Which is Better for Recovering Internal Rotation Strength?: Comparing Anterior Latissimus Dorsi and Teres Major Tendon Transfer and Lateralized Reverse Shoulder Arthroplasty in Irreparable Anterosuperior Rotator Cuff Tears with Loss of Active Internal Rotation

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INTRODUCTION:

Irreparable anterosuperior rotator cuff tears (IASRCTs) remain a challenging problem, especially in non-arthritic and active high-demand patients with loss of internal rotation (IR). Although reverse shoulder arthroplasty (RAS) shows good clinical outcomes and reliable restoration of range of motion (ROM), the restoration of IR has been limited, and IR related to toileting activity has a considerable influence on satisfactory clinical outcomes. Recently, combined anterior latissimus dorsi and teres major (aLDTM) tendon transfer has gained attention as a potential treatment for IASRCTs. Although RSA and combined aLDTM tendon transfer could be selected for active high-demand patients with IASRCTs, there is no clinical comparative study between RAS and combined aLDTM tendon transfer in IASRCTs. The purpose of this study was to compare the clinical outcomes and recovery of IR strength between lateralized RSA and combined aLDTM tendon transfer in active high-demand patients with IASRCTs.

METHODS:

We retrospectively performed a clinical comparative study of patients who underwent RSA or combined aLDTM tendon transfer for IASRCTs between January 2017 and December 2020. The indications for RSA or combined aLDTM tendon transfer for IASRCTs were as follows (Fig 1). Using propensity score matching based on demographic variables, 29 patients in each group were included (RSA and aLDTM groups) with a minimum 2-year follow-up (Fig 1). After Propensity score matching, there was no significant difference in age, sex, dominant hand and FI grade between two groups. In the surgical procedure, The pectoralis major tendon was elevated and spared, while the LDTM tendons were simultaneously detached and re-attached to 2 cm distal to the greater tuberosity and lateral to the bicipital groove (Fig 2). Clinical outcomes were compared using visual analogue scale (VAS) score, Constant shoulder score, American Shoulder and Elbow Surgeons (ASES) score, University of California Los Angeles (UCLA) shoulder score, activities of daily living requiring active IR (ADLIR) and active range of motion (aROM). Subscapularis (SSC)-specific examinations, rotational strength, and ability to perform toileting activity were compared between the two groups. The acromiohumeral distance (AHD) and Hamada classification were assessed in the true AP view with the patient standing.

RESULTS: While significant improvements in clinical outcomes were observed in both groups, in aLDTM group, VAS (2.4 \pm 1.3 vs. 1.4 \pm 0.7, *p* <.002), Constant score (58.4 \pm 10.5 vs. 69.1 \pm 8.2, *p* <.001), ASES score (64.5 \pm 12.3 vs. 78.5 \pm 10.9, *p* <.001), ADLIR (20.4 \pm 6.3 vs. 26.9 \pm 6.2, *p* <.011), forward flexion (134.1 \pm 35.7 vs. 162.4 \pm 15.5, *p* < .001), IR at back (4.6 \pm 1.1 vs. 6.9 \pm 2.2, *p* < .001) and IR at 90° of abduction (34.7 \pm 1.18 vs. 47.2 \pm 14.3, *p* <.036) were significantly better compared to RSA group (Table 1). The SSC-specific physical examination (*p* <.001), IR strength (*p* < .001) and ability to perform toileting activity (*p* < .001) were significantly better in aLDTM group than RSA group (Table II). In combined aLDTM tendon transfer, no significant progression of AHD change (preoperatively 8.3 \pm 1.3 to postoperatively 8.5 \pm 1.8, *p* = 0.367) and no significant progression of cuff tear arthropathy (Hamada grade: preoperatively 1.4 \pm 0.5 to postoperatively 1.5 \pm 0.6, *p* = 0.458) were noted.

