TECHNIQUE

Arthroscopically Assisted Latissimus Dorsi Transfer for Irreparable Rotator Cuff Tears

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ABSTRACT

Massive posterosuperior rotator cuff tears are traditionally repaired by open latissimus dorsi transfer. Latissimus dorsi transfer can substantially improve chronically painful, dysfunctional shoulders. We present a technique of arthroscopically assisted latissimus dorsi transfer which avoids an incision through the deltoid. By preserving the deltoid, a better and faster clinical outcome may be obtained.

Keywords: shoulder, massive rotator cuff tears, irreparable rotator cuff tears, arthroscopically assisted latissimus dorsi transfer

Massive rotator cuff tears can be functionally debilitating and cause disabling pain. Irreparable rotator cuff tears are those that because of their size and retraction cannot be repaired primarily to their insertions. Often, the amount of muscle atrophy and fatty infiltration prevents repair by conventional methods of mobilization and soft-tissue releases.[1] Many chronic irreparable rotator cuff tears can be treated nonoperatively, particularly when the patient has reasonable shoulder function. Debridement and subacromial decompression can be considered for some patients, whereas reconstruction of the rotator cuff can be considered for functional restoration.

Irreparable rotator cuff tears also occur in 2 distinct patterns, posterosuperior and anterosuperior. A posterosuperior failure consists of a complete tear of the supraspinatus, infraspinatus, and teres minor and is more common. An anterosuperior pattern consists of complete tears of the supraspinatus and subscapularis, sometimes with damage to the long head of the biceps. Patients with posterosuperior disruption have decreased abduction, forward flexion, and active external rotation. Anterosuperior failure often manifests with decreased abduction and forward flexion.

Latissimus dorsi muscle transfer is the preferred treatment for active disabled patients with a posterosuperior irreparable cuff tear and a functional deltoid.[2] Anterosuperior irreparable defects can be treated with pectoralis and teres major tendon transfers. This technique is traditionally performed open. We present a technique of arthroscopically assisted latissimus dorsi transfer for massive irreparable rotator cuff tear. AQ1

SURGICAL TECHNIQUE

The patient is placed on a beach-chair position with the entire arm and hemithorax prepared using sterile technique. A standard posterior arthroscopy portal is made, and a diagnostic arthroscopy is conducted both in the glenohumeral and subacromial space (Fig. 1). The rotator cuff is inspected, and any portion that can be repaired arthroscopically should be done at this time (Fig. 2). F1 F2

The arm is then placed into abduction, and an incision is carried posteriorly along the anterior border of the latissimus dorsi (Fig. 3). The posterior approach is a 20-cm incision in the postaxillary crease down the lateral aspect of scapula. The latissimus and teres major are identified, and the latissimus is dissected free from the teres major and chest wall toward its insertion on the humerus (Figs. 4A–D). The latissimus is the most anterolateral muscle with a long easily identifiable tendon. The teres major is more superior with a short broad tendon. It is important to differentiate between the 2 tendons. Once the latissimus dorsi tendon is identified, it can be detached with a Potts scissors. Number 2 FiberWire sutures are then placed through the end of the tendon to facilitate mobilization, maintain tension, and secure the tendon transfer. The neurovascular pedicle is identified, and the muscle-tendon unit is mobilized until the tendon can reach the top of the acromion, avoiding excessive tension on the pedicle. If the latissimus tendon is too short, it can be augmented with allograft tissue, we prefer Achilles autograft (Fig. 4E). F3 F4

The interval underneath the deltoid and posterior to the teres minor is developed by blunt dissection to create

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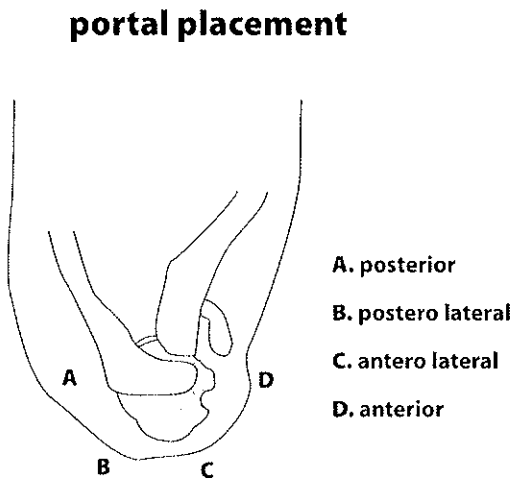

