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A Comparative Study on Arthroscopic Superior Capsule Reconstruction Using Fascia Lata Autograft with and without Biceps Tendon Augmentation: Two-Year Patient-Reported Outcomes and Radiographic Analysis

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Faculty Disclosure Information

- No conflicts of interest to disclose

Background

- Arthroscopic SCR has demonstrated effectiveness in addressing irreparable RCTs
- Different graft options can be utilized to re-establish a stable shoulder fulcrum and AHD
- The aim of our study was to compare PROMs based on CSOs, and radiographic findings after FL SCR with or without LHBT incorporation

SCR: superior capsular reconstruction, RCT: rotator cuff tear, AHD: acromiohumeral distance, PROMs: patient-reported outcome measures, CSOs: clinically significant outcomes, FL: fascia lata, LHBT: long head of the biceps tendon

Materials and Methods

- Retrospective analysis of 43 patients receiving arthroscopic SCR between 2016 and 2020
- LHBT augmentation group (n = 27) and no-augmentation group (n = 16)
- PROMs assessment: VAS, ASES, SANE, and Constant score
- Radiographic data: AHD, Hamada classification, muscular fatty infiltration grading, graft integrity and tear pattern
- Analysis for MCID, SCB, PASS, and MOI values were applied at a minimum of 2 years postoperatively

VAS: visual analog scale, ASES: American Shoulder and Elbow Surgeons, SANE: Single Assessment Numeric Evaluation, MCID: minimal clinically importance difference, SCB: substantial clinical benefit, PASS: patient acceptable symptom state, MOI: maximal outcome improvement

Materials and Methods

- Autologous ipsilateral FL graft folded into a patch of 3x5 cm ^{2} with 6-8 mm thickness
- For normal LHBT or minor tears within 50% of the diameter
  ➔ LHBT augmented on the FL graft with Ethibond suture
- For severely damaged LHBT
  ➔ suprapectoral tenodesis with 2.3 mm Iconix suture anchor before graft passage

