Lower Trapezius Transfer for Shoulder External Rotation in Patients With Paralytic Shoulder

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Restoration of shoulder external rotation in patients with paralytic shoulder is very challenging. When nerve repair and/or transfer fails, or if patients present late after injury such that nerve reconstruction is not possible, tendon transfer to restore shoulder external rotation becomes the main option. Good outcome has been reported with lower trapezius transfer to the infraspinatus to restore shoulder external rotation in patients with paralytic shoulder. The purpose of this manuscript is to describe the surgical technique of this transfer. *(J Hand Surg Am. 2014;39(3):556–562. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words External rotation, paralytic, transfer, trapezius.

Persistent shoulder partial or complete paralysis, in patients with brachial plexus injury, whether treated conservatively with observation or with nerve reconstruction through nerve grafts or nerve transfer, is a common debilitating complaint that is difficult to manage.[1–3] The most common presentation in these patients is poor or lack of shoulder abduction, flexion, and external rotation, associated with pain related to inferior shoulder subluxation as a result of the loss of the dynamic stabilizers of the glenohumeral joint.

After successful restoration of elbow flexion, lack of shoulder external rotation leads to the hand-on-belly position that limits functional use of the upper extremity.[4,5] The author described lower trapezius transfer to the infraspinatus tendon to restore shoulder external rotation in patients with paralytic shoulders.[4–6] This technique was used later for reconstruction of massive irreparable rotator cuff tear, but this latter technique is not discussed in this manuscript and the focus is on the surgical reconstruction of shoulder external rotation using lower trapezius transfer in patients with paralytic shoulder.

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INDICATIONS

Patients with paralytic shoulder who lack active shoulder external rotation and who failed either to recover spontaneously after brachial plexus injury or to recover after a previous attempt at nerve repair/reconstruction.

CONTRAINDICATIONS

Contraindications include

- Patients who have total or subtotal paralysis of the trapezius muscle.
- Patients with advanced glenohumeral joint arthritis.
- Patients with an open wound with or without infection.
- Patients who are not willing to comply with the postoperative immobilization/rehabilitation protocol.

SURGICAL TECHNIQUE

The author has modified his original technique that required prolongation of the lower trapezius with Achilles' tendon allograft to allow successful transfer of the lower trapezius to the infraspinatus.[5,7] In this technical modification, because the infraspinatus tendon is almost always intact in patients with paralytic shoulder, it is possible to transfer the lower trapezius tendon directly to the infraspinatus. Tendon allograft is not used except to augment the tendon repair if needed.

Surgical steps

The patient is positioned in the lateral position with the involved side facing the ceiling (Fig. 1A, B). Scrubbing and draping of the involved arm and the anterior and posterior chest area from the upper neck level to the upper abdomen is performed. The hand is mounted on a Tenet dynamic arm holder (Smith and Nephew, Memphis, TN), which allows positioning the shoulder throughout the surgery.

The surgery is performed through dual incisions, and the proposed incision sites are marked (Fig. 2). A vertical incision is made starting about 2 cm medial to the medial aspect of the palpable scapula spine and extended distally approximately 5 cm (Fig. 3A–C). The lower trapezius is identified, dissected toward its insertion on the medial spine of the scapula, and then detached from its insertion (Fig. 4A–E). Further dissection is performed more medially to separate the lower from the middle trapezius. The best way to identify this interval is by visualizing the triangular shape of the tendinous portion of the lower trapezius insertion and dissect medially parallel to the superior border of the tendon (Fig. 4A). A number 2 Orthocord (Dupuy, Warsaw, IN) is placed in Krackow fashion in the tendinous and musculotendinous portion of the lower trapezius and is used later for the repair. During the separation of the lower from the middle trapezius, the spinal accessory nerve is identified, most commonly two finger breadths medial to the medial border of the scapula, and it is protected during this dissection (Fig. 4C). A nerve stimulator is used as needed to confirm the location and normal function of the spinal accessory nerve.

The lower trapezius is left deep to the skin in the medial wound and attention is directed toward the lateral exposure of the infraspinatus. The posterior half of the posterior deltoid is detached from its origin on the spine of the scapula and retractors are placed around the posterior deltoid to facilitate exposure of the lower trapezius (Fig. 5). The visible portion of the infraspinatus tendon is short, measuring at most 2 to 3 cm. However, if some of the paralyzed infraspinatus muscle is peeled off the tendon, then the full length of the infraspinatus tendon is exposed, usually measuring 5 to 7 cm (Fig. 6A, B). A number 2 Orthocord Krackow suture is placed in the tendinous portion of the infraspinatus. A deep subcutaneous tunnel is created between the medial and the lateral wounds, and using a grasping instrument, the lower trapezius tendon is passed from the medial to the lateral wound (Fig. 7). Because of the relatively short

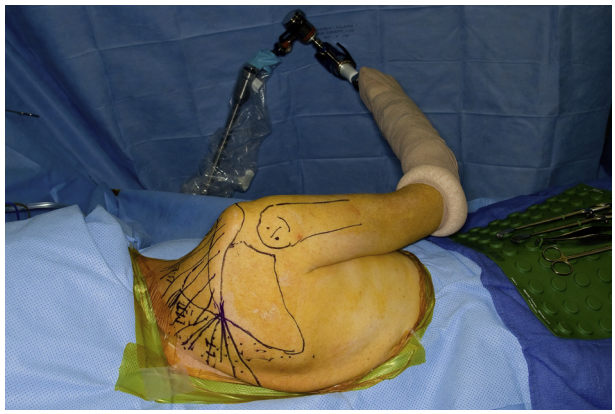

FIGURE 1: Intraoperative picture shows lateral positioning. The hand is placed in a dynamic arm holder to help position the shoulder throughout the surgery.

FIGURE 2: Markings of the proposed medial and lateral surgical incisions. (© 2013. By permission of Mayo Foundation for Medical Education and Research. All rights reserved.)

distance between the insertion of the lower trapezius and the infraspinatus tendon (fully exposed), it is easy to transfer the lower trapezius tendon directly to the infraspinatus tendon with the shoulder in external rotation (Fig. 8A, B). We place the shoulder in maximal external rotation during the transfer because we learned that most patients regain internal rotation, and this position places the least stress on the repaired