

CASE REPORT

Microsurgical Anastomosis of Median and Ulnar Nerve by Sural Nerve Grafting

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ABSTRACT

The young to the middle-aged group is most affected in peripheral nerve injuries (PNI) and male gender shows predominance among the patients. Upper extremities are most likely to get injured which is three-fourth of total patients. This case report is about repairing of median and ulnar nerve by autologous sural nerve grafting. A 28-year-old man had an alleged history of a stab wound at his right arm 3 months ago. He had clinical features of complete injury of his right ulnar and median nerve. Nerve electrophysiology and magnetic resonance imaging also supported the diagnosis. Neuromas were formed in both the upper ends and the gap between the ends was more than 2 centimetres. The nerve was repaired under an operating microscope by sural nerve and musculocutaneous nerve grafting with very thin monofilament suture. His postoperative recovery was uneventful. Sensory recovery was earlier than motor recovery.

INTRODUCTION

Peripheral nerve injuries (PNI) are gradually increasing in numbers for the last few decades which is nearly 2.8% of all trauma patients¹. The young to the middle-aged group is most affected and male gender shows predominance among the patients. Upper extremities are most likely to get injured which is three-fourth of total patients. The radial nerve is commonest in upper extremities and the sciatic nerve is commonest in lower limbs to be affected². Modern surgical techniques

like intra-operating electrophysiology monitoring, microscopic neurosurgery and nerve grafting techniques have encouraged surgeons to treat PNI patients more efficiently than before. PNI are classified into five groups according to the severity. Neuropraxia is a less severe type where neurotomesis is the severest. Axonomesis type is also significant but neurotomesis is the type where surgery mostly indicated. High-grade nerve injuries lead to compromising the nerve integrity and suboptimal regeneration and causes Wallerian degeneration. Generally, the regeneration rate of the peripheral nerve is very slow at the rate of 1 millimetre per day³.

