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The effect of concomitant glenohumeral joint capsule release during rotator cuff repair—a comparative study

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Background: There is debate as to whether to operate or to defer surgery on patients with concomitant rotator cuff tear and shoulder stiffness. The purpose of this study was therefore to compare the outcomes in those patients who had both their rotator cuff tear and shoulder stiffness treated with the outcomes of patients who had a rotator cuff repair but no stiffness.

Methods: Twenty-five patients formed the stiffness group (receiving a concomitant rotator cuff repair and manipulation under anesthesia ± arthroscopic capsular release for preoperative ipsilateral stiffness), and a chronologically matched group of 170 rotator cuff repair–only patients formed the nonstiffness group. Patients ranked their pain and function scores preoperatively and at 1 week, 6 weeks, 12 weeks, 6 months, and 2 years postoperatively; examiners recorded range of motion, strength, and presence of impingement signs. Repair integrity was determined using ultrasound.

Results: Patients from both groups had significantly improved clinical outcomes at the 2-year follow-up compared with preoperative values. Range of motion was similar between groups at 2 years for forward flexion, abduction, and external rotation, whereas the nonstiffness group had a superior range of internal rotation ($P = .014$). Stiffness patients had 0 of 25 (0%) retears at 2 years compared with 34 of 170 (20%) in the nonstiffness group ($P = .009$).

Conclusions: The good outcomes of rotator cuff repair with glenohumeral capsular release disproved our hypothesis and suggest that there is no advantage in delaying repair of a rotator cuff tear to allow stiffness to resolve and that stiffness confers an advantage in terms of repair integrity.

Level of evidence: Level III; Retrospective Cohort Design; Treatment Study

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Keywords: Rotator cuff tear; rotator cuff repair; shoulder stiffness; frozen shoulder; manipulation under anesthesia; capsular release

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The most common complication of rotator cuff repair is a retear of the rotator cuff, with recent studies reporting retear rates of 14% to 41%.[26,27,35] Another common complication is postoperative stiffness.[5,18,21,28,30,33] Concomitant stiffness has been a traditional indicator to delay surgical repair of a rotator

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cuff tear until shoulder range of motion improves.[8,28,29,33] Surgical interventions for shoulder stiffness have included a manipulation under anesthesia (MUA) or an open or arthroscopic capsular release.[11,22,24] There are, however, potential benefits to repairing torn rotator cuffs early, as chronic rotator cuff tears are associated with fatty infiltration, muscle atrophy, and loss of elasticity of the remaining tendon.[2,3,12-14,29,36]

To date, there has been limited research examining the outcomes of concomitant treatment of rotator cuff tears and shoulder stiffness using a single operative procedure.[8,9,17,28,31] The aim of this study was to evaluate the clinical outcomes, particularly with regard to repair integrity and range of motion in patients who have both rotator cuff repairs and concomitant surgical treatment for shoulder stiffness. We hypothesized that patients treated with concomitant rotator cuff repair and glenohumeral joint capsule release will have similar or worse clinical outcomes compared with rotator cuff repair–only patients at a 2-year follow-up.

Materials and methods

Study design

The study was a retrospective case-controlled cohort study using prospectively collected data evaluating the midterm outcomes of patients who had had either rotator cuff repair surgery or rotator cuff repair concomitantly with a release of the glenohumeral joint capsule. The primary outcome was defined as the effect of arthroscopic rotator cuff repair or arthroscopic rotator cuff repair with glenohumeral joint capsule release on rotator cuff repair integrity 2 years after surgery. Secondary outcomes were defined as the outcomes of the combinations of these procedures on patient-ranked frequency of pain with activity, pain at night, and extreme pain; magnitude of pain at rest, at night, and with overhead activities; difficulty reaching behind the back or above the head; level of activity at work and level of sport currently played; overall shoulder stiffness; overall patient rating of the shoulder; and examiner-ranked range of motion, strength, and presence of impingement signs.

Patient selection

Between January 2005 and May 2012, 1232 primary arthroscopic rotator cuff repairs were performed at our center by the senior author. Of these, 43 had a concomitant MUA ± capsular release for shoulder stiffness.

For the purposes of this study, those patients who had a rotator cuff repair with concomitant release of the glenohumeral capsule by a manipulation or arthroscopic capsular release were defined as the "stiffness″ group. As a general rule, those patients who underwent manipulation or arthroscopic capsular release as well as rotator cuff repair were noted to have significant stiffness on passive range of motion testing (ie, external rotation <20°, forward flexion <90°, abduction <90°, internal rotation <T12). These patients also had imaging, usually ultrasound, showing a full-thickness rotator cuff tear or a partial-thickness tear involving >60% of the thickness of the tendon. If the previously outlined restriction in range of motion was confirmed under anesthesia, these patients were treated with concomitant MUA ± arthroscopic capsular release as well as a rotator cuff repair.

The "nonstiffness" group was selected from chronologically matched patients to allow a surgical learning curve, 4 patients from a consecutive list of rotator cuff repairs before and 4 after each stiffness patient.

The exclusion criteria for both groups were (1) ipsilateral glenohumeral osteoarthritis graded either as moderate-severe, grade 3-4 or "marked," as determined intraoperatively, (2) irreparable or partially repaired rotator cuff tear, (3) rotator cuff repair using a polytetrafluoroethylene patch, (4) ipsilateral shoulder arthroplasty, (5) ipsilateral humeral head fractures, (6) previous ipsilateral shoulder surgery, and (7) patients unable to be contacted or unable to attend the 2-year follow-up clinic.

Surgical procedure

All cases were performed as day surgery, under interscalene regional anesthesia and light sedation, in the beach chair position.[22,34] Passive range of motion was assessed and recorded before surgery and at the end of the case.

MUA and arthroscopic capsular release

If a significant preoperative reduction of passive shoulder range of motion was confirmed under anesthesia, MUA with or without arthroscopic capsular release was performed before rotator cuff repair. Manipulation consisted of gradually moving the shoulder through forward flexion, abduction, external rotation, and internal rotation. During a successful manipulation, there was a sudden marked improvement in each of these planes of movement. If there was persistent restriction of movement or a "rubbery" end point was noted, a formal arthroscopic capsular release was performed, as previously described,[22] with sectioning of the anterior, inferior, and posterior capsule, to result in a 360° circumferential release. Arthroscopy was used to confirm that the glenohumeral joint capsule was divided (either by the manipulation or the capsular release) circumferentially around the glenoid.

Rotator cuff repair

Arthroscopic rotator cuff repair was performed while it was visualized from the glenohumeral joint space using single-row knotless tension band inverted mattress suture anchors (ArthroCare Corp, Austin, TX, USA).[1] Partial-thickness tears were converted to full-thickness tears with a scalpel under direct vision and then repaired in the same manner. Patients from both groups were discharged with a small abduction sling

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