

Massive Rotator Cuff Tears

# THE ARGUMENT FOR LOWER TRAPEZIUS TRANSFER

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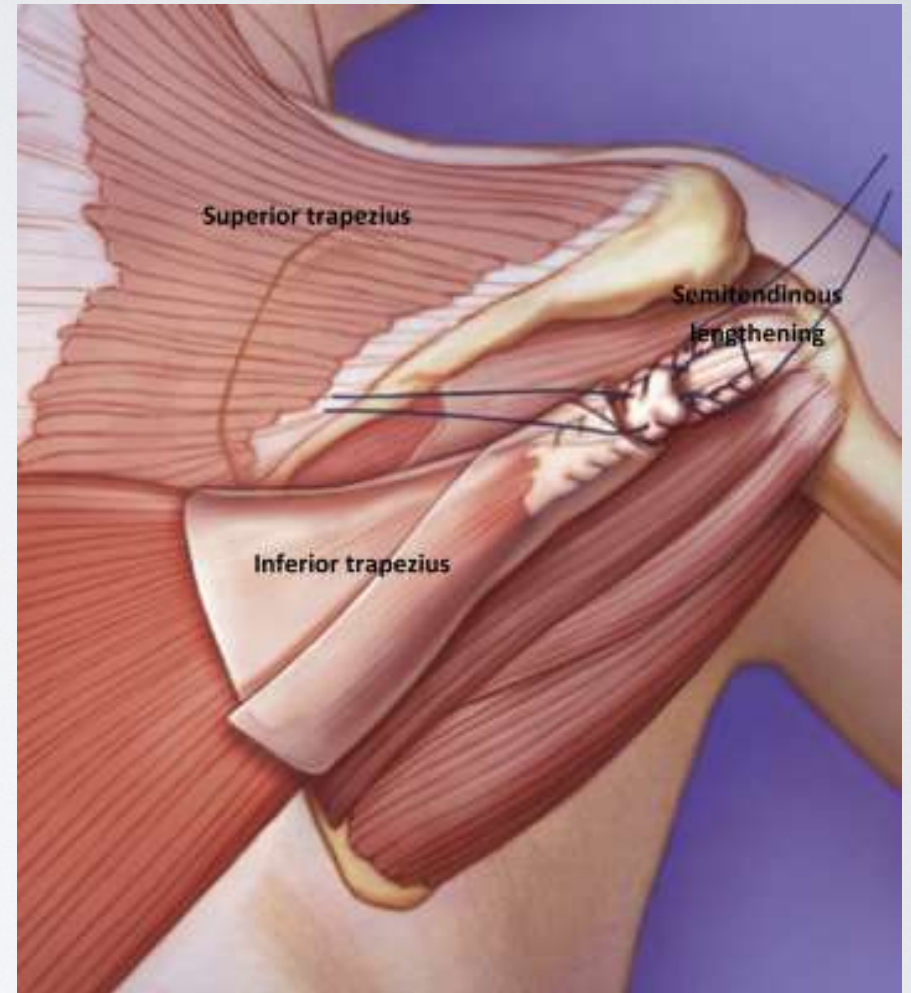
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# WHAT IS A LOWER TRAPEZIUS TRANSFER?

