Abstract Title:
Interposition Porcine Acellular Dermal Matrix Xenograft Successful Alternative in Treatment for Massive Rotator Cuff

Authors:
Julie Neumann, MD¹, Miltiadis H. Zgonis, MD², Kathleen Dolores Reay, MD³, Stephanie W. Mayer⁴, Blake Boggess, MD², Alison P. Toth, MD⁵.
¹Duke University Medical Center, Durham, NC, USA, ²University of Pennsylvania Health System, Philadelphia, PA, USA, ³Duke University Health System, Durham, NC, USA, ⁴Hospital for Special Surgery, New York, NY, USA, ⁵Duke Sports Medicine, Durham, NC, USA.

Objectives: Despite advances in the surgical techniques of rotator cuff repair (RCR), the management of massive rotator cuff tears in shoulders without glenohumeral arthritis poses a difficult problem for surgeons. Failure of massive rotator cuff repairs range from 20-90% at one to two years postoperatively using arthrography, ultrasound, or magnetic resonance imaging. Additionally, there are inconsistent outcomes reported with debridement alone of massive rotator cuff tears as well as limitations seen with other current methods of operative intervention including arthroplasty and tendon transfers. The purpose of this prospective, comparative study was to determine if the repair of massive rotator cuff tears using an interposition porcine acellular dermal matrix xenograft improves subjective function, pain, range of motion, and strength at greater than two years follow-up. To our knowledge, this is the largest prospective series reporting outcomes of using porcine acellular dermal matrix xenograft as an interposition graft.

Methods: Thirty-seven patients (37 shoulders) with an average age of 66 years (range 51-80 years) were prospectively followed for 33 months (range 23-48) following massive RCR using porcine acellular dermal matrix interposition xenograft. Subjective outcomes were measured using the Visual Analog Scale (VAS) pain score (0-10, 0 = no pain), Modified American Shoulder and Elbow Score (M-ASES), and Short-Form12 (SF-12) scores. Preoperative and postoperative objective outcome measures included active range of motion and supraspinatus and infraspinatus manual muscle strength. Postoperative outcome measures included quantitative muscle strength using a dynamometer and static and dynamic ultrasonography to assess the integrity of the repair.

Results: Average VAS pain score decreased from 4.5 to 1.1 (P<0.001). Average postoperative M-ASES was 89.23. Average postoperative SF-12 was 52.6. Mean forward flexion, external and internal rotation significantly improved from 133.2° to 157.9° (P=0.003), 51.56° to 64.25° (P=0.001), and 49.8° to 74.0° (P<0.001), respectively. Manual strength (10 point scale) in supraspinatus and infraspinatus increased from 7.3 to 8.9 (P<0.001) and 7.4 to 9.4 (P<0.001), respectively. Using a dynamometer, supraspinatus quantitative strength was a mean of 68.6N and infraspinatus quantitative strength was a mean of 50.6N. Ultrasound evaluation of repairs showed 33 (89.1%) to be fully intact, three (8.1%) had partial tears, and one repair (2.7%) was not intact. The one patient whose repair was not intact by ultrasound was a revision repair. No infections, evidence of inflammatory reaction, tissue rejection, or major adverse outcomes were identified. Three patients underwent ipsilateral shoulder surgery for lysis of adhesions
due to post-operative decreased ROM during the follow-up period.

**Conclusion:** Following repair of massive rotator cuff tears with interposition porcine acellular dermal matrix xenografts, patients had significant improvement in pain, range of motion, strength and reported good subjective function based on M-ASES and SF-12 scores. The repair was completely intact in 89% of patients, a vast improvement compared with results reported for primary repairs of massive rotator cuff tears. Tissue grafts such as the porcine acellular graft used in our study hold great promise in the treatment of massive, retracted rotator cuff tears.