Instability after reverse shoulder arthroplasty with tendon transfer for CLEER: a case series

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INTRODUCTION:

Reverse shoulder arthroplasty with tendon transfer (RSA-TT) was introduced by Boileau for patients with rotator cuff arthropathy and combined loss of active elevation and external rotation (CLEER).[1] The transfer of the latissimus dorsi with or without teres major or the lower trapezius at the time of RSA has been shown to increase external rotation compared to RSA alone.[2] While postoperative instability has been reported following RSA-TT, it has been thought to be an uncommon complication occurring in approximately 5% of cases.[2] We present a novel case series of RSA-TT and post-operative instability.

METHODS:

A multicenter retrospective review was performed to identify patients who underwent RSA-TT between 2008 and 2021. Cases were performed by one of five shoulder and elbow fellowship-trained surgeons. Patients with rotator cuff arthropathy and CLEER undergoing RSA-TT and age greater than 18 years old were included in the present study. Revision arthroplasty cases were excluded. Implants and tendon transfer technique were selected by the treating surgeon. Patient demographics, surgical data, and postoperative metrics were collected including post-operative instability events and final range of motion. Continuous variables were calculated and expressed as the mean and standard deviation and compared using the Student t-test. Frequencies and proportions were calculated for categorical variables and were compared using the Chi-Squared test.

RESULTS:

Thirty-one patients underwent RSA-TT during the study period. Twenty-eight patients had sufficient follow-up for analysis in the present study. 7 patients (25%) had a post operative dislocation event (table 1). Patients with instability were all male with average age of 70±6 years with BMI 29±4 kg/m^2. Average available follow up was 16 months (range, 6-48 months). The latissimus dorsi was transferred in all 7 patients with the teres major additionally transferred in 2 patients. There were no lower trapezius transfers. Subscapularis was repaired in 4 patients, irreparable in 1 patient, and voluntarily not repaired in 2 patients. All dislocation events were anterior and spontaneous without inciting traumatic event. The average time to dislocation was 47 days (range, 10-176). 3 patients dislocated within 2 weeks of surgery. 3 patients dislocated 1-2 months post-operatively. One patient dislocated nearly six months following surgery. At time of revision surgery, tendon transfer was intact in all patients. Two patients required multiple revision procedures to attain definitive stability, including one conversion to hemiarthroplasty. The tendon transfers were taken down in 3 patients. At final follow up, all patients remained stable. There were no documented nerve palsies. Final range of motion for patients with and without instability did not significantly differ (table 2). Of those with instability, five patients (71%) were able to touch the back of their head at final follow up which was not significantly different than patients who remained stable (87%) ($p=0.31$). Of the two patients who could not touch the back of their head, one had intact transfer and one did not.

DISCUSSION AND CONCLUSION:

The series suggests that postoperative instability following RSA-TT is more common than previously reported. Despite instability requiring surgical revision, final active range of motion did not significantly differ between those with stable and unstable RSA-TT patients. While RSA-TT may improve external rotation, this surgery does carry a significant risk of instability. This may be influenced by RSA biomechanics since lateralized designs, including those in this series, can produce substantially more external rotation torque compared to medialized Grammont style configurations.[3] In those that suffered an instability event, dislocation occurred within 2 months of surgery in 86% of cases. It is important to be aware of this elevated risk of instability following this procedure and to tailor rehabilitation protocols accordingly.

References

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Table 2. Final average range of motion in degrees for RSA-TT patients who experienced instability and those who did not.

	Unstable	Stable	P Value
Forward Elevation (SD)	124 (33)	110 (36)	0.39
Abduction (SD)	87 (34)	82 (24)	0.68
External Rotation At Side (SD)	32 (14)	29 (21)	0.67

SD: standard deviation

Figures/Tables

Table 1. RSA-TT patients with postoperative instability.

Patient	Initial Implants	Tendon Transfer, Site of Attachment	Time to Dislocation (days)	# Revision Procedures	Final Implants	Final TT Status	Able to touch back of head at final follow up?
1	DJO Altivate 32N glenosphere 32N semiconstrained poly	LD-Tm, lateral to bicipital groove	10	1	DJO Altivate 44, +8 glenosphere 44N poly	Intact	Yes
2	DJO RSP 32, -4 glenosphere 32N poly	LD-Tm, greater tuberosity	13	3	DJO Altivate Hemiarthroplasty56 x 22mm humeral head	Taken down	No
3	DJO Altivate 32N glenosphere 32N poly	LD-Tm, lateral to bicipital groove	14	1	DJO Altivate 44, +8 glenosphere 44N semi-constrained poly	Intact	Yes
4	Arthrex MGS 20deg augmented baseplate, no lateralization 39, +4 glenosphere 39, 3mm poly	LD alone, lateral to bicipital groove	28	2	Arthrex MGS 20deg augmented baseplate 39, +4 glenosphere 39, 3mm poly 12mm spacer Pec transfer to anterior cup	Taken down	Yes
5	DJO Altivate 36N glenosphere 36, +4 poly	LD-Tm, lateral to bicipital groove	40	1	DJO Altivate 36N glenosphere 36, +4 semi-constrained poly 8mm spacer	Intact	No
6	Arthrex MGS 28, +4 baseplate 39, +4 glenosphere 39, 3mm poly, 2mm posterior offset	LD alone, lateral to bicipital	54	1	Arthrex MGS 42 glenosphere 42, 6mm poly	Taken down	Yes
7	DJO Altivate 32N glenosphere 32N poly	LD-Tm, lateral to bicipital groove	176	1	DJO Altivate 40N glenosphere 40, +4 poly	Intact	Yes