

Allograft Augmentation Of Irreparable Supraspinatus Tendon Tears, High Graft Healing Rate With Improved Clinical Function: A Case Series Study, [Abstract ID# 22617](#)

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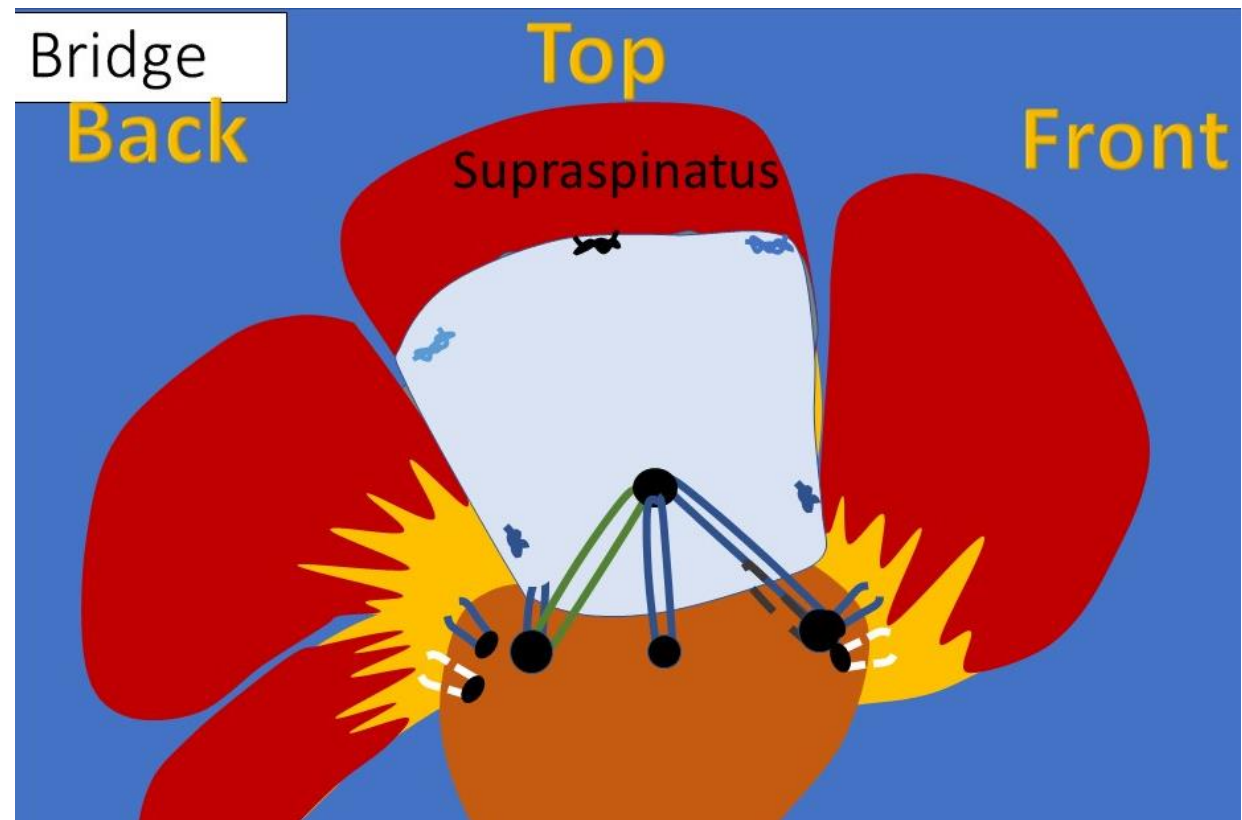


Introduction

- Massive rotator cuff tears which are confirmed at surgery to be irreparable, presents a challenge for the shoulder surgeon. Over the years many surgical techniques were introduced to deal with this problem.
- The use of scaffolds to augment cuff repair is gradually gaining popularity, and it is nowadays, the preferred methods used by many shoulder surgeons worldwide.
- The purpose of this study was to evaluate the functional outcome and retear rate when performing arthroscopic rotator cuff repair (ARCR) using an Allopatch, which is a donated human allograft dermis for augmentation of irreparable supraspinatus tendon tears.
- The time point for examination of cuff integrity was six months, chosen on the basis of a number of studies of rotator cuff repair healing process including human and animal studies.

