Anterior Capsulolabral Reconstruction for Traumatic Recurrent Anterior Shoulder Dislocation

James Hale, M.D., Andrew S. Rokito, M.D., and Jamie Chu, M.D.

Abstract
The anterior capsulolabral reconstruction (ACLR) has been shown to yield satisfactory results predominantly in overhead athletes with atraumatic anterior shoulder instability. The purpose of this study was to assess the clinical results of patients who underwent ACLR for recurrent traumatic anterior shoulder dislocation. A retrospective review of 41 patients, mean age 29 (range: 16 to 55 years) who underwent ACLR for traumatic recurrent anterior shoulder dislocation was performed. All patients reported a traumatic anterior shoulder dislocation with subsequent recurrent instability. Seven patients had undergone previous shoulder stabilization surgery which had failed. The mean number of previous dislocations was 4.5 (range: 1 to 15). There were 31 males and 10 females, and the dominant arm was involved in 24 patients. In all cases, the capsulolabral complex was detached from the glenoid rim. The mean follow-up was 3.6 years (range: 15 to 80 months). All patients were evaluated by physical examination. The mean modified Rowe score was 93.6 (range: 65 to 100). There were 32 excellent, 5 good, 1 fair, and 2 poor results. Instability was eliminated in 38 patients (93%). Of 25 patients who engaged in recreational sports, all were able to return to their previous level of participation. One patient sustained a traumatic redislocation and underwent revision surgery. Two patients reported atraumatic recurrent subluxation with one requiring revision surgery due to persistent symptoms of instability. There was no loss of range of motion in comparison to preoperative values. Of the seven shoulders that had undergone previous surgery, all remain stable. These results indicate that a glenoid-sided capsulolabral reconstruction can restore shoulder stability in patients with recurrent traumatic anterior shoulder dislocation. Success rates comparable to those of other open anterior shoulder repair procedures can be achieved.

The treatment of anterior shoulder instability has been a controversial topic for several years which has broadened recently with the advent of arthroscopic stabilization. The evolution of open stabilization procedures has been well documented within the literature as well as have their results and complications. A number of different procedures are designed to prevent recurrent instability including anatomic and nonanatomic repairs. The anatomic repairs tend to address the detachment of the anterior inferior glenohumeral ligament from the anterior inferior labrum, the classical Bankart lesion. Nonanatomic repairs such as the Putti Platt and Magnusson Stack procedures seek to tighten the subscapularis tendon. These repairs have been able to address the paramount goal of recurrent instability, but when analyzed more closely such repairs have been fraught with complications and loss of function.

The anterior capsulolabral reconstruction was developed as an alternative repair designed to avoid excessive scarring and shortening of the subscapularis tendon, thereby maintaining range of motion. This procedure was used primarily to address instability in the overhead athlete. Jobe and colleagues reported good or excellent results in 92% of 25 skilled athletes with shoulder pain secondary to anterior glenohumeral instability whom failed to improve with conservative therapy and underwent an anterior capsulolabral reconstruction. Seventeen patients returned to their prior competitive level for at least 1 year. Montgomery and Jobe reported similar results using suture anchors instead of drill holes in thirty
one athletes with recurrent instability. Eighty-one percent of the patients returned to the same sport at the same level of competition. These investigators stated that this modification of the anterior capsulolabral reconstruction simplified the procedure and allowed a more aggressive early rehabilitation program with 97% good or excellent results. An essential aspect of this study was the maintenance of functional outcomes. There was an average loss of only 1° of external rotation with the shoulder in abduction.

The current literature on anterior capsulolabral reconstructions focuses on professional athletes and their ability to return to competitive sports. The purpose of this study was to evaluate both the success and functional outcomes of the anterior capsulolabral reconstruction in the treatment of recurrent anterior shoulder instability in the general population.

**Materials and Methods**

A total of 41 patients (age range: 16 to 55 years) underwent an anterior capsulolabral reconstruction between February 1996 and January 2000. All patients reported traumatic anterior shoulder dislocations with recurrent episodes (range: 1 to 15) of instability. Seven patients had undergone previous shoulder stabilization surgery which had failed. There were 31 males and 10 females, and the dominant arm was involved in 24 patients. A retrospective review was done evaluating duration of symptoms, number of previous dislocations, prior surgery, evidence of preoperative apprehension and relocation, and range of motion. A follow-up exam was performed to evaluate for recurrence of instability, as well as to evaluate functional outcome.

