Dermal Allograft Augmentation in Rotator Cuff Repair: Is There Patch Integration?

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Disclosure

Authors have nothing to disclose.

Introduction

- The aim of using patch augments in rotator cuff repair is to induce native tissue growth, providing biomechanical support and an optimal environment for rotator cuff healing.

Barber, F. A., et al., Arthroscopy, 2012

- The dermal matrix graft augmentation increases the maximum load but did not increase the linear stiffness.
- Cadaveric studies shows RCR repair with dermal allograft has higher load to failure compared to without.

Omae, H., et al., Clin Biomech, 2012

Barber, F. A., et al., Arthroscopy, 2008

- The use of dermal allograft to augment rotator cuff repair has been reported to improve clinical outcome.

Kantanavar, R., et al., JSES, 2024

Orozco, E., et al., Arthroscopy, 2024

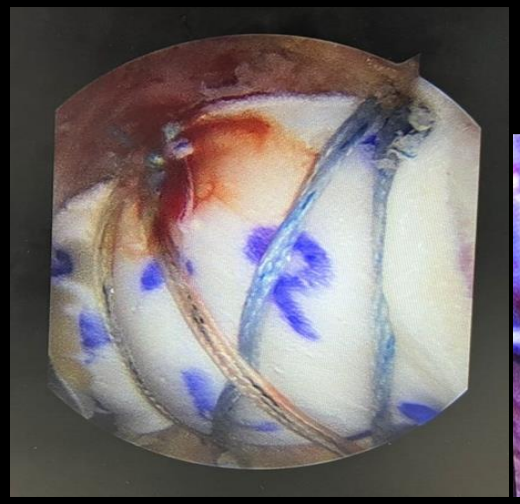
- Study comparing MRI results of repair using dermal allograft augmentation vs without augmentation showed significantly reduced re-tear rates in the group with the augmentation.

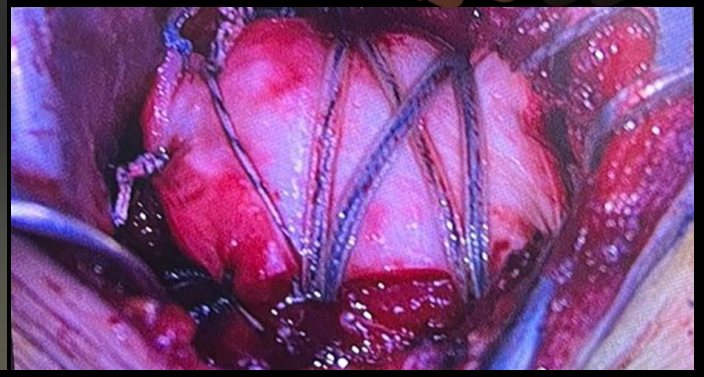
Barber, F. A., et al., Arthroscopy, 2012

- However, there have been no study looking into integration of the dermal allograft with the repaired rotator cuff on magnetic resonance imaging.

Objective

- To evaluate potential of dermal allograft integration with native repaired rotator cuff.
- To evaluate re-tear rate of repaired rotator cuff tendon.
- To compare clinical outcome scores and range of motion pre- and post-operatively
- To compare the outcomes between arthroscopic group and open groups





Methodology

- Retrospective record review of prospectively collected data of patients operated between November 2021 to February 2024.
- Patients who underwent rotator cuff repair using dermal allograft augmentation for large to massive rotator cuff tear.
- All patients were scheduled for arthroscopic repair and augmentation. Decision for conversion to open repair made after arthroscopic evaluation if tissue found to be friable, thin and or when only partial/incomplete repair is possible.
- Exclusion criteria: Incomplete medical record, concomitant procedures done in the same surgery.
- Re-tear evaluation done using ultrasound evaluation in clinic setting as well as MRI

Graft integration

Proposed Rhee classification for repaired rotator cuff-graft integration based on MRI images (H.E.A.L)

Grade I: Healed

- Advanced stage of graft healing, indistinguishable from rotator cuff with homogenous low signal

Grade II: Evolving

- Graft evolving, it appears thin with more homogenous signal intensity of repaired cuff tissue

Grade III: Above

- Allograft seen above the repaired tendon, not yet integrated, thickness and signal intensity maintained.

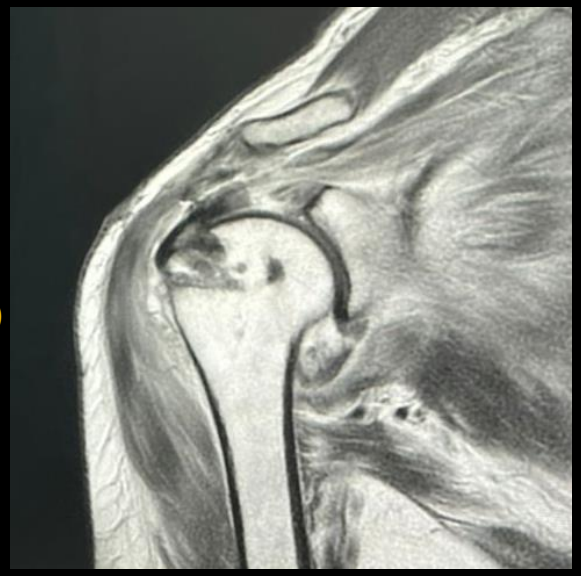
Grade IV: Loosening

- Loosening of dermal allograft with re-tear of repaired rotator cuff

Rhee Classification of Patch Integration on MRI

TIME ZERO

MOST RECENT



Healed

Evolving

Above

Loosening

TIME ZERO

MOST RECENT

Results

- Total patients: 130
- Arthroscopic: 114, Open: 16
- Number of patients with follow up MRI: 71
- Mean follow up: 8.8 months

