

Special Article - Surgery

End-To-End Repair of Damaged Peripheral Nerves

Moattari M¹, Moattari F², Kaka G^{3*} and Kouchesfahani HM^{1*}

¹Department of Animal Biology, Kharazmi University, Iran

²Faculty of Agriculture and Natural Resources, Persian Gulf University, Iran

³Neuroscience Research Center, Baqiyatallah University of Medical Sciences, Iran

*Corresponding author: Gholamreza Kaka, Neuroscience Research Center, Baqiyatallah University of Medical Sciences, Aghdasie, Artesh Boulevard, Artesh Square, Tehran, Iran

Homa Mohseni Kouchesfahani, Department of Animal Biology, Faculty of Biological Science, Kharazmi University, Iran

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Editorial

Peripheral nerve injuries are prevalent clinically and recognized in traumatology. It is reported that 5% of all trauma cases include peripheral nerves and have a great impact on patients and societies [1]. In the case of severed peripheral nerve injuries the only way to attain function (sensory or motor) is end-to-end repair. Severity of the primary injury, injury location, time of repair, patient factors and of course surgical techniques is factors that affect the final outcome of repair procedure [1].

The first person in the history who tried to suture a severed peripheral nerve was probably Paul of Argina who lived in 600 A.D. was the first person who tried to suture a severed peripheral nerve. Hueter (1871, 1873) described primary epineurial nerve suturing. Mikulicz (1882) and Loebke (1884) explained techniques used to optimize suturing and regeneration of nerves where described by bone shortening to reduce nerve tension, respectively [2]. In the cases of nerve loss which direct repair was not possible, Seddon presented nerve grafting [3]. Microsurgery by introduction of microscope revolutionized world and improved outcome of nerve repair. In the cases that there is no tissue loss or small gaps, direct repair is done to reappose proximal and distal cut ends of damaged nerve. In direct repair, a connective tissue surgery with the goal of alignment of two healthy distal and proximal cut ends. Direct repair includes a) end-to-end nerve repair, b) epineurial sleeve repair, and c) end-to-side nerve repair. End-to-end nerve repair techniques consist of epineurial repair, group-fascicular repair, and fascicular repair. Epineurial repair is a commonly used technique following severe nerve injury of proximal

cut end of nerves without nerve tissue ends and fascicle dissection. Epineurial repair is performed for monofascicular small nerves (digital nerves). Relevant group of fascicles are re-approximated by means of two to three sutures through the interfascicular epineurium. To prevent scar formation which decreases the results of nerve repair, the number of sutures and pressure should be reduced. In fascicular repair, perineurium is the sutured. In this technique dissection of the interfascicular epineurium and separation of fascicles is essential. Since, two to three sutures per fascicle leads to scar formation, fascicular repair has limited application [4]. Fascicular repair is frequently applicable in partial injured nerves. Group fascicular is used to treat nerve gaps in large nerves with multiple fascicles. Single sutures which were passing the perineurium, re-approximate proximal and distal cut ends of motor and sensory nerves to avoid misdirection of these nerves. In this type of repair, microscope magnification, longer operative times, and proper identification of fascicles are required. The aim of both the group fascicular and the fascicular repair is providing better fascicular alignment and reducing misdirection of regenerating axons. In comparison with epineurial repair, additional dissection and higher number of sutures are required which lead to increased intraneural scarring and disruption of intraneural blood flow [5]. In the aspect of functional results, there was no difference when more exact fascicle re-apposition in group fascicular repair applied over standard epineurial technique outcomes [6]. Many surgeons prefer epineurial sutures or standard technique in comparison with epi-perineurial and perineurial methods because these techniques showed no advantageous [7].

References

1. Noble J, Munro CA, Prasad VSS V, Mida R. Analysis of upper and lower extremity peripheral nerve injuries in a population of patients with multiple injuries. *J Trauma Acute Care Surg.* 1998; 45:116-122.
2. Mafi P, Hindocha S, Dhital M, Saleh M. Suppl 1: Advances of peripheral nerve repair techniques to improve hand function: a systematic review of literature. *Open Orthop J.* 2012;6: 60-68.
3. Seddon HJ. The use of autogenous grafts for the repair of large gaps in peripheral nerves. *Br J Surg.* 1947; 35: 151-167.
4. Trumble TE. *Peripheral nerve injury: pathophysiology and repair.* Trauma 4th ed New York, NY Mc Graw-Hill. 2000; 1047-1055.
5. Ogata K, Naito M. Blood flow of peripheral nerve effects of dissection, stretching and compression. *J Hand Surg Am.* 1986; 11: 10-14.
6. Hudson AR, Hunter D, Kline DG, Bratton BR. Histological studies of experimental interfascicular graft repairs. *J Neurosurg.* 1979; 51: 333-340.
7. Wolfe SW, Pederson WC, Hotchkiss RN, Kozin SH, Cohen MS. *Green's Operative Hand Surgery: The Pediatric Hand E-Book.* Elsevier Health Sciences. 2010.