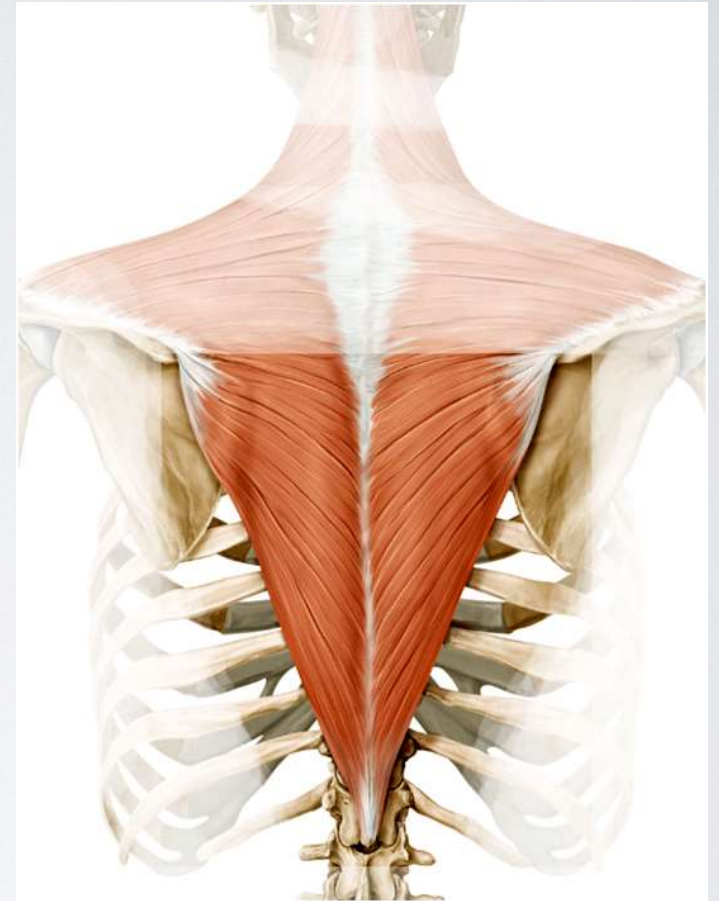
- Indicated for patients with deficits of external rotation at 0° of abduction
- Functions in place of a deficient infraspinatus
- Inferior trapezius has a line of pull similar to the infraspinatus



Jean, 2019

# LOWER TRAPEZIIUS

- Originates along the spine around T4-T12
- Inserts 3-4 cm lateral to the medial spine of the scapula.
- In-phase with infraspinatus with similar line of pull.
- Excursion and tendon forces more similar to infraspinatus than latissimus dorsi



# INDICATIONS

- IDEAL INDICATION
- Isolated infraspinatus complete atrophy (e.g. secondary to intramuscular rupture)
- Irreparable massive posterosuperior rotator cuff tear
- Goutallier grade greater than or equal to 3 for supraspinatus and greater than or equal to 2 for infraspinatus
- Patte grade greater than or equal to 2
- Chief complaint of weakness, particularly external rotation



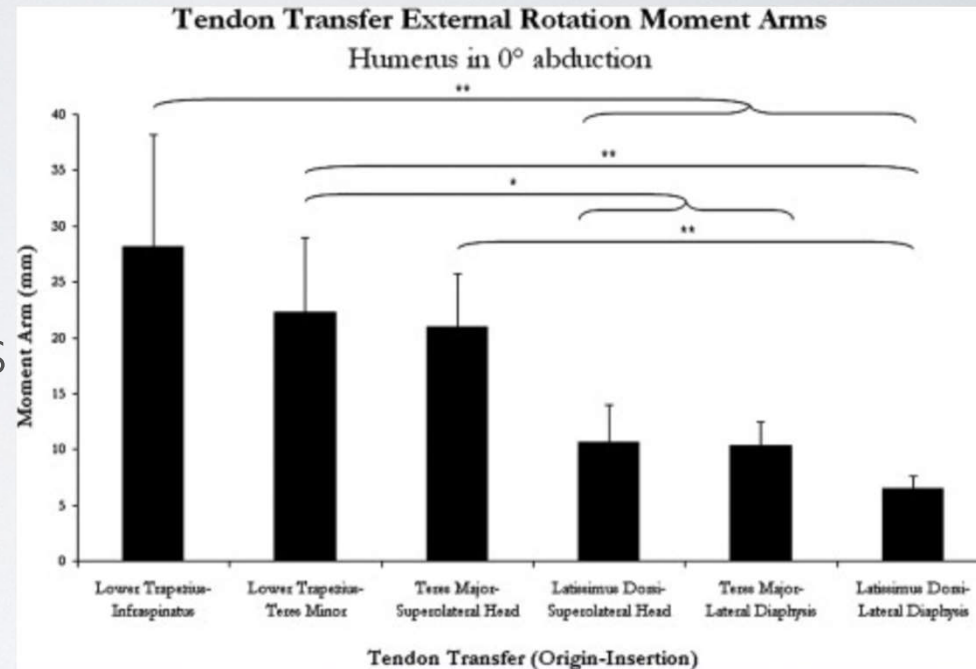
# CONTRAINDICATIONS

- Multiple medical comorbidities with contraindications for surgery
- Inability to comply with postoperative instructions
- Advanced glenohumeral joint arthritis
- Advanced age
- Subscapularis deficiency
- Deltoid deficiency
- Trapezius deficiency
- Forward elevation of less than  $60^{\circ}$  (relative)

