Sports Activity After Arthroscopic Superior Labral Repair Using Suture Anchors in Overhead-Throwing Athletes

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Purpose: To evaluate the results of arthroscopic repair of type II superior labral anterior posterior lesions of the shoulder in overhead athletes.

Hypothesis: Such repair is useful for overhead athletes in terms of postoperative sports activity.

Study Design: Case series; Level of evidence, 4.

Methods: The study group was composed of 40 patients with a mean age of 24 years (range, 15-38 years); mean follow-up was 41 months (range, 24-58 months). They were divided into an overuse (n = 22) and a trauma group (n = 18). The authors used 2 suture anchors loaded with a nonabsorbable suture at the 11-o'clock and 1-o'clock positions through the anterosuperior and lateral trans–rotator cuff portal. A modified Rowe score and postoperative athletic activities were evaluated.

Results: After arthroscopic repair, mean modified Rowe scores improved from 27.5 to 92.1 points ($P < .0001$). Rated on this scale, the results were excellent in 30 (75%), good in 6 (15%), and fair in 4 (10%) athletes; there were no poor results. Satisfactory outcomes were achieved in 36 (90%) of these patients; 30 (75%) experienced a return to the preinjury level. The complete return rate of baseball players in the overuse group was lower than that of other overhead athletes in the trauma group.

Conclusion: Arthroscopic superior labral repair is a safe and reliable procedure in overhead athletes.

Keywords: superior labral lesion; type II superior labral anterior posterior (SLAP) lesion; arthroscopic repair; suture anchor; overhead athletes

In 1985, Andrews et al[1] first described labral injuries in throwing athletes, and in 1990, Snyder et al[29] portrayed the superior labral anterior posterior (SLAP) lesion. It represents an injury to the superior labrum that begins posteriorly and extends anteriorly, and it often includes the origin of the biceps tendon. The superior glenoid labrum and the long head of the biceps contribute to the stability of the glenohumeral joint.[2,10,15,17,23,25] A SLAP lesion can occur as a result of traumatic or overuse injuries.[1,16,19,20,28,29] Associated injuries include rotator cuff tears, chondral lesions, and instability of the glenohumeral joint.[8,12,16,19,20,28,29]

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The SLAP lesion has been classified into 4 types.[29] Type I is a degenerative tear of the superior labrum with an intact labral and biceps anchor. Type II is a detachment of the superior labrum along with the biceps anchor; therefore, the biceps-labral complex is unstable. Type III is a bucket-handle tear of the superior labrum with an intact biceps tendon anchor. Type IV is a bucket-handle tear of the superior labrum with extension into the biceps tendon and flapping of the displaced labrum into the joint. The tear that consists of a detached superior labrum tear and a bucket-handle tear[29] is more complex than had been thought.[19] Although good results have been reported with debridement alone for type I and type III lesions, surgical repair is preferable for type II lesions when the biceps anchor is unstable. Cordasco et al[4] reported that arthroscopic debridement of type II lesions was not effective; their success rate was 78% at 1-year follow-up, 63% at 2 years, and 45% at 3 years.

Although the successful arthroscopic repair of type II SLAP lesions has been reported,[7,20,24,27,33] its effect on postoperative athletic activity in overhead sports remains

controversial. Morgan et al[20] reported that 37 (84%) of 44 baseball pitchers returned to their preinjury levels of activity after such a repair. On the other hand, of 18 overhead athletes treated by Kim et al,[16] only 4 (22%) returned to their same level of competitiveness in their sport.

In 1998, we began a prospective study of the outcomes of arthroscopic repair of type II SLAP lesions in a cohort of consecutive patients who engaged in overhead sports. Through the anterosuperior and lateral trans–rotator cuff portal, we placed 2 absorbable suture anchors loaded with a No. 2 nonabsorbable polyester suture at the 11-o'clock and 1-o'clock positions on the glenoid surface. This study examines the results of this procedure performed by one of the authors (J.I.) at our institution.

