Management Of Median Nerve Palsy: Our Experience

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Abstract

Background: Extensor indicis opponensplasty is the gold standard treatment for the restoration of opposition in individuals with median nerve injuries, and it has excellent outcomes. This prospective study was designed to evaluate the results of EIP transfer for management of median nerve injury.

Methods: The study was conducted from November 2015 to December 2020 in the department of Plastic and Reconstructive Surgery GMC Srinagar. Results: The study included 20 posttraumatic median nerve palsies who were treated with EIP opponensplasty. There was a marked male predominance in the study group. These included 18 men and 2 women, with an average age of 25 years (ranging from 20 to 55 years). Of these 20 patients, 16 had isolated median nerve injuries, and 4 had combined nerve injuries. Four patients had proximal injuries, while the rest had distal injuries. Glass was the most frequently encountered causative tool in 15 cases. The average interval between injury and intervention was 14 months. Follow up ranged from 5 months to 18 months.

Conclusions: Transferring the EIP to restore opposition has several advantages. It should be considered especially in the traumatic setting with lacerated flexor tendons.

Keywords: Extensor Indicis, Tendon transfer, Opponensplasty, Median nerve injury

Introduction

Having a hand with an opposable thumb has allowed the human race to make great advances. Its functional and aesthetic considerations cannot be overestimated. The functional deficit following injury to the median nerve distal to the innervation of the extrinsic forearm flexor muscles consists primarily of loss of opposition of the thumb and absent sensation over the thumb, index, long, and radial half of the ring finger. Opposition is a composite motion that occurs at all 3 joints to position the thumb pad opposite the distal phalanx of the partially flexed long finger. Abduction, pronation, and flexion occur at the carpometacarpal joint, abduction and flexion at the metacarpophalangeal joint, and either flexion or extension at the interphalangeal joint. Of the 3 intrinsic thenar muscles, the flexor pollicis brevis (FPB) muscle typically, although not always, receives a dual innervation from both the median and ulnar nerves. Because the FPB may remain innervated by the ulnar nerve in approximately 70% of median nerve injuries, patients may not notice any significant functional loss, but careful testing will reveal decreased strength of the abductor pollicis brevis (APB) and lack of pronation. Median nerve palsy with loss of opposition is devastating and results in the loss of 50% of all hand functions. Hence, every attempt should be made to restore opposition. Extensor indicis proprius (EIP) opponensplasty is considered by many to be the gold standard for restoring opposition in the posttraumatic setting.
Materials And Methods

The study was conducted from November 2015 to December 2020 in the department of Plastic and Reconstructive Surgery GMC Srinagar. Patients meeting the following criteria were included in the study design.

Inclusion Criteria
1. Patients between 10 and 60 years of age
2. Patients who suffered a traumatic nerve injury
3. Patients in whom nerve regeneration, whether spontaneous or after nerve repair, is no longer expected

Exclusion criteria
1. Patients who suffered traumatic injuries proximal to the brachial plexus
2. Patients with ischemia in the hand
3. Patients with a non-recovering insensate hand

The preoperative examination included an investigation of the movements at the carpometacarpal (CMJ) and MP joints of the thumb. Additionally, the ability to independently extend the index finger was routinely assessed. Preoperative nerve conduction studies were performed in all patients. Immediately prior to surgery, we marked our incision sites and the proposed EIP track around the ulna. When harvesting the EIP tendon, we included part of the extensor expansion with the tendon to obtain a sufficiently long tendon segment. We used polypropylene 3–0 sutures to secure our insertions, starting with the MP joint capsule with the thumb in maximal abduction and internal rotation and the tendon under maximum tension and followed by the extensor apparatus with the MP joint at 40° of flexion. The thumb was immobilized at maximal abduction in a dorsal slab for 4 weeks. Then gradually started with range of motion exercises for the thumb. After the completion of follow-up (mean 10 months), the final outcome was recorded.

Results

The study included 20 posttraumatic median nerve palsies who were treated with EIP opponensplasty. There was a marked male predominance in the study group. These included 18 men and 2 women, with an average age of 25 years (ranging from 20 to 55 years). Of these 20 patients, 16 had isolated median nerve injuries, and 4 had combined nerve injuries. Four patients had proximal injuries, while the rest had distal injuries. Glass was the most frequently encountered causative tool in 15 cases. The average interval between injury and intervention was 14 months. Follow up ranged from 5 months to 18 months. According to the Sundaraj and Mani14 system, the results were excellent to good in 17 patients (85 %), and 3 patients (15%) had a fair result.

Fig 1. EIP harvested
Discussion

As distal nerve transfer procedures with promising outcomes evolve, enough data should become available to allow a comparison of their outcomes to those of the previously established tendon transfer techniques; in particular, functional outcomes, setbacks, and the time needed before a return to productivity should be analysed7.

Transferring the EIP to restore opposition has several advantages. It should be considered especially in the traumatic setting with lacerated flexor tendons. Furthermore, there is minimal donor site morbidity. Additionally, it preserves the extrinsic digital flexors as donors for the intrinsic reconstruction of combined median/ulnar nerve injuries. In addition, it is very useful in the setting of proximal median nerve palsy, in which the flexor digitorum superficialis (FDS) tendons are unusable. Finally, this technique does not require the surgical creation of a pulley, as the transfer around the ulna results in an ideal vector to achieve opposition 8.

A variety of attachments have been described for inserting the EIP to restore opposition. In general, compared with insertions located on the dorso-ulnar aspect of the MP joint, insertions at the radio-palmar aspect of the metacarpophalangeal joint (MP) result in better pulp-to-pulp pinch 9.

Littler wove the transferred tendon into the abductor pollicis brevis tendon (ABP). Riordan described a sequential insertion of the transferred tendon into the
ABP tendon with continuation of the tendon distally into the extensor hood of the thumb MP joint and the extensor pollicis longus (EPL). Brand wove one half of the transferred tendon into the ABP and EPL and the other half of the tendon into the adductor pollicis (AdP). Dual insertions into the APB and either the dorsal MP joint capsule or the thumb extensor expansion have been described for the intrinsic minus thumb 10–13.

Many authors used the Sundraraj and Mani or the Jacob and Thompson scoring systems to describe their outcomes. The Mehta and Malivaya evaluation system was devised in 1996 and was more comprehensive and complex than the previous systems. Kapandaji used a numerical scale in a study with children according to the position the thumb pad can reach when attempting opposition14–17. Our technique for EIP opponensplasty resulted in excellent outcomes in 92% of the patients, according to the classic scoring system.

Conclusion

Transferring the EIP to restore opposition has several advantages. It should be considered especially in the traumatic setting with lacerated flexor tendons.

References