LOWER TRAPEZIUS TENDON TRANSFER FOR CHRONIC RETRACTED CUFF TEAR

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Abstract:

Management of massive irreparable posterior- superior rotator cuff tears is very challenging, particularly in patients who are not candidates for reverse shoulder arthroplasty, such as younger patients, or in transfer (LTTT) those with a high level of activities. We report a case of 60 year old, physiologically active male with a chronic massive posterosuperior cuff tear, managed with arthroscopic assisted lower trapezius tendon

Introduction:

Rotator cuff tear is a common cause of shoulder pain and loss of function, affecting 10% of the population under 60 and 40% of those aged 70 and above. Massive irreparable rotator cuff tears account for 30-40 % of all tears and their management continues to be an orthopaedic challenge(1).

Traditional open and arthroscopic repair has resulted in disappointing outcomes, with tears being either irreparable intraoperatively or resulting in unacceptably high retear rates postoperatively, ranging from 25% to 94%. These tears are now commonly referred to as functionally irreparable rotator cuff tears (FIRCTs) (2).

Recent treatments include arthroscopic debridement, partial or complete repair, tendon transfer, various grafting techniques, balloon spacer, and arthroscopic superior capsular reconstruction. Tendon transfers have the potential to restore shoulder function by reconstructing the muscle function of the irreparable rotator cuff tear.

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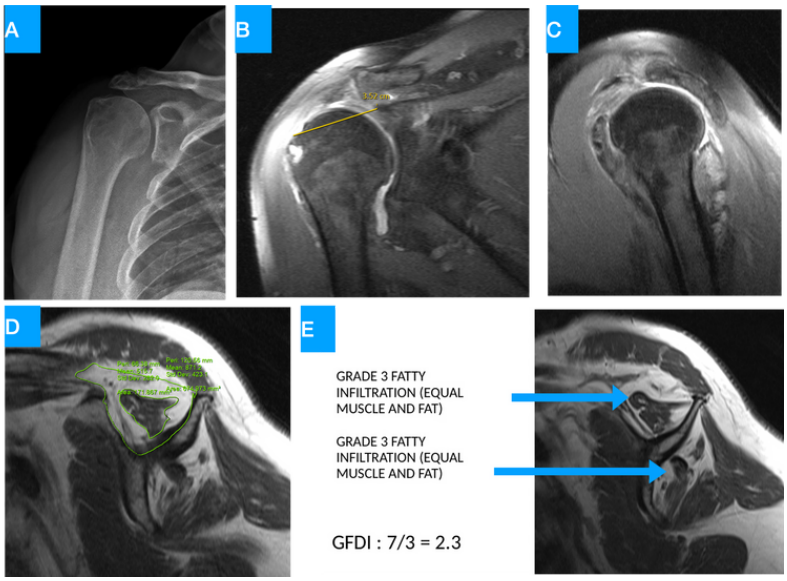

Fig 1 : (A)plain radiograph shows decreased acromiohumeral distance ; (B & C) MRI coronal and sagittal sections show posterosuperior cuff tear ; (D) Occupancy ratio calculation by Thomazieu et.al method ; (E) Fatty infiltration calculated by Goutallier et.al method.

Case:

A 60 year old right hand dominant male , carpenter by profession , presented with complaint of persistent pain and difficulty in lifting weights after having a fall 2 years back. On examination , passive range of movement is full . However, active ROM is limited to 90 deg of forward elevation(vs 170 deg on contralateral side) and 20 deg of external rotation (vs 60 deg on contralateral side).

JOBES test and External rotation resistance test is positive. External rotation lag sign at both 0 deg and 90 is positive.

Plain radiographs show HAMADA grade 1 changes. MRI shows supraspinatus and infraspinatus tear with 3 cm retraction and Global Fatty Degeneration Index of 2.3 with an occupancy ratio of 0.254 by

He has functional limitations in external rotation and Abduction beyond 90 degrees is positive. Considering his age and clinicoradiological correlation, we took consent for arthroscopic evaluation + complete repair / partial repair with lower trapezius tendon transfer with autograft/ allograft augmentation.

