CORRECTION OF HOOKED-NAIL DEFORMITY BY HOMODIGITAL REVERSE FLOW ISLAND FLAP

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ABSTRACT

Objective: Hooked-nail deformity results from loss of bony and soft tissue support of the nail bed. Various treatment methods have been described for soft tissue support with inconsistent results.

Methods: Eleven patients (mean age 21 years old, 10 male, 1 female) with hooked-nail deformities on twelve of their fingertips were treated by using homodigital reverse flow island flap. Mean follow-up period was 6 months.

Results: All treated fingers gained nearly normal appearances and all patients were satisfied. None of the patients had experienced recurrence of the deformity. 2 patients complained of cold intolerance.

Conclusion: The described method is a one-stage procedure. Ample flap tissue taken from the same finger is applied to the fingertip. A short period of immobilization is necessary avoiding any joint stiffness. Homodigital reverse flow island flap was considered an effective method for correcting hooked-nail deformities resulting from inadequate soft tissue support of nail bed.

Key Words: Hook nail, Homodigital reverse flow island flap.

INTRODUCTION

Hooked-nail deformity, causing pain and an unpleasant claw-like appearance of the fingertip, is the result of insufficient bone and soft tissue support to the nail bed. Tight closure of a fingertip amputation and/or loss of bony support for the nail bed are the most common causes of the deformity. However, isolated loss of soft tissue support for the nail bed such as fingertip burns or finger pulp avulsions can also result in hooked nail deformity (1,2). The growing nail follows the nail matrix. When the support of the distal nail bed is lost, the nail begins to curve, forming a claw-like appearance.

To correct the deformity, it is necessary to release the nail bed completely, set back to the upward position and provide adequate support to maintain the newly constructed displaced nail bed (3-5). Bone grafts are used for bony support with inconsistent results due to bone graft resorption. A free vascularized transfer of second-toe tip, distal phalanx and nail can be an alternative solution (6). In the case of loss of soft tissue support of the nail bed, various procedures such as V-Y advancement flap, cross-finger flap, full thickness skin graft or composite toe graft have been described to replace the soft tissue of the tip and allow replacement of the nail bed onto the dorsum of the bone (7-9).

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In this study, soft tissue support of the hooked nail bed was achieved by homodigital reverse flow island flap.

PATIENTS AND METHODS

Patients

Eleven patients with hooked-nail deformity on twelve of their fingertips were treated using reversed homodigital artery island flaps. Ten patients were male and one was female. Their ages ranged from 18 to 24 years old (mean 21). The deformity was a result of finger pulp amputation in 2 cases and burn contracture in 9 cases. The distribution of the deformity among the fingers was variable; index finger in 2 cases, middle finger in 6 cases and ring finger in 4 cases. Eight of the patients were right-handed and 3 were left-handed (Table I).

Table I. Characteristics of the patients. M: male, F: female, R: right L: left, PBC: post burn contracture, PA: pulpa amputation

Case number	Sex	Age (years)	Hand and finger	Etiology	Follow-up (months)
1	M	21	R, index	PBC	9
2	M	20	L, middle		
			R, ring	PBC	8
3	F	18	R, middle	PBC	7
4	M	21	R, ring	PA	7
5	M	20	R, index	PBC	6
6	M	21	L, middle	PBC	6
7	M	22	R, middle	PBC	6
8	M	19	R, ring	PA	5
9	M	23	L, ring	PBC	4
10	M	24	R, middle	PBC	4
11	M	21	R, middle	PBC	4

Method

All the operations were performed under tourniquet control with the aid of brachial plexus block anaesthesia. The distal edge of the hooked nail was resected 2 mm proximal to its curving point. The nail bed was released from the distal phalanx with a fish mouth incision. The fusiform-shaped flap was planned over noncritical lateral aspect of the proximal phalanx. The long diameter of the flap ranged between 15 to 17 mm while the short diameter ranged between 10-12 mm. The neurovascular bundle of the finger was exposed by midlateral zigzag incision. Blood circulation of the finger and the flap were evaluated following deflation of the tourniquet and proximal clamping of the digital artery. The digital artey was ligated at the proximal border of the flap. The vessel was then dissected retrogradely up to the midpoint of the middle phalanx so as to preserve the middle-communicating arcade with the opposite digital artery. Maximum care was taken to leave more fatty tissue around the pedicle to preserve peri-arterial venous plexus during dissection. The flap was transferred through the incision and set parallel to the long axis of the fingertip defect with 5/0 no propylene sutures. The flap donor site was resurfaced by split-thickness skin graft taken from the hypothenar region and a tie-over dressing was applied (Fig. 1). The zigzag incision was loosely closed. A fluffy dressing was applied to the hand and an absorbent dressing impregnated with chlorhexidine acetate was applied to the skin graft donor site. Gentle active exercise was initiated on postoperative day 7.

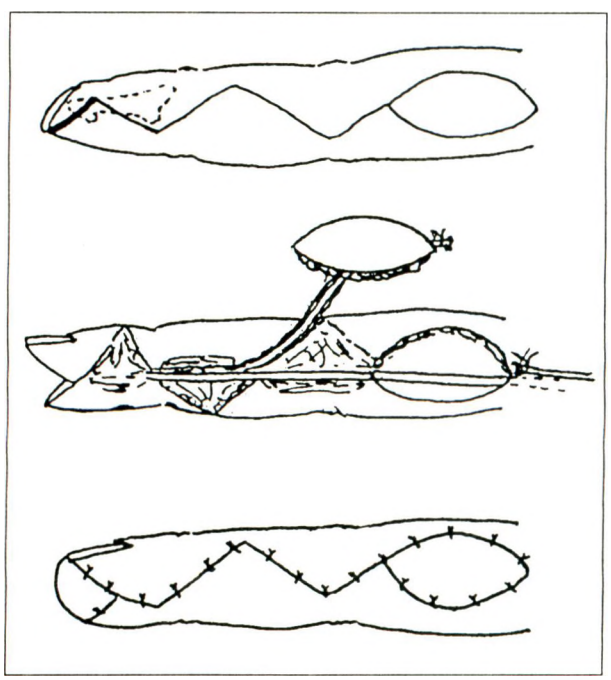

Fig. 1.: Schematic diagram of **(top)** preoperative planning of the flap and the incisions, **(center)** soft tissue defect on the fingertip and the homodigital reverse flow island flap raised, **(bottom)** the flap inset and the flap donor site is covered with a hypothenar split graft.

