Lower Trapezius Tendon Transfer Protocol

Lower Trapezius Tendon Transfer (LTTT) for irreparable Rotator Cuff Tears

Sling	From Day 1	Restrictions	Strengthening
Abduction wedge sling 6 weeks	Cervical, Elbow, & Wrist and Hand AROM	No IR, ADD or Ext PROM for 6/52. No AROM for 6 weeks.	Focus on contralateral side and lower limb for first 6 weeks.

Factors that may affect progression rate:

- Tissue Quality inc bone health
- Age
- Multi-tendon involvement
- Anterior deltoid function
- Diabetes
- Smoking and Alcohol status

Timescales are general guidelines and are dependent on the patients individual factors and pre-operative history / status. When considering dose of prescribed exercise consider aim of the exercise and the individual patient – consider they may need to build up to desired dose and manipulating the F.I.T.T principles.

Phase 1 (Day 1 – 6 weeks) Initial in hospital and on discharge exercises

Aims/Goals: Minimise pain, protect the repair and restore passive range of movement.
Avoid: Weight bearing, forced flexion PROM, No passive IR, Add and Extension and No AROM.

Exercise:	Dose:
AROM • C-Spine, Elbow, Wrist and Hand.	
PROM: After 3 weeks can start PROM GHJ (Patient Guided / Tolerated) • Flexion as tolerated • Flexion in scapular plane as tolerated • External rotation – neutral to EOR as tolerated	
Strengthening • Scapular retraction • Shoulder shrugs • Sub maximum Deltoid Isometrics	

Treatment Note:

- Reminder on importance of pain control.
- Use of ice pack
- Abduction wedge sling to be worn all the time except for exercise and washing.
- Stitches to be removed at 2/52 post op at GP practice
- Patient can still engage with lower limb rehab and strengthening of the non-operated

side to facilitate recovery.

Phase 2 (6 weeks -12 weeks)

Aims/Goals: Restore ROM, Restore proprioception, encourage light ADL's with operated side, increase strength.
Avoid: No forced IR, ADD or extension, No forced Flexion PROM and No lifting or carrying

Exercise:	Dose:
AROM • C-Spine, Elbow, wrist and hand.	
PROM: Continue (Patient Guided / Tolerated) as able progress to active assisted (below) • Flexion as tolerated • Flexion in scapular plane as tolerated • External rotation – neutral to EOR as tolerated • Internal rotation as tolerated • Extension as tolerated • Horizontal adduction as tolerated	
Active Assisted to Active Range of Movement • Forward flexion • Flexion in scapular plane as tolerated • External rotation – neutral to EOR as tolerated • Internal rotation as tolerated • Prone Rowing AROM exercise	
Strengthening • Scapular retraction • Shoulder shrugs • Sub maximum Deltoid Isometrics • Sub maximal Rotator cuff isometrics • Wall / Table push-up plus • Light open chain proprioceptive and rhythmical stabilisation exercises	

Treatment Note: • Abduction wedge sling removed at 6 weeks. • Patient again reminded they can still engage with lower limb rehab and strengthening of the non-operated side to facilitate recovery.

Phase 3 (12 weeks - 6 months)

Aims/Goals: Maintain and enhance PROM/AROM, Re-establish proprioception, Regain strength and stability.
Avoid: Any forces stretching in all planes, No heavy lifting, No sports activity and no strengthening with heavy weights / weighted equipment on affected side. Cross body activities (combined IR and ADD).

Exercise:	Dose:
Active Assisted to Active Range of Movement • Forward flexion • Flexion in scapular plane as tolerated • External rotation – neutral to EOR as tolerated • Internal rotation as tolerated • Prone Rowing AROM exercise • Gentle end of range stretching as tolerated	
Strengthening: Start supine then progress to antigravity • Deltoid • Periscapular muscles • External rotators • Internal rotators • Biceps / Triceps / General UL conditioning Proprioception • Light open chain proprioceptive • Rhythmic stabilisation exercises.	

Treatment Note:
- To progress – Pt to demonstrate proprioceptive awareness, adequate strength in IR and ER.
- Patients will be followed up in clinic again at 3 months
- Consider advising patients to review – BMJ Load vs Capacity and Injury - https://youtu.be/H1rp_v4Dr3g

Phase 4 (6 months +)

Aims/Goals: Return to unrestricted activity
Avoid: Any activity beyond patient capacity and advice on graduated building back to activity.

Exercise:	Dose:
Active Assisted to Active Range of Movement • Forward flexion • Flexion in scapular plane as tolerated • External rotation – neutral to EOR as tolerated • Internal rotation as tolerated • Prone Rowing AROM exercise • Gentle end of range stretching as tolerated	
Strengthening: Start supine then progress to antigravity • General UL conditioning • Progress RC strengthening as above • Initiate push up plus progression • Light sport / recreation activities Proprioception • Light open chain proprioceptive • Rhythmic stabilisation exercises.	

Treatment Note:
• Aim for function specific rehabilitation considering manipulating training principled for power and endurance. Loaded cuff strengthening and kinetic chain rehabilitation if appropriate.

- Patients are followed up in clinic at 1 year post op.

Appendix: Procedure Summary

'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 those with high level of activities. In these patients without advanced glenohumeral arthritis, various tendon transfers have the potential to restore the patients' function and relieve their pain, such as the latissimus dorsi, teres major, or lower trapezius tendon transfers (LTTT). When considering the different transfer options, a recent biomechanical study showed that the lower trapezius has better moment arm of external rotation compared with latissimus dorsi and teres major transfer[2]. The lower trapezius is harvested from the ipsilateral side and augmented with an Achilles tendon allograft'[3]. However moving forwards the LTTT may be augmented with semitendinosis or LARS ligament (please see operation notes for clarification). The graft is then anchored to greater tuberosity arthroscopically.

Expected Outcome

At 24 months[4]

Mean AROM	• Flexion improved from 150 – 160 degrees, • External rotation with arm by side from -20 to 24 degrees. • External rotation with arm at 90 degrees abduction improved from -10 to 40 degrees.
Mean VAS	Improved from 7 - 2
Mean Shoulder Subjective Value (SSV)	Improved from 40% - 70%.
Clinical Assessment	Negative Lag and Drop sign expected

Reference List

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2. Hartzler, R.U., Barlow, J.D., An, K.N. & Elhassan, B.T. (2012). Biomechanical effectiveness of different types of tendon transfers to the shoulder for external rotation. *J Shoulder Elbow Surg*, *21*, 1370-1376. Doi:10.1016/j.jse.2012.01.026.
3. Elhassan, B.T, Alentorn-Geli, E., Assenmacher, A.T. & Wagner, E.R. (2016). Arthroscopic-Assisted Lower Trapezius Tendon Transfer for Massive Irreparable Posterior-Superior Rotator Cuff Tears: Surgical Technique. *Arthrocopic Techniques, 5*(5), 981-988. Doi:10.1016/j.eats.2016.04.025.
4. Valenti, P. & Werthel, J-D. (2018). Lower trapezius transfer with semitendinosus tendon augmentation: Indications, technique, results. *Obere Extremitat, 4*, 261-268. Doi: 10.1007/s11678-018-0495-8.