Materials And Methods

- Patients who underwent arthroscopic rotator cuff repair with Allopatch allograft augmentation for the treatment of massive rotator cuff, between January 2019 and July 2021, by a single surgeon were included in the study.

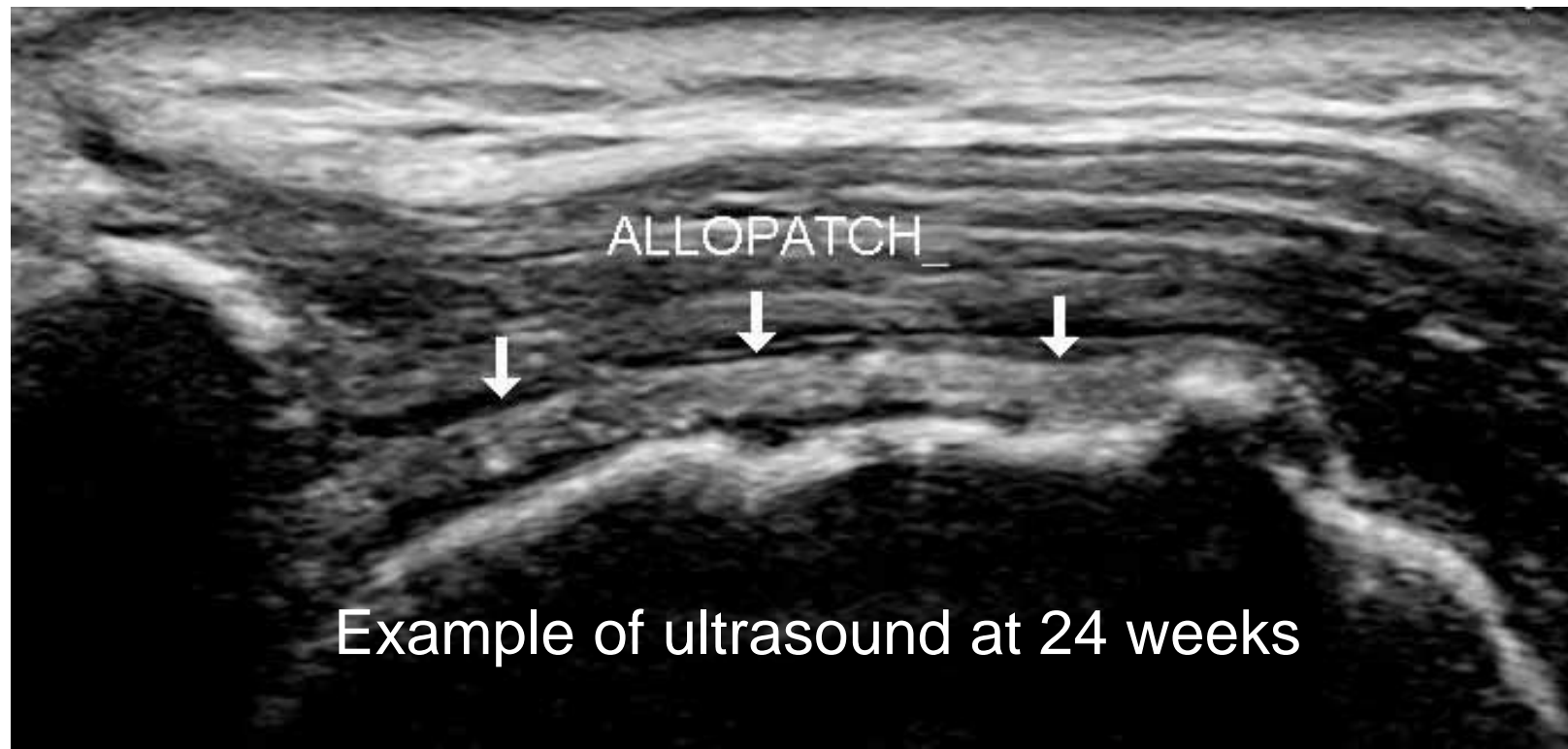


- The unique surgical technique was developed and well documented by the surgeon. It allows maximum contact of the Allopatch to the greater tuberosity bone in a double row configuration. It further ensures optimal graft fixation, with medial, anterior, and posterior attachments.
- The assessment included ultrasound and clinical review at 6 weeks, 12 weeks, 24 weeks. Cuff and Allopatch integrity on ultrasound were classified as intact, segmental, or complete re-tear.
- Preoperative patient-reported outcome measures (PROMs) were analyzed including Western Ontario Rotator Cuff Index (WORC) and Oxford Shoulder Score (OSS) and at 12 months following surgery were recorded.



Results

- Overall, 26 patients were included in the study, 22 primary and 4 revision cuff repair surgeries. This group of patients consisted of 21 males and 5 females with an average age at surgery of 57.5 years (range 43-71). The average graft thickness used for the augmentation was 2.8 mm (range 1.8-4.2).



Example of ultrasound at 24 weeks

- All patients underwent a check ultrasound at 24 weeks following surgery and all, 100%, demonstrated intact Allopatch repair to the greater tuberosity (as seen above)
- On average, patients demonstrated improvement in all the functional scores from the preoperative period to the 12 months post-operative follow-up.
- OSS significantly increased from 27.07 to 43.2
- WORC significantly increased from 28.38% to 76.02% percentage of normal.
- One patient who suffered from significant post-operative pain and stiffness underwent re-operation, arthroscopic release of adhesions, 8 months following the repair with significant improvement.

Discussion

The Role of Biologic Augmentation of Large/Massive Rotator Cuff Tear Repairs

- The high rate of incomplete healing or re-tearing associated with RCR surgery is noted when there is
 - Retraction (>2 cm) which is the most significant factor