TABLE 1
Preoperative Sports Activities of the 40 Patients

Sport	No. of Patients
Baseball	19
Handball	5
Volleyball	4
Basketball	3
Softball	3
Racquetball	2
Goalkeeping	2
Swimming	2
Total	40

PATIENTS AND METHOD

Patient Selection

The 2 inclusion criteria for the study were arthroscopic confirmation of superior detachment of the glenoid labrum and regular participation in overhead sports. Excluded were patients with an associated lesion such as a significant partial-thickness (grade 2 or 3 according to Ellman[6]) or full-thickness tear of the rotator cuff, a Bankart lesion, a partial tear or subluxation of the long head of the biceps tendon,[8] or acromioclavicular joint arthritis; patients with a grade 1[6] partial-thickness tear of the rotator cuff were included. Between 1998 and 2001, we treated 41 patients (41 shoulders) who fit the inclusion and exclusion criteria with arthroscopic suture repair. As 1 patient was lost to follow-up, the study population was composed of 40 patients (40 shoulders) who were followed up for a mean of 41 months (range, 24-58 months). There were 7 female and 33 male patients; their mean age was 24 years (range, 15-38 years). In 36 patients, there was involvement of the right shoulder; in 38 patients, there was involvement of the dominant arm. The sports in which the patients engaged are listed in Table 1; 36 participated in competitive and 4 in organized recreational sports. Eighteen patients had a history of significant trauma; the other 22 did not recall any specific trauma.

All patients complained of shoulder pain that was aggravated by overhead activity. Thirty-four patients had maximal pain at the cocking phase of throwing, 4 patients at the follow-through phase, and 2 patients at both phases. A painful click was noted in 3 patients. The mean duration of symptoms was 10 months (range, 4-36 months). All patients wanted to return to athletic activities; however, their performance was limited by the shoulder pain. All patients provided written informed consent stating that they understood the purpose of the study as well as the potential risks and benefits of the operation.

Preoperative Physical Examination

Physical examination consisted of measurement of the range of motion and manual muscle strength, the active compression test,[22] the anterior apprehension test, the Speed test,[5] and the Yergason test.[32] Thirty-eight patients had a positive active compression test result. All patients had a negative anterior apprehension test result, but 37 reported pain in the anterior apprehension test position.

Radiographic Evaluation

Radiographs were obtained of all shoulders; they were AP in adduction and abduction, as well as external rotation, axillary (West Point), and scapulolateral. Thirty-nine patients had undergone MRI study with intra-articular contrast medium[18]; in the remaining patient, MRI was performed without contrast. The diagnosis of superior labral tear was based on the detection of accumulated contrast medium or increased signal intensity between the superior portion of the labrum and the superior portion of the glenoid fossa. All patients had documented evidence of a detached superior labrum. No patients had a bony Bankart or a Hill-Sachs lesion.

Examination Under Anesthesia

The shoulder was examined for anterior, posterior, and inferior translation. Inferior translation was measured by applying a distraction force to the adducted shoulder and measuring the amount of movement of the humeral head by estimating the acromiohumeral distance.[9] This distance was more than 2 cm in both shoulders of 3 patients. Anterior translation and posterior translation were evaluated with the shoulder abducted from 0° to 90° and held in the plane of the scapula with the humerus externally rotated from 60° to 90°. An axial load was applied down the humeral shaft with one hand while the other hand applied an anterior or posterior drawer.[9] None of the study subjects showed anterior or posterior subluxation of the humeral head.

Arthroscopic Evaluation

At the time of arthroscopy, the joint was inspected for evidence of substantial articular injury and concomi-