FIGURE 1. Portals placements for arthroscopically assisted latissimus dorsi transfer.

a subdeltoid tunnel. The tendon is transferred arthroscopically into the joint where it can be pulled over the top of the humeral head and lateralized (Figs. 5A–D). The no. 2 FiberWire sutures are pulled out the anterior portal to maintain tension. Three 5-mm BioCorkscrew anchors are used in a diamond double-row pattern to secure the latissimus tendon into place onto the footprint of the greater tuberosity (Figs. 6A, B). The preferred placement of the transferred tendon is into the footprint of the supraspinatus on the anterolateral aspect of the greater tuberosity. The transferred tendon is secured to the greater tuberosity by staggering the anchors medially and laterally on the footprint. The no. 2 FiberWire sutures are

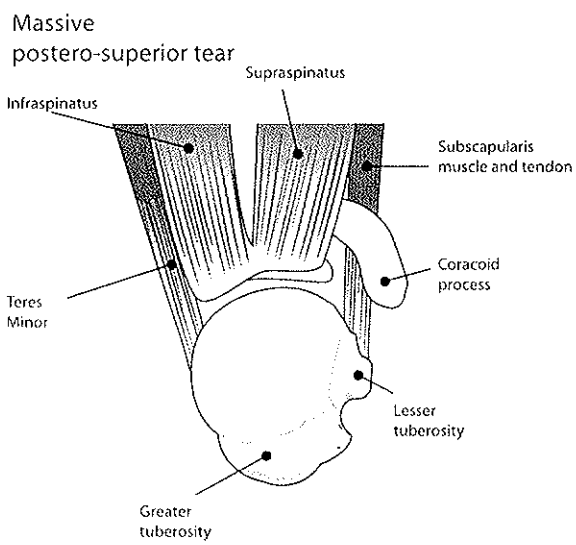

FIGURE 2. Presentation and visualization of massive posterosuperior tear.

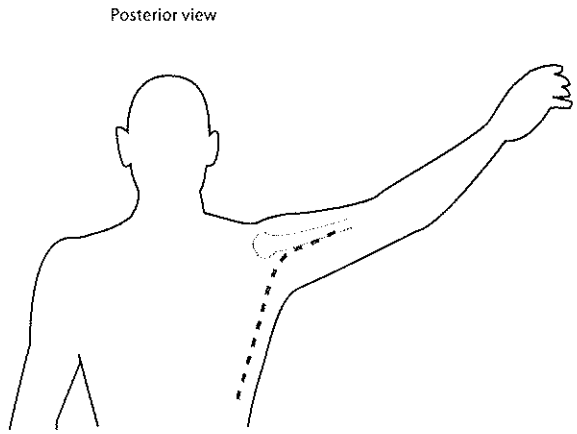

FIGURE 3. Incision for latissimus dorsi harvest.

then secured to the subscapularis arthroscopically closing the rotator interval.

The authors routinely perform an acromioplasty but preserve the coracoacromial ligament. If an acromioplasty has been preformed in previous rotator cuff repair surgery, then an additional acromioplasty may not be needed. If the long head of the biceps is diseased, a tenotomy or, more commonly, a subpectoral tenodesis is performed. An irreparable subscapularis tendon tear is a contraindication for this type of tendon transfer.

The patient is placed in an abduction orthosis using a SmartSling (OSSUR, Aliso Viejo, Calif) brace or similar type of abduction brace for the first 6 weeks to allow the tendon to heal without tension. A physical therapist performs passive motion of the arm in abduction and external rotation, not allowing internal rotation or adduction. This motion prevents stiffness and adhesions. At 6 weeks, the patient is allowed to start active-assisted and active range of motion. In addition, a biofeedback program is initiated to retrain the latissimus dorsi muscle to fire during flexion and external rotation of the shoulder. At 3 to 4 months, muscle strengthening can begin.

