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Outcomes of Combined Arthroscopic Rotator Cuff and Labral Repair

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Background: Rotator cuff tears, Bankart lesions, and superior labral anterior posterior lesions commonly occur in isolation, but there is a subgroup of patients who experience combined injuries. Prior studies have excluded such patients as confounding groups.

Hypothesis: In patients with combined lesions of the labrum and rotator cuff, arthroscopic repair of both lesions will restore range of motion and stability and provide good clinical results.

Study Design: Cohort study; Level of evidence, 3.

Methods: We retrospectively evaluated the clinical outcomes of a series of patients with combined rotator cuff and labral (Bankart or superior labral anterior posterior) lesions treated arthroscopically.

Results: Thirty patients (average age, 47.8 years) with combined rotator cuff and labral lesions were evaluated at a mean follow-up of 2.7 years (range, 24-54 months). Sixteen patients had Bankart lesions and 14 patients had SLAP lesions. Significant improvements in forward flexion (20.5°, $P = .005$), external rotation (9.0°, $P = .008$), and internal rotation (2 vertebral levels, $P = .016$) were observed. The mean L'Insalata and American Society of Shoulder and Elbow Surgeons scores for all patients were 92.9 and 94.3, respectively. Twenty-seven (90%) patients reported satisfaction as good to excellent, and 23 of 30 (77%) returned to their pre-injury level of athletics. Two patients suffered recurrent rotator cuff tears.

Conclusion: In patients with rotator cuff and labral lesions, arthroscopic treatment of both lesions yields good clinical outcomes, restoration of motion, and a high degree of patient satisfaction.

Keywords: rotator cuff; Bankart; superior labral anterior posterior lesions; arthroscopy

Although rotator cuff (RTC) tears, Bankart lesions, and superior labral anterior posterior (SLAP) lesions have been reported to occur in isolation, a subgroup of patients experience combined injuries, whether from traumatic or degenerative mechanisms.²⁵ Mileski and Snyder¹⁴ found SLAP lesions occurring concomitantly with rotator cuff tears 40% of the time and Bankart lesions concomitantly with rotator cuff tears 22% of the time. Cole and Warner³ considered combined rotator cuff and Bankart lesions a relative indication to perform an open repair.

We are aware of no study that reports the outcome of combined all-arthroscopic repair of Bankart or SLAP lesions in combination with rotator cuff tears. This likely is

attributed to the fact that most prior outcomes studies have excluded such patients as confounding groups (Refs 1, 13, 14; W. B. Stetson et al, unpublished data, 1998).

We hypothesized that when lesions of the labrum and rotator cuff occur concomitantly, arthroscopic repair of both lesions will restore range of motion and stability and provide good clinical results. This study reports the outcome of patients with combined rotator cuff and labral lesions who underwent simultaneous arthroscopic repair.

METHODS

After obtaining Institutional Review Board approval, we retrospectively reviewed patients who underwent combined arthroscopic rotator cuff repair and labrum repair at our institution between 2002 and 2004.

Office records, operative reports, and MRI reports were reviewed. In addition to demographic information, preoperative patient-reported symptoms, mechanism of injury, number of dislocations (if applicable), and physical findings were recorded. The diagnosis of rotator cuff and labrum injury was confirmed in all cases at the time of surgery.

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Exclusion criteria included patients younger than the age of 18 years, prior ipsilateral shoulder procedures, and workers' compensation cases. Any patient converted to an open rotator cuff repair, mini-open rotator cuff, or open labrum repair was excluded.

Arthroscopic surgery of the shoulder was performed under interscalene block anesthesia with the patient in the beach-chair position. Diagnostic arthroscopic examination was performed by 1 of the 3 senior authors (RFW, FAC, AAA) through a posterior portal. The presence of rotator cuff and labral lesions was documented. Rotator cuff repairs were performed using suture anchors, and concomitant labral repairs were performed using either suture or Suretac anchors (Acufex Microsurgical, Mansfield, Mass) in an all-arthroscopic manner.