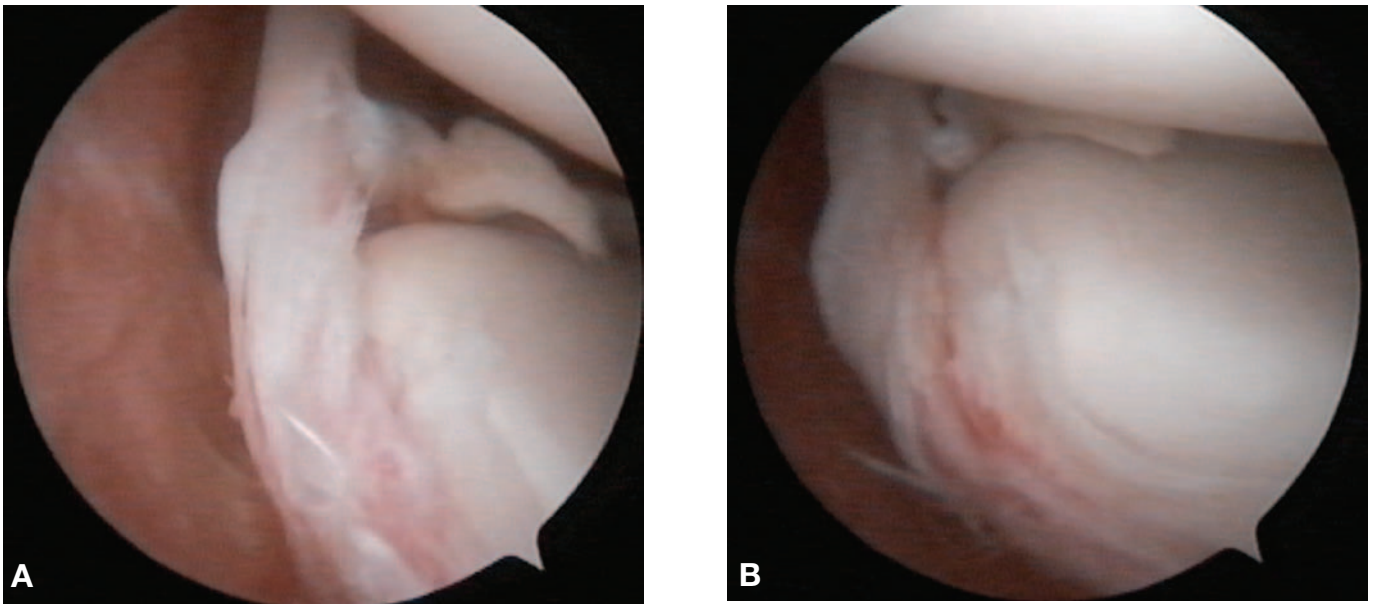

Figure 1. A, arthroscopic view of the right shoulder from the posterior portal, showing the superior labral lesion at 40° of abduction in 0° external rotation position. B, arthroscopic view of the right shoulder from the posterior portal, showing that the superior labrum was detached and peeled back at 90° of abduction in 90° external rotation position.

tant injury of the biceps origin, glenoid labrum, or rotator cuff. We carefully looked for normal variations in the glenohumeral ligaments labrum complex,[13] for example, a sublabral foramen or a cord-like middle glenohumeral ligament. It was considered normal when the superior sublabral sulcus was covered with articular cartilage up to 5 mm medially beneath the superior labrum. The final diagnosis of a detachment of the superior labrum was based on arthroscopic findings. A superior labral tear was defined as the separation between the articular cartilage margin of the glenoid and the attachment of the superior portion of the labrum and biceps anchor when tension was applied to the long head of the biceps tendon. All patients had a detachment of the superior labrum. The presence of the peel-back phenomenon[3] of a detached superior labrum at dynamic arthroscopy in the abduction and external rotation positions was noted in the majority of patients (Figure 1). Thirty patients had grade 1 partial-thickness articular-side rotator cuff tears, which were located at the insertion of the supraspinatus tendon in most of these patients. Intra-articular impingement between the posterosuperior glenoid and the supraspinatus insertion at dynamic arthroscopy in the 90° abduction and external rotation positions was also seen in most of the patients. All partial-thickness tears were debrided arthroscopically.

Arthroscopic Procedure

The patient was placed in the lateral decubitus position on a beanbag so that the trunk was tilted approximately 20° posteriorly. A shoulder distraction device (3-point shoulder distraction system, Arthrex Inc, Naples, Fla) and an arthroscopy pump (Continuous Wave 2 arthroscopy pump, Arthrex) were used. Posterior, anterosuperior, and lateral trans–rotator cuff portals were created (Figure 2). The posterior portal was made approximately 2 cm inferior and 2 cm medial to the acromial angle. The anterosuperior portal was placed just inferior to the leading edge of the superior glenohumeral ligament. The lateral trans–rotator cuff portal was placed just lateral to the acromion.[20,21] A small-diameter cannula (5.0 mm) was inserted into the lateral portal; a large-diameter threaded cannula (8.0 mm) was placed in the anterosuperior portal.

Diagnostic arthroscopy was performed through the posterior and anterosuperior portals. The fibrous tissue between the superior portion of the labrum and the glenoid was debrided, and the superior portion of the labrum was removed from the superior portion of the glenoid neck with a shaver or an arthroscopic rasp. The glenoid neck was lightly decorticated with a high-speed bur.

