

# Abstracts

These are the abstracts of the papers presented at the Annual Meeting of the Arthroscopy Association of North America, Orlando, Florida, April 22-25, 2004

## **Relation Between Preoperative Magnetic Resonance Imaging Findings and the Functional Outcome of Massive Rotator Cuff Repairs (SS-01)**

**Purpose:** To determine whether preoperative MRI abnormalities, such as muscle atrophy and fatty infiltration, affects the functional outcome of arthroscopically repaired massive ( $\geq 5$  cm) rotator cuff tears. **Type of Study:** Retrospective. **Methods:** Between January 1997 and December 2001 a total of 203 massive rotator cuffs were repaired. A total of 125 of this series had MRI scans available for review. These MRI images were assessed by a musculoskeletal radiologist to determine the degree of muscle atrophy (MA), and fatty infiltration (FI). The MA and FI were graded as normal, mild, moderate or severe based upon their MRI scans. The radiologist was blinded to the functional outcomes of this series of patients. Fifty-seven of these patients were assessed using previous validated scoring systems (American Shoulder and Elbow Surgeons [AS&E], Constant, Rowe and Walch-Duplay) to determine their functional outcomes. **Results:** The average postoperative forward elevation was  $166.8^\circ \pm 25.9^\circ$  and abduction was  $165.9^\circ \pm 25.1^\circ$ . The average rotational motion postoperative was  $53.4^\circ \pm 16.7^\circ$  of external rotation and  $60.0^\circ \pm 19.8^\circ$  of internal rotation. A majority of patients in this series had a good functional outcome based upon AS&E, Constant, Rowe, and Walch-Duplay scores regardless of the preoperative MRI findings. The average Constant score was  $78.6 \pm 14.2$  and the average AS&E score was  $91.3 \pm 10.4$ . In this series, 87.7% of patients had a good-excellent result using the Rowe score for assessment while 84.2% of patients had a good-excellent result based upon the Walch-Duplay criteria. All patients in this series had muscle atrophy of their supraspinatus with 19.2% of these patients having severe atrophy. A majority of patients (94.7%) had significant fatty changes to their supraspinatus. Most patients also had significant degenerative changes with their infraspinatus (MA = 98.2%; FI = 91.3%). Teres minor had less significant changes with 43.9% having no muscle atrophy and 57.9% having no fatty infiltration. The subscapularis was more likely to have muscle atrophy (63.2%) than fatty changes

(52.6%). Only one patient in this series expressed dissatisfaction and stated that they had no improvement postoperatively. **Conclusions:** Not only is it possible to repair massive rotator cuff tears arthroscopically, but arthroscopic repair of such tears leads to a good functional outcome regardless of the preoperative MRI findings of muscle atrophy and/or fatty infiltration.

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## **Evaluation and Treatment of Stiffness in Patients With Rotator Cuff Tears (SS-02)**

The independent problems of shoulder stiffness and rotator cuff tearing have been extensively studied. In this study, a subgroup of patients who have both problems simultaneously is evaluated. This was a prospective evaluation of 72 consecutive arthroscopic rotator cuff repair patients. Preoperative range of motion (ROM) deficits in abduction, forward flexion, external rotation (ER) and internal rotation (IR) were recorded. These measurements were then added together to calculate the total ROM deficit (TROMD). The patients were then divided into three groups depending on their TROMD. In group 1 there were 42 patients with a  $0^\circ$  to  $20^\circ$  TROMD. In group 2 there were 24 patients with a  $25^\circ$  to  $70^\circ$  TROMD. In group 3 there were 6 patients with greater than a  $75^\circ$  TROMD. Patients in group 3 initially had standard frozen shoulder treatment consisting of intra-articular cortisone injections and physical therapy. The relative sizes of the RCT in each group were compared using a "cuff tear index" (CTI) which is the A/P dimension times the M/L dimension of the tear. The CTI in group 1 was 3.7, in group 2 it was 7.7 and in group 3 it was 12. In group 1, 33% of the patients had hypertension or heart disease, 42% in group 2 and 50% in group 3. In group 1, 5% of the patients had diabetes, 8% in group 2 and 50% in group 3. Preoperative Modified UCLA scores were the highest in group 1 (total score 25) and lowest in group 3 (total score 17). Bursal inflammation was seen in 76% of group 1 patients, 83% of group 2 patients and 100% of group 3 patients. Capsular abnormalities were common in all of the groups but a thick and