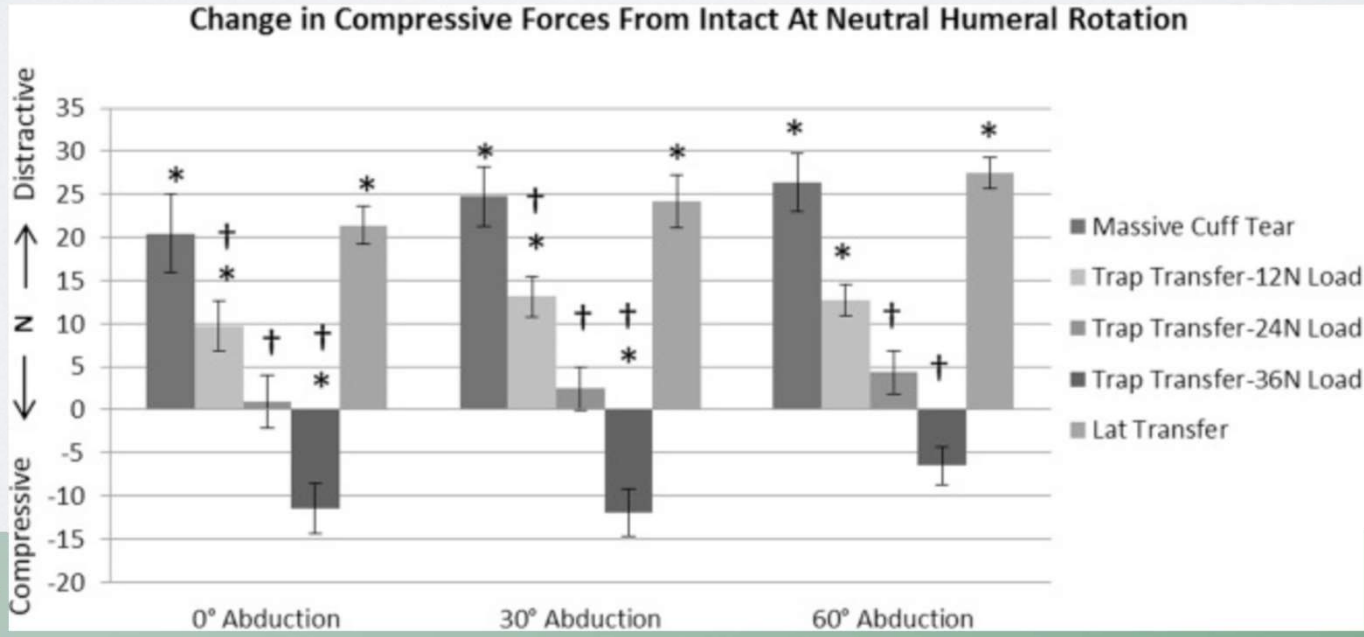


# BIOMECHANICS

- Hartzler et al., 2102
- Cadaveric study comparing external rotation moment arm for latissimus dorsi and teres major vs the lower trapezius.
- Lower trapezius to the infraspinatus insertion had the highest external rotation moment arm at 0° of abduction.
- The lower trapezius had external rotation moment arm most similar to anatomic external rotators.



- *Omid et al. 2015*
- Cadaveric study comparing intact rotator cuff, massive posterosuperior rotator cuff tear, lower trapezius transfer, and latissimus dorsi transfer at various degrees of abduction.
- Latissimus dorsi able to correct the internal rotation due to muscle loading at 0° abduction, while the lower trapezius was able to correct this at all abduction angles.
- Lower trapezius restored anterior-posterior balance caused by a massive rotator cuff tear, while the latissimus dorsi worsened it.
- Lower trapezius was able to restore decreased glenohumeral compression forces caused by the massive rotator cuff tear.