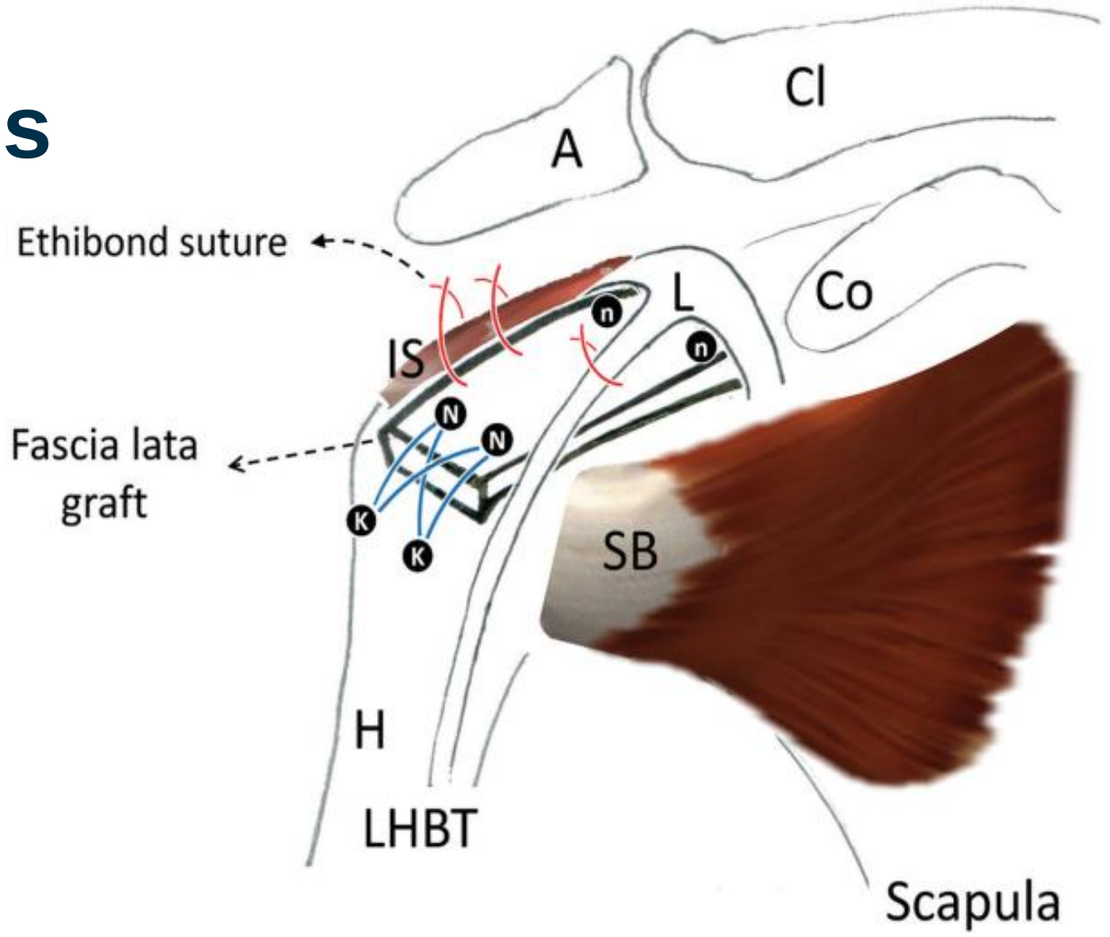

Figure 1. Diagram of superior capsular reconstruction using fascia lata graft and biceps tendon augmentation in the right shoulder with an irreparable rotator cuff tear. A, acromion; Cl, clavicle; Co, coracoid process; L, superior glenoid labrum; IS, infraspinatus; SB, subscapularis; LHBT, long head of the biceps tendon; H, humerus; n, 1.4-mm Iconix suture anchor; N, 2.3-mm Iconix suture anchor; K, Reelx knotless anchor (with permission of the journal and authors[8]).

Results

Baseline data:
no significant differences

Satisfied vs unsatisfied groups:
all significantly different

TABLE 2
Comparison of Baseline Data[a]

	LHBT Augmentation Group (n = 27)	No–LHBT Augmentation Group (n = 16)	*P*
Age, y	67.0 ± 6.7	66.6 ± 7.5	.418
Sex, n			.366
Male	12	8	
Female	15	8	
BMI, kg/m^2	25.6 ± 3.7	26.5 ± 3.9	.431
Dominant side	21 (78)	12 (75)	.421
Pseudoparalysis	9 (33)	5 (31)	.395
AHD, mm	4.1 ± 2.8	3.9 ± 2.6	.415
Range of motion			
Forward flexion, deg	130.7 ± 42.9	126.9 ± 56.9	.408
External rotation, deg	40.0 ± 18.9	38.8 ± 21.9	.429
Internal rotation[b]	2.3 ± 0.7	2.5 ± 1.0	.209
Hamada classification			.463
Stage 1	7 (26)	4 (25)	
Stage 2	14 (52)	8 (50)	
Stage 3	4 (15)	3 (19)	
Stage 4	2 (7)	1 (6)	
GFDI	1.9 ± 0.6	1.9 ± 0.5	.484
Subscapularis repair	9 (33)	5 (31)	.360
Surgical time, min	223.1 ± 30.5	218.7 ± 21.1	.417

[a]Data are presented as the mean ± SD or n (%) unless otherwise indicated. AHD, acromiohumeral distance; BMI, body mass index; GFDI, global fatty degeneration index; LHBT, long head of the biceps tendon.
[b]Internal rotation is presented as the mean ± SD based on a 5-point scale.[10]