When a Bankart lesion was identified, the instrumentation was inserted through dual anterior portals. When the labrum was scarred to the medial aspect of the glenoid neck, it was carefully released from the glenoid to allow anatomical repair. The osseous rim of the glenoid was abraded anteriorly and inferiorly before reattachment of the soft tissue. A grasper was then used to reduce the detached labrum onto the anterior portion of the glenoid rim. One to 3 anchors were placed on the rim of the glenoid based on size of the tear and space available.

For SLAP lesions, the superior labrum was carefully probed from an anterior portal using a needle localization technique in the rotator interval. Evaluation included direct observation of the attachment using a probe for elevation. Indication for surgical repair included the presence of a tear at the labral edge or recessed site with apparent laxity and detachment of the biceps insertion. The superior portion of the glenoid neck was debrided to bleeding bone using an arthroscopic shaver. The SLAP tears were repaired through the defect in the rotator cuff using 2 to 4 anchors. The 4 patients with partial RTC tears were treated either through a superolateral rotator interval portal or through a trans-rotator cuff portal, penetrating either the supraspinatus or infraspinatus muscle-tendon junctions.

Arthroscopic rotator cuff repair was performed in all patients with the use of suture anchors and a suture-passing device or by shuttle relay technique. Repairs were performed using a variety of anchor configurations and suture techniques, including single- and double-row repairs. All rotator cuffs were repaired using Arthrex Corkscrew anchors (Arthrex, Naples, Fla). Sixteen labral lesions (9 Bankart, 7 SLAP) were repaired with Arthrex Fastak anchors, and 14 labral lesions (7 Bankart, 7 SLAP) were repaired with Suretac anchors (Acufex Microsurgical, Mansfield, Mass).

Release of cuff adhesions was performed to reduce the tension on the repair. Additional arthroscopic procedures were performed as necessary in accordance with the preoperative and intraoperative findings. No shoulders were manipulated under anesthesia.

Postoperatively, a physical therapy protocol was directed toward protecting the rotator cuff repair. Rehabilitation protocols were not changed on the basis of the type of labrum repair performed. All patients had their arm placed in a sling and were permitted passive range of motion in the

scapular plane (maximum 90° forward flexion) and pendulum motion during the first 6 postoperative weeks. During weeks 6 to 12, passive range of motion was increased and active range of motion initiated. At 6 weeks, rotator cuff strengthening with a low-resistance Theraband (The Hygenic Corporation, Akron, Ohio) was allowed. At 10 to 12 weeks, light weights were added. From week 12 to 6 months postoperatively, rotator cuff strengthening and scapular stabilizing exercises were progressed with unlimited return to activity at 6 months postoperatively.

At a minimum of 2 years postoperatively, patients completed the L'Insalata¹² and the American Society of Shoulder and Elbow Surgeons (ASES)¹⁰ questionnaires (each 100-point systems) and underwent a thorough bilateral shoulder examination. All physical examinations were performed by an unblinded sports medicine fellow and resident. Range of motion was determined with the use of a hand-held goniometer including forward flexion, external rotation at the side, and behind-the-back internal rotation. Patients completed a visual pain scale (0-10) and were asked to rate their overall satisfaction with the procedure at the time of follow-up. A standardized (ASES) physical examination of the affected and contralateral shoulder was performed.

The Student *t* test and Mann-Whitney test were used to compare results between the rotator cuff/Bankart and the rotator cuff/SLAP subgroups and to compare range of motion in the affected and unaffected sides. Statistical significance was set at $P < .05$.