DISCUSSION AND CONCLUSION:

Discussion

This study is the first clinical comparative analysis of combined aLDTM tendon transfer with RSA for IASRCTs with loss of IR. RSA is an effective option for IASRCTs, but restoring IR aROM remains challenging, affecting daily activities like toileting. aLDTM transfer has recently emerged as a reliable surgical alternative for IASRCTs, which rebalances shoulder stability, providing improved IR aROM due to its biomechanical advantages. This study showed that combined aLDTM tendon transfer had similar clinical outcomes to RSA. Notably, the aLDTM group showed superior results in ADLIR scores, IR aROM, and IR strength. Additionally, only 30% of patients in the aLDTM group experienced difficulties with toileting activities compared to 80% in the RSA group. Limitations include retrospective design, small sample size, and short-term follow-up.

Conclusion

Although both lateralized RSA and aLDTM improved overall patient outcomes postoperatively, combined aLDTM transfer was superior in terms of ADLIR score, IR aROM, IR strength, and toileting activity in patients with IASRCTs and loss of IR, without significant progression of cuff tear arthoparhy. This study suggests that combined aLDTM tendon transfer could be a first-line joint-preserving treatment option for non-arthritic and active high-demand patients with IASRCTs and loss of active IR, given longevity and related complications of arthroplasty.



Figure 1. Flowchart of patient inclusion. RSA, reverse shoulder arthroplasty; aLDTM, autorior latitisimus dorsi and teres major; IASRCT, irreparable anterospecies rotator cult tears; SSC, subscapularis; SSP, superspinatus; MRI, magartic resonance image



Perr 2. (a) Notice minute any ploced on the combined harvested initiations detail (LD) and trees may CTM) tendom (metrink). After complete disorders and release from the memorizing concentrations of combined instances, in positione to be manifered. (B) Transfer discontinues 1D and Thumkson (metrick) with an advanced restrictment distulty to the larger dark of the genere toleranity and latentity to the hieroge grower. IT, lease understandy, GT, gramer tuberosity.

	RSA Group	aLDTM Group	р
VAS score			
Preoperative	4.8 ± 1.2	4.4 ± 1.3	0.13
Postoperative	2.4 ± 1.3	1.4 ± 0.7	0.00
P			
Constant score			
Postoperative	44.9 ± 7.9	43.3 ± 5.6	0.64
Postoperative P	58.4 ± 10.5	69.1 ± 8.2	<0.00
ASES score			
Preoperative	52.1 ± 8.3	49.2 ± 8.6	0.54
Preoperative	64.5 ± 12.3	78.5 ± 10.9	< 0.00
P			
ADLIR			
Preoperative	14.9 ± 3.7	15.6 ± 3.2	0.13
Preoperative	20.4 ± 6.3	26.9 ± 6.2	0.01
· P			
Active FF, "			
Preoperative	109.3 ± 30.8	107.6 ± 21.5	0.90
Postoperative	134.1 ± 35.7	162.4 ± 15.5	<0.00
P			
ER at 0° of abduction, "			
Preoperative	39.5 ± 11.1	42.8 ± 7.9	0.13
Postoperative P	44.9 ± 12.4	49.7 ± 13.6	0.28
ER at 90° of abduction.			
Preoperative	55.3 ± 15.1	55.8 ± 8.7	0.88
Postoperative	60.2 ± 13.1	63.8 ± 13.6	0.36
, p			
IR at back			
Preoperative	3.3 ± 1.5	3.4 ± 2.1	0.67
Postoperative	4.6 ± 1.1	6.9 ± 2.2	<0.0
P			
IR at 90° of abduction, "			
Preoperative	30.7 ± 10.8	33.1 ± 13.3	0.21
Postoperative	34.7 ± 11.8	47.2 ± 14.3	0.03

Outcomes	RSA Group	Group M	p
Ability to perform toileting			-0.001
activity , %			-0.001
- Easily	4 (13.8)	22 (75.9)	
 With difficulty 	18 (62.1)	7 (24.1)	
- Unable	7 (24.1)	0(0.0)	
SSC specific test, %			
- Positive belly press	9 (31.0)	3 (10.3)	< 0.001
- Positive bear hug	10 (34.4)	4 (13.8)	-0.001
- Positive lift off	9 (31.0)	4 (13.8)	< 0.001
Strength, N			
- IR at side	13.6 ± 9.5	26.1 ± 10.3	< 0.001
- ER at side	15.2 ± 6.1	19.1 ± 5.8	-0.001
Significant p-value is < 0.05; R	5A, reverse shoulder	arthroplasty: aLDTM	Lanterior latis