The first hole was drilled at the edge of the glenoid articular surface at the 11-o'clock position through the lateral portal at an angle of approximately 45° to the articular surface as viewed from the posterior portal (Figure 3). The suture anchor (Panalok, Mitek, Johnson & Johnson, Norwood, Mass) loaded with a No. 2 nonabsorbable polyester suture (Ethibond Excel, Ethicon, Somerville, NJ) was inserted into the drilled hole through the lateral portal. This anchor was tested by pulling on the suture. A suture hook loaded with a shuttle relay (Linvatec Inc, Largo, Fla) was inserted through the anterosuperior portal, piercing the posterosuperior labrum at the base of the biceps tendon. The shuttle relay was retrieved through the lateral portal with grasper forceps. A No. 2 Ethibond suture was fed into the eyelet of the shuttle relay and

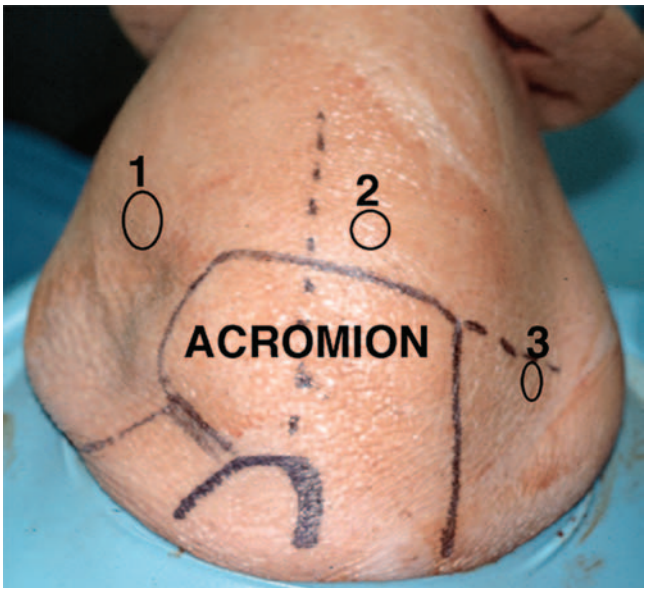

Figure 2. Portal placement. 1, anterosuperior portal; 2, lateral trans–rotator cuff portal; 3, posterior portal.

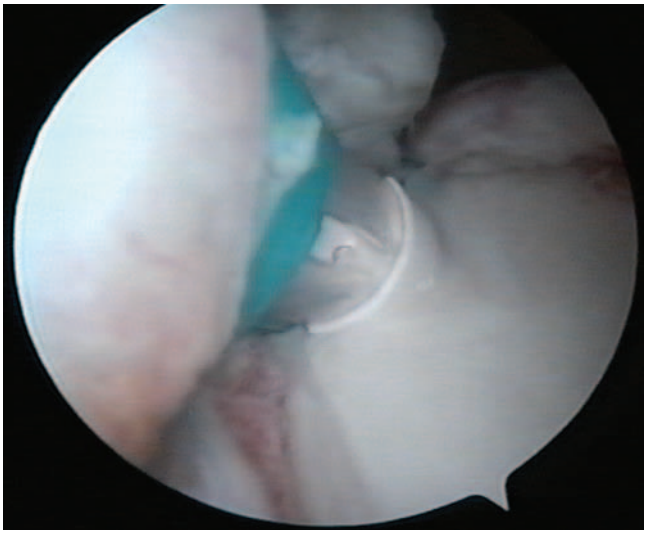

Figure 3. Arthroscopic view of the right shoulder from the posterior portal, showing suture anchor insertion to the posterosuperior glenoid at the 11-o'clock position through the lateral trans–rotator cuff portal.