 - Multiple tendon involvement
 - High-grade fatty infiltration of the muscles (Goutallier .2).
 - Increasing age (mostly >65 years)
- Other than stitch configuration, there are no other ways a surgeon can improve load to failure.
- Therefore when performing arthroscopic rotator repair surgery (ARCRS) when patients are deemed high risk and at the time of surgery a repair is not achievable or would be under extreme tension, biological augmentation is indicated. Therefore when operating on high risk RC tears, in this series of patients an Allopatch is on standby and used when necessary.

Allopatch HD[®] used in this study for the a biologic scaffold.

- Allograft augmentation for tissue repair should be biologic, sterile, non-inflammatory, and have good suture pullout strength.
- Human dermal allograft (HAD) also referred to as acellular dermal matrix (ADM), is an ExtraCellular Matrix (ECM) collagen scaffold, derived from human allograft skin which is minimally processed, which preserves and maintains the graft's natural biomechanical and biochemical properties of the collagen graft.
- It has been shown to have tissue integration properties, in vivo revascularization, cellular incorporation, and excellent biomechanical properties that make it an attractive option for soft tissue augmentation procedures in orthopaedics.
- A benefit of the Allopatch is it requires no refrigeration or hydration and is ready to use off the shelf. Ideal to have on standby when needed.



In a paper titled: Rationale for Biologic Augmentation of Rotator Cuff Repairs by Mirzayan et al, it states

- Dermal allografts, otherwise known as acellular dermal matrices (ADMs), have been the subject of extensive clinical and preclinical evaluation and can significantly increase the ultimate load to failure.
- These grafts are processed to remove donor cells, leaving behind the extracellular matrix, which is mostly composed of type I collagen. Given their biomechanically proven superior Biologic Augmentation of Rotator Cuff Repair and excellent suture pull-out strength they provide strengthening the repair while allowing an optimized environment for host cells and growth factors to promote repair site healing.