RESULTS

All the operations were successful and the postoperative period was uneventful. Any complication such as vascular impairment of the finger or the flap or sensibility disturbance of the finger was not observed. However, 2 patients complained of cold intolerance in wintertime. The follow-up period ranged between 4-9 months with an average of 6 months.

Acceptable aesthetic and functional results were achieved in all operated fingernails (Figs. 2 and 3). The patients were all satisfied. None of the patients experienced recurrence of the deformity. Static two-point discrimination tests of the flaps ranged between 10 mm and 5 mm, and the return of sensation was directly proportional to the time elapsed after the operation.

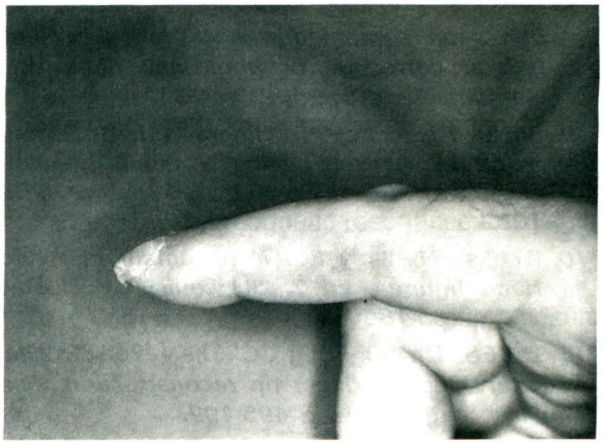

Fig.2.a: Hooked-nail deformity due to inadequate soft tissue support of the nail bed.

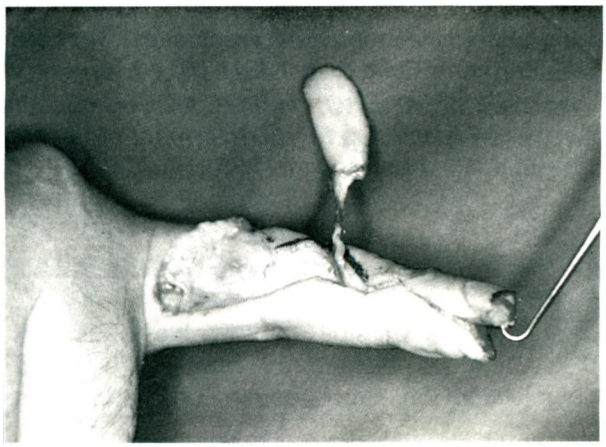

Fig.2.b: Fingertip defect and raised flap.

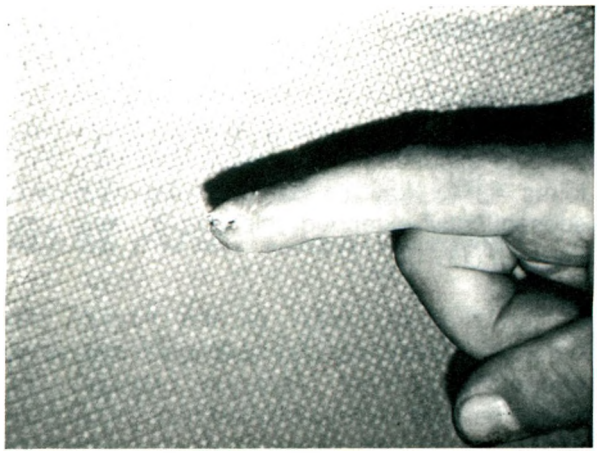

Fig.2.c: Follow-up at 6 months.

Fig.3.a: Preoperative view

Fig.3.b: Follow-up at 8 months

DISCUSSION

The homodigital reverse flow island flap was first described by Weeks and Wray when they used it to cover exposed proximal interphalangeal (PIP) joints (10). Lai et al and Kojima et al subsequently extended this flap to reach the fingertip (11, 12).

In the present study, all the hooked nail deformities were due to inadequate soft tissue support and there were no bony support problems. The aforementioned flap successfully covered the soft tissue defect created by releasing the hooked nail bed. The flap has certain advantages over alternative methods; it does not contract like skin grafts, larger tissue can be transferred to the defect compared to volar V-Y advancement flap, there is no risk of PIP joint stiffness as in the case of cross-finger flap, and it is a one-stage procedure.

Although there has been a modification of the flap as a neurosensorial flap (13), we did not attempt to perform additional nerve dissection and anastomosis since it was reported that the two point discrimination was less than 10 mm due to peripheral neurotization after a one-year-period (14). Our results also confirmed the report. So, we avoided rendering the procedure more sophisticated and longer.

The main drawbacks of the procedure are sacrificing one palmar digital artery and cold intolerance; we would be reluctant to recommend it for patients who spend time outdoors in cold climates. Skin grafting of the flap donor site might cause a problem. However, it is a one-stage procedure, which brings ample flap tissue to the fingertip from the same finger and necessitates only a short period of immobilization avoiding any joint stiffness.

It is concluded that homodigital reverse flow island flap can be an alternative solution for soft tissue support of hooked nail deformity.

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