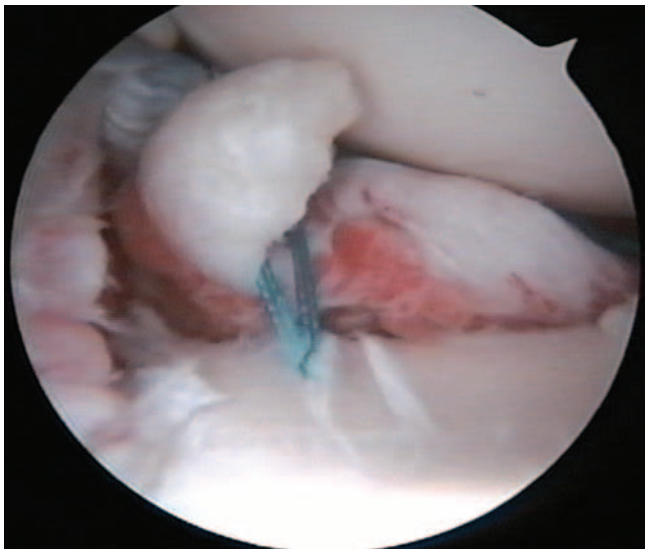

Figure 4. Arthroscopic view of the right shoulder from the posterior portal, showing sutures of the anchor at the 1-o'clock position. Note the complex lesion of a detached superior labrum and a tear of the superior labrum with extension into the long head of the biceps tendon.

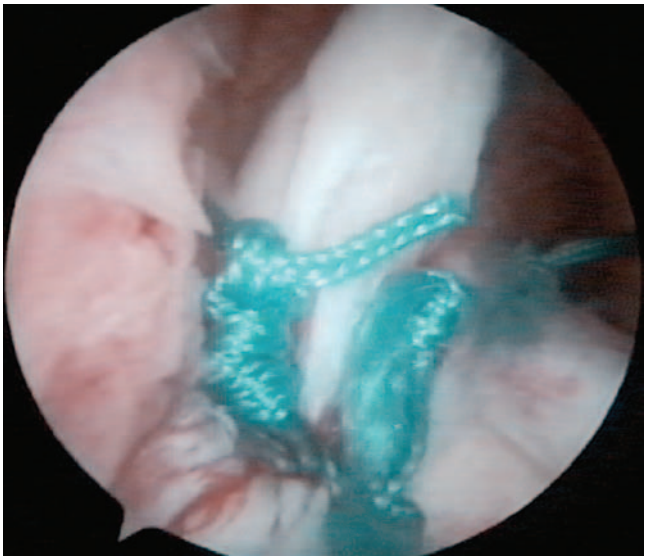

Figure 5. Arthroscopic view of the right shoulder from the posterior portal, showing complete repair of the superior labral lesion with use of 3 suture anchors at the 10-, 11-, and 1-o'clock positions.

pulled out through the lateral portal; then a Duncan loop sliding knot backed with alternating-post half-hitches was made.

The second hole was drilled at the edge of the glenoid articular surface at the 1-o'clock position through the anterosuperior portal in the same manner. The suture anchor was inserted into the drilled hole through the anterosuperior portal (Figure 4). A suture hook loaded with a shuttle relay was inserted through the anterosuperior portal, piercing the anterosuperior labrum at the base of the biceps tendon. The shuttle relay was retrieved through the lateral portal with grasper forceps. A No. 2 Ethibond suture was fed into the eyelet of the shuttle relay and pulled out through the lateral portal; then a Duncan loop sliding knot backed with alternating-post half-hitches was made. Once the repair was complete, the suture was carefully tested using a probe. Additional suture anchors were used as needed (Figure 5).

TABLE 2
Modified Rowe Grading System[a]

Category	Points
Function, 50 points	
No limitation in sports or work; able to throw baseball and football	50
No limitation in work; slight limitation in throwing baseball, serving forcefully in tennis; can throw football normally	35
Moderate limitation in overhead work, throwing baseball and football, or serving in tennis	20
Marked limitation in throwing and in all sports; unable to work overhead	0
Pain, 10 points	
None	10
Moderate	5
Severe	0
Active compression test and anterior apprehension test, 30 points	
Negative result	30
Negative result but pain with arm in abduction and externally rotated position	15
Positive active compression test result or positive anterior apprehension test result	0
Motion, 10 points	
Full range of motion	10
As much as 25% loss of motion in any plane	5
More than 25% loss of motion in any plane	0

[a]Excellent, 90 to 100 points; good, 70 to 89 points; fair, 40 to 69 points; poor, 39 points or less.

Postoperative Management

For the first postoperative week, the patients wore a shoulder immobilizer with their arms in internal rotation. For the next 2 weeks, they were instructed to perform elevation and external rotation exercises to 90° and 0°, respectively. The patients wore an immobilizer or sling for the first 3 weeks when they were not performing the exercises. Sling removal was permitted for bathing. As the immediate postoperative pain subsided, external and internal rotation-strengthening exercises[14] were initiated with the use of resistance tubing. After 4 weeks, the patients began progressive range of motion exercises and strengthening of the rotator cuff and the scapular stabilizers.[14] Four months after the operation, a sport-specific exercise program was begun. Full return to throwing sports was allowed after 6 months.