The role of Biologic Augmentation of Rotator Cuff Repairs

- Multiple biomechanical studies have evaluated ADMs in rotator cuff repair
- Barber et al and Beitzel et al demonstrated in cadaver RCT models an increase in mean failure strength in augmented repairs with ADMs compared with cadaveric controls.
- A number of clinical studies demonstrate that RCRs augmented with ADMs appear to have a much higher rate of structural integrity, Examples include:
- Barber et al evaluated 42 patients randomized to single-row arthroscopic repair and patients to single-row arthroscopic repair augmented by ADMs by an onlay technique. At an average follow-up of 24 months, 85% of the augmented repairs were intact on MRI at follow-up, compared with 40% in the control group.
- Agrawal retrospectively reviewed 14 patients arthroscopically repaired with a double-row technique with ADM augmentation. Postoperative MRI obtained at an average of 16.8 months revealed 85.7%
- Petri et al looked at the outcomes after open revision repair of massive RCSs with ADM augmentation confirming it was a safe and effective for deficient **posterosuperior** rotator cuff tendons in the presence of **healthy** rotator cuff muscles

The Role of Ultrasound Assessment of the ADM including Superior Capsular Reconstruction (SCR)

- Hirahara et al reported on Ultrasound assessment of Graft Thickness and Vascularity in SCR with Dermal Allograft: He noted, compared to (MRI) or computed tomography, the benefit of ultrasound was it was of less cost, non-irradiating, and less inconvenience to the patient. It has been accurate in evaluating the rotator cuff repairs and is an effective device to monitor SCR patients throughout the postoperative period. They demonstrated the SCR dermal allograft significantly thickens at its lateral aspect, and demonstrated evidence of increased vasculature in most patients in the first year of implantation, and is not resorbed by the body.