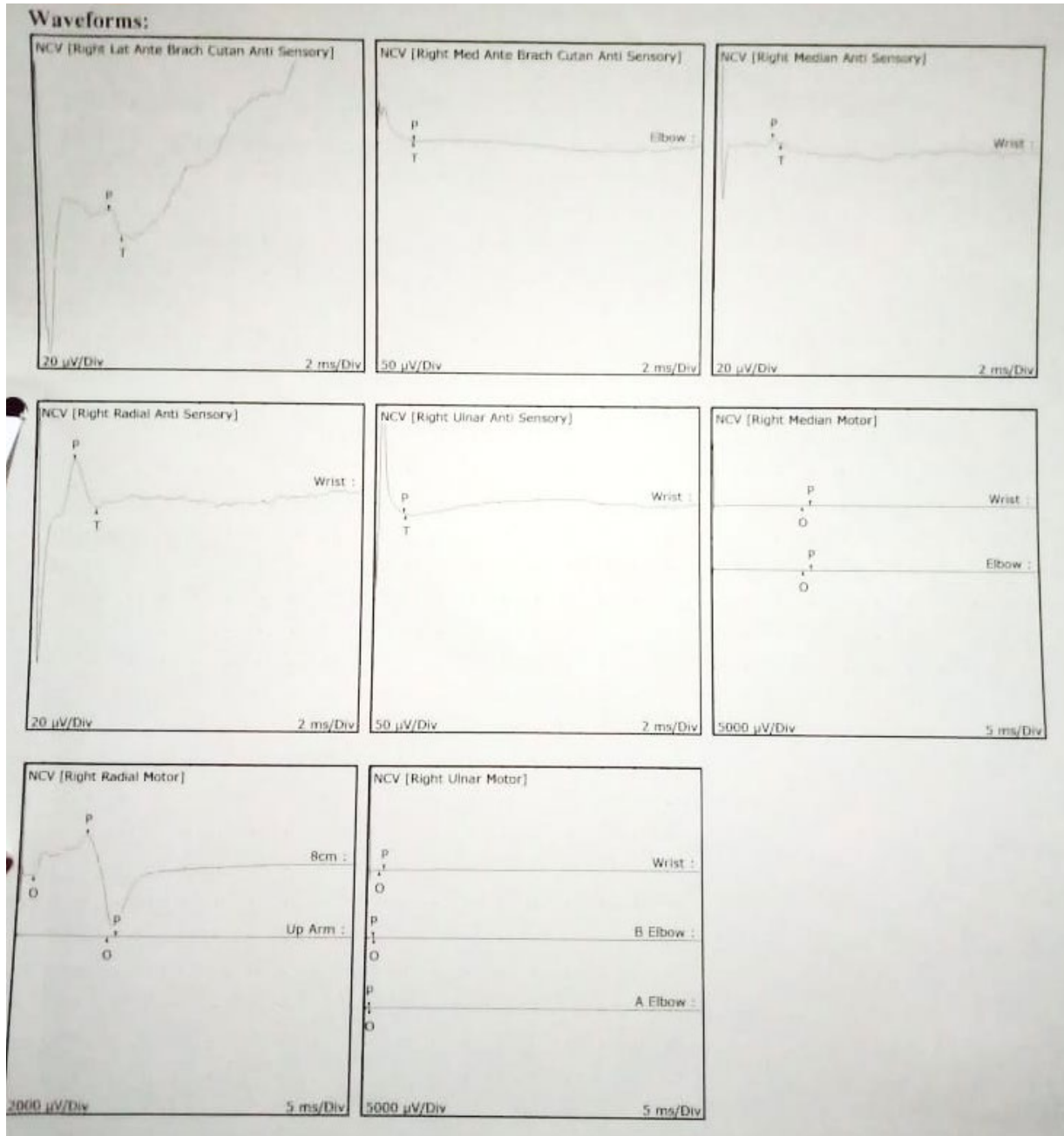
Different surgical options are available for repair of PNI, they are direct end-to-end repair, end-to-side repair, nerve grafting and nerve transfer. Different techniques of nerve anastomosis are epineural repair, grouped fascicular repair and fascicular repair⁴. Autograft has shown a better outcome than the allograft. The common harvesting sites for nerve grafts are sural nerve, lateral antebrachial nerve proximal to the elbow, medial antebrachial cutaneous nerve, a dorsal cutaneous branch of the ulnar nerve and lateral femoral cutaneous nerve⁵. There are many grading systems to assess post-operative nerve repair outcomes. Seddon's grading scale is one of the commonest among the surgeons. It is a four-tier grading includes bad, fair, good and excellent. The assessing parameters are muscle wasting, muscle power (MRS scale), tropic change, sweating, stereognosis, two-point discrimination and temperature sensation⁶. This case presentation is about the surgical technique of Sural and musculocutaneous autograft for a 28-year-old gentleman who suffered from a neurotomesis type of injury to his ulnar and median nerves.

CASE PRESENTATION

This 28-year-old gentleman consulted at neurosurgery outpatient department for his right upper limb weakness and lack of sensation for 3 months. He had an alleged history of stab injury at his inner surface of the upper part of the right arm 3 months ago. He underwent initial toileting and suturing in a local hospital. In course of time, there was no muscle power or sensation improvement achieved. On examination, he was conscious and well oriented. His speech and gait were normal. All cranial nerves were intact. There was an old irregular scar, apparently healed by secondary intention measured 9.5 cm present in the inner aspect of the upper one third-lower two-third junction of his right arm. He had a weakness (0/5) in pronation of the right forearm. He had a claw hand deformity at rest. He had flexion weakness (0/5) at the wrist and medial 3 digits. There was no adduction, abduction, and rotation power of the right thumb. He also had a complete sensory deficit at front of the forearm in the ulnar and median nerve distributing areas and palmar surface of his right hand mostly in the ulnar side in all modules of sensations. His Seddon's grading was bad as his muscle power was 0/5 and had lack of sensation, sweating, stereognosis and two-point-discrimination.

The nerve conduction velocity test reported as evaluation of right median motor nerve showed prolonged distal onset latency (13.8 ms) and reduced amplitude (0.0 mV). The right ulnar motor, the right median sensory and the right ulnar sensory nerves showed reduced amplitude (R0.0, R2.7, R1.3 μ V). The conclusion of the report was right brachial plexopathy at the extreme lower end (Figure 1).

Figure 1 The amplitudes of NCV of the upper limb



Magnetic resonance imaging of the right arm revealed complete transection of the right ulnar and median nerve with more than 3 cm gap with neuroma at upper ends of both nerves (Figure 2).

