Restoration of Active Fingers Flexion With Tensor Fascia Lata Transfer in Total Brachial Plexus Palsy

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Abstract: In total brachial plexus palsy, fingers flexion restoration is a real challenge. Nerve surgery can generally restore shoulder abduction and elbow flexion. However, results of nerve grafts or nerve transfers are generally poor for hand function. As a matter of fact, the long distance between nerve sutures and terminal nerve branches in muscles decreases the rate of reinnervation. When finger flexion occurs, strength is generally weak and function remains fair. Therefore, we proposed a new technique to restore fingers flexion. The tensor fascia lata tendon is harvested and sutured between the biceps and flexor digitorum profundus (FDP) tendons. When elbow is flexed, the biceps muscle contraction pulls FDP tendons resulting in a partial but strong hand occlusion. This technique is an alternative to free muscle transfers or nerve surgery with reliable results.

Key Words: brachial plexus, fingers flexion, tensor fascia lata, palsy

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HISTORICAL PERSPECTIVE

The restoration of fingers flexion is a real challenge in total brachial plexus palsy. As a matter of fact, shoulder and elbow function are recovered after nerve graft from C5 or C6 roots or nerve transfers from spinal or intercostals nerves. Hand function is generally not considered, and only wrist arthrodesis is performed to place the hand in a good position. However, some authors have proposed nerve transfers from contralateral C7 to median nerve to recover finger flexion. Moreover, Doi et al[1–7] have proposed a double free transfer to recover finger flexion. However, in these techniques, microsurgery failures may occur. Therefore, we proposed a new technique to recover active finger flexion in total brachial plexus palsy using the free tensor fascia lata tendon (Fig. 1). A few authors have used autograft tendon to restore muscle function.[8–10] However, this technique has not been described to our knowledge. We present this technique in 2 patients with total brachial plexus palsy.

TECHNIQUE

The patient is brought in the operating room under general anesthesia. The upper limb is placed in supine position, and the ipsilateral lower limb is prepared to harvest the tensor fascia lata.

Two longitudinal volar incisions are performed on the forearm: a 10-cm proximal longitudinal incision on the volar elbow crease and a 10-cm distal incision on the lateral border of the flexor carpi radialis tendon. At the proximal part of the incision, the biceps tendon is isolated. At the distal part of the incision, the flexor carpi radialis is retracted with median nerve and flexor digitorum superficialis to expose the FDP tendons. Then the flexor digitorum tendons are sutured together preserving the physiological flexion of the fingers. The distance between the biceps tendon and the FDP tendons is measured to assess the size of the tensor fascia lata graft. Then a subcutaneous tunnel is performed from the proximal to the

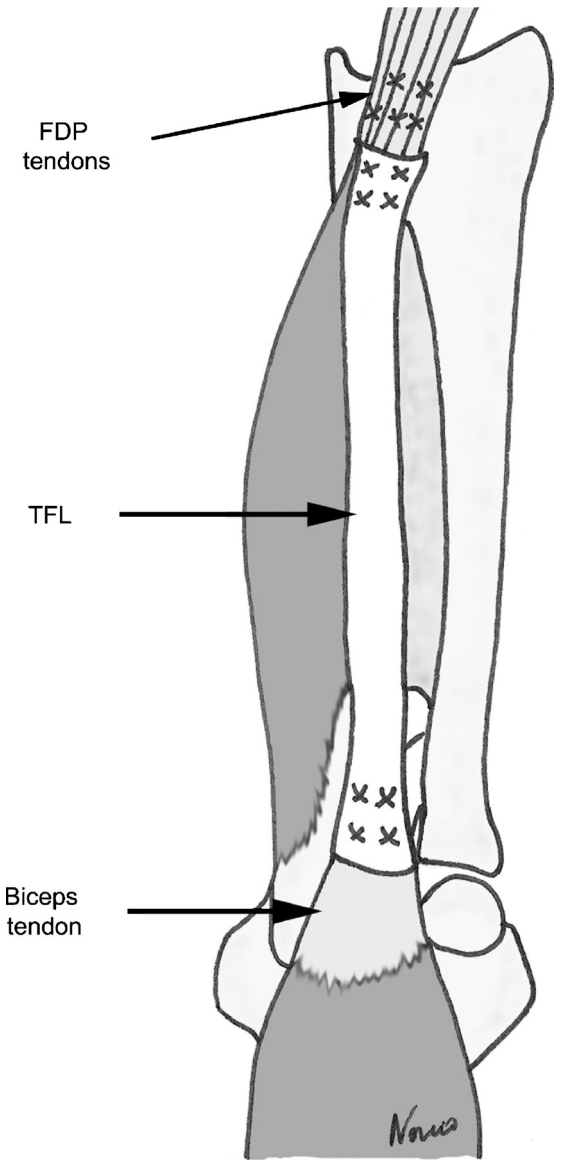

FIGURE 1. Principle of the tensor fascia lata transfer: the proximal part of the tensor fascia lata is sutured to the biceps tendon and the distal part is sutured to the FDP tendon. In active elbow flexion, finger flexion occurs.