RESULTS

Demographics

A total of 35 patients were identified who underwent arthroscopic rotator cuff repair combined with either a Bankart repair (Figure 1) or a SLAP repair (Figure 2). Of these, 30 (16 Bankart repairs and 14 SLAP repairs in combination with a rotator cuff repair) were available for follow-up. One patient declined to participate, 2 were workers' compensation cases, and 2 were converted to mini-open repairs for large rotator cuff tears early in the study period. Twenty-two of the patients were women and 8 were men. The mean overall age was 48 years (range, 31-65). The average age of the Bankart group was 47 years (range, 36-61). The average age of the SLAP group was 49 years (range, 31-65). In 23 patients the dominant extremity was affected, and in 7 patients the nondominant extremity was affected. The mean follow-up after surgery was 2.7 years (range, 24-54).

Mechanism and Preoperative Symptoms

The onset of symptoms was acute in 24 patients and insidious in 6 patients. In 11 patients, the source of injury was sports related: skiing (4), snowboarding (1), hockey (1), weight lifting (3), rugby (1), and rollerblading (1). Other mechanisms of injury included assault (1), non-sports-related falls (11), and machinery accidents (1).

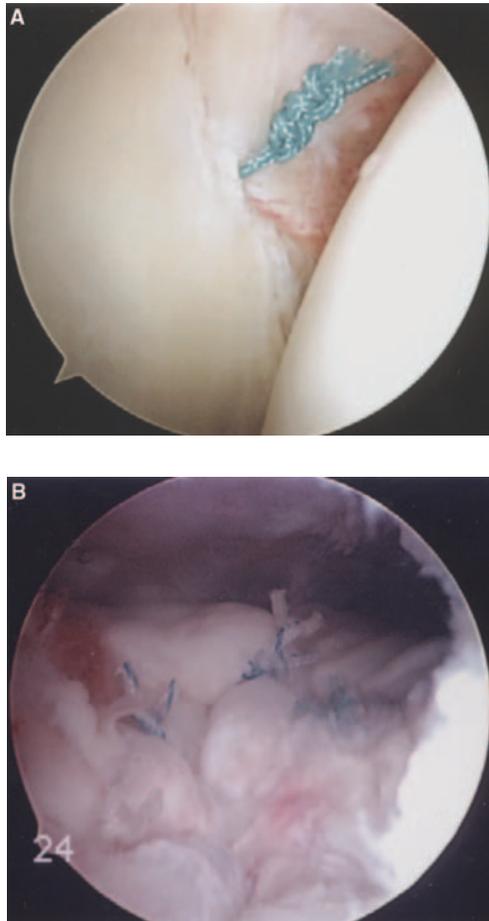


Figure 1. Arthroscopic photographs of combined Bankart (A) and rotator cuff (B) repairs.

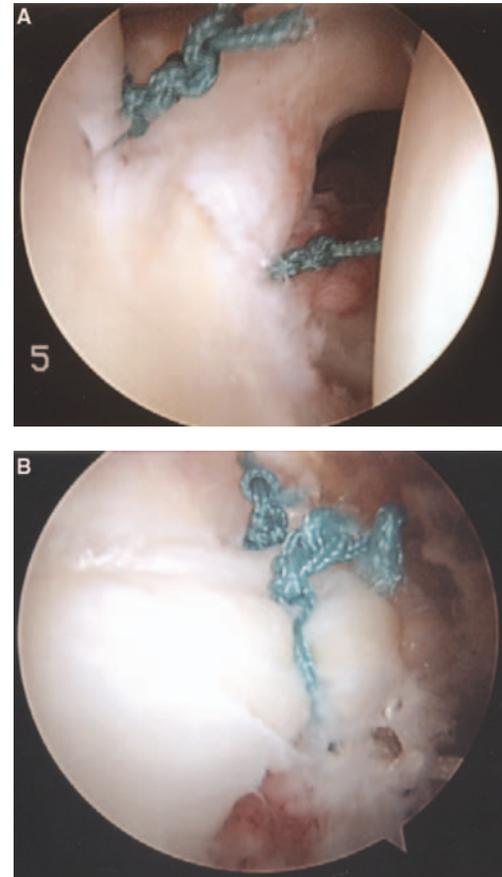


Figure 2. Arthroscopic photographs of combined superior labral anterior posterior (A) and rotator cuff (B) repairs.