DISCUSSION

Latissimus dorsi transfer for irreparable posterosuperior rotator cuff tears has been utilized for many years. Gerber et al[3] reported good to excellent results in 13 of 16 patients of latissimus dorsi transfer for treatment of massive rotator cuff tears. Miniaci and MacLeod[4] reported satisfactory results in 14 of 17 patients who had undergone a latissimus dorsi transfer after failure of previous surgical repair of a massive rotator cuff tear. Iannotti et al[5] also described good pain relief and function in 9 of 14 patients who underwent latissimus dorsi transfer. Warner and Parsons[6] reported better results in primary cases as opposed to revision cases of latissimus

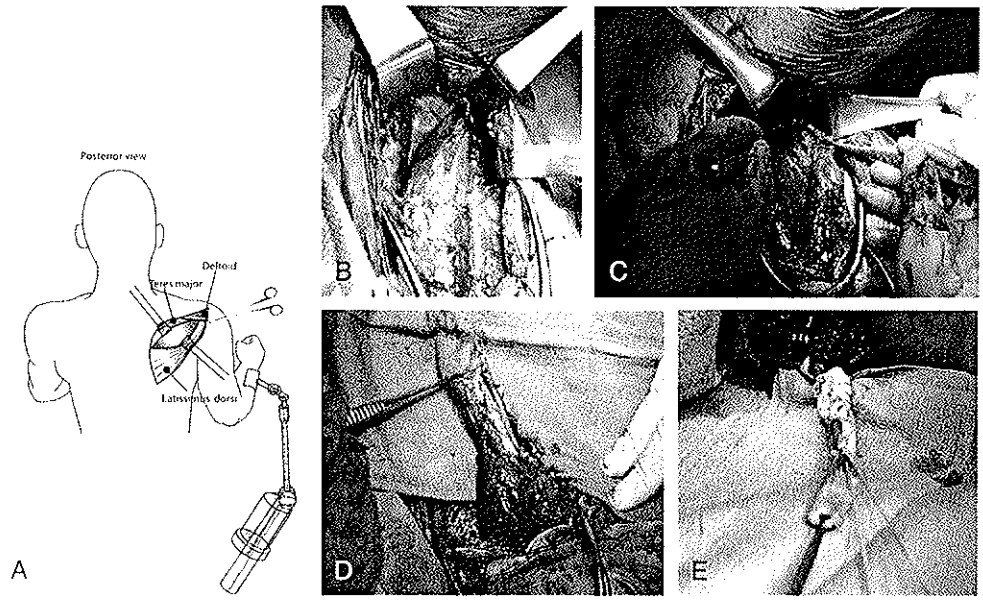

FIGURE 4. A, Illustration of latissimus dorsi exposure and harvest. B, Latissimus dorsi surgical exposure. C, Latissimus dorsi surgical exposure. D, Latissimus dorsi surgical harvest. E, Latissimus dorsi harvest augmented with allograft.