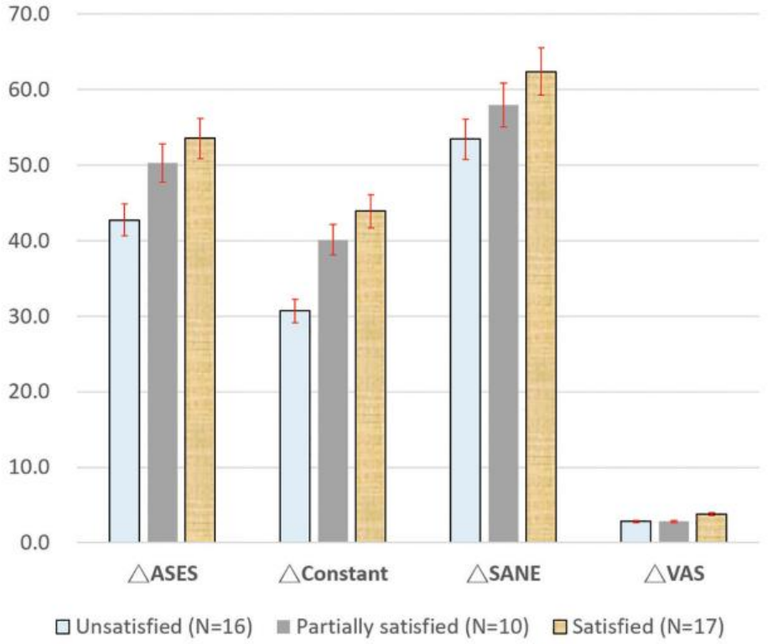

Figure 2. Score changes at 2-year follow-up in unsatisfied (n = 16), partially satisfied (n = 10), and satisfied (n = 17) patients. ASES, American Shoulder and Elbow Surgeons; SANE, Single Assessment Numeric Evaluation; VAS, visual analog scale.

Results

Patients' functional status after surgery: significant difference between 3 groups

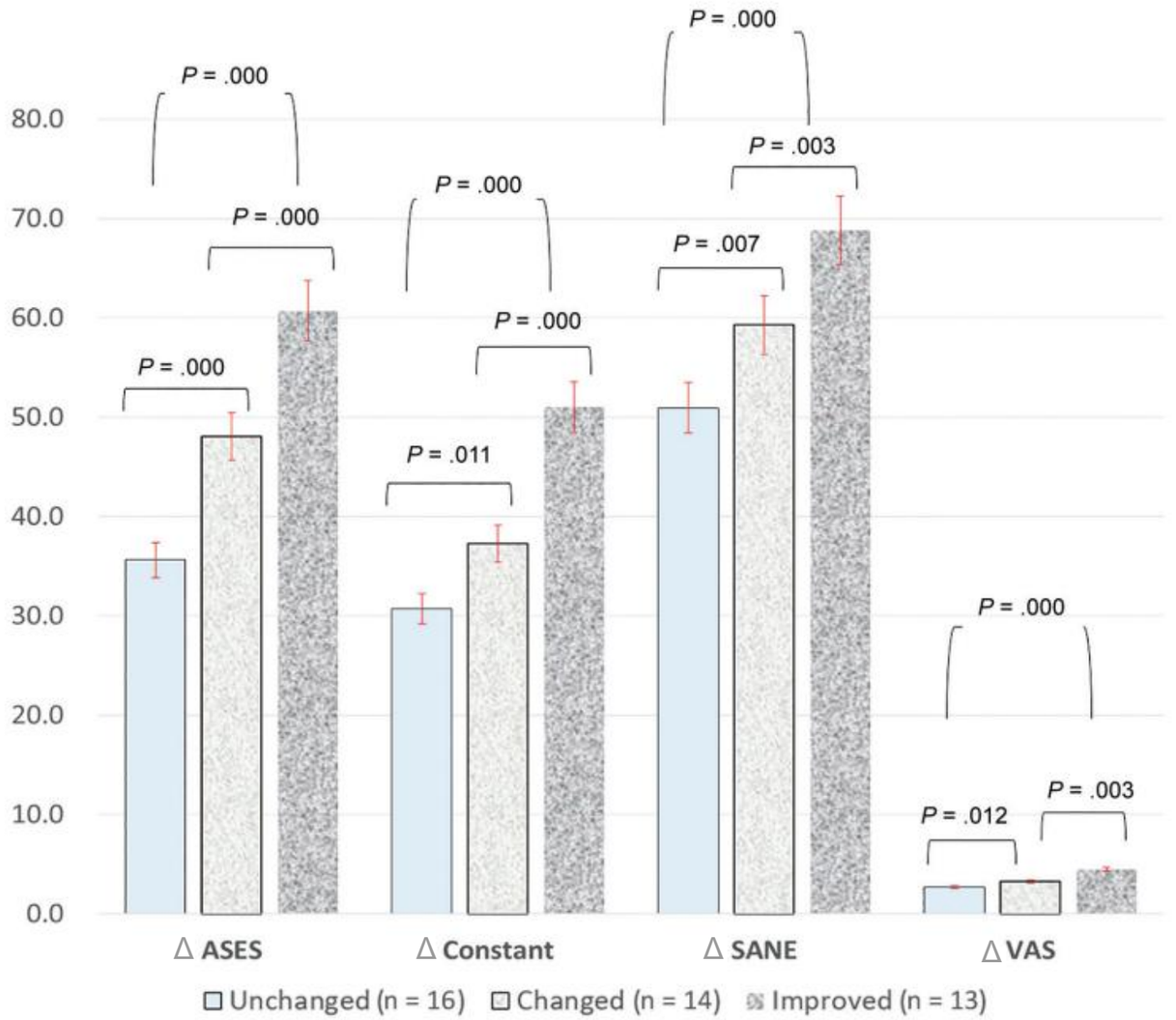

Figure 3. Comparison of score changes at the 2-year follow-up among the unchanged, changed, and improved patients. ASES, American Shoulder and Elbow Surgeons; SANE, Single Assessment Numeric Evaluation; VAS, visual analog scale.