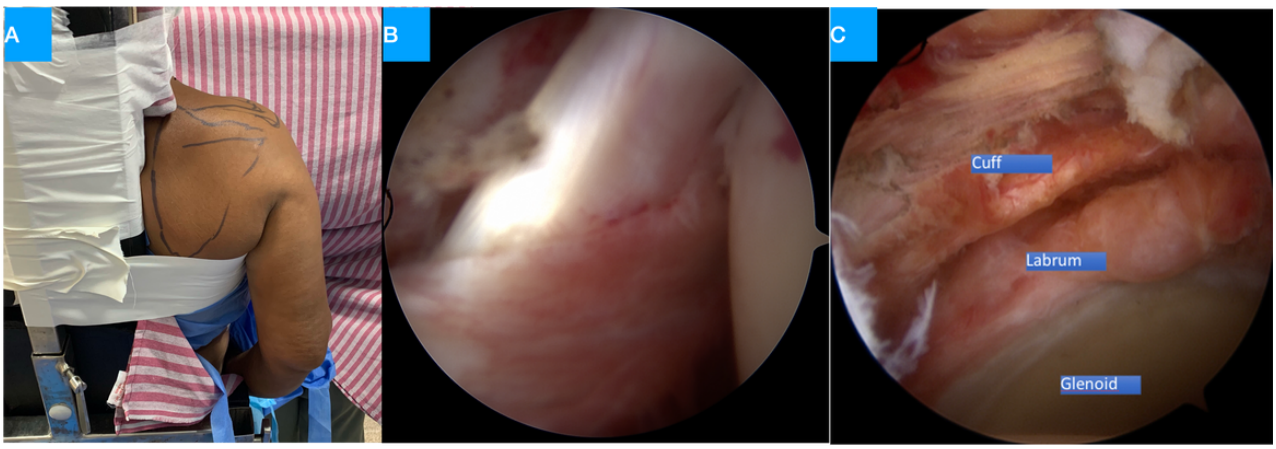

Fig 2 : (A) Beach chair position of patient exposing the medial aspect of scapula ; (B) Diagnostic arthroscopy showing intact subscapularis ; (C) posterosuperior cuff retraction till glenoid.

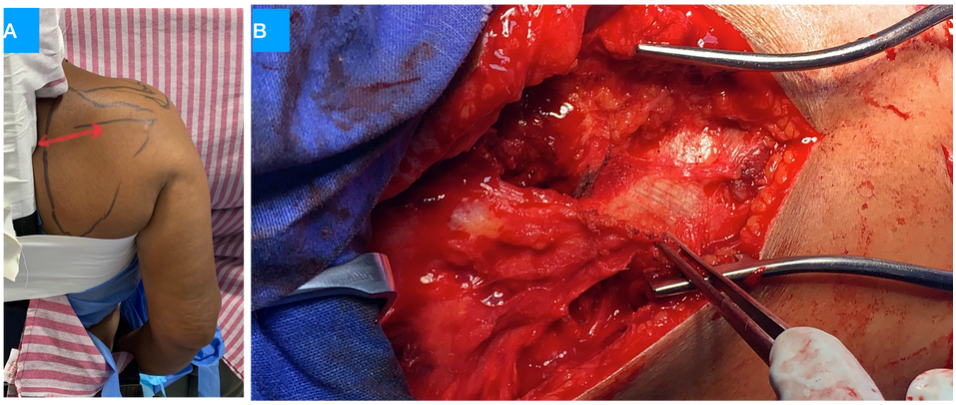

Fig 3 : (A) Skin incision ; (B) harvesting of lower trapezius tendon

Surgical technique:

Under general anaesthesia , patient placed in beach chair position with entire ipsilateral half of the back uncovered by the drapes so that there is an easy access to the medial aspect of tn transfer.
he scapula for graft harvesting.
A standard posterior portal is used for initial diagnostic arthroscopy. Assessment of glenohumeral cartilage, long head of biceps , subscapularis, rotator interval and rotator cuff is done. Scope is then shifted to subacromial space . Subscapularis is intact . There is posterosuperior cuff tear with retraction till glenoid. (Fig 2)
Adequate release of the rotator cuff is done by using a radiofrequency probe. One double loaded suture anchor inserted and partial infraspinatus repair done .
Supraspinatus could not be brought back to its footprint. Hence , proceeded for Lower Trapezius tendon transfer.