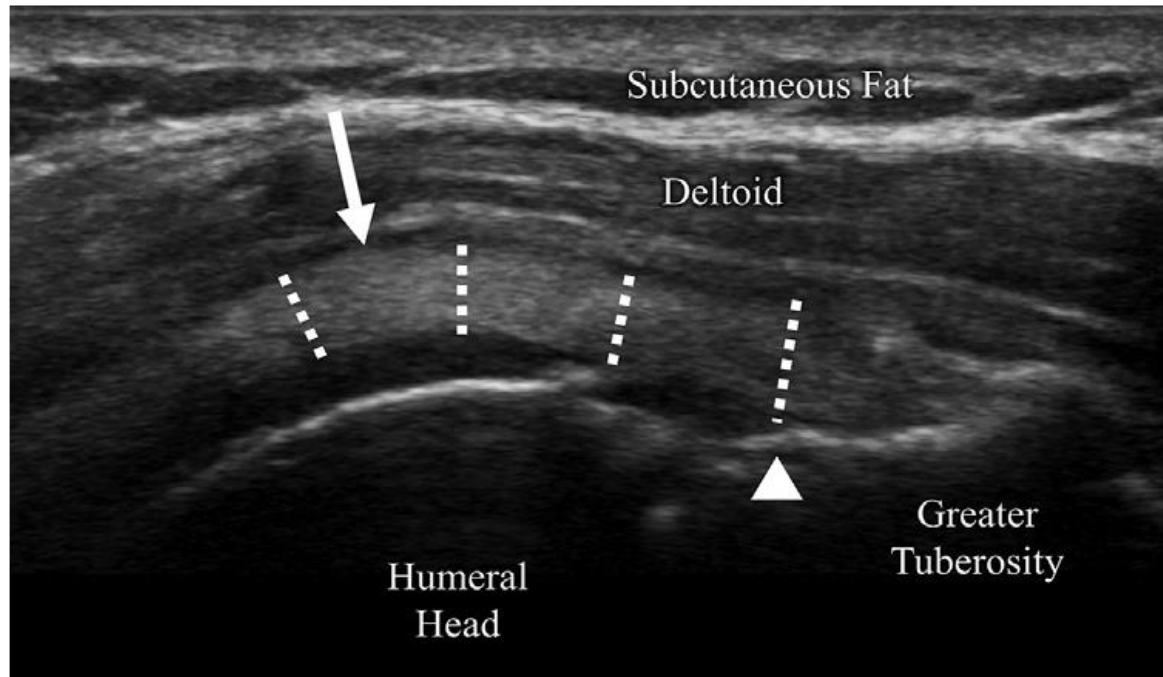
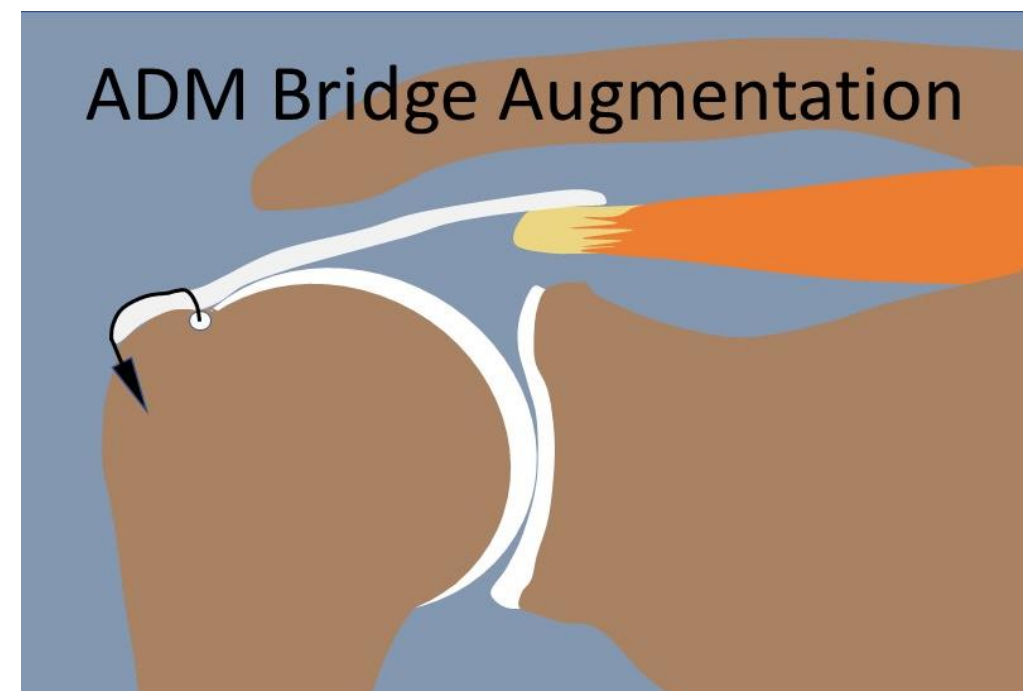
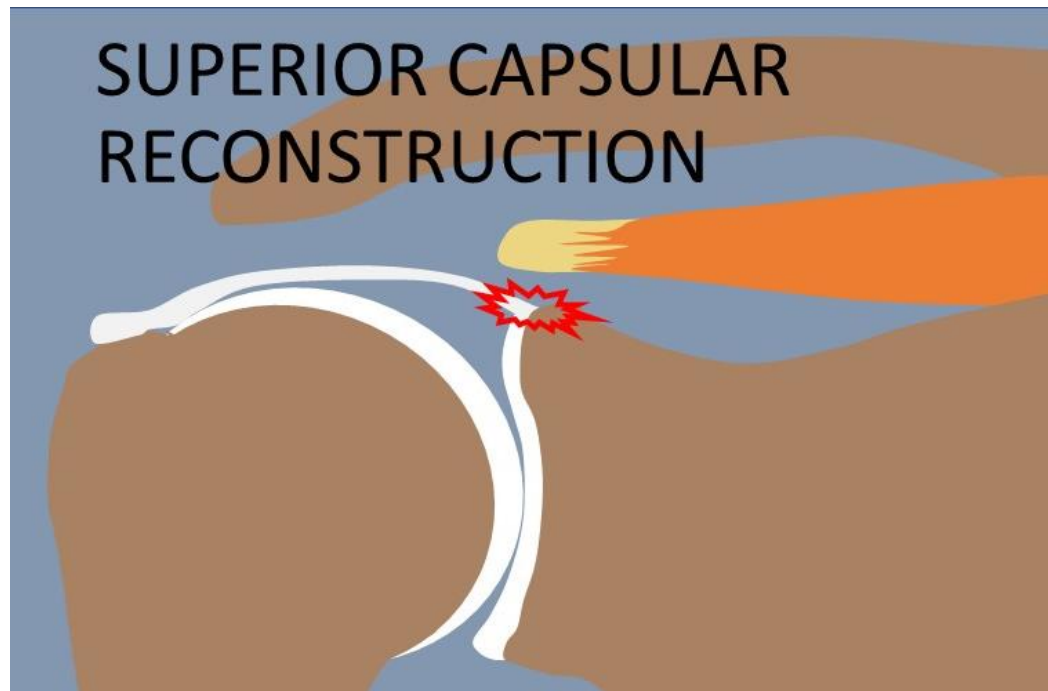


