TWO-STAGE AUTOGRAFT FOR REPAIR OF EXTENSIVE MEDIAN AND ULNAR NERVE DEFECTS

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Extensive median and ulnar nerve loss in the forearm, associated with soft tissue destruction, presents a difficult problem in management. The soft tissue defect can be repaired by skin grafting, but the loss of a large portion of both nerves can not be overcome even by extensive dissection. End-to-end suture is impossible.

The hand is useless from a functional standpoint even though flexion of the fingers is still possible with the long flexor tendons. The hand is completely anaesthetic on the palmar surface and the small muscles are paralyzed. It is impossible to effectively pick up or grasp small objects. The anaesthesia makes it dangerous to use the hand, as degrees of temperature and pain are not appreciated. Severe burns are common. Position sense is absent, and any object placed on the hand is soon dropped unless the patient constantly watches the hand and concentrates on active flexion of the fingers.

It is obvious in analyzing the disability that the major portion of the functional loss is due to the median nerve paralysis. If sensation and some motor power could be restored into the thumb and first three fingers, the patient would have a useful hand.

A nerve graft is necessary, due to the great length of nerve destroyed. Homografts in our experience have failed due to rapid fibrosis of the grafts. Free autografts of considerable length usually suffer the same fate because of lack of adequate blood supply. It was thought possible to overcome the problem of vascularity and fibrosis by means of an extensive autograft done in several stages.

The first patient treated by this method was a 23-year-old Marine (R.T.L.), injured 31 July 1944 by shrapnel on Tinian. A massive soft tissue wound of the left forearm destroyed a large portion of the median and ulnar nerves. When seen 7 months later at the National Naval Medical Center, the original wound was well healed by dense scar tissue. No attempt had been made to repair the nerve injury. Complete median and ulnar nerve paralysis was present with marked muscle atrophy of the thenar eminence and moderate flexion contractures of the last three fingers.

The proximal and distal stumps of the median and ulnar nerves were identified at the time of the first exploration, 2 February 1945, and the extent of the defects measured (Fig. 1A). The neuromas were 10 cm. apart, and normal nerve tissue was separated by an even greater distance. A tantalum wire suture was placed through the neuromas of each nerve and gentle

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tension applied. The neuromas were then wrapped with tantalum foil to aid in later identification (Fig. 1B). After partial closure of the wound, the large soft tissue defect was repaired with a split-thickness skin graft. Three months later, 7 May 1945, the wound was reexplored and the proximal portion of the median nerve exposed. The incision was then extended up-

Fig. 1. A, Diagram of extent of combined nerve lesion and soft tissue defect. B, Tantalum foil and sutures to aid later identification.

ward on the mesial aspect of the arm and the ulnar nerve exposed and divided 9 cm. above the olecranon process (Fig. 2A). The neuroma was resected from the proximal stump of the median nerve, and the cut end anastomosed to the distal end of the divided ulnar nerve with tantalum wire sutures. Only that portion of the ulnar nerve necessary for anastomosis was mobilized.

During the next 4 months a positive Tinel’s sign with tingling referred to the median nerve distribution of the hand could be obtained from the point of anastomosis downward along the course of the ulnar nerve. At the end of this period, tingling in the thumb and the first three fingers could be elicited by tapping the neuroma on the end of the ulnar nerve in the forearm, and it was assumed that the median nerve fibers were present throughout the length of the ulnar segment to be used as a graft.

The wound below the elbow was then reopened and the portion of the ulnar nerve below