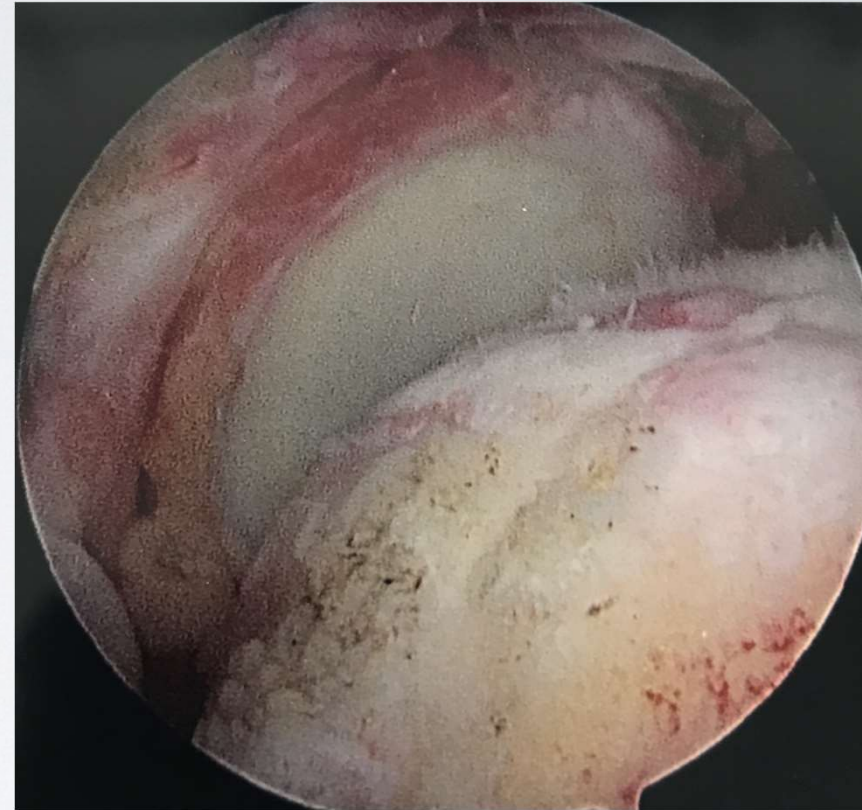
# TENDON TRANSFER 10 COMMANDMENTS

1. A given transferred tendon can reproduce only 1 function;
2. A transferred muscle loses about 30% force
3. The direction of the movement enabled by the transfer depends on the transferred tendon fixation point with respect to the joint center of rotation;
4. Transfer muscle tension should be physiological
5. Insertion site fixation should be as solid as possible, to allow early mobilization and avoid joint stiffness
6. Surgical approaches should be minimally traumatic, to facilitate muscle course and limit adherence;
7. Transfer course should be sufficient to easily reach the reinsertion receiver site;
8. The direction of the transfer should be that of the replaced muscle;
9. The neurovascular pedicle should be located and conserved;
10. Using an agonist muscle helps recovery.

