The "antenna" procedure for the "hook-nail" deformity

The hook-nail deformity is a relatively common problem after fingertip amputations. It is usually ignored but can be quite disabling. This deformity can be corrected by a carefully planned operation. Most of the curved nail plate is removed, the pulp is reflected from the distal phalanx out to a normal contour, and then the full thickness of the nail bed is elevated off the distal phalanx and splinted by multiple small Kirschner pins in a straight position. The defect created is covered with a cross finger flap. (J HAND SURG 8:55-8, 1983.)

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A wide variety of flaps and grafting procedures have been described for the repair of skin defects and fingertip amputations, but little has been written on correction of the defects and deformities of the nail plate and nail bed that are very common after thumb and nail bed injuries. Knowledge of the anatomy and physiology of the nail and surrounding structures is a prerequisite of good treatment of nail bed injuries and will reduce the incidence of secondary nail deformities. 1-8 The nail problem that frequently follows distal finger amputations is the hook-nail deformity (Figs. 1, A, B, C, D, E). This usually occurs after loss of part of the pulp, phalanx, and nail bed. To some patients the lesion is trivial and may be ignored; to others it has great cosmetic significance or may be disabling with regard to certain occupations. We have termed this "antenna procedure" for this method of the multiple Kirschner wires protruding end of the finger like antennas.

And methods

Patients have been treated by this method with a follow-up of 1 to 4 years.

1. A 25-year-old machine operator sustained a left ring finger amputation by the gear of a machine in September 1977. The initial treatment consisted of primary closure of the fingertip in the emergency room of a hospital. The patient gradually developed a typical hook-nail deformity. On Jan. 6, 1978, the antenna procedure was performed. Missing pulp was reconstructed and straight nail growth was achieved. In December 1978, two-point discrimination was 4 mm; the pa-
patient had slight paresthesia at the tip of the finger but was very happy with the result, being able to work without any difficulty.

Case 2. An 18-year-old male sustained a transverse amputation through the distal third of his left ring finger by a broken beer bottle during a fight on Sept. 23, 1978. The emergency care consisted of triangular palmar flap procedure (VY), and within 3 to 6 weeks postoperative period he had developed a hook-nail deformity, which was corrected by an antenna procedure in December 1978 (Fig. 2). A longer, straighter and better-looking nail was obtained and a better padded pulp had been provided. In March 1981, two-point discrimination was 4 mm on the corrected fingertip; the patient had no complaints and was very happy with the result.

Case 3. A 36-year-old hand surgeon sustained fingertip amputations of left ring and long fingers by a planer in 1972 while he was in military service. The revision of the tips and skin grafting procedure were performed as the primary care. He then developed mild to moderate hook-nail deformity of the left ring finger tip and poor sensibility, especially on the ulnar side which had no two-point discrimination. The deformity was corrected on Jan. 30, 1980, by the antenna procedure. Two years after surgery the patient has 8 mm two-point discrimination on the involved fingertip and straight nail; he is happy with the result.

Case 4. A 34-year-old female professional guitar player sustained a fingertip amputation on her fretting left ring finger in December 1979. The initial care consisted of a triangular palmar flap procedure (VY) in the emergency room of a hospital. She gradually developed a moderate hook-nail deformity and was unable to play the guitar because of inadequate pulp and a curved nail that reached the strings of the guitar above the pulp. The correction of the nail and nail bed and reconstruction of the pulp was performed by antenna procedure in December 1980 (Fig. 3). One year after surgery she had 3 mm two-point discrimination at the pulp of the left finger. The nail is straight and she is very happy with the result because she is now able to fret the strings of the guitar correctly.

Technique

The technique has three aims: (1) to free the tethered pulp, (2) to free the tethered nail bed and split the nail straight, and (3) to reconstruct the pulp by covering the defect with a cross finger flap.

The curved nail plate is carefully elevated from the nail bed along its full length and the portion distal to the lunula is discarded. The pulp skin is incised along the hyponychium and extended on both sides of the pulp defect (Figs. 1, B, 3, A). The incision is deepened around the palmar surface of the tip of the distal phalanx sufficiently to reflect the pulp skin out to a normal contour. It may be necessary to excise scar tissue from...
Fig. 3. A, Hook-nail deformity on a female guitar player. Beginning of reconstruction, most of nail was removed and incision marked. B, Pulp was reflected, and nail bed was elevated and splinted with three small Kirschner wires as antennas. C, Dorsal view, marking of the flap. D, Cross finger flap covering the defect. E, Two weeks post-operatively. Division of the flap. F, Side view 6 months post-operatively. G, Dorsal view 6 months after antenna procedure.

The 'antenna' procedure for hook-nail deformity involves adequate pulpal elevation and reconstruction. Procedure begins by reflecting the left ring finger pulp with the triangular incision on the nail bed and margin of the pulp in order to free the tether along the surface and covering the nail bed. The full-thickness nail bed is carefully elevated from the distal phalanx. The elevation continues back to the distal edge where the nail bed is straight. The nail bed is immobilized in this position with two or three 0.028 gauge Kirschner pins, which are inserted into the dorsum of the distal phalanx (Figs. 1, C, 3, B).

The defect that has been created by the reflected pulp and elevated nail bed is covered with a cross finger flap from the dorsum of the adjacent finger (Figs. 1, D, 3, C, 3, D). The involved fingers, wrist, and forearm are immobilized in a plaster splint.

The cross finger flap is divided in 2 weeks and the fingers are gently manipulated for mobility. The patient is encouraged in immediate active and passive exercises. The Kirschner pins are left in place for a total of 3 weeks (Figs. 1, E, 3, E).

Discussion

Nail production is directed distally by the nail folds, and the nail remains adherent to the nail bed by virtue...
of the continuing production of nail by the ventral nail matrix. The contour of the nail bed is dependent on its mechanical support. Normally, the distal phalanx maintains a gentle convexity and the nail bed and nail growth follow this. Tension applied to the nail bed will distort it and nail distortion will follow, but if the prolonged support remain unaltered, the distortion will be less. After loss of the tip of the distal phalanx, growth pattern of the nail bed and nail are influenced by the tension forces. This explains the production of a hook-nail deformity in a fingertip amputation that has healed after tight primary closure, a split skin graft, or a tension-loaded advancement flap.

The antenna procedure supports the nail bed, and the cross finger flap reconstructs the previously lost pulp and relieves the deforming tension.

The viability of the elevated nail bed is not disturbed as long as its continuity with the remaining proximal matrix and paronychial skin fold is not interrupted.

REFERENCES

A circumferential fingernail—Fingernail on the palmar aspect of the finger

A case of an unusual congenital deformity with circumferential nail growth over all sides of the left small finger is presented. (J HAND SURG 8:58-60, 1983.)

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It is generally believed that congenital deformities occur in 1% to 2% of all live births. The exact incidence of congenital hand malformations is unknown. The presence of a nail on the palmar aspect of the small finger is a very rare and unique deformity.

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In our review of the literature we have encountered only one previously reported case in which chromosome-6 abnormality was the suggested cause of this deformity. In this previously reported case the dorsal skin and fingernails appeared on the palmar aspect of both small fingers.

Case report

The mother's main concern with her 4-month-old Caucasian male baby was the abnormal appearance of the left small finger, which had a well-developed, totally circumferential nail.