Management of digital nerve gaps: By Tubulization Technique

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Abstract

Digital nerve defects following open injuries in the hand has significant morbidity as it often leads to neuromas and sensory dysesthesias. Reconstruction of such defects with nerve grafts frequently results in donor site complications. A simple solution to bridge such defects is the use of the Tubulisation technique. We present a case report of two patients and discuss its benefits.

Key words: Digital nerve, nerve conduit, Tubulisation

Introduction :

Digital nerve reconstruction continues to represent a challenge for hand surgeons, particularly when direct tensionless suture repair cannot be performed owing to the loss of nerve substance in severe and complex injuries, neglect or delayed nerve repair. In the attempt to avoid donor site morbidity and its related problems, researchers have directed their efforts toward the development of nerve guides.

From the first successful report on the use of non-nervous tissue for peripheral nerve reconstruction in 1880, there have been many attempts at nerve scaffolds using autologous conduits (blood vessels, synovial sheaths, muscle, vein filled with skeletal muscle, or nerve), artificial non bio absorbable conduits like silicon, polytetrafluoroethylene, polyethylene, polyvinyl, polyester and rubber tubes and, more recently, bio absorbable scaffolds like polyglactin, polyglycolic acid, collagen and polylactide-caprolactone [1].

In 1993, Brunelli et al described the use of the vein conduit filled with fresh skeletal muscle to bridge nerve defects in rats, with functional results better than those obtained with muscle or vein graft alone and similar to those found with nerve graft. It is accepted that the use of vein or muscle graft alone is a good solution for nerve reconstruction but suitable only for bridging limited nerve defects (3cm) [2].

The purpose of this study was to evaluate the application of muscle-in-vein conduits for digital nerve reconstruction, highlighting the surgical technique and the results.

Case report :

We present a study of two consecutive patients with digital nerve defects who were treated with vein conduits filled with fresh skeletal muscle for secondary nerve reconstruction. Both were males (each 28 and 37 years in age) and in each patient the index and middle finger were involved respectively.

The inclusion criteria was isolated untreated clean lesions of the ulnar digital nerves with nerve defects measuring each with a gap of 1 cm and 3.5 cm respectively. The defect was bridged by vein graft harvested from the volar side of forearm. A small filament of superficial volar flexor muscle was harvested and used to fill the vein lumen in a retrograde fashion (Fig. 1).

Results:

The results of sensory recovery in each of the affected digit were 3.61 (Semmes Weinstein values) and 6mm (moving two-point discriminations) at 12 months after surgery, respectively. None of the patients had any evidence of neuroma pain at the site of injury at 12 months follow up.

Discussion:

Conventional nerve grafts have been the standard care for nerve defects [1]. But they have the disadvantage of donor morbidity like neuroma pain, scar, tenderness and additional incision for surgery and need for general anaesthesia [2].

This technique is simple, quick and has a short learning curve. The vein conduit and skeletal muscle can be harvested easily in a short operative time close to the site of injury under regional anaesthesia. Need of nerve graft is

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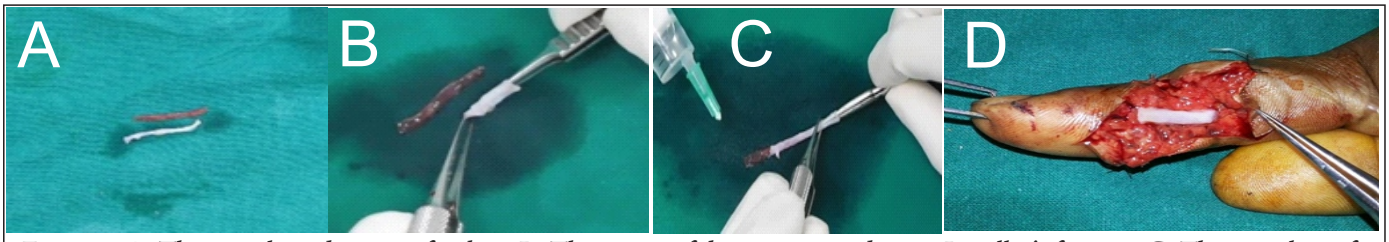

Figure 1: A: The muscle and vein graft taken. B: The vein graft being prepared using Jeweller's forceps. C: The muscle graft being introduced in the vein graft. D: Repairing the defect in digital nerve using muscle in vein graft.

avoided. Excellent nerve regeneration can be expected even in cases with gap as long as 3cm.

The advantage this technique is the optional need of microscope. The technique can be practised in centres where microsurgical infrastructure is unavailable. There is no functional loss because of the sacrificed fascicle, muscle or vein graft in the operated area.

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