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ORIGINAL ARTICLE

FASCICULAR NEURORRHAPHY FOR NEUROMA IN CONTINUITY OF MEDIAN NERVE

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ABSTRACT: It is not common for an orthopaedic surgeon to anastomose or repair a peripheral nerve lesion. Fascicular neurorrhaphy has variable out come with median nerve repairs. The recovery by neuropathy as evidenced by NCVS does not correlate with the clinical outcome. We treated a post traumatic median nerve neuroma in continuity of right hand proximal to wrist with sensory hyperaesthesisa. It was treated with excision of neuroma internal neurolysis and fascicular neurorrhaphy along with, carpal tunnel release which gave him good relief from pain in the immediate post-operative period.

KEYWORDS: Median nerve C10.668.829.500.500, neuroma C04.557.580.600.610, median neuropathy C10.668.829.500.500.

INTRODUCTION: A neuroma-in-continuity is a neuroma that results from failure of the regenerating nerve growth cone to reach peripheral targets. It occurs within an intact nerve in response to internally damaged fascicles, resulting in a distal portion of the nerve that no longer functions properly. Approximately 3-5% of all patients involved in peripheral nerve injury develop a symptomatic neuroma,.[1] Sunderland in 1951 described a classification which is more readily applicable clinically (table1). In this classification, peripheral nerve injuries are arranged in ascending order of severity from the first to the fifth degree. Anatomically, the various degrees represent injury to (1) myelin, (2) axon, (3) the endoneurial tube and its contents, (4) perineurium, and (5) the entire nerve trunk. Sixth-degree (Mackinnon) or mixed injuries occur in which a nerve trunk is partially severed, and the remaining part of the trunk sustains fourth-degree, third-degree, second-degree, or rarely even first-degree injury. A neuroma in continuity is present, and the recovery pattern is mixed depending on the degree of injury to each portion of the nerve. Surgical intervention to correct the fourth-degree and fifth-degree components may sacrifice the function of lesser injured fascicles. To perform partial neurorrhaphy (Fig. 1), the incision is extended longitudinally in the epineurium proximally and distally several centimeters, as necessary. The intact funiculi are dissected out for the same distance. The ends of the injured part of the nerve are resected to normal tissue. At the cut ends, an end-to-end neurorrhaphy is performed. If the epineurium is inadequate for placement of epineural sutures, epiperineurial or perineurial (fascicular) sutures suffice. The proximal and distal dissection should be extensive enough to prevent kinking of the loop of intact nerve.

AIM AND OBJECTIVES: To evaluate the functional outcome of fascicular neuroraphy in a patient with traumatic median nerve neuroma in continuity with visual analogue scale of pain.

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SURGICAL PROCEDURE: 50yr old male patient with history of cut injury, accidental fall of window glass over his right forearm with a painful hyperaesthetic region in the course of right median nerve just proximal to wrist. The patient has been treated elsewhere with just suturing of skin wound 6 months back. He developed excruciating pain of right palm and hyperaesthesia in response to touch on palmar skin. His pain was graded as seven on a VA scale. He also complained of nodular swelling over the course of median nerve over the right forearm. The swelling was also hyperaesthetic. On investigations his blood counts were normal. MRI revealed a continuous median nerve with no interruption. His NCVS revealed no conduction beyond 4 cm proximal to wrist crease. So the plan was to explore the injury site. On exploration of right forearm we found a tethered Palmaris longus tendon to the median nerve, neuroma in the continuity in the median nerve 6 cm proximal to the flexor retinaculum (Fig. 2) endo neurolysis and exploration of nerve fascicles were performed. (Fig. 3) The neuroma excised on ulnar side of the median (Fig. 4) nerve and a fascicular neurorrhaphy of 3 major fascicles were performed (Fig. 5) A sub cuticular fat sheeth arranged around the repair and the wound was closed in layers.

POST OPERATIVE CARE: Patient has been given a dorsal splint in the immediate post-operative and the patient got rid of hyperesthesia and pain, by a factor of 80 percent (VAS). His pain was graded as one on VA scale

DISCUSSION: Treatment of painful neuromas in continuity of the median nerve at the wrist level is a challenging problem. Chemical methods, and microsurgical techniques including fascicular ligation, and burying into muscle and bone have been reported to prevent neuroma-in-continuity formation. Adani et al proposed pronator quadrates muscle flap coveri g the neuroma and showed good results.[2] Koichi tomita of Osaka university Japan has proved nerve bypass grafting for neuroma in continuity a good option for retaing neuronal function in experimental rats.[3] Edward cabaud et al from USA showed no difference between fascicular neuroraphy and epineural neuroraphy in cats.[4] H Kus opined microsurgical fascicular neuroraphy superior to epineural neuroraphy but for small defects in the nerve continuity he recommended epineural neuroraphy with equal results.[5] spinal cord stimulation, transcutaneous electrical nerve stimulation (TENS) and repeated nerve blocks have also been applied, with limited success[6] Mirror therapy, as described by Ramachandran and Hirstei has a potential role in sensory re-education[7] This technique has been used for the treatment of hyperesthesia and pain after hand injuries in cases in which the injured hand cannot be touched because of excessive hypersensitivity.[8]

CONCLUSION: Neuroma in continuity needs surgical intervention.it also needs a through pre-operative evaluation. Partial neurorrhaphy with endo neurolysis the preferred treatment. The technique of fascicular neurorrhaphy with epi peri neurorrhaphy confers good postoperative pain relief and preservation of motor function distal to repair. Sensory recovery though is incomplete. A painful neuroma responds best to endoneurolysis and partial neurorrhaphy.

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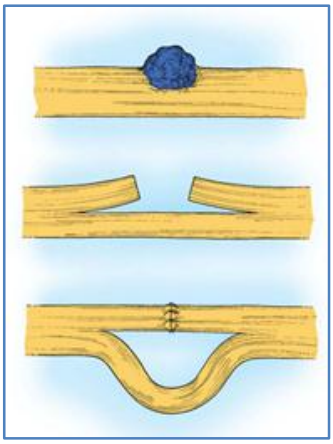

Fig. 1: Schematic of partial neurorrhaphy

Fig. 2: Neuroma Exposed

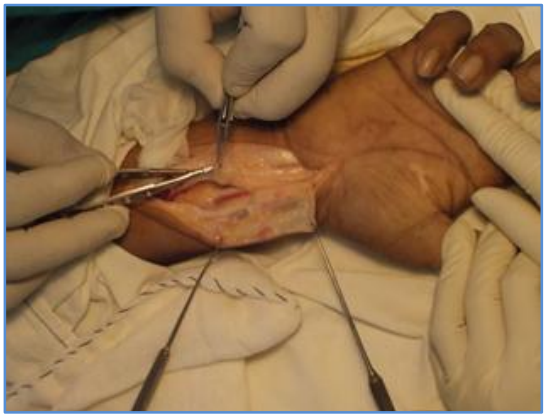

Fig. 3: Endo Neurolysis

Fig. 4: Excised Neuroma

Fig. 5: Fascicular & Epineural Neurorrhaphy

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DEGREE OF INJURY		HISTOPATHOLOGICAL CHANGES					TINEL SIGN	
Sunderland	Seddon	Myelin	Axon	Endoneurium	Perineurium	Epineurium	Present	Progresses Distally
I	Neurapraxia	±					–	–
II	Axonotmesis	+	+				+	+
III		+	+	+			+	+
IV		+	+	+	+		+	–
V	Neurotmesis	+	+	+	+	+	+	–

Table 1: Classification of nerve injuries

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