A horizontal incision just inferior to the scapular spine, from 4 cm lateral to the medial edge to 1 cm medial to the medial edge is given. Subcutaneous tissue dissection done. The fat triangle near the tendon insertion and the inferior muscle belly traveling diagonally up to the scapular spine helped us identify the insertion of the LT, which they then detached, mobilizing the trapezius muscle body from the underlying infraspinatus fascia. We then separated the lower and middle trapezius muscle bellies by following the horizontal part of the triangular tendinous insertion of the lower trapezius horizontally toward the mid-thoracic spine, protecting the spinal accessory nerve in the deep fascia of the muscle. (Fig 3).
The greater tuberosity is prepared utilizing the “crimson duvet” technique to facilitate bone healing.
Simultaneously, we harvested semitendinosus graft from ipsilateral leg and prepared.

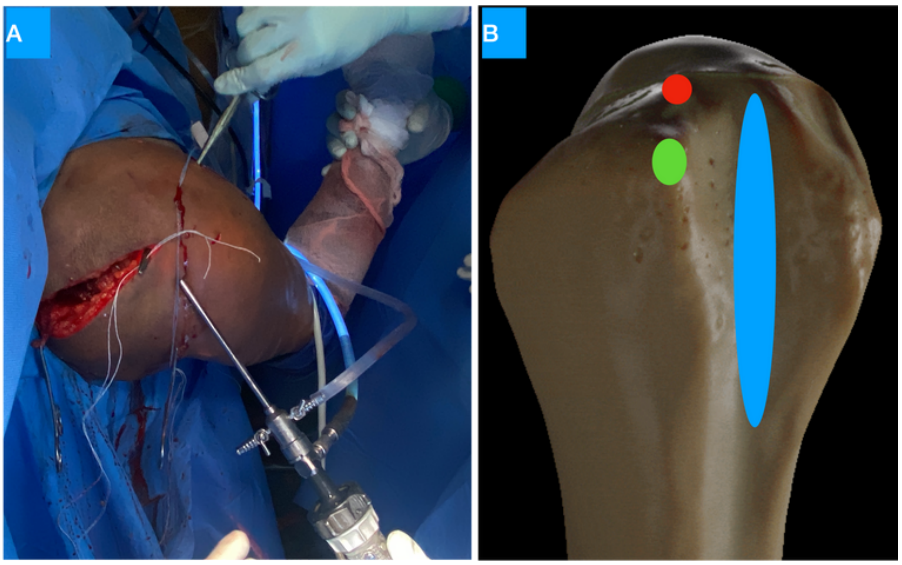

Fig 4 : (A) Placing long arthroscopic grasper through the antero- lateral portal out the medial incision to grasp the prepared semitendinosus graft and shuttled anteriorly ; (B) Anchor sites for interconnecting graft on greater tuberosity of humerus; blue oval - bicipital groove ; red circle - anteromedial anchor and green circle - anterolateral anchor

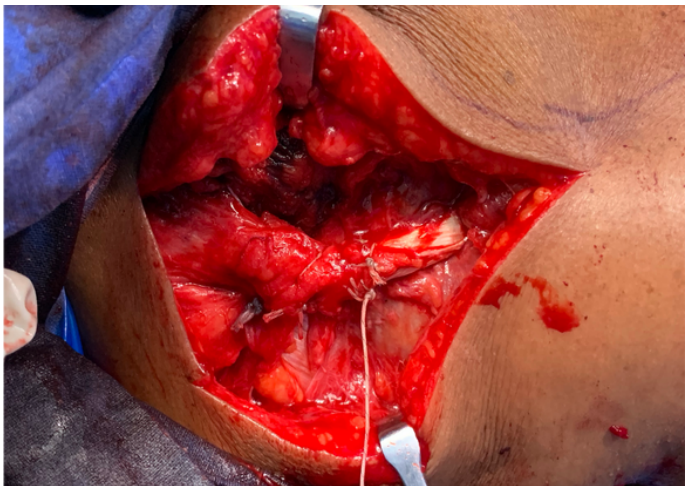

Fig 5 :Securing medial end of interconnecting graft to lateral end of lower trapezius tendon by modified Pulvertaft weave technique