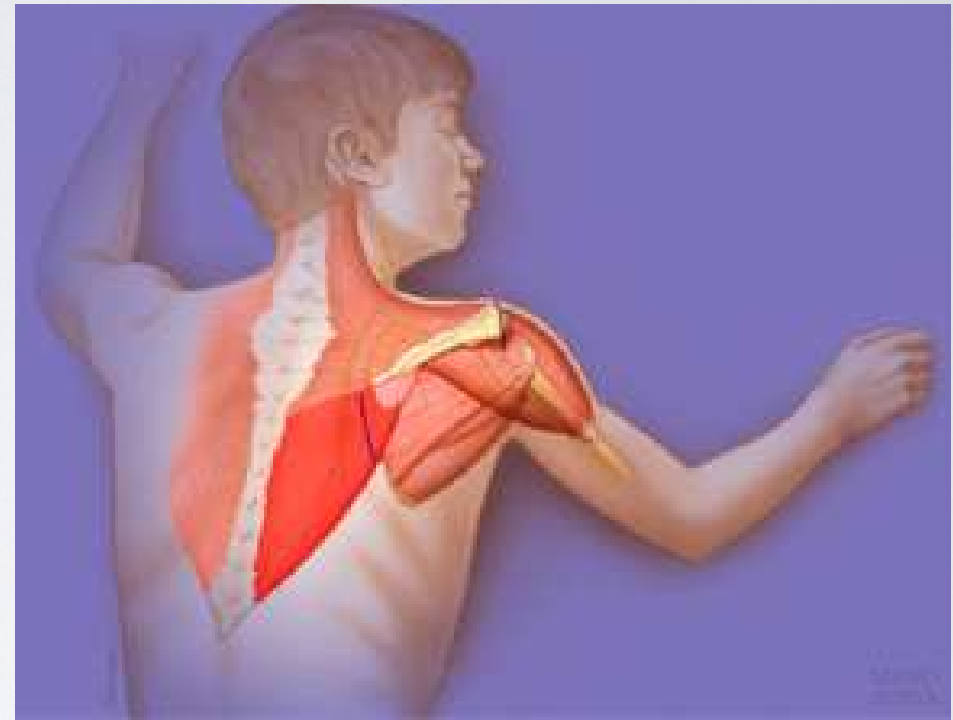


# ARTHROSCOPIC-ASSISTED TECHNIQUE

- Beach chair or lateral decubitus
- Create portals and standard diagnostic scope.
- Address concomitant pathology intraarticularly (e.g. subscapularis, biceps tendon)
- Subacromial decompression
- Debride footprint
- Repair healthy rotator cuff tissue or incorporate into transfer.
- Develop interval along infraspinatus.
- Incise infraspinatus fascia to make pathway for transfer.



- Vertical or hockey-stick shaped incision along the inferior scapula spine
- 1 cm medial to the scapula to 3-4 cm lateral

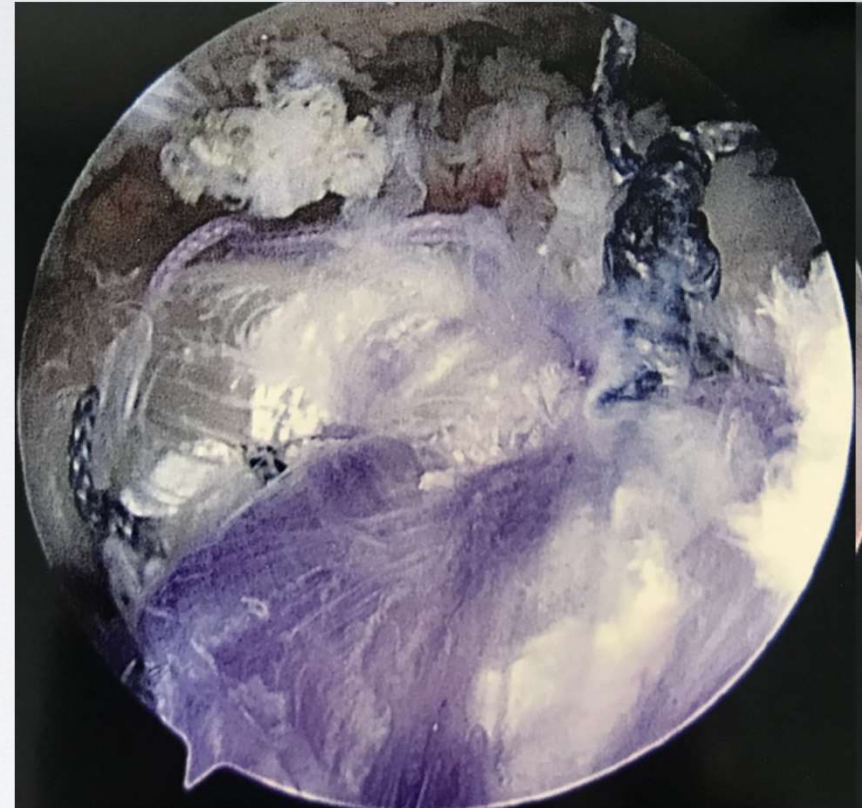


Clark and Elhassan, 2018

- Create full thickness skin flaps over the fascia of the infraspinatus and trapezius
- Expose muscle belly inferiorly
- Trace inferior edge back to the musculotendinous junction and attachment at scapular spine.
- Detach lower trapezius tendon, including overlying periosteum, and mobilize.
- Prepare tendon with non-absorbable, locking suture.



