Rehabilitation Protocol for Anterior Latissimus Dorsi Transfer

The intent of this protocol is to guide clinicians and patients through the rehabilitation course for anterior latissimus dorsi tendon transfer. This protocol is time based (dependent on tissue healing) as well as criterion based. Specific intervention should be decided based on the individual needs of the patient, their clinical exam and post-operative progress. The timeframes for expected outcomes contained within this guideline may vary based on surgeon's preference, additional procedures performed, and/or complications. If a clinician requires assistance in the progression of a post-operative patient, they should consult with the surgical team.

The interventions included within this protocol are not intended to be an inclusive list of exercises. Therapeutic interventions should be included and modified based on the progress of the patient and under the discretion of the clinician.

Why an Anterior Latissimus Dorsi Tendon Transfer?

When rotator cuff muscles are torn, an arthroscopic repair is almost always possible if the rotator cuff is reparable. Reparable means that the quality of muscle is still preserved, and the tendon quality and length are good for the repair. However, when the rotator cuff tendon is degenerated and shortened, the healthy muscle tissue is replaced with fat and it cannot be effectively repaired.

As an alternative to repair in these cases, tendon transfers were developed to restore function of the shoulder. The anterior latissimus dorsi transfer was developed specifically to reconstruct an irreparable subscapularis tear, and to avoid the need for a reverse shoulder arthroplasty in a younger and/or more active population.

Indications for an anterior latissimus dorsi procedure include pain and limitation in shoulder function that interferes with daily activities, a known irreparable subscapularis tear, and normal function of the latissimus dorsi muscle.

Advantages to using the latissimus dorsi over alternative muscles include a line of pull that mimics the subscapularis, the ability to retrain the muscle in its synergistic native function of shoulder internal rotation, and technique flexibility between open and arthroscopically assisted transfer.

In the procedure, the latissimus dorsi tendon is separated from the teres major muscle and released from its insertion on the humerus. The tendon is then passed under the pectoralis major to the anterior aspect of the shoulder and attached to the lesser tuberosity. In cases of a combined irreparable subscapularis and supraspinatus tear, the tendon is attached to the anterior aspect of the greater tuberosity.

Considerations for the Post-Operative Anterior Latissimus Dorsi Transfer Rehabilitation Program

Respect the procedure. It is critical to the success of this surgery that the transferred tendon heal with the appropriate tension. Follow all range of motion, loading, and sling wearing instructions very carefully.

The latissimus dorsi has a new role. The latissimus dorsi has a new job of functioning like the rotator cuff to elevate and internally rotate the shoulder. It takes time to learn new movement patterns and activate transferred muscles correctly. Be patient and follow the protocol closely.

No External Rotation. Moving into external rotation can overstretch the transferred tendon and affect the appropriate tension needed to maximize functional outcomes. Wear the sling as indicated, avoid external rotation beyond neutral (0 degrees) as well as reaching behind the back until cleared by surgeon. Physical therapists should not stretch the surgical arm into external rotation for the first 16 weeks post-operatively, unless otherwise advised by surgeon.

Post-operative Complications

If you develop a fever, unresolving numbness/tingling, excessive drainage from the incision, uncontrolled pain or any other symptoms you have concerns about you should contact the surgical team.

PHASE I: MAXIMAL PROTECTION (0-8 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Maximize protection of the transfer and facilitate healing • Follow sling instructions closely. The arm must remain immobilized in internal rotation to allow the transfer to heal at the appropriate tension • Patient education
Sling	• Remain fully immobilized in the sling at all times for the full 8 weeks
Precautions	• If removing sling for showering, keep arm in position of sling with non-surgical arm supporting forearm • No shoulder motion permitted • No weight bearing through surgical arm • No pushing and pulling
Interventions	• No formal physical therapy in this phase • Patient is allowed to move the elbow, wrist, and hand while in the sling, but absolutely no shoulder motion is permitted • Ice for pain and inflammation management
Criteria to Progress	• Appropriate healing time for tendon transfer (not before 8 weeks, unless otherwise indicated by surgical team) • No complications with Phase I

PHASE II: ACTIVE ASSISTED/ACTIVE RANGE OF MOTION (8-16 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Retrain transferred tendon functionally • Minimize post-operative stiffness while simultaneously protecting the tendon transfer • Begin to use arm within ranges of comfort for light ADLs – with the exception of motion into external rotation beyond neutral (0 degrees), as well as reaching hand behind the back • Reduce inflammation, minimize pain • Patient education emphasizing compliance of the post-operative protocol, specifically avoiding stretching and loading the tendon
Sling	• Sling can be gradually removed with physician's clearance
Precautions	• Once the sling is removed, active motion of the shoulder is allowed within ranges of comfort; avoiding stretching of the tendon • No stretching at this time. Patient is cleared to use arm functionally to improve range of motion • Absolutely no external rotation. This can disrupt the correct tension of the transfer causing the procedure to fail