contracted capsule was found only in group 3 patients (3 out of 6 patients). Acromioplasty and an arthroscopic RCR was performed in all cases. There were no manipulations under anesthesia, nor any capsular releases except to improve cuff mobility. One year postoperatively, TROMD in group 1 was reduced to an average of 4°, in group 2 to 12°, and in group 3 to 31°. However, three patients in this group required a second arthroscopy with a capsular release in order to achieve their final level of improvement. The release was performed at an average of 5 months postoperative after poor return of ROM. All had intact repairs and did well after capsular release. All 3 patients had thick, contracted capsules at the time of the initial RCR and at the time of capsular release. Based on this study, patients with TROMD up to 75° will do well with rotator cuff repair and postoperative rehabilitation. Even patients with greater than 75° TROMD will do well if they do not have true capsulitis. Stiff RCT patients who have capsulitis will not do well. We are currently performing a simultaneous RCR and complete capsular release on these patients with very good early clinical results.

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#### **Rotator Cuff Repair: The Effect of Double-Row Fixation Versus Single-Row Fixation on Three-Dimensional Repair Site (SS-03)**

In rotator cuff surgery, increasing emphasis is being placed on maximizing the repair site contact area, thereby increasing the tendon-bone interface to potentially enhance more complete healing. Previous studies have demonstrated that traditional repairs using a single row of suture anchors or trans-osseous sutures fail to reproduce the area of the native supraspinatus tendon insertion or "footprint" on the greater tuberosity. The purpose of this study was to demonstrate the superiority of a double-row fixation technique in restoring the normal area of the supraspinatus footprint. Materials and Methods: A cadaveric study was performed using 7 fresh frozen shoulders. Rotator cuff tears were created and then repaired using several techniques: single-row suture anchor fixation (SRSA) using Mitek Fastin RC anchors (Mitek Worldwide, Norwood, MA), double-row suture anchor fixation (DRSA), and trans-osseous suture technique (TOS). The repair footprint area was determined for each technique by three-dimensional digitation, using a MicroScribeG2X digitizer (Immersion Corp, San Jose, CA). The area of the original tendon insertion site was also assessed for comparison. The data was processed using Rhinoceros NURBS modeling software (McNeal and Associates, Seattle, WA) and the repair site areas

were compared for the different repair techniques. Appropriate power analysis was performed to insure adequate sample size and a 2 tailed paired Student *t* test was performed to reveal statistical significance of detected differences. Results: The footprint area of the DRSA technique was larger than that of the other two techniques. These findings were statistically significant ( $P < .05$ ). Furthermore, the DRSA technique consistently reproduced 100% of the original supraspinatus footprint area. Both the SRSA and TOS technique failed to do so. On average, the TOS technique reproduced only 71% of the original insertion site and the SRSA technique reproduced 46%. The differences between the area of the original footprint, TOS and SRSA were all statistically significant ( $P < .05$ ). Conclusions: Double-row fixation in rotator cuff repair reproduces 100% of the supraspinatus footprint while traditional single-row techniques fail to do so. Double-row fixation may be a superior technique by providing a tendon-bone interface better suited for biologic healing and restoring normal anatomy.

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#### **Outcome of Arthroscopic Repair of High-Grade, Bursal-Sided, Partial Rotator Cuff Tears (SS-04)**

The natural history of the high-grade, partial tear of the bursal surface of the rotator cuff is not clearly understood. Recent evidence suggests that arthroscopic subacromial decompression or debridement alone can lead to poor outcome and may allow further deterioration of the rotator cuff. These tears may be particularly well-suited for an arthroscopic repair because of the presumably lower fixation demands afforded by the intact portion of the rotator cuff. We sought to evaluate the outcome of patients who've undergone arthroscopic repairs of high-grade bursal-sided rotator cuff tears. Methods: Between January 2000 and December 2002, 27 patients who had an intact articular surface, but a high-grade bursal-sided tear (>7 mm of exposed tuberosity) were treated with a subacromial decompression and an arthroscopic rotator cuff repair. All patients had a single row repair with at least one suture anchor. No lesion was completed to a full-thickness tear. Outcomes were assessed by serial examination and the L'Insalata shoulder rating questionnaire. Results: Mean follow-up was 24.5 months. 24 of the 25 patients were satisfied. L'Insalata scores increased from 34.7 to 85.1 ( $P < .001$ ). Analysis of variance showed significant increases in abduction postoperatively ( $P = .004$ ). Internal and external rotations were not significantly altered. Conclusions: Arthro-