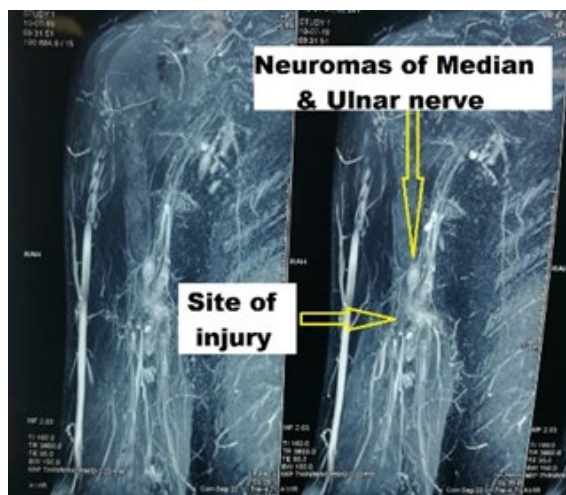


Figure 2 MRI of arm showing the injury site the ends of the injured nerves with neuromas

Poor prognosis and slow recovery were discussed with the patient and relatives. If autograft required then possible complications of donor site was also elaborated. After proper explanation and counselling, he was scheduled for right median and ulnar nerve repair by left sural nerve grafting under general anaesthesia. The scar was measured 60 cm from the tip of the right middle finger. After exposure of the wound, both ends of ulnar and median nerves were identified. The musculocutaneous nerve identified as completely severed. The musculocutaneous nerve had a continuation from the proximal end but the lower end was not well identified. Both the neuromas were dissected shelved off. Dissection and releasing of the fibrous tissue done at both ends of the ulnar and median nerves. After the flexion of the forearm, the distance between the ends of the ulnar nerve was measured 2.5 cm and the gap between the ends of the median nerve was 3 cm. A free auto nerve was harvested from the left sural nerve (Figure 3) measuring 5 cm. A nerve of 3 cm was harvested from the free proximal end of the musculocutaneous nerve. Sural nerve graft was incised into two equal pieces.



Figure 3 Identifying and harvesting of sural nerve for grafting.

The ulnar nerve was microscopically repaired by two pieces of sural nerves end to end epineural anastomosis with 6-0 sized synthetic, monofilament, nonabsorbable polypropylene suture. The median nerve was repaired with a musculocutaneous nerve graft (Figure 4) by a similar microscopic technique. The wound was closed in layers. Right upper extremity was immobilized in flexion position by a posterior slab.

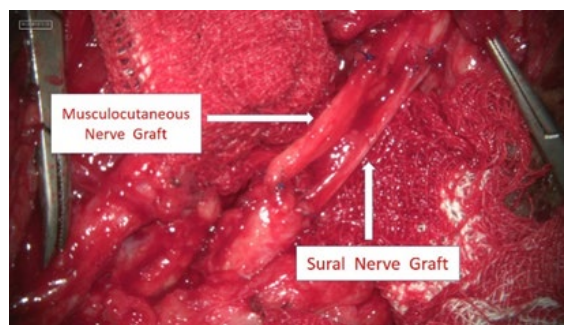


Figure 4 Intraoperative picture showing repair of nerves by grafting.

His postoperative recovery was uneventful. There was no new neurological deficit noticed after the surgery. Touch and temperature modules of sensations of his right hand started appearing and all lateral four finger's power improved to 4/5 when he was examined after 2 months of surgery.

He was able to use his right hand for feeding, dressing and using the toilet after 2 months. A long term follow-up is expected to show more precise postoperative recovery in future.

DISCUSSION

This case report is on a median and ulnar nerve injury patient who underwent repair of the nerves by autograft. The findings of this patient were compared with those of other international cases.

Moneim (1982) published his systemic review on interfascicular nerve grafting⁷. He found that small gap and early repair by direct anastomosis sometimes help in functional recovery. If the lesion is more than 3 weeks old and the gap is more than 2 cm then grafting is ideal. According to his study, he found that if the lesion is above the elbow joint then the chance of regaining the muscle power of the median and ulnar nerve was poor. After grafting of nerve, recovery of median nerve function was proven better than ulnar nerve when operated at the same site of arm or forearm. Dorsal cutaneous nerve separating from the main trunk using as graft showed a better result than other grafts. In this case, the gap was more than 2 cm in case of both the nerves. The injury was 3 months old.