	• No weight bearing through surgical arm • No pushing or pulling
Interventions	*Range of motion/Mobility* • PROM: Begin PROM exercises with an external rotation limit to neutral (0 degrees) • AAROM: Begin A/AAROM exercises to promote functional use of the surgical arm Supine Flexion AAROM (using contralateral UE), Supine Dowel ER (to 0 degrees), Supine AROM Flexion (initially to 90 degrees progressing to overhead ranges), Railing Slides, Standing Cane-Assisted Flexion, Towel Wall Slides *Strengthening* • Do not strengthen or load the operated arm • Core and hip strengthening is permitted, preventing any pushing or stress through the surgical arm Supine Core Alternating March *Conditioning* • Treadmill walking and stationary bike for cardiovascular health *Pool Therapy* • If available, active assisted range of motion is permitted in the pool within ranges of comfort. Feet must remain on the pool floor. Swimming is not permitted. Do not push or pull surgical arm or create resistance in the water
Criteria to Progress	• Appropriate healing time for tendon transfer (not before 16 weeks unless otherwise indicated by surgical team) • Minimal pain with AROM, appropriate recruitment of transferred tendon • No complications with Phase II

PHASE III: INITIAL STRENGTHENING (16-24 WEEKS AFTER SURGERY)

Rehabilitation Goals	• Continue to retrain transferred tendon functionally • Continue to use arm within ranges of comfort for ADLs • Improve scapular muscle activation • Patient education emphasizing compliance of post-operative protocol, specifically over-stretching and over-loading the tendon
Sling	• Discontinue
Precautions	• Gradual progression of lifting activities • No supporting of body weight by hands and arms • No aggressive stretching in all planes • External rotation beyond 0 degrees is allowed once cleared by surgeon • No loading of the shoulder in extension
Interventions	*Range of motion/Mobility* • PROM: Continue PROM. Avoid aggressive stretching of the shoulder into external rotation • A/AAROM: Continue with exercises to promote functional use of the surgical arm *Strengthening* • Initiation of gentle strengthening with low level resistance bands Supine: Supine Resisted Band ER (unilateral; isometric progressing to isotonic), Supine Bilateral Resisted Band ER (isotonic), Supine Press-Up (towel roll progressing to band; to 90 degrees progressing to overhead ranges), Supine Resisted Horizontal Abduction (isometric; at 90 degrees progressing to overhead ranges) Standing: Standing Resisted Band ER with elevation, D2 Extension with Resistance Band, Standing Row • Core and hip strengthening, while continuing to protect the surgical arm

	• Postural training and education *Conditioning* • Walking, jogging and stationary bike for cardiovascular health *Pool Therapy* • If available, range of motion is permitted in the pool within ranges of comfort. Swimming is still not permitted until Phase IV, feet must remain on the pool floor
Criteria to Progress	• Good mechanics with active motion • No compensation when performing light resistance exercises • Ability to perform light, non-repetitive activities of daily living or work tasks without pain or difficulty

PHASE IV: ADVANCED STRENGTHENING (24+ WEEKS AFTER SURGERY)

Rehabilitation Goals	• Maintain pain-free ROM • Progress strength, endurance and motor control exercises • Enhance functional use of upper extremity • Gradual return to strenuous work/sport activity
Precautions	• No forceful or heavy lifting • Avoid falling • Avoid activities that are painful • No range of motion restrictions at this time
Interventions **Continue with Phase II-VI interventions*	*Strengthening* • Progressive strengthening, progressing to weights. Focus on low weights, high reps; proximal motor control and muscle endurance T and Y, Bicep Curl, Tricep Extension, Wall Push-Up • Proprioceptive training, including initiation of closed chain activities Quadruped alternating isometrics, ball stabilization on wall, PNF - D1 diagonal lifts, PNF – D2 diagonal lifts • Progress core and hip strengthening *Conditioning* • Walking, jogging and stationary bike for cardiovascular health *Pool Therapy* • Continue with pool exercises progressing toward swimming
Criteria to Progress	• Last stage-no additional criteria
Return-to-Sport	• For the recreational or competitive athlete, return-to-sport decision making should be individualized and based upon factors including level of demand on the upper extremity, contact vs non-contact sport, frequency of participation, etc. We encourage close discussion with the referring surgeon prior to advancing to a return-to-sport rehabilitation program

References:

1. Elhassan BT, Wagner ER, Kany J. Latissimus dorsi transfer for irreparable subscapularis tear. *J Shoulder Elbow Surg*. 2020;29(10):2128-2134. doi:10.1016/j.jse.2020.02.019