Lower Trapezius Tendon Transfer Improves Range of Motion, Function, and Restores External Rotation in Patients with a Massive, Irreparable, Posterosuperior Rotator Cuff Tear

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INTRODUCTION: Massive, irreparable rotator cuff tears can cause severe pain and weakness. In younger, more active patients, joint salvage interventions are the preferred treatment. Over the last decade, lower trapezius tendon transfer (LTTT) has increasingly been used to reduce pain and improve function in patients with massive posterosuperior rotator cuff tears. Few studies have reported outcomes following LTTT or examined risk factors for failure and poor patient-reported outcomes. The objective of this study was to report on failure rate, patient-reported outcomes, and possible risk factors up to two-years postoperative in those undergoing LTTT in the management of massive, irreparable, posterosuperior rotator cuff tears.

METHODS: This is a prospective longitudinal observational study conducted between 2018 and 2023. All patients undergoing arthroscopic assisted LTTT by two fellowship trained upper extremity surgeons from two sites were screened. Inclusion criteria were patients with massive (2+ tendons), irreparable rotator cuff tears in the primary or revision setting. Irreparable was defined as two or more of the following: grade 3 or higher fatty infiltration, patte grade 3, tendon length < 15mm, previous rotator cuff repair surgery. Exclusion criteria were prisoners, military, non-English speakers, patients <18 years of age. Consented patients completed a demographic form, and the Single Assessment Numeric Score (SANE), 4-point satisfaction scale (poor, fair, good, excellent), and ASES score at baseline, and 12- and 24-months postoperative. A clinical assessment was conducted at all timepoints including range of motion, and lag sign. Surgical failure was defined as reoperation, LTTT failure, SANE score of <50%, or forward flexion of less than 90°. Descriptive statistics were generated for all measures. Independent t-tests were performed between timepoints for patient-reported outcomes. Exploratory logistic regression was conducted to evaluate risks of failure with age, sex, workers' compensation board (WCB), primary or revision surgery, subscapularis status, and subscapularis repair as possible predictors. Linear regression was conducted to evaluate possible predictors of 12-month postoperative SANE scores including WCB status, and revision or primary surgery.

RESULTS: Seventy-four patients were recruited and have completed 12-months of follow up. Fifty-one of those have reached 24-months. Twenty-six had previous rotator cuff procedures before undergoing LTTT. The mean (SD) age was 58.3 (7.8) years with 17 (23%) females and 57 (77%) males. Seven were WCB clients, 10 were smokers. Five patients had a complete full tear of subscapularis and 19 had a tear of the upper 50% or less. Ten (14%) LTTT surgeries were considered failures by 24-months postoperative, of which five had a subscapularis repair during their LTTT procedure, and five had a normal subscapularis. Table 1 presents patient-reported outcomes and active range of motion (AROM) scores pre- and postoperatively. Lag sign was positive in 42 of 74 patients preoperative, with 32 corrected with surgery, four remaining positive, and six that did not attend in-person postoperative follow up. The four patients with persistent lags were identified as failures. A complete full thickness subscapularis tear was predictive of failure (p=0.009) despite full repair. WCB status was predictive of 12-month SANE scores (p=0.006), specifically patients with a WCB claim were associated with poorer outcomes. Other variables were not predictive.

DISCUSSION AND CONCLUSION: At up to two-years post-LTTT surgery, the majority of patients experienced improved range of motion, functional outcomes, and restoration of external rotation. However, those with a complete full thickness subscapularis tear may be at greater risk of failure despite undergoing repair, and WCB patients may have lower SANE scores at 12-months postoperative.

Table 1. Mean (SD) for all patient reported outcomes and range of motion at pre-, 12-, and 24-months post-operative.

Outcome		Pre (n=66)	12-mos (n=64)	24-mos (n=34)
SANE		33.6 (17.0)	77.3 (18.5)*	77.3 (19.5)*
ASES		38.2 (18.7)	72.6 (20.6)*	79.4 (18.3)*
Satisfaction	Poor (%)	88	8	3
	Fair (%)	9	6	3
	Good (%)	3	20	15
	Excellent (%)	0	66	79
Forward flexion AROM (°)		113.9 (38.4)	154.7 (22.2)	159.3 (24.5)
External rotation AROM (°)	Performed at 90° abduction	33.0 (32.2)	58.8 (20.1)	62.6 (15.6)

*=significant improvement from pre-operative.