

## Outcome of bridging a nerve gap with minced nerve tissue filled vein graft: Case Report

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### ABSTRACT

Severed nerve ends at the proximal site have regenerating axons with tissue rich in growth factors essential for healing. Experimental results have shown that vein grafts filled with minced nerve tissue give results almost as like free nerve autografts. By writing this case report we would like to report about a patient who had satisfactory recovery following vein graft conduit filled with regenerative tissue from the proximal cut nerve end, used to bridge the median nerve gap.

**Key words:** Nerve, vein graft, nerve graft

### Introduction

Autologous nerve grafts are considered as gold standard for bridging nerve gaps. However, alternatives like vein graft conduits and synthetic conduits are available. Sahin et al. reported that vein graft conduits filled with minced nerve tissue in rat experimental study shows almost similar results as nerve autografts [1]. Terzis et al. used "tubulisation" biology where they used minced nerve tissue in vein grafts to accomplish connectivity between nerves [2]. By writing this case report, we would like to highlight about a similar technique for bridging nerve gaps, where the regenerating axons with tissue from the proximal severed nerve end

were used as minced tissue filled into a vein graft used to bridge the gap.

### Case Report

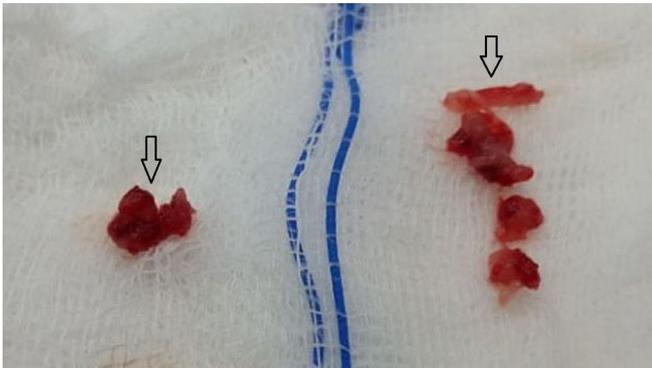
A 40-year-old right-hand dominant female presented to the emergency with a history of road traffic accident - similar to a sideswipe injury sustaining an open fracture of the left elbow medial epicondyle, crushing of the cubital fossa with brachial artery laceration and median nerve injury. X-rays of the elbow revealed a medial condyle fracture of the distal humerus and distal radius fracture.

She was immediately taken up for surgery where fracture stabilization with an external fixator and de-

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**Figure 1.** Showing minced nerve tissue ( downward arrows).



**Figure 2.** Intraoperative picture of the cubital fossa showing the minced tissue filled vein graft bridging the nerve gap of 3 cm (upward arrows). Downward arrows depict the repaired brachial artery.

bridement of the cubital fossa and brachial artery repair was done. Once the limb survived, she was taken up for further definitive fixation of distal humerus medial condyle, distal radius, and repair of the median nerve. She underwent screw fixation for the medial condyle of distal humerus and variable angle locking plate fixation for

distal radius. The median nerve repair was done using a basilic vein conduit filled with minced nerve tissue harvested from the proximal end of the median nerve as shown in Figure 1. The proximal end of the severed nerve containing regenerating axons was dissected carefully under microscope till healthy epineurium was reached and filled into the vein graft like a sausage and used to repair the median nerve gap in the cubital fossa (of about 3 cm) as in Figure 2. Post-operative course was uneventful in the immediate post-op, and she was discharged with advise for the care of anesthetic hands and need for physiotherapy.

She was followed up at monthly interval while attending physiotherapy sessions as an outpatient. Tinels after being static for initial six weeks started to progress distally in the forearm, and her elbow and wrist range of movements improved to almost normal. She was followed up for a period of 16 months from surgery, and her hand function at the latest follow up shows a sensory recovery of S3+ and motor recovery of M4+ in the hand using the British Medical Council Scale (Figure 3). She had two-point discrimination of 10 mm in the thumb, 10mm in the index. Electromyography showed progressive improvement in the amplitude of motor unit potentials in abductor pollicis brevis and ultrasonography revealed honeycomb appearance in the cross-section where vein grafting was done indicative of tubulisation with axonal continuity. She is back



**Figure 3.** Showing final outcome in Hand function depicting full closure and extension of fingers and opposition of thumb to little finger.

to her pre-injury occupation and a vocational fitness trainer doing all her activities as before

### Discussion

Autologous nerve grafts are the gold standard when the end to end tension free neurorrhaphy in nerve transections cannot be achieved. Owing to donor site morbidity, especially when the gap is up to 30mm, different options are available like vein conduits, synthetic conduits [3] and tissue filled vein conduits. However, results with these alternatives are suboptimal when compared with autologous nerve grafts [4,5]. Following an injury to a peripheral nerve, changes occur in both proximal and distal segments of the cut nerve ends. It is well known that immediately after the injury, innate mechanism occurs to promote nerve healing like an increase in the size of the neuronal cell body, dissolution of Nissl bodies, and peripheral migration of the nucleus [6]. Proinflammatory cytokines help in the degradation of myelin along with alignment of Schwann cells (Bands of Bungner) guide and help to regenerating axons to reach the end organ. The proximal cut end shows retrograde changes with the release of growth promoting proteins, neurotrophins, key transcription factors and axonal sprouts emerge which grow into the endoneurial tube towards the cut end [7]. Experimentally, minced nerve tissue in vein grafts as conduits has shown regeneration of nerve almost like nerve graft [1].

We utilized this principle here where regenerating axons were available at the proximal end, however without having a specific target owing to the discontinuity. This tissue was carefully dissected out till healthy epineurium was reached without further increasing the gap and used to fill the vein graft to use as an autologous

conduit accomplishing the tubulisation. Owing to the presence of regenerative factors in a contained manner within a vein graft, we believe the patient recovered satisfactory function in her median nerve without the need for an autologous nerve graft/synthetic conduit and with no donor site morbidity.

### Conflict of interest statement

The authors have no conflicts of interest to declare.

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