Results

Only the proportions of patients who achieved the CSO threshold for the MOI for the ΔASES score were significantly different

TABLE 3
CSO Thresholds and Intergroup Comparison of 2-Year Outcomes[a]

2-Year Results from CSO analysis		AUC	LHBT Augmentation Group (n = 27) % Achieved	No–LHBT Augmentation Group (n = 16) % Achieved	P
ΔASES					
MCID	33	0.881	92.6	87.5	.308
SCB	47	0.802	70.4	50	.068
PASS	63	0.881	74.1	62.5	.242
MOI	49	0.812	70.4	37.5	.011[b]
ΔConstant					
MCID	21	0.802	92.6	100	.133
SCB	44	0.901	40.7	37.5	.382
PASS	31	0.801	70.4	81.3	.201
MOI	43	0.781	51.9	43.8	.268
ΔSANE					
MCID	45	0.921	92.6	93.8	.432
SCB	60	0.761	51.9	62.5	.399
PASS	75	0.921	77.8	81.3	.374
MOI	60	0.837	51.9	62.5	.296

[a]ASES, American Shoulder and Elbow Surgeons; AUC, area under the curve; CSO, clinically significant outcome; LHBT, long head of the biceps tendon; MCID, minimal clinically importance difference; MOI, maximal outcome improvement; PASS, Patient Acceptable Symptom State; SANE, Single Assessment Numeric Evaluation; SCB, substantial clinical benefit.
[b]A p-value less than 0.05 indicates statistical significance.

Results

Greater AHD in the LHBT augmentation group with statistical significance

TABLE 4
Radiographic Analysis and Comparison[a]

	LHBT Augmentation Group (n = 27)	No–LHBT Augmentation Group (n = 16)	*P*
AHD, mm	8.1 ± 2.2	7 ± 1.9	.037[b]
Graft tear	11 (41)	8 (50)	.320
Partial thickness	9	6	
Full thickness	2	2	
Graft tear pattern			
Glenoid site	1	4	
Midsubstance	5	2	
Tuberosity site	5	2	

MRI follow-up at 2 yr

[a]Values are presented as mean ± SD, n (%), or n. AHD, acromiohumeral distance; LHBT, long head of the biceps tendon.
[b]A p-value less than 0.05 indicates statistical significance.

Discussion

- This study showed that patients undergoing autologous FL SCR with in situ LHBT augmentation achieved similar PROMs and better restoration of AHD compared with those without LHBT augmentation
- The role of the superior capsule is increasingly recognized as an essential
  - Spacer under the acromion
  - Stabilizing role in all directions
- Inadequate improvement in AHD served as a predictive factor for graft tear
  - Better restoration of AHD in the augmentation group due to the additional thickness of LHBT
- Theoretical reasons for using biceps for augmentation
  - LHBT has a high concentration of tenocytes, similar to rotator cuff tendon
  - LHBT stabilizes the glenohumeral joint and is readily accessible in most patients

Discussion

- The concept of MOI was to establish the threshold for maximal predictability of excellent satisfaction based on ROC analysis
  - Threshold is normalized by the maximal possible improvement in each patient
  - Complements other metrics like MCID, PASS, and SCB
  - Helps in setting a higher standard for better outcomes

Limitations:

- Small sample size
- Short-term follow-up duration
- Retrospective study
- Surgical decision and availability of LHBT were based on arthroscopic inspection
- Lack of preclinical cadaveric research

ROC: receiver operating characteristic

Conclusion

- No significant difference in PROMs and percentage of patients achieving MCID, SCB, and PASS between isolated and LHBT augmentation SCR groups
- A higher percentage of patients achieving MOI and slightly greater AHD were found in the LHBT augmentation group
- Further evaluation is required to determine if there is any long-term benefit to LHBT augmentation of SCR

For full text:

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