Pre operative comparison

	Arthroscopic	Open	P-value
Number of patients	114	16	-
Age	64.66 ± 0.68	63.86 ± 1.68	0.665
BMI	24.54 ± 0.32	24.28 ± 0.58	0.786
AHI	7.54 ± 0.18	7.87 ± 0.49	0.536
VAS	5.27 ± 0.12	5.36 ± 0.30	0.447
ASES	67.59 ± 1.70	74.2 ± 3.53	0.169
Forward flexion	151.69 ± 2.58	148.5 ± 8.72	0.699
External rotation	51.14 ± 2.29	61.67 ± 6.77	0.165
Abduction	103.48 ± 2.79	92.0 ± 3.92	0.13

Range of Motion

	Arthroscopic			Open			Arthroscopic vs Open (post-op)
	Pre-op	Post-op	P-value	Pre-op	Post-op	P-value	P-value
Abduction	103.48 ± 2.78	105.29 ± 3.55	0.685	92.0 ± 3.92	92.22 ± 8.29	0.798	0.130
Forward flexion	151.69 ± 2.57	157.64 ± 2.01	0.066	148.5 ± 8.72	159.0 ± 5.89	0.310	0.96
External rotation	51.13 ± 2.29	62.87 ± 2.00	0.0001	61.66 ± 6.77	64.66 ± 6.53	0.766	0.407

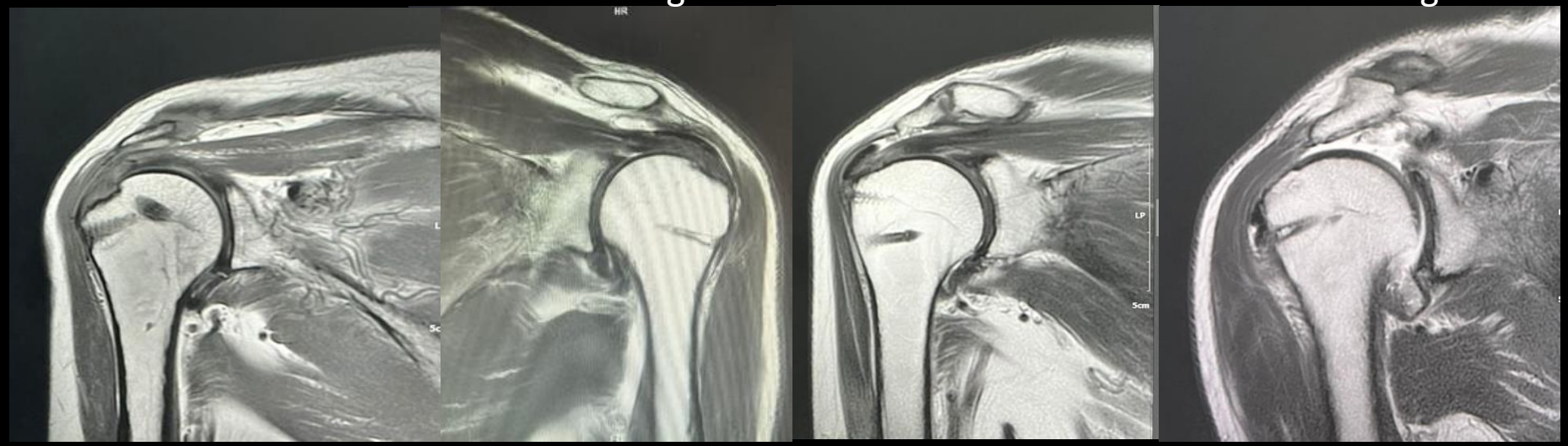
Functional Outcome

	Arthroscopy & Open		Arthroscopy		Open	
	Pre-op	Post-op	Pre-op	Post-op	Pre-op	Post-op
VAS	5.28 ± 0.11	1.64 ± 0.11	5.27 ± 0.12	1.66 ± 0.12	5.36 ± 0.30	1.5 ± 0.34
ASES	68.39 ± 1.56	79.98 ± 1.60	67.59 ± 1.70	79.72 ± 1.68	74.2 ± 3.53	82.58 ± 5.43

MRI integration

	Number of patients	Percentage, %
Grade I	12	17
Grade II	37	52
Grade III	12	17
Grade IV	10	14

Healed Evolving Above Loosening



Discussion

- Our findings are consistent with those of previous literature in terms of improved functional outcome and range of motion.
- Patients demonstrated improvement in visual analogue scores (VAS) compared to pre-operatively. This improvement in pain contributed to improved post operative functional outcome (ASES) scores as well.
- Furthermore, they demonstrated statistically significant improvement in forward flexion and external rotation, with p value .036 and .0002 respectively.

Discussion

- There have been no prior studies looking into graft integration after RCR with dermal allograft augmentation.
- 69% of our patients showed graft integration.
- 17% and 52% of patients showed grade I (healed) and grade II (evolving) graft integration respectively.
- We documented re-tear rate of 7.7%. These rates didn’t defer much when comparing arthroscopic or open technique.

Conclusion

- We propose the Rhee Classification as a novel MRI interpretation for evaluation of graft integration.
- Dermal allograft integration with native repaired rotator cuff can be expected in up to 69% of cases
- The re-tear rates with this technique is 7.7% which is better compared with other methods of augmentation and repair techniques
- Improved post operative functional scores as well as range of motion, with no difference between the arthroscopic vs open groups.

Reference

- Barber, F. A., et al., Arthroscopy, 2012
- Omae, H., et al., Clin Biomech, 2012
- Barber, F. A., et al., Arthroscopy, 2008
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