Six patients had documented dislocations, and 2 had recurrent dislocations.

Of the 11 patients whose symptoms began with a fall, the average age was 51 years (range, 39-61). Five of these patients suffered a dislocation event. Of the 11 patients whose symptoms were sports related, the average age was 43 years (range, 31-56), with 1 patient suffering a dislocation. The 6 patients with insidious onset of symptoms had an average age of 53 years (range, 44-65) with no dislocations.

The predominant symptom in all patients was pain (30). The predominant physical examination findings were rotator cuff weakness (24), impingement (18), apprehension (10), and positive active compression (10).

Intraoperative Findings

Examination under anesthesia was documented in 26 of 30 patients. The 4 omitted patients were in the SLAP group. Eight patients had no evidence of abnormal laxity (6 SLAP and 2 Bankart). Eighteen patients had grade 1+ to 2+ increased anterior laxity (4 SLAP and 14 Bankart). On arthroscopic evaluation of the shoulder, 26 patients had full-thickness rotator cuff tears and 4 patients had partial-thickness tears that involved more than 50% of the

TABLE 1
Average Clinical L'Insalata and ASES Scores^a

Group (No. of Patients)	L'Insalata	ASES
Bankart (16)	95.0	95.8
SLAP (14)	88.3	91.9
Overall (30)	92.9	94.3

^aASES, American Society of Shoulder and Elbow Surgeons; SLAP, superior labral anterior posterior.

footprint and required formal takedown and repair. Sixteen patients had anterior labral tears. Thirteen of 14 SLAP tears were grade II and 1 was a grade III based on the classification system by Snyder et al.²¹ Additional arthroscopic procedures performed at the time of surgery included subacromial decompression (30), distal clavicle resections (3), biceps tenodesis (2).

Postoperative Outcomes

At a mean of 2.7 years (range, 24-54 months), 30 patients completed the questionnaires and physical examination.

TABLE 2
Average Range of Motion Preoperatively Versus Postoperatively^a

Group	Direction	Preoperative	Postoperative	Mean Difference	P Value
Overall	FF	148	168	20.5	.005
	ER	67	76	9.0	.008
	IR	10.7 (T11)	8.7 (T9)	-2.0 ^b	.016
Bankart	FF	139	173	33.1	.0014
	ER	64	78	14.1	.0001
	IR	10.8 (T11)	8.1 (T8)	-2.7 ^b	.0007
SLAP	FF	159	164	5.0	.54
	ER	71	74	2.7	.54
	IR	10.5 (T11)	9.5 (T10)	-1.0 ^b	.09

^aFF, forward flexion; ER, external rotation; IR, internal rotation.

^bA negative number indicates that nonoperated shoulder had on average greater internal rotation.

TABLE 3
Average Range of Motion in the Affected Extremity Compared With the Contralateral Nonoperated Shoulder^a

Group	Direction	Operated Shoulder	Nonoperated Shoulder	Mean Difference	P Value
Overall	FF	168	176	7.4	.067
	ER	76	83	7.4	.101
	IR	8.7 (T9)	8.0 (T8)	-0.7 ^b	.343
Bankart	FF	173	178	5.9	.098
	ER	78	82	4.0625	.204
	IR	8.1 (T8)	7.6 (T8)	-0.5 ^b	.578
SLAP	FF	164	173	9.2	.229
	ER	74	85	11.5	.231
	IR	9.5 (T10)	8.5 (T9)	-1.0 ^b	.445

^aFF, forward flexion; ER, external rotation; IR, internal rotation.

^bA negative number indicates that nonoperated shoulder had on average greater internal rotation.

The mean L'Insalata and ASES scores for all patients were 92.9 and 94.3, respectively (Table 1). The average L'Insalata scores for the Bankart and SLAP groups were 95.0 and 88.3, respectively. The average ASES scores for the Bankart and SLAP groups were 95.8 and 91.9, respectively. Comparing the L'Insalata and ASES scores for the Bankart versus SLAP groups revealed no statistical significance ($P = .33$ and $.68$, respectively).

