Bioaugmentation demonstrates similar outcomes for arthroscopic rotator cuff revision repair compared to revision without bioaugmentation

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INTRODUCTION

Arthroscopic revision rotator cuff repairs exhibit lower healing rates and inferior outcomes compared to primary repairs.

Autologous conditioned plasma (ACP) and bio-inductive patches such as collagen bovine patches (CBP) are promising adjuncts that been shown to improve healing rates by inducing new tendon like tissue in the degenerated cuff and patient reported outcomes in the primary setting[1,2,5].

Aim: The aim of this study is to assess the use of ACP and collagen bovine patch augmentation for revision arthroscopic rotator cuff repair. We hypothesized improved patient reported outcomes and higher healing rates with bioaugmentation for revision repair compared to without.

METHODS

- IRB approved retrospective case-control study from two fellowship-trained surgeons that included all consecutive patients undergoing arthroscopic revision rotator cuff repair from 2015 to 2022.
- Exclusion criteria
  - Reconstruction such as superior capsular reconstruction, partial revision repair, and less than one year follow-up were excluded. The bioaugmentation cohort received ACP and/or collagen bovine patch at the time of revision repair.
- Patient reported outcomes were collected from all patients including:
  - American Shoulder and Elbow Society Standardized Assessment Form (ASES), visual analog scale for pain (VAS), Brophy score, Patient-Reported Outcomes Measurement Information System (PROMIS) mental and physical scores. Failure of revision rotator cuff repair was defined as an ASES postoperative total score less than 60 or a symptomatic re-tear confirmed on MRI.
- Student's T-test was used for all comparisons of continuous variables. Chi-squared used for comparison of all categorical variables. Statistical significance was set at <0.05.

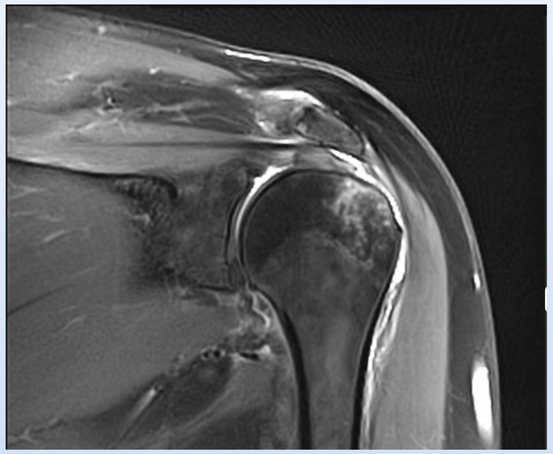

Figure 1: full-thickness tear of the supraspinatus tendon seen at footprint associated with retraction of torn fibers
Source: Radiopedia

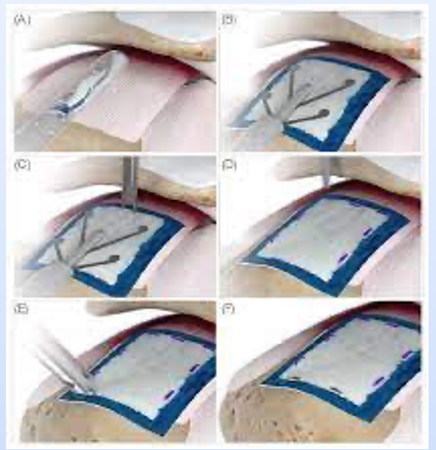

Figure 2: Application of bovine BCI (using REGENTENTM)
Source: Bovine bio-inductive collagen implant (REGENETENTM) for the repair of rotator cuff tear

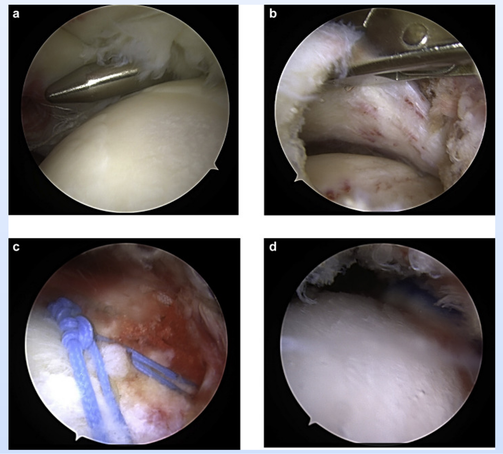

Figure 3: Arthroscopic images of a full-thickness rotator cuff tear from the articular (a) and bursal (b) sides that was repaired using a double-row technique (c) and a supplemental bio-inductive implant (d).
Source: Bushnell etal. 2020

RESULTS

Table 1. Patient demographics

Age, years (SD)	60.32 (8.4)
Body Mass Index (SD)	32.0 (5.8)
Smoke, %	15
Traumatic Injury, %	38
Dominant Hand, %	59
Failure, n (%)	6 (15)

Table 2. Pre-and Post-Operative Range of Motion (ROM), Visual Analogue Scale (VAS) and Shoulder Subjective Scale (SSV)

Pre-Op	No augmentation (n=17)	Bioaugmentation (n=22)
Forward flexion, mean	147.6	151.8
External Rotation, mean	46.4	52.9
Internal Rotation, T11 (%)	15.3	17.9
VAS, mean	7	6.4
SSV, mean	37.9	42.1
Post-Op		
Forward flexion, mean	152.0	152.2
External Rotation, mean	44.7	48.8
Internal Rotation, T11 (%)	20.5	20.5
VAS, mean	3.7	3.2
SSV, mean	74.7	77.7

Table 3. Patient demographics and patient reported outcomes revision rotator cuff repair with and without bioaugmentation

Patient Demographic	No augmentation (n=17)	Bioaugmentation (n=22)	*P*
Age, years (SD)	60.7 (10.1	60.2 (7.0)	0.86
Involving dominant hand, n (%)	9 (52.9)	16 (72.3)	0.31
ASA Class, mean (SD)	2.4 (0.49)	2.3 (0.83)	0.75
Tear size in mm, mean (SD)	13.1 (9.9)	12.7 (5.3)	0.88
Follow-up, years (SD)	3.4 (1.5)	3.6 (1.9)	0.66
Failure, n (%)	5 (29.4)	9 (40.1)	0.52
Patient Reported Outcome			
Visual analog scale pain, mean (SD)	3.3 (2.8)	3.1 (2.9)	0.82
ASES, mean (SD)	71.6 (20.7)	60.2 (21.4)	0.12
Brophy, mean (SD)	6.6 (5.2)	4.1 (4.4)	0.15
PROMIS Mental, mean (SD)	13.9 (4.2)	8.7 (6.0)	**0.007**
PROMIS Physical, mean (SD)	12.8 (3.3)	8.9 (6.2)	**0.031**

CONCLUSIONS

Bioaugmentation with a bio-inductive collagen patch or autologous conditioned plasma demonstrated similar rates of failure and patient reported outcomes compared to without bioaugmentation in the setting of revision rotator cuff repair. There is not enough evidence to suggest better or worse prognostic outcomes associated with ACP/CBP use in revision rotator cuff repairs many reasons, including the size of the sample, the similarity between comparison groups, relatively low number of prior surgeries, Goutallier classification. Patients within the study also had relatively low Goutallier classifications for the tendon targeted to be repaired (largest being a classification of 2, smallest being a classification of 1). Per patient demographics, literature suggests better outcomes given their characteristics (high number of non-smokers, low Goutallier classifications, low number of prior surgeries)[3-4]. Future studies should continue to analyze the use of ACP/CBP in revision rotator cuff surgeries with more participants.

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