Clinical Assessment

The clinical assessment consisted of a structured interview, a detailed physical examination, and evaluation using the modified scoring system of Rowe and Patel[26] (Table 2). The modified Rowe scoring system assigns 50 points for function, 30 points for the active compression and anterior apprehension test, 10 points for pain, and 10 points for motion. The clinical results were classified as excellent when the modified Rowe score was 90 to 100 points, good when it was 70 to 89 points, fair when it was 40 to 69 points, and poor when it was less than 40 points.

All patients were evaluated by an examiner who was not the surgeon. Physical examination consisted of evaluation by the active compression and anterior apprehension test, measurement of the range of motion with a goniometer, and a manual muscle strength test.

The patients' return to their previous sports and the level of their postoperative athletic activities were investigated. We divided postoperative athletic activities into 4 grades according to shoulder function, pain, range of motion, and return to sports. Grade 0 represented no limitation on sports activities and a complete return to the patient's previous sport without loss of motion in any plane; the patient had no pain while playing sports but experienced occasional discomfort after these activities. Grade 1 represented a return to the previous sport at a lower level of competitiveness with less than a 10% loss of motion in any plane; the patient had no pain while playing sports but suffered discomfort thereafter. Grade 2 meant that the patient returned to the previous sport at a lower level with a 10% to 20% loss of motion in any plane; the patient had occasional pain while playing sports. Grade 3 meant that the patient could not return to the previous sport because of constant pain while playing sports or because of marked limitation of throwing due to restricted range of motion. Grades 0 and 1 were classified as satisfactory results, and grades 2 or 3 were classified as unsatisfactory.

Patient Demographics

Patients were classified into 2 groups: those without a history of trauma (overuse group, n = 22) and those with a history of trauma (trauma group, n = 18). Patient demographics are shown in Table 3. Age, gender, number of injured dominant extremities, and preoperative mean modified Rowe scores were not significantly different between the 2 groups. The percentage of baseball players in the overuse group was significantly higher than that in the trauma group (χ^2 test, $P = .0038$). The duration of symptoms in the overuse group was significantly longer

TABLE 3
Patient Demographics Grouped by Type of Injury

Characteristic	Overuse Group	Trauma Group	*P*
No. of patients	22	18	
Age, y[a]	25 (15-35)	23 (15-38)	>.05
Gender (male/female)	19/3	14/4	>.05
Injured arm (dominant/nondominant)	22/0	16/2	>.05
No. of baseball players/other overhead sports	15/7	4/14	.0038
Duration of symptoms, mo[a]	12.1 (7-36)	7.6 (4-12)	<.05
Preoperative modified Rowe score, points[a]	29.2 (15-55)	24.8 (10-55)	>.05
Type of superior labral lesion[b]			.0465
Type II	22	15	
Complex of types II and III	0	2	
Complex of types II and IV	0	1	
Partial articular-side rotator cuff tear (grade 1[c])	18	12	>.05

[a]The values are given as the mean (range).
[b]Classification of Snyder et al.[29]
[c]Classification of Ellman.[6]

than that in the trauma group (unpaired *t* test, $P < .05$). In reference to arthroscopic findings, complex lesions such as a combination of type 2 and type 3, or type 2 and type 4, were observed only in the trauma group. The incidence of grade 1 partial-thickness articular-side rotator cuff tear was not significantly different between the 2 groups.

The patients were further classified into baseball players (n = 19) and other overhead athletes (n = 21). Accordingly, there were 4 groups: baseball players in the overuse group (n = 15) and in the trauma group (n = 4) and other overhead athletes in the overuse group (n = 7) and in the trauma group (n = 14).

Statistical Analysis

Data were analyzed with the Statview program for the Macintosh (Abacus Concepts Inc, Berkeley, Calif). The paired *t* test was used for matched pairs. The differences in values between the 2 groups were analyzed with the unpaired *t* test. Multivariate analysis was done by a χ^2 test. A value of $P < .05$ was considered significant.

