TITLE

Open Capsular Shift with Achilles Allograft Augmentation for Multidirectional Shoulder Instability: Long-Term Outcomes and Implications for Patients with Ehlers-Danlos Syndrome

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ABSTRACT

Introduction: Multidirectional shoulder instability (MDI) is associated with pain and recurrent subluxations and often requires surgical intervention. While open or arthroscopic capsular shift is the standard treatment, allograft tissue augmentation is uncommonly required for patients with recurrent instability and deficient capsular tissue. In particular, patients with connective tissue disorders such as Ehlers-Danlos Syndrome (EDS), a tissue disorder associated with generalized ligamentous laxity, may require allograft tissue for capsular augmentation. The purpose of this study was to report the outcomes of open capsular shift with Achilles allograft augmentation in patients with MDI, focusing on improvements in long-term shoulder stability, symptoms, and function.

Materials & Methods: Study approval was obtained by our institutional IRB. Nine patients (10 shoulders, mean age 32 years, 6 females) were identified retrospectively and contacted prospectively by telephone to analyze surgical outcomes following open capsular shift with Achilles tendon allograft augmentation for MDI by the senior author. The inclusion criteria were patients with MDI resulting from EDS (6 patients, 7 shoulders) or MDI with no underlying connective tissue disorder (3 patients, 3 shoulders). Patients with instability resulting from traumatic injuries were excluded from this study. Patients were contacted by telephone to determine outcomes based on five standard patient reported outcome measures and scores: American Shoulder and Elbow Surgeons (ASES), Western Ontario Shoulder Instability Index (WOSI), Pain Catastrophizing Scale (PCS), Tampa Scale of Kinesiophobia (TSK), and Subjective Shoulder Value (SSV). Recurrent instability, patient satisfaction, pain, and subsequent surgical intervention were also assessed.

Results: The mean follow-up time was 10 years. There were no recurrent subluxations or dislocations post-surgery for any of the 10 shoulders, and the mean subjective pain rating was 1.9 (range 0-5). Eight out of the 9 patients were able to return to sports/work and activities of daily living. The mean ASES score was 73 (range 43-100), the mean WOSI score was 30% (range 0.5-61.9%), the mean SSV score was 79.5% (range 50-100%), the mean PCS score was 2.7 (range 0-11), and the mean TSK score was 32 (range 20-41). Out of the 10 shoulders, two shoulders underwent subsequent shoulder replacement surgery. One patient underwent total shoulder arthroplasty 14 years after his surgery with the senior author. Another patient underwent two subsequent surgeries on the affected shoulder: a biceps tenodesis 6 years after his surgery and a total shoulder arthroplasty 2 years later.

Discussion: Open capsular shift with Achilles tendon allograft augmentation for MDI provided improvement in long-term shoulder stability and functionality, reduced pain, and minimized recurrent subluxation events. This is supported by the high mean ASES score, low mean WOSI score, low mean PCS score, and low mean TSK score at a mean follow-up time of 10 years. Although our patient cohort (9 patients, 10 shoulders) was large relative to the current literature, more data is needed to confirm the efficacy of this procedure.

Table 1. Demographic Data for Participating Patients							
Patient	**Sex**	**Age* (yr)**	**EDS or No connective tissue disorder (n/a)**	**Side**	**Dominant Hand**	**Prior Surgeries**	**Follow-up time (yr)**
1	M	22	n/a	L	R	3	17.6
2	M	32	n/a	R	R	3	9
3	F	23	n/a	L	R	1	1.6
4	M	55	EDS	L	R	1	7.5
5	F	36	EDS	L	R	0	7.8
6	F	31	EDS	L	R	0	3.2
7	F	26	EDS	R	R	3	2.4
8	F	22	EDS	L	R	0	13.7
9 - right	F	35	EDS	R	L	1	18.8
9 - left	F	34	EDS	L	L	4	20.3
mean years ± sd		**32 ± 10**					**10 ± 7**

*age at time of surgery

Table 2. Outcomes for Participating Patients										
Patient	**Pain Scale (0-10)**	**Recurrent subluxations or dislocations**	**Subsequent surgeries**	**Subjective stiffness**	**Able to return to sports/work**	**Shoulder functionality**	**ASES Score**	**WOSI Score**	**PCS Score**	**TSK Score**
1*	1	No	1	yes	yes	95%	93	11.70%	0	31
2*	3	No	2	yes	no	65%	50	61.90%	4	37
3*	0	No	0	yes	yes	80%	85	11%	0	28
4	2	No	0	no	yes	70%	67	50.70%	8	41
5	3	No	0	yes	yes	85%	52	46.70%	4	33
6	2	No	0	yes	yes	70%	68	34.30%	0	34
7	5	No	0	yes	yes	50%	43	61.90%	11	39
8	0	No	0	yes	yes	100%	95	6.20%	0	35
9 - right	3	No	0	yes	yes	80%	77	15.70%	0	20
9 - left	0	No	0	yes	yes	100%	100	0.50%	0	20
mean ± sd	**1.9 ± 1.7**					**79.5% ± 16**	**73 ± 20**	**30% ± 24**	**2.7 ± 4**	**32 ± 7**
No, n (%)		**10 (100%)**	**8 (80%)**	**1 (10%)**	**1 (11%)**					
Yes, n (%)		**0 (0%)**	**2 (20%)**	**9 (90%)**	**8 (89%)**					

*Patients with no connective tissue disorder