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Wide-awake Local Anesthesia No Tourniquet Tendon Transfers in a Patient With High Median Nerve Palsy

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Tendon transfers are frequently performed to restore lost functions in cases of peripheral nerve palsy that has persisted for more than a year.[1] A comprehensive physical examination is essential to assess the patient's specific functional requirements and develop effective treatment strategies.[1] Selecting a suitable donor tendon according to the established technical principles of tendon transfer is the next critical step.[2] Furthermore, when appropriate, performing the transfer under wide-awake local anesthesia no tourniquet (WALANT) allows for precise tensioning of the tendon through intraoperative active movement, which helps to improve functional outcomes.[3]

PATIENT BACKGROUND

In July 2023, the patient sustained a laceration to the medial aspect of the upper arm. He was admitted to a hand surgery clinic, where repairs of the brachialis and biceps muscles, along with the median nerve, were documented. Fourteen months postinjury, he presented to our clinic for further treatment, with the physical examination recorded in Video 1. (**See Video 1 [online]**, which displays a detailed physical examination of the patient with a high median nerve palsy.)

PATIENT NEEDS ASSESSMENT

After a thorough examination, we identified 2 primary objectives: restoring index finger flexion and strengthening thumb flexion to enhance grasp and pinch functions. Supporting this, Bertelli et al[4] reported that, when considering motor units, only thumb and index flexion are essential for surgical reconstruction in cases of high median nerve injuries.

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DONOR TENDON SELECTION

1. Index finger flexion: We chose to perform a side-to-side transfer of the flexor digitorum profundus from the second finger to the third, fourth, and fifth fingers.
2. Thumb flexion strengthening: Instead of the brachioradialis (BR) to flexor pollicis longus (FPL) transfer, we opted for a palmaris longus (PL) to FPL transfer. The commonly preferred transfer of the BR to the FPL tendon was not suitable for our patient because the BR was playing a crucial role in elbow flexion and possibly contributing to pronation. The PL-to-FPL transfer, although infrequently reported, has shown successful outcomes.[5,6] Koh et al[5] noted that all 3 of their patients regained full range of motion in the thumb interphalangeal joint and averaged 90% of pinch strength. They emphasized that the FPL is vital for stabilizing the thumb interphalangeal joint alongside the co-contraction of the extensor pollicis longus during daily activities.[5] In our patient, we utilized the PL as a suitable expendable donor to enhance the function of the FPL in counteracting the action of the extensor pollicis longus during opposition and daily activities.

TENDON TRANSFERS UNDER WALANT

The local anesthesia injection technique and surgical procedures are demonstrated in Video 2. (**See Video 2 [online]**, which displays tendon transfers under WALANT to augment thumb and index finger flexions.) During the administration of local anesthetic, we typically inject up to 50 mL of 1% lidocaine with 1:100,000 adrenaline. If additional volume is required, we can add sterile saline to the initial 50 mL, up to a total of 150 mL. It is crucial to ensure that tumescent local anesthesia is adequately provided in the areas to be incised, dissected, or retracted. The patient should only feel minor stings from the 27G needle, helping them remain calm, confident, and prepared for cooperation throughout the awake surgery. Joukhadar and

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Lalonde[7] offered valuable tips for minimizing injection pain, which we highly recommend implementing.

WALANT enables precise tensioning of the tendon transfers according to intraoperative active movement. In Video 2 (**Video 2 [online]**, at 3.05 min), we told the patient to make a fist and observed the need for additional tensioning of the flexor digitorum profundus 3 with side-to-side sutures to improve middle finger flexion. Similarly, we monitored the force and excursion of the PL-to-FPL transfer during active movement. In summary, tendon transfers performed under WALANT enable us to make necessary adjustments before closing the skin.

POSTOPERATIVE FOLLOW-UP

On postoperative day 18, the patient expressed satisfaction with index finger flexion. (**See Video 3 [online],** which displays postoperative follow-up examination of the patient demonstrating the necessity for opposition augmentation.)

However, although thumb flexion strength had increased, effective tip-to-tip pinch was not restored, likely due to insufficient activity of the abductor pollicis brevis. Although opposition transfers are infrequently required for median nerve palsy,[4,8] we recognized the need for increased palmar abduction (and thus, pronation of the thumb) and planned an extensor indicis proprius (EIP) opposition transfer for this particular patient.

EIP OPPOSITION TRANSFER

In tendon transfer surgery, subcutaneous tunnels are commonly utilized and must also be adequately anesthetized. (**See Video 4 [online]**, which displays EIP opposition transfer under WALANT.) During the EIP opposition transfer, several subcutaneous tunnels were created and generously injected with local anesthetic. Tumescent local anesthesia should be palpable at least 2 cm on either side of the tunnels. The activity of the transferred tendon within the tunnels can be observed through the previously made stab incisions while the patient performs active opposition. This allows for the identification and correction of any kinks or errors before closing the skin.

THERAPY

We utilized a modified version of the Saint John Protocol for therapy.[9] After the first operation, we used a static dorsal wrist-hand-finger orthosis including dorsal thumb component, positioning the wrist in neutral and the metacarpophalangeal joints at 45 degrees of flexion. Starting on the fifth postoperative day, therapy sessions included 20 repetitions of passive full finger flexion and 10 repetitions of active movements, performed 3 times daily while in the splint. Three-finger blocking active flexion was introduced on the fifth postoperative day, and 2-finger blocking active exercises began in the third week.

On the 18th postoperative day, the patient underwent EIP opposition transfer surgery. Therapy was paused for 3 days and resumed on the 21st postoperative day, allowing active half-fist movements for the fingers. By the end of the fourth week, the patient was permitted to make a full fist. After the opposition transfer, passive exercises of the thumb were performed during the first 3 weeks, and active movement was encouraged afterward. (**See Video 5 [online]**, which displays a third week follow-up of the patient after opposition transfer.) The splint was worn full-time for seven weeks following the first surgery.

CONCLUSIONS

Successful tendon transfers for patients with peripheral nerve palsy depend on a thorough understanding of individual needs and careful donor tendon selection. Performing the procedure under WALANT facilitates precise tensioning and allows for necessary real-time adjustments, leading to improved outcomes in tendon transfer surgery. Postoperative evaluations showed enhancements in index finger flexion; however, challenges with thumb function required further EIP opposition transfer. Therefore, ongoing assessment and follow-up are crucial for addressing any residual functional limitations and optimizing recovery.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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