RESULTS

Clinical Results

Mean modified Rowe scores significantly improved from 27.5 points (range, 10-55 points) preoperatively to 92.1 points (range, 45-100 points) postoperatively (paired *t* test, $P < .0001$). According to the modified Rowe scale, 30 (75%) of the outcomes were excellent, 6 (15%) were good, 4 (10%) were fair, and none were poor.

Preoperative muscle strength and range of motion were not significantly different from those at the latest follow-up (paired *t* test, $P > .05$). Mean modified Rowe scores in the overuse group (90.2 points; range, 45-100 points) did not significantly differ from those of the trauma group (93.7 points; range, 70-100 points) (unpaired *t* test, $P > .05$).

Active Compression Test and Anterior Apprehension Test

At the latest follow-up, all patients had a negative anterior apprehension test result, but 2 patients had pain in the anterior apprehension test position. Two other patients had pain in the anterior apprehension test position and a positive active compression test result.

Return to Sports and Postoperative Athletic Activities

Thirty-eight (95%) of the 40 patients returned to their previous sports. Thirty-six (90%) patients with grade 0 or 1 were classified as satisfactory. Grade 0 was obtained in 30 (75%) of 40 patients, grade 1 in 6 patients (15%), grade 2 in 2 patients (5%), and grade 3 in 2 patients (5%).

Table 4 shows the level of postoperative sports activity in each group. Grade 0 was obtained in 60% (9/15) of the baseball players in the overuse group, in 71% (5/7) of other overhead athletes in the overuse group, 75% (3/4) of the baseball players in the trauma group, and 93% (13/14) of the other overhead athletes in the trauma group. The percentage of grade 0 among baseball players in the overuse group was significantly lower than that in the other overhead athletes in the trauma group (χ^2 test, $P = .0388$). There was no significant difference between any of the other groups (χ^2 test, $P > .05$).

Analysis of Unsatisfactory Results

The results in 4 patients with grade 2 or 3 were classified as unsatisfactory. All 4 rated fair on the modified Rowe scale. There were 2 baseball pitchers, 1 volleyball player who played the offensive position, and 1 handball player. All were in the overuse group. Two patients could not return to their previous sports. At the latest follow-up, they had a positive active compression test result in addition to pain in the anterior apprehension test position. Two

TABLE 4
Level of Postoperative Athletic Activity
Grouped by Type of Injury

	No. of Patients				
Group	Grade 0	Grade 1	Grade 2	Grade 3	Total
Overuse					
Baseball players	9	4	1	1	15
Other overhead athletes	5	0	1	1	7
Trauma					
Baseball players	3	1	0	0	4
Other overhead athletes	13	1	0	0	14
Total	30	6	2	2	40

other patients reported pain in the anterior apprehension test position.

Complications

There were no intraoperative complications related to the arthroscopic procedure with regard to axillary nerve injury, suprascapular nerve injury, compartment syndrome, or infection. No neurologic compromise was detected in the patients at the latest follow-up.

DISCUSSION

According to previous studies, athletic activity in overhead sports after arthroscopic type II SLAP repair has been inconsistent. Pagnani et al[24] reported that 12 (92%) of 13 overhead athletes were able to return to full preinjury function after a repair using an absorbable tack. Morgan et al[20] reported that 37 (84%) of 44 baseball pitchers returned to their preinjury levels of activity after the repair using suture anchors through the anterosuperior and lateral portals. On the other hand, O'Brien et al[21] reported that only 16 (44%) of 31 patients returned to their preinjury levels of sports after this repair using an absorbable tack through the trans–rotator cuff portal. Kim et al[16] reported that only 4 (22%) of 18 overhead athletes returned to their sports at the same level of competitiveness after such a repair using a suture anchor through the anterosuperior portal. In the present study, a mean follow-up period of 41 months showed 36 (90%) of the 40 patients achieved results classified as satisfactory, with 30 (75%) returning to the same level of competitiveness. We prefer to place 2 suture anchors loaded with a No. 2 nonabsorbable polyester suture at the 11-o'clock and 1-o'clock positions through the anterosuperior and lateral trans–rotator cuff portal for the repair of the type II SLAP lesions because it is relatively easy to position and provides secure suture repair. When necessary, we were able to easily place additional suture anchors at the 10-o'clock position through the lateral trans–rotator cuff portal. Arthroscopic suture repair of the posterosuperior labrum at the 11-o'clock position may be important for successful repair of type II lesions. The tendon fibers of the long head of the biceps continue posteriorly as periarticular fiber bundles,[11,30] and the posterosuperior glenoid labrum sustains traction and compression forces during the throwing motion that include the peel-back mechanism[3] and internal impingement.[31] Traditionally, a posterior portal is used to visualize the labrum, and an anterosuperior or anteroinferior portal, through the rotator interval, is used for repair of the lesion. These portals limit access to the more posterosuperior aspect of the glenoid labrum and usually do not allow placement of the suture anchors posterior to the biceps anchor. The posterosuperior glenoid cannot be adequately approached through the anterosuperior portal because the angle of this approach is almost parallel to the bone surface, precluding proper suture anchor placement. Morgan et al[20] and O'Brien et al[21] also recommended the use of the lateral trans–rotator cuff portal for secure fixation of type II lesions.