1. Prepare the allograft (e.g. Achilles) for augmentation by placing non-absorbable sutures through the superior and inferior end of the thicker part of the graft
2. Pass the sutures of the allograft out the anterolateral portal
3. Rotate shoulder to ensure graft moves easily and is not twisted
4. Anchor the graft using suture anchors to the greater tuberosity
5. Split the medial aspect of the allograft in half
6. Use Pulvertaft weave to inferior half of allograft to the lower trapezius tendon.
7. Oversew superior half of allograft over the Pulvertaft weave.

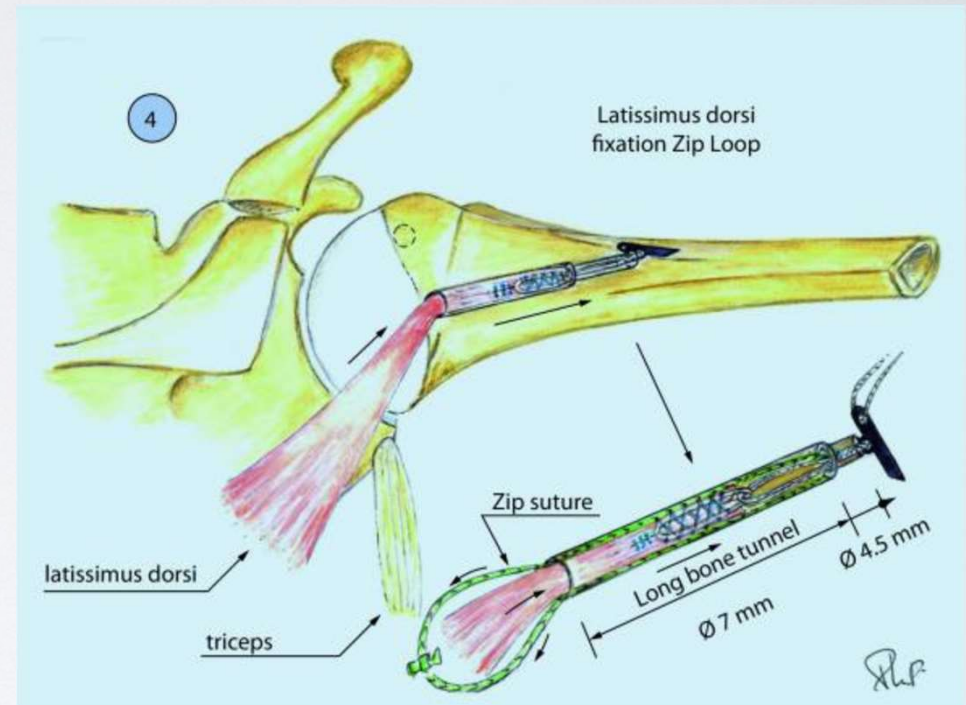


# OUTCOMES

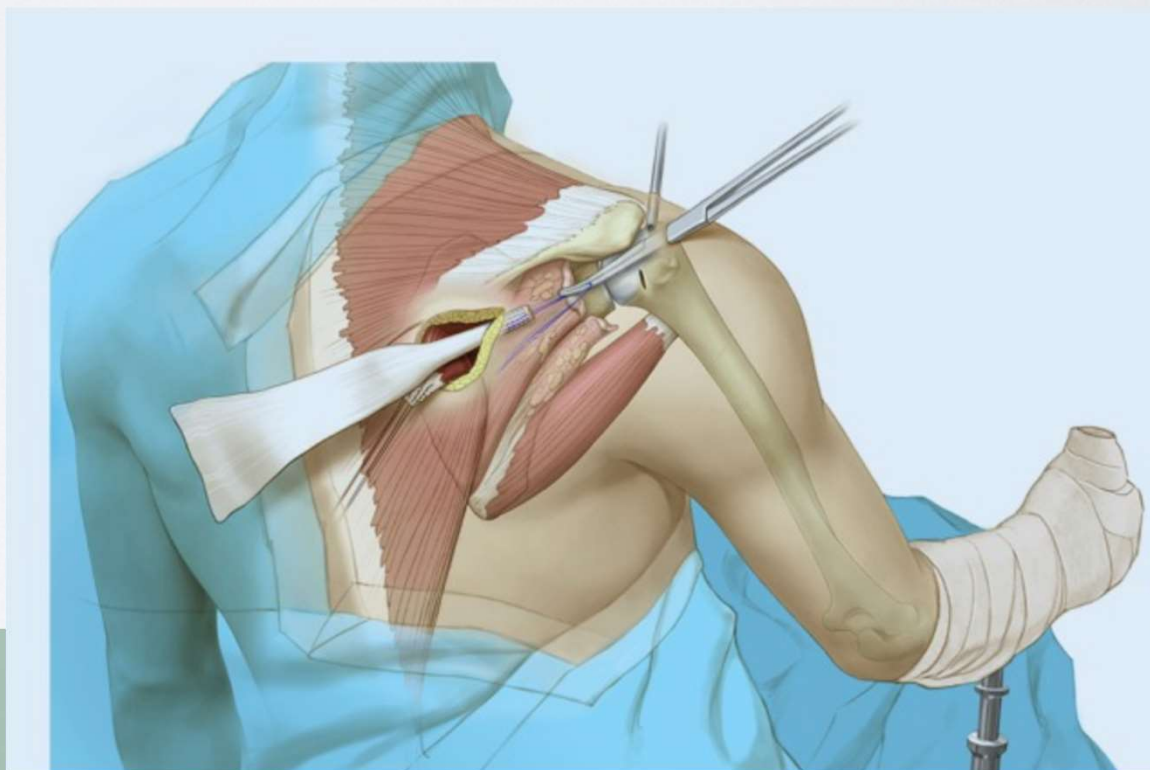
- *Elhassan et al. 2016*
- 33 patients with symptomatic posterosuperior massive rotator cuff tears treated with open lower trapezius/ Achilles tendon allograft with average 47 month follow-up
- 32/33 had significant improvement in pain and shoulder range of motion
- Average FF 120°, abduction 90°, ER 50°
- Patients with >60° of FF had more significant gains in ROM.
- Seroma in 4 patients
- One patient with infection treated with debridement who eventually went on to have shoulder fusion.



- *Valenti, 2018*
- 14 patients with irreparable posterosuperior rotator cuff tears treated with arthroscopic-assisted lower trapezius transfer extended with semitendinosus autograft; 4 with FF <math><120^\circ</math> had concomitant latissimus dorsi transfer.
- Mean ER at  $0^\circ$  improved by  $-20^\circ$  to  $24^\circ$ , ER at  $90^\circ$  from  $-10^\circ$  to  $40^\circ$ , and FF from  $150^\circ$  to  $160^\circ$
- Mean Constant-Murley, SSV, and VAS scores all significantly improved.
- Postoperative drop arm and lag signs all negative.
- 2 reoperations for hematoma formation at harvest site, 1 with *C. acnes* infection.



- *Aibinder and Elhassan, 2018*
- Arthroscopically assisted trapezius transfer with Achilles augmentation in 41 patients
- At mean follow-up 13 months, 90% had improvement in all measures.
- Pseudoparalysis reversed in >90%
- Reparable subscapularis tears did not impact outcomes, but degenerative changes, particularly, Hamada stage 2 or 3 did.



# CONCLUSIONS

- Provides durable and reliable restoration of motion
- Provides durable and reliable relief of pain
- Few complications and need for revision surgery



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# THANK YOU!

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