The average L'Insalata and ASES scores for the fall group were 96.7 and 94.3 and for the sport group 92.6 and 94.8, respectively. The average L'Insalata and ASES scores for the insidious onset group were 87.0 and 92.9, respectively.

Average overall preoperative range of motion in the affected extremity for all patients was 148° of forward flexion (range, 60°-180°), 67° of external rotation at the side (45°-90°), and internal rotation to T11 (T5-L4) (Table 2). Postoperatively motion improved to 168° of forward flexion (100°-180°), 76° of external rotation (50°-90°), and internal rotation to T8 (T5-L3). Significant improvements in forward flexion (20.5°, $P = .005$), external rotation (9.0°, $P = .008$), and internal rotation (2 vertebral levels, $P = .016$) were observed.

In the Bankart group, preoperative range of motion was 139° (range, 60°-170°) of forward flexion, 64° of external rotation (45°-80°), and internal rotation to T11 (T5-L3).

Postoperative range of motion improved to 173° of forward flexion ($P = .0014$) (120°-180°), 78° of external rotation ($P = .001$) (55°-90°), and internal rotation to T8 ($P = .006$) (T5-L1). Preoperative motion in the SLAP group was 159° of forward flexion (100°-180°), 71° of external rotation (45°-90°), and internal rotation to T11 (T5-L4). Postoperative motion improved to 164° of forward flexion ($P = .5$) (100°-180°), 74° of external rotation ($P = .5$) (50°-90°), and internal rotation to T10 ($P = .08$) (T5-L3).

Range of motion in the contralateral, unaffected extremity was 176° of forward flexion (120°-180°), 83° of external rotation (55°-90°) at the side, and internal rotation to T8 (T5-L1). Comparing range of motion overall in the affected extremity postoperatively versus range of motion in the contralateral normal extremity, we found no statistical differences in forward flexion ($P = .067$), external rotation ($P = .101$), or internal rotation ($P = .343$) (Table 3). Preoperative versus postoperative ranges of motion between the fall, sport, and insidious onset groups are listed in Table 4.

Twenty-seven patients (90%) reported their satisfaction as good to excellent, and 23 of 30 (77%) patients returned to their preinjury level of athletics. The activities included golf (7), weight lifting (4), tennis (3), skiing (3), running (3), rugby (1), amateur baseball (1), and professional dancing (1). Nine of 11 (81.8%) patients with sports-related injuries

TABLE 4
Range of Motion Preoperatively Versus Postoperatively
in the Fall, Insidious Onset, and Sport Groups^a

Group	Direction	Preoperative	Postoperative
Fall	FF	141	172
	ER	62	75
	IR	T11	T9
Insidious	FF	160	170
	ER	76	78
	IR	T9	T9
Sport	FF	149	163
	ER	67	76
	IR	T11	T8

^aFF, forward flexion; ER, external rotation; IR, internal rotation.

returned to preinjury level of athletics. No patient had an episode of recurrent dislocation, instability, or apprehension. Two patients had recurrent tears of the rotator cuff; 1 suffered a repeat tear of the rotator cuff when attempting to lift several heavy bags of trash at 3 years from surgery and the other during a physical altercation 2.5 years postoperatively. One patient had a nonpainful shoulder click. Six patients had weakness of abduction, all with 4 out of 5 muscle strength (4 in the Bankart group and 2 in the SLAP group). There was no difference in outcome based on type of implant used.

DISCUSSION

Several studies have reported combined lesions of the labrum and rotator cuff at the time of arthroscopy; however, this group of patients is often excluded from the results (Refs, 1,4,14,16,18,24; W. B. Stetson et al, unpublished data, 1998). Therefore, the outcomes of patients with combined lesions of the rotator cuff and labrum have not been extensively reported. To our knowledge, this is the first study evaluating clinical outcomes after arthroscopic treatment of combined cuff and labral injury.