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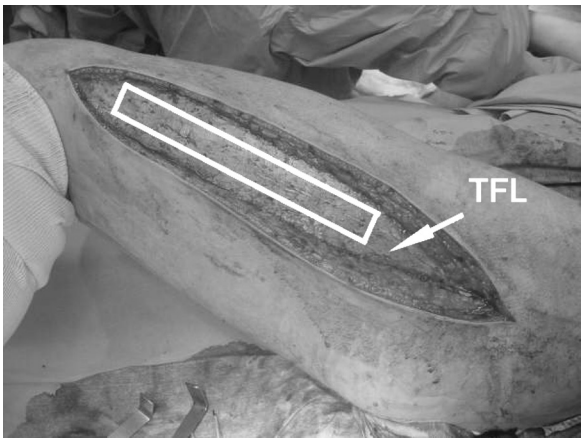

FIGURE 2. The fascia lata is exposed and harvested. The width of the graft is 4 cm and the length must match to the distance between the biceps and the FDP tendons (approximately 20–25 cm).

distal forearm incisions. This tunnel must be large to facilitate the gliding of the tensor fascia lata tendon.

The tensor fascia lata is harvested. A 30-cm incision is performed on the lateral aspect of the thigh. The tensor fascia lata tendon is exposed to be harvested. The width of the graft must be 4-cm, and the length must match to the distance between the biceps and the FDP tendons (approximately 20–25 cm; Fig. 2). After hemostasis, the tensor fascia cannot be closed. A sheet of absorbable polypropylene may be placed to close the gap and avoid muscle hernias. The skin is sutured on a suction drain to avoid hematomas.

Then the tensor fascia lata tendon is passed in the subcutaneous tunnel between the proximal and the distal incisions on the forearm (Fig. 3). The tensor fascia lata is then sutured to the biceps tendon with multiple nonabsorbable sutures to perform a strong repair. The tensor fascia lata is passed under the skin of the forearm to the distal incision. The distal part of the tensor fascia lata is then retrieved at the distal incision and sutured to the FDP tendons with multiple nonabsorbable 3.0 sutures. When sutures are performed, elbow must be in 90 degrees flexion, and finger must be flexed with a 4-cm pulp-to-palm distance to obtain an effective tension.

INDICATION/CONTRAINDICATION

This technique may be proposed in total brachial plexus palsy. The active elbow flexion must have been previously restored (with nerve graft from C5C6 roots or intercostals nerve transfers). Full passive finger range-of-motion must be present to restore active flexion.

No scars must be present on the thigh to be sure tensor fascia lata is preserved.

FIGURE 4. The transfer of fascia lata tendon allows handling a bottle or a glass with active elbow flexion.

COMPLICATIONS

The main complication on the donor site is muscle hernia of the vastus lateralis through the defect after the harvest of the tensor fascia lata. However, this complication may be avoided in using an absorbable mesh used in abdominal hernias. Adhesions of the tensor fascia lata tendon may occur if the subcutaneous tunnel is not correctly performed.

REHABILITATION

The elbow, wrist, and fingers are immobilized in a splint during 3 weeks. Then rehabilitation is started with a physical therapist. Active elbow flexion and passive finger flexion are performed. Strengthening and heavy lifting are not begun before 6 weeks.

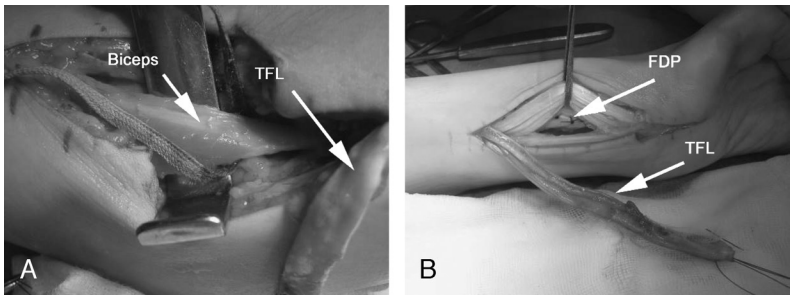

FIGURE 3. The tensor fascia lata tendon is passed under the skin through a large subcutaneous tunnel. A, The biceps tendon is exposed with the proximal approach to perform the suture on the tensor fascia lata tendon. B, The flexor carpi radialis tendon, median nerve, and flexor digitorum superficialis tendons are retracted to expose the FDP tendons and suture the distal part of the tensor fascia lata.

RESULTS

We performed this technique in 2 male patients with total brachial plexus palsy. Active shoulder flexion has been previously restored with 3 intercostal nerve transfers to the musculocutaneous nerve.[11] Elbow flexion was noted M4 based on medical council scale. To restore finger flexion, the transfer of the tensor fascia lata from the biceps to the FDP tendons was performed. No complications were described in these 2 patients. At 3-month follow-up, active finger flexion was present with 4-cm pulp-to-palm distance. The patients were able to place a glass or a bottle in their hand and grasp it in 90-degree elbow flexion (Fig. 4). Passive elbow extension must be performed to drop the object.

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