A long arthroscopic grasper is then placed through the antero- lateral portal out the medial incision to grasp the prepared semitendinosus graft and shuttled anteriorly through sub acromial space. The autograft is then anchored into the tuberosity, using an anteromedial anchor just lateral to the articular surface and posterior to the bicipital groove, as well as an anterolateral anchor just off the edge of the greater tuberosity, posterior to the bicipital groove . (Fig 4)

Attention is then directed back to the medial scapular incision. The arm is placed in maximal external rotation in 60°–90° of abduction and the medial end of autograft secured to the lower trapezius using a Pulvertaft weave technique in maximal tension with multiple sutures . (Fig 5)

Post Op Rehab :

The post-op Rehab Protocol has been described below(Fig. 6).

Result:

Follow-up at 6 months shows restoration of external rotation and active abduction of more than 90 degrees. (Fig 7)

Discussion:

Since its original description by Elhassan et al.in 2009, LTTT has been reported to successfully restore external rotation in the paralytic shoulder (3). The ease and success with which patients are able to retrain their shoulder after the transfer is in part due to its “in-phase” contraction with the native shoulder external rotators and abductors (4), a similar excursion when compared with the infraspinatus (5), and “in-line” pull that simulates the infraspinatus vector. There are 2 largest studies till now, one by Elhassan et al. and the other by Valenti et.al.

A

Postoperative time point	Activity
0 to 6-8 wk	Immobilization in custom external rotation brace, with shoulder maintained in 40°-60° of external rotation
6-8 to 12 wk	Passive, active-assisted and eventually active shoulder motion with an internal rotation limit to 0°; pool-based exercises are encouraged
12-16 wk	Gradual removal of passive and active internal rotation limit; return to most activities of daily living
16 wk to 6 mo	Gradual progression of strengthening without motion limits in internal and external rotation, and abduction are permitted
6 mo	Return to full unrestricted activities

B

Fig 6 : (A) Post operative protocol table and (B) position of immobilization in custom brace with shoulder maintained in 40 to 60 deg of Abduction and maximum external rotation

Fig 7 : Six months follow up with restoration of full external rotation and abduction beyond 90 degrees

Elhassan et al. reported on 41 patients with 22 of them having previous failed failed rotator cuff repair. Average age of patients was 52 years (range 37-71) . All underwent arthroscopic assisted LTTT with Tendoachilles allograft augmentation. At an average follow up of 14 months , 37 patients (90 %) had significant improvement of all outcome scores and improvement in external rotation. 2 patients had traumatic rupture of transfer and 2 patients with Hamada > 2 required revision to Reverse Shoulder Arthroplasty. Subscapularis or teres minor pathology, as well as pseudoparalysis, did not seem to impact the ultimate outcome (6).
sValenti et al. reported on 14 patients with external rotation lag and Hornblower's signs who underwent LTT augmented with a semitendinosus autograft . At a mean follow-up of 24 months, patients improved their PROMs and pain scores by more than double, with only 1 revision procedure secondary to an infection and no graft tears(7).
Despite these positive outcomes, functional improvement likely depends on patient selection . Considerations that are reportedly associated with improved outcomes after LTTT include patients with minimal to no glenohumeral osteoarthritis, preoperative shoulder flexion greater than 60 degrees, and less than 2 years time elapsed from symptoms to presentation (6).

We have operated 6 patients till now using this arthroscopic assisted lower trapezius tendon transfer technique for functionally irreparable cuff tears. We have used Tendoachilles allograft in 1 ; hamstring autograft in 4 and peroneus longus in 1 case for augmentation . We haven't faced any major complications till now and are waiting for long term outcomes. Ideal indications for LTT from our experience would be ER lag sign positive with active elevation(preferably >60 degrees) , Involvement of two or more tendons , Retracted-Patte stage III , Grade3 + Fatty infiltration , Revision cuff repairs.

Conclusion :

Lower trapezius tendon transfer is a promising technique for massive , functionally irreparable cuff tears in active individuals to regain strength of the shoulder . Careful selection of patient is very important . The biomechanical rationale and early clinical results are encouraging, providing strong support for its continued use in these challenging patient population. Long-term results and comparative data are needed to optimize outcomes and establish clear clinical indications going forward.

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