Limitations of this work include the inherent weakness in retrospective cohort studies. A standardized grading scheme for the intraoperative findings was not used. Finally, no soft tissue imaging techniques were used to objectify the integrity of the repairs.

There is no literature to guide surgeons on the outcomes of arthroscopic treatment of combined labral and cuff tears. Goldberg et al⁶ reported a series of 6 elite rugby union and rugby league footballers who were seen with shoulder instability and large rotator cuff tears. They were treated with a 2-stage procedure: an open rotator cuff repair followed by open shoulder stabilization 10 weeks later. All had successful outcomes. We found a 90% good to excellent clinical result and a 77% return to sport rate in our cohort at an average 2.7-year follow-up. In addition, we found no differences in the range of motion between the affected and the contralateral shoulders at this follow-up. There were 2 patients (7%) with clinical retears of the rotator cuff but no clinical failures of the labral repairs.

In comparing our results of combined rotator cuff and labral lesions, we found that the Bankart group averaged 95.0 on the L'Insalata survey and 95.8 on the ASES survey. The SLAP group averaged 88.3 on the L'Insalata survey and 91.9 on the ASES survey. Other studies have shown similar results in the treatment of isolated lesions. Youm et al²⁶ reported results of arthroscopic versus mini-open rotator cuff repairs with ASES scores averaging 91.1 for the arthroscopic group and 90.2 for the mini-open group ($P > .05$). Carreira et al¹ prospectively reported 90% excellent or good results and average ASES scores of 92 postoperatively in patients treated arthroscopically for isolated Bankart lesions for anterior instability. Sperling et al²³ recently reported results when comparing open and arthroscopic repair of Bankart lesions in patients aged 50 or greater. The mean ASES score was 98 in the open group versus 87 in the arthroscopic group.

Cohen et al² reported an overall patient satisfaction of 71% in 33 patients at a mean follow-up of 3.7 years after the treatment of type II SLAP lesions repaired arthroscopically using a bioabsorbable device. Average L'Insalata scores were 86.7 at an average of 3.7 years. Another case series by Samani et al¹⁹ reported ASES scores postoperatively of 92 in 25 patients using an absorbable tack to repair type II SLAP lesions. As opposed to Cohen et al and Samani et al, who performed repairs through an intact rotator cuff, the SLAP tears in our study were repaired through a defect in the rotator cuff. Although the SLAP group did not show statistically significant improvements in preoperative versus postoperative range of motion, the SLAP group had maintained good shoulder motion preoperatively and thus had a narrower margin on which to improve.

Patients with combined rotator cuff and labral tears in this study had an average age of 48 years. This is an older age group than reported in most studies of SLAP and Bankart repairs and a younger group than reported in most studies of arthroscopic cuff repairs.^{2,5,7,8,9,11,15,17,20,22,26} We do not have an epidemiologic reason for the preponderance of women in this study. The patients in this study all had pain as a primary symptom. In 80% of these patients, the findings were rotator cuff weakness or positive impingement signs, 33% of patients had positive apprehension, and only 6% of patients had recurrent instability. Finally, 33% of patients had a positive active compression (O'Brien's test), and 80% of patients had an acute, traumatic event associated with their symptoms. This clinical information is useful in identifying this patient population; patients are typically younger than those with degenerative rotator cuff disease and have shoulder pain, impingement symptoms, variable labral signs, and often a history of shoulder trauma. Therefore, we were more likely to address the labral injury in these patients, whereas it may not be necessary in the older patient.

When lesions of the labrum and rotator cuff occur concomitantly, arthroscopic repair of both lesions will restore range of motion and stability and provide good clinical results in the short term. Range of motion was restored despite the use of a longer, more restricted postoperative rotator cuff protocol as opposed to a shorter, less restricted rehabilitation protocol for isolated labral lesions. Further

prospective studies with long-term follow-up are currently being performed to substantiate these initial encouraging results.

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