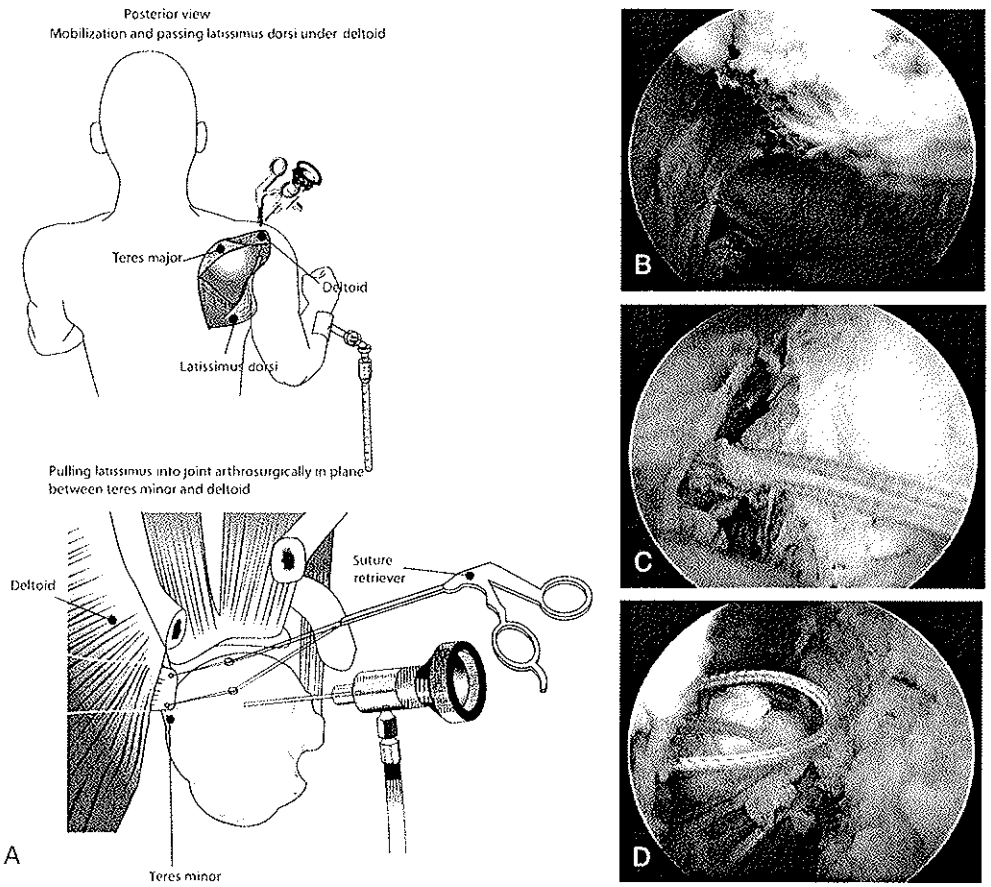

FIGURE 5. A, Illustration of patient position and mobilization and passing the latissimus dorsi under deltoid. B, Pulling the latissimus dorsi into the joint arthroscopically in plane between the teres minor and deltoid. C, Suture passing under the deltoid. D, Graft passing into the joint arthroscopically.

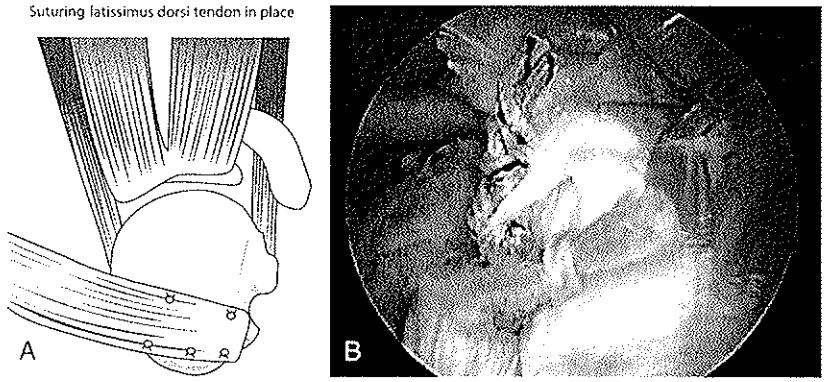

FIGURE 6. A, Illustration showing the suturing of the latissimus dorsi to the greater tuberosity with suture anchors. B, Arthroscopic view of the sutured latissimus dorsi to the greater tuberosity.

dorsi transfer for irreparable cuff tears. They compared improvement in the Constant score in 6 patients who underwent latissimus dorsi transfer for primary reconstruction versus 16 patients who had the tendon transfer as a salvage reconstruction. There was a significant difference in Constant score improvement of 70% for the primary group versus a 55% improvement for the salvage group. One possible cause for the worse outcomes in the revision cases might be additional insult to the deltoid muscle that occurred in the revision surgical cases.

With the arthroscopic variation presented here, we avoid an incision through the deltoid muscle that occurs in open approaches to the rotator cuff. Other investigators have shown that subscapularis and deltoid function can affect the outcome of the latissimus dorsi transfer. In its normal position, the latissimus dorsi muscle is an adductor and internal rotator of the humerus, and when transferred, it is expected to contract in abduction and external rotation. Iannotti et al[5] found synchronous in-phase contraction of the transferred latissimus dorsi, preoperative shoulder function, and general strength affected their results. However, in their group, deltoid function was a prerequisite for good function. By preserving the deltoid through this arthroscopic technique, it may provide patients undergoing latissimus dorsi transfer for massive rotator cuff tears a better clinical outcome.

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