Fig 2. A long axis view of an intact dermal allograft of the superior capsular reconstruction (SCR) (solid white arrow) on the right shoulder at three months postoperatively. The articular margin-greater tuberosity interface is identified (white arrowhead). Demonstration of the tuberosity and midsubstance measurement locations are shown (dashed white lines).

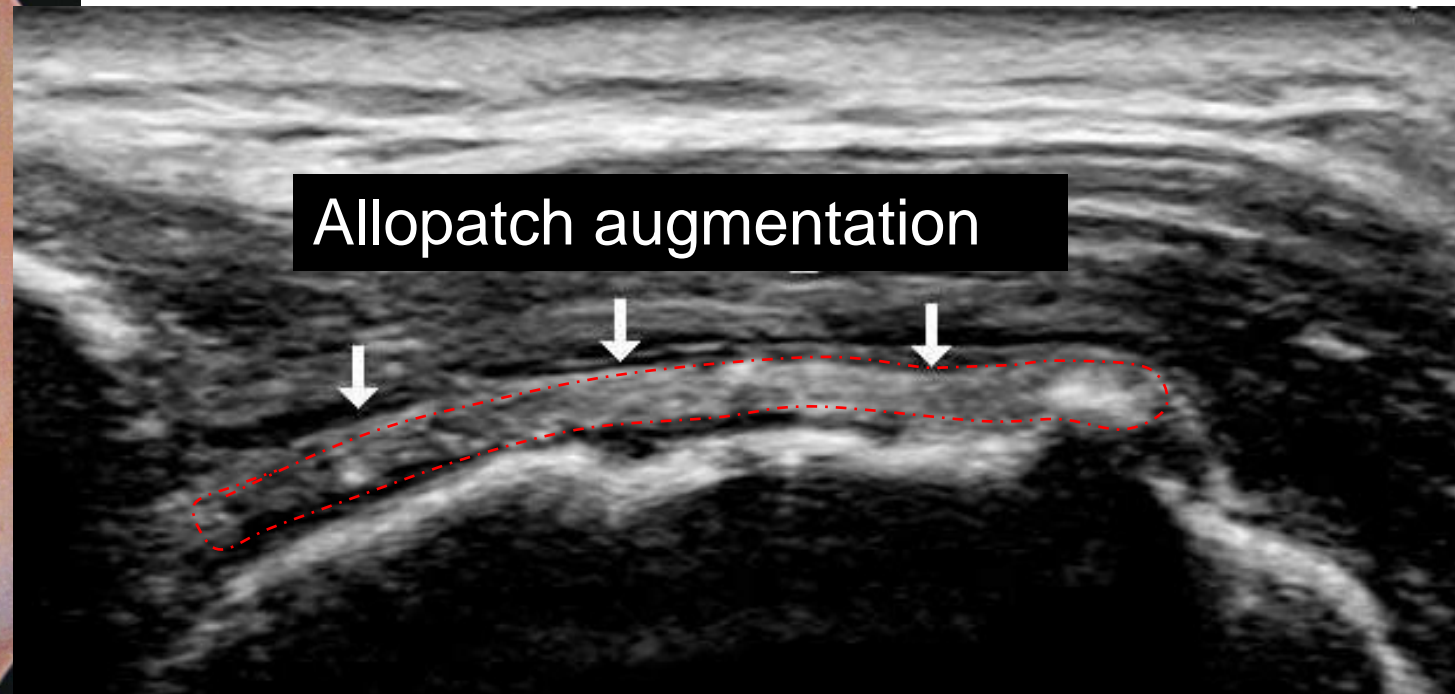
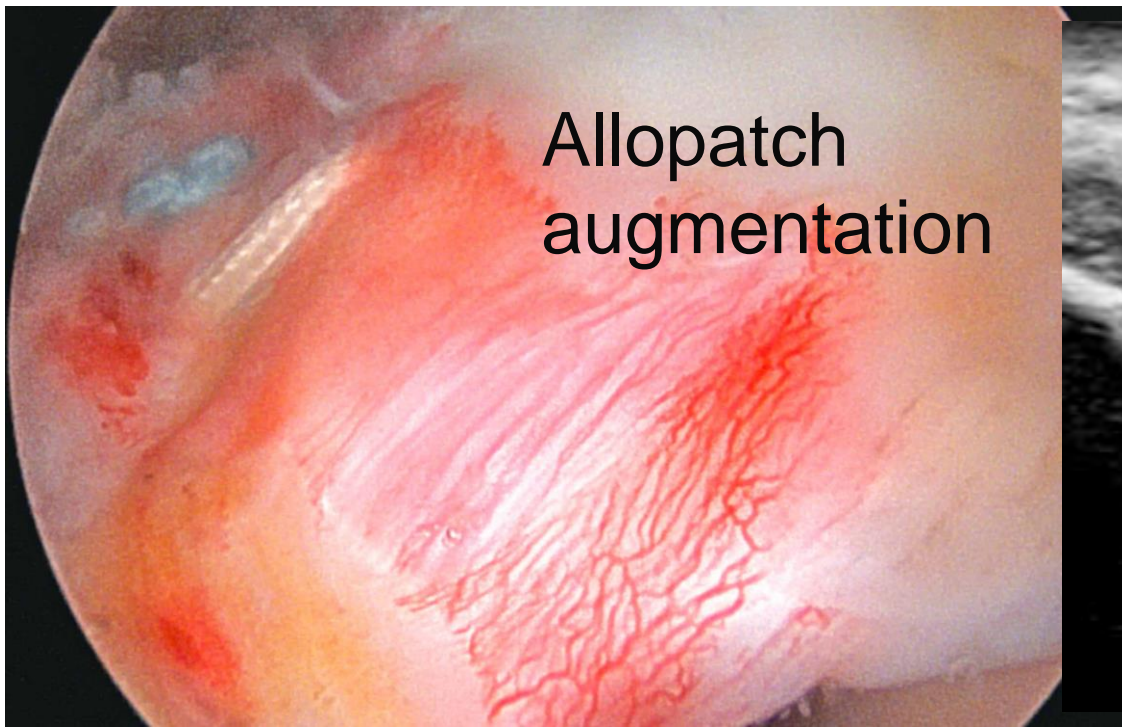
The Rational for the use of Dermal Allograft for Augmentation vs Superior Capsular Reconstruction (SCR)

- Purnachandra et al in an editorial commentary on dermal allograft stated it was a viable salvage procedures in treating irreparable RCT's. Their interesting comment on (SCR) that bridging reconstruction may have a better role in treating patients with some cuff remnant and “ the basic principle of restoring anatomy should not be ignored...reconnecting viable cuff muscle to tuberosity directly or through a graft should be considered before SCR.



Conclusions

- Arthroscopic cuff repair using a dermal Allopatch, is an excellent, though technically demanding option, for the augmentation of irreparable Supraspinatus tendon tears with 100% graft integrity at the 24 weeks follow-up in our case series and significantly improved functional scores at 1 year of follow-up with OSS significantly increased from 27.07 to 43.2 and WORC significantly increased from 28.38% to 76.02% percentage of normal.
- This procedure is in keeping with the basic principle of restoring anatomy . Reconnecting viable cuff to tuberosity directly as much as possible and the use of a graft where not possible to bridge the gap between RC tendon and tuberosity. The arthroscopy picture below is an image of the only case in which a repeat arthroscopy was performed for persistent stiffness demonstrating re-vascularization.



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