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Clinical and structural results of arthroscopic repair of bursal-side partial-thickness rotator cuff tears

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Background: There have been few studies using magnetic resonance imaging (MRI) to evaluate the clinical outcomes and structural results after arthroscopic repair of bursal-side partial-thickness rotator cuff tears (PTRCTs).

Methods: From 2009 to 2012, 73 consecutive patients with bursal-side PTRCTs underwent arthroscopic repair. Fifty-nine of them were retrospectively evaluated as Ellman classification grade 2 (group A, n = 11) or grade 3 (group B, n = 48). All repairs were performed with a technique that preserved the intact articular fibers and repaired the avulsed bursal flap. The University of California–Los Angeles (UCLA) score and Constant score were assessed before the operation and at the final follow-up. Postoperative cuff integrity was determined with MRI following Sugaya's classification.

Results: At the 2-year follow-up, the average UCLA score increased from 17.3 ± 3.7 to 33.3 ± 2.2, and the Constant score increased from 65.3 ± 12.9 to 93.9 ± 5.1 ($P < .001$). Forty-nine patients received follow-up MRI examinations at an average of 10.3 months after surgery. Of these 49 patients, 41 patients (83.7%) had a healed tendon and 8 patients had partial tears. Neither the clinical scores nor the retear rates on follow-up MRI were significantly different between the 2 groups.

Conclusions: Arthroscopic repair of bursal-side PTRCTs achieved good functional and structural outcomes at a minimum of 2 years after surgery.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Shoulder; rotator cuff; partial-thickness tear; bursal-side tear; arthroscopic repair; preservation of intact tissue

Partial-thickness rotator cuff tears (PTRCTs) are a common source of shoulder pain and dysfunction and can be classified as bursal-side, articular-side, or intratendinous tears. Compared with articular-side tears, fewer studies examining functional and structural outcomes of bursal-side tears have been reported.[3,4,8-12,14,16,18,20-22]

There is no real consensus in the literature on the threshold of tendon injuries that require repair or on the best treatment approach for bursal-side PTRCTs. Several different surgical approaches have been reported, including tear completion followed by repair[4,8,10] and repair while preserving the normal articular-side tendon.[11-12,14,21]

The purpose of this study was to evaluate the functional outcomes and structural results after arthroscopic repair of

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bursal-side PTRCTs while preserving the normal articular-side tendon and suturing the bursal flap.

Materials and methods

Patient selection

For this retrospective case study, 84 consecutive patients (84 shoulders) with bursal-side PTRCTs underwent arthroscopic treatment between August 2009 and February 2012. The inclusion criteria were (1) symptoms lasting more than 3 months with proper conservative treatment, (2) tears of >25% of the tendon thickness (or 3 mm) confirmed during surgery, and (3) no major associated disease that needed to be addressed at the time of arthroscopic surgery, such as frozen shoulder or Bankart lesion. Six patients with tear <3 mm, who underwent arthroscopic débridement, as well as 5 patients with frozen shoulder were excluded from this study. Of the 73 patients who met the inclusion criteria, 1 patient died of an unrelated disease and 13 patients did not participate in follow-up for 2 years. Consequently, 59 patients were included in this study. There were 30 men and 29 women. The mean age at the time of surgery was 48.9 years (range, 27-81 years); 43 patients (73%) had repair of the dominant shoulder.

Preoperative clinical features

All patients had shoulder pain, and 26 patients had a history of acute trauma to the shoulder. The duration of pain ranged from 3 months to 15 years with an average of 24.9 months, and 25 patients experienced consistent pain including night pain, 22 patients complained of pain during light activities, 10 patients felt pain during strenuous exercises, and 2 patients felt light pain or discomfort occasionally. All patients had positive Neer or Hawkins impingement signs. The active range of motion was 149° (range, 60°-180°) in flexion, 141° (range, 40°-180°) in abduction, and 41° (range, 10°-50°) in external rotation; the active internal rotation was L5 (range, T10 to the gluteus).

Preoperative imaging

All of the patients received preoperative bilateral radiographs of the anteroposterior and supraspinatus outlet views and magnetic resonance imaging (MRI) scans. The acromial morphology was divided into 3 categories according to the Bigliani classification.[1] The preoperative diagnoses were based mainly on the oblique coronal T2-weighted fat-suppressed MRI scans. The diagnostic signs included a defect on the bursal side of the cuff and fluid signal intensity within the tendon that connected to the bursal surface of the tendon.

Surgical technique

All of the procedures were performed with the patient under general anesthesia in the beach chair position. Diagnostic arthroscopy was performed, and a variety of intra-articular pathologic processes, such as superior labrum anterior-posterior (SLAP) lesions, partial rupture of the long head of the biceps tendon, and partial tears of the subscapularis tendon, were treated appropriately. The arthroscope was then redirected into the subacromial space, and the hypertrophic bursal tissue was removed. Formal acromioplasty was performed on all of the patients.

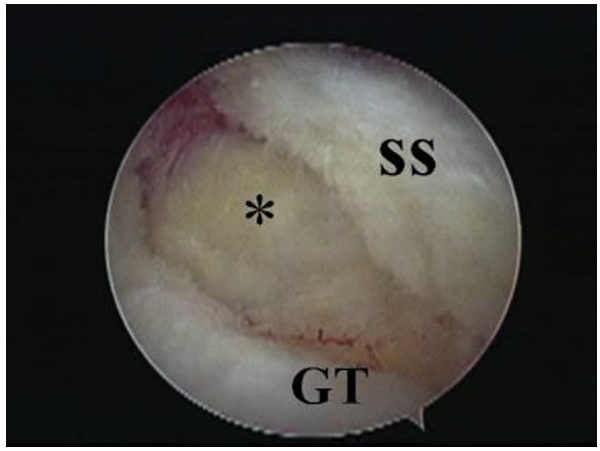

Figure 1 Arthroscopic view showing a bursal-side tear. *SS*, supraspinatus; *GT*, greater tuberosity; *, normal articular-side tendon.

After confirmation of the tear, the degenerative tissue of the tendon was removed until normal articular-side tendon fibers inserting into the greater tuberosity could be identified (Fig. 1). The thickness of the tear was measured with a calibrated probe. The classification of Ellman[5] based on the depth of the tear (grade 1, <3 mm; grade 2, 3-6 mm; and grade 3, >6 mm) was used. The greater tuberosity was prepared by removal of a thin layer of cortical bone with a power burr to promote healing of the reattached cuff. Only the detached layer was reattached to the greater tuberosity. Thirty patients received a single-row repair (Fig. 2), whereas 29 patients were treated by the suture bridge technique (Fig. 3).

Rehabilitation

Postoperatively, the arm was maintained in a sling at 15° of abduction and neutral rotation for 6 weeks. Gentle pendulum exercises and passive external rotation were started on the first postoperative day. An ice bag was used to reduce swelling and pain. Passive range of motion exercises were initiated with minor loads across the repair for weeks 1 to 6. After 6 weeks, active range of motion exercises that applied progressive loading to the repair construct were allowed. Strengthening exercises that focused on restoring power and endurance to the healing rotator cuff muscles were started after 3 months and continued until 4 to 6 months postoperatively. Six months after surgery, patients were allowed to gradually return to their full sports activities.

Clinical evaluation

The University of California–Los Angeles (UCLA)[6] and Constant-Murley[2] scoring systems were adopted before the operation and at the final evaluation.

MRI evaluation

Forty-nine patients received postoperative MRI scans, which were performed at a mean of 10.3 months after surgery (6-42 months),