Young et al. performed their study on the effectiveness of nerve grafting who underwent median, ulnar and digital nerve surgery⁸. A total of 38 patients included in the study among where 11 patients had the median nerve, 7 patients had the ulnar nerve and 33 had digital nerve graft. They have also compared the prognosis between grafted and non-grafted patients. It was concluded that sensory function improvement was significantly better in grafted patients in comparison to the non-grafted patients in case of ulnar nerve injuries. Ulnar nerve patient's motor recovery was as similar to the direct repair patients. Median nerve grafted

patients had a significantly better result than the non-grafted patients. In this case, sensory has recovered earlier than motor but there was ulnar or median nerve predominance.

Mohseni et al. reported their study on different types of nerve repairs with their result⁹. The study included 85 adult and 65 paediatric patients. The follow-up period was between 2 – 10 years. Primary repaired patients obtained better result than grafting or delayed repaired patients. Younger patients showed a better outcome than older patients. The patient of this study was adult who required a graft and eventually showed a good result.

Yang et al. published one of the largest meta-analysis studies on nerve repair in 2011 which included 33 studies and 1531 cases¹⁰. They did not find any significant difference in the postoperative outcome between the median and the ulnar nerves (odds ratio = 0.98). Sensory nerves achieved a better satisfactory recovery than motor nerves after nerve repair surgery ($P < 0.05$). In the cases of nerve gap less than 5 cm, there was no statistical difference in outcome between the direct repair and the autologous nerve graft patients. According to the study, the median nerve with sensory impairment had the best postoperative prognosis, while ulnar nerve with motor power damage showed worse prognosis. In this case, both ulnar and median nerves were repaired for the same patient and the gap was less than 5 cm. A longer period follow-up may highlight more information regarding optimum recovery. The study of Yang et al.¹⁰ did not show similarity with this study as we could not establish any comparative study between grafting and direct closure cases.

CONCLUSION

Few international studies had a similar result to this study. On the other hand, few had contradictory results. A comparative study of large case number with significant test could have highlighted a better result about

the preferred surgical option. As far surgical technique is a concern, a sural nerve grafting could be a preference of grafting.

CONFLICT OF INTEREST

The authors declare that they have no competing interests in publishing this case.

CONSENTS

Written consent was obtained from the patient to publish the case with some related pictures. A copy of the written consent is available for review by the Chief Editor.

REFERENCES

1. Noble JMC, Prasad VS, Midha R. (1998). Analysis of upper and lower extremity peripheral nerve injuries in a population of patients with multiple injuries. *J Trauma* 45: 116 – 122.
2. Robinson LR. (2000). Traumatic injury to peripheral nerves. *Muscle and Nerve* 23: 863 – 873.
3. Spinner RJ, Kline DG. (2000). Surgery for peripheral nerve and brachial plexus injuries or other nerve lesions. *Muscle Nerve* 23: 680 – 695.
4. Tetik C, Ozer K, Ayhan S, Siemionow K, Browne E, Siemionow M. (2002). Conventional versus epineural sleeve neuroorrhaphy technique: functional and histomorphometric analysis. *Ann Plast Surg* 49: 397 – 403.
5. Matsuyama T, Mackay M, Midha R. (2000). Peripheral nerve repair and grafting techniques: A review. *Neurol Med Chir (Tokyo)* 40: 187 – 199.
6. Seddon HJ. (1948). A review of work on peripheral nerve injuries in Great Britain during World War II. *J Nerv Ment Dis.* 108: 160 – 168.
7. Moneim MS. (1982). Interfascicular nerve grafting. *Clin Orthop Relat Res.* 163: 65 – 74.
8. Young VL, Wray RC, Weeks PM. (1980). The results of nerve grafting in the wrist and hand. *Ann Plast Surg* 5 (3): 212 – 215.
9. Mohseni MA, Pour JS, Pour JG. (2010). Primary and delayed repair and nerve grafting for treatment of cut median and ulnar nerves. *Pakistan Journal of Biological Sciences* 13: 287 – 292.
10. Yang M, Rawson JL, Zhang EW, Zhang F. (2011). Comparisons of outcomes from repair of median nerve and ulnar nerve defect with nerve graft and tubulization: A meta-analysis. *Journal of Reconstructive Microsurgery* 27 (8): 451 – 460.