Morgan et al[20] classified type II SLAP lesions into anterior, posterior, and combined anterior and posterior lesions. They suggested that SLAP lesions with a posterior component develop posterosuperior instability, which manifests itself by a secondary anteroinferior pseudolaxity that can be evaluated as a drive-through sign; they also suggested that chronic superior instability leads to rotator cuff tears which begin as partial-thickness articular-side tears. Our study suggested that anteroinferior instability is not a part of the pathophysiology of pain experienced by overhead athletes in the early stages. Rather, it supported the hypotheses of those who suggest that the SLAP lesion is the main culprit in the pain suffered by throwing athletes. A grade 1 partial-thickness articular-side rotator cuff tear, located at the insertion of the supraspinatus tendon, was found in 30 (75%) of 40 patients. This finding suggests that type II SLAP lesions were caused by internal impingement[31] between the posterosuperior glenoid and supraspinatus tendon insertion in addition to the anterior translation of the humeral head or anteroinferior pseudolaxity during the late cocking phase of throwing. Eccentric traction on the long head of the biceps tendon during the deceleration phase[1] and the peel-off of the posterosuperior labrum during the cocking phase[3] may also play a role in the genesis of type II SLAP lesions.

In our series, type II SLAP lesions resulted from a single traumatic incident in 18 (45%) of 40 patients and from repetitive overhead motion such as throwing in 22 (55%). The complete return rate of baseball players in the overuse group (60%, 9/15) was significantly lower than that of the other overhead athletes in the trauma group (93%, 13/14). Nevertheless, the incidence of the grade 1 partial-thickness articular-side rotator cuff tear was not significantly different between these subgroups. We performed arthroscopic treatment after at least 3 months of nonoperative treatment failed to be effective and MRI study detected a type II SLAP lesion. The mean duration of the symptoms in the overuse group (12.1 months; range, 7-36

months) was significantly longer than that of the trauma group (7.6 months; range, 4-12 months). Cumulative abnormality such as stretching of the capsule, including the inferior glenohumeral ligament,[25] might be more common in the overuse group than in the trauma group. Furthermore, baseball players, especially pitchers, must satisfy greater demands for precision, load transfer, and endurance than do the other overhead athletes. Based on these considerations, we postulate that this may account for the less favorable complete return rate of baseball players in the overuse group.

The present study has a number of weaknesses. Although our investigation was prospective and the evaluator was blinded, we had no control group for arthroscopic debridement or nonoperative treatment. Direct comparison of the results of the present study with those of previous studies is difficult because of the various rating systems used. Although the Rowe score was used for the evaluation of the results of arthroscopic type II SLAP repair in a previous study,[7] it was originally a scoring system for the unstable shoulder, and it does not include information on the patients' return to previous sports. We used a modified Rowe score in which the category of instability was deleted and that of active compression test was added. Furthermore, we divided the levels of postoperative athletic activities into 4 grades according to shoulder function, pain, range of motion, and return to sports. Although the double-suture anchors technique described in this study may provide more secure fixation for type II SLAP lesions than would the traditional single-suture anchor technique, a biomechanical investigation may be needed to test this suggestion.

In conclusion, arthroscopic repair of a superior labral lesion of the shoulder using a suture anchor technique is a reliable procedure with respect to shoulder function and postoperative sports activity in overhead athletes. However, baseball players in the overuse group who are considering this surgery should be warned about the probability of restriction and the reduced likelihood of their return to preoperative competitiveness.

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