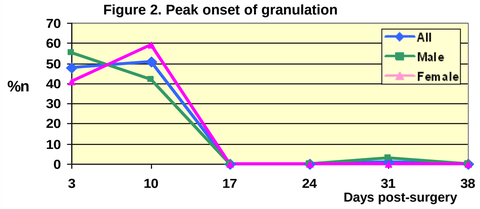
Re-dressings did not involve wound irrigation, and the same type of dressing was applied as that used in the original surgery. Dressings took place 3 days post-surgery, followed at 7-day intervals until resolution occurred. The wound was assessed objectively by the same practitioner at each visit, using a post-surgical assessment protocol.

Results

A total of 75 procedures were performed in 75 patients with an age-range of 10-72 years; 38 males (12-70 yrs, X=40), 37 females (10-72yrs, X=43). Of the 75 procedures, 33 were total nail avulsions, 37 were partial nail avulsions, and 5 were re-growth revisions.

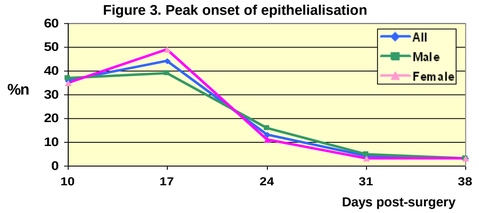
Granulation tissue was first noted in the wounds by Day 3 in 48% of subjects, with a further 51% by Day 10.

Figure 2. Peak onset of granulation



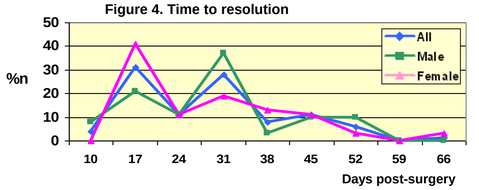
Commencement of epithelialisation was first noted on Day 10 in 36% of procedures, by Day 17 in 44%, Day 24 in 13% procedures, and Day 31 in 4%, and the final 3% by Day 38.

Figure 3. Peak onset of epithelialisation



Resolution was first noted by Day 10 in 4%, Day 17 in 31%, Day 24 in 11%, Day 31 in 28%, and Day 38 in 8% procedures. In 18% resolution took place between Days 45 and 66.

Figure 4. Time to resolution



Post-operative bleeding occurred in 71% of subjects. Of those undergoing total avulsion 88% experienced post-operative bleeding, whilst 65% of those undergoing partial nail avulsion experienced the same. None of those having re-growth revision bled. Post-operative discomfort between the surgery and Day 3 was reported by 63%, the remaining 37% reported no discomfort at any time. Post-operative infection was diagnosed by the assessing clinician in 2 procedures, representing a post-operative infection rate of 2.6%

At 12 months post-surgery, nail re-growth had occurred in 4 patients (5%). These occurred after total nail avulsion in 3 subjects, and after a partial avulsion in 1 subject. In all cases the re-growth was non-painful, and no subject elected for further surgery.

Discussion

This study looked at healing times following toenail surgery in relation to (1) time taken for granulation tissue to appear; (2) onset of epithelialisation; and (3) to determine the time in days from surgery to discharge. From this it was hoped to provide baseline data on optimal healing and discharge times.

1. Granulation: 99% of subjects had shown some degree of granulation by Day 10 (Fig.2). In 'normal' healing the beginning of proliferation is usually 4-7 days post-wounding, granulation beginning within 2 days of the onset of this phase. In this study, granulation was noted in 48% subjects by Day 3, which is considerably earlier than what would normally be expected in a phenolised wound (de Berker, 2001, Rinaldi, 1982), suggesting that the presence of phenol in these wounds did not significantly affect the progression of healing. This may be due to the reduced application time of the phenol when compared to other studies (Varma et al, 1983, Rob & Murray, 1982).

In an earlier study where application of 89% phenol was for two minutes, 98.6% of subjects had begun granulation by Day 10 (Brown, 2003). In comparing wounds with exposure to phenol for one and two minutes, it appears there is little difference between the two groups, and therefore it appears reduced phenolisation time does not significantly affect the time taken for granulation tissue to appear.

2. Epithelialisation: in 36% of subjects epithelialisation had begun by Day 10, (Fig 3), occurring in all subjects by Day 38. Epithelialisation is expected to begin in a normal wound towards the end of the proliferative phase, and in a phenol-induced wound again this is expected to be extended. In the earlier study by Brown epithelialisation had begun in 35% by Day 10. Again little difference appears between the two groups, and so it could be said that a reduction of phenolisation time does not appear to significantly affect the time taken for epithelialisation to begin.

3. Time to Discharge: 74% of the subject group had achieved resolution and discharge by Day 31 (Fig 4), differing from the results of the earlier study, where 55% had reached this stage by Day 31. From this it does appear that reduced phenolisation time results in earlier resolution and discharge.

Looking at more subjective factors, 63% of patients reported discomfort on their first review. Of this group 57% reported that this had resolved by Day 10, and a further 28% had no further discomfort by Day 17. In the earlier study discomfort rates were lower, with 47% of patients reporting pain at first review. Within that group, 68% had no discomfort at Day 10, and a further 23% reporting the same at Day 17. This longer contact time with the phenol may have contributed to more extensive demyelination of nerve endings, and therefore this group of patients felt less pain post-surgically than the group who experienced one minute phenolisation. If phenol contact times are to be reduced then it is important to remember that there is likely to be an increase in numbers of patients experiencing pain directly after surgery, and therefore appropriate advice should be given to patients relating to this.

When observing recurrence rates 12 months post-surgery, there was a 5% rate for the one minute group compared to a 2.7% rate for the two minute group, suggesting that although the wounds from the one minute group heal more rapidly, there is a higher risk of insufficient destruction of the nail matrix tissue in relation to the shortened phenol contact time.

Conclusions and Recommendations

Phenolisation with 89% phenol for one minute in nail matricectomy reduces wound healing times when compared to a longer time of two minutes, however more patients experience post-operative bleeding and report post-operative discomfort. In addition, re-growth rates are higher when the phenolisation time is reduced to one minute. This leads to the recommendation that in order to achieve lower re-growth rates and minimise post-operative complications for patients, a minimum phenol contact time of two minutes is suggested.

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