The duration of symptoms averaged 3.9 years, ranging from nine months to eleven years. The number of previous dislocations averaged 4.5, ranging from one to fifteen. Twenty-five of the patients considered themselves recreational athletes. There were no professional athletes included in the study.

On preoperative physical examination, all patients in this study had positive apprehension and relocation tests.8

Preoperative range of motion was assessed. Active forward elevation averaged 160°, and passive forward elevation averaged 168°. Average active external rotation in adduction measured 51°, and passive external rotation measured 59°. Average internal rotation was measured to T10.

Seven patients underwent a primary stabilization procedure at an outside institution before presentation. One patient had a Bankart repair, capsular shift, and subscapularis tendon plication. Four patients had Bankart repairs. One patient had a Putti Platt procedure performed, and the final patient had a Magnusson Stack procedure with an inferior capsular shift. All of these patients had repeated episodes of recurrent anterior glenohumeral dislocations after the primary procedure.

An examination under anesthesia followed by an anterior capsulolabral reconstruction was performed in all patients. All patients exhibited gross anterior instability during the exam under anesthesia.

The operative technique described by Jobe and modified by Montgomery and associates was used for each patient and all patients were operated on by the same surgeon (AR).5,7 The patients were positioned supine on the operating table with the arm supported by an armboard with two folded towels beneath the scapula for support. An anterior axillary approach was used with the incision along Langer’s lines extending from a point 2 to 3 cm distal and lateral to the coracoid process to the level of the axillary crease. The deltopectoral interval was developed, retracting the deltoid muscle and cephalic vein laterally, and the pectoralis major muscle medially. The conjoined tendon was retracted medially. The subscapularis was then split transversely in line with its fibers at the junction of the upper two thirds and lower one third of the tendon. The subscapularis was then dissected sharply off the underlying glenohumeral joint capsule. A modified Gelpi retractor was then used to maintain this interval, and a three-pronged retractor was placed medially on the glenoid neck. A horizontal anterior capsulotomy was then made in line with the split in the subscapularis tendon from the humeral insertion laterally to the anterior glenoid neck medially.

Stay sutures were then placed in the inferior and superior capsular flaps at the glenoid margin. A narrow humeral head retractor was then inserted in order to laterally retract the humeral head. Next the capsule was dissected subperiosteally to the level of the ten o’clock position superiorly, and to the six o’clock position inferiorly for a left shoulder, and for a right shoulder, this corresponded to the two o’clock and six o’clock position accordingly. The anterior glenoid neck was then rongeured to bleeding decorticated bone. Drill holes were then made near the glenoid rim at the nine, eight, and seven o’clock positions, for a left shoulder, and three, four, and five o’clock positions for a right shoulder. Suture anchors with No 2 braided nonabsorbable sutures (Mitek Surgical products, Norwood, MA) were then placed in corresponding drill holes. The first step is to shift the inferior capsular flap superiorly. The inferior flap is tied down with its corresponding sutures in a horizontal mattress fashion taking care to shift the capsule superiorly, and not medially. The stay sutures help in preventing over medialization of the capsule. Next, the superior flap is shifted inferiorly, overlapping and reinforcing the inferior capsular flap. The reconstruction consists of a medially-based double-layered capsule, which provides reinforcement at the site of previous instability. The shoulder was then taken through its range of motion and stability was assessed.
The degree of motion allowed was that which did not put undue tension on the sutures. This degree of abduction and external rotation was noted and used in determining the desired range of early postoperative range of motion exercises. The capsule was then loosely closed with interrupted sutures. The split subscapularis tendon was then reapproximated using absorbable sutures.

Postoperatively, the patients were placed in an arm sling, which was worn for three weeks following surgery, except when they participated in physical therapy. All patients participated in a supervised rehabilitation program that consisted of immediate active elbow flexion and extension exercises and active shoulder range of motion exercises and passive range of motion to the surgically-determined limits of abduction and external rotation. The object was to increase the patient’s range of motion slowly without placing undue stress on the anterior capsular repair. Progressive strengthening and stretching exercises were then carried out under close supervision for the next few months. After rehabilitation was complete, a follow-up visit was conducted which consisted of an office physical examination and the modified Rowe grading system was used as well to evaluate stability, motion, function, and subjective assessment of pain.6,9

Results

The results at follow up were rated as 32 excellent, 5 good, 1 fair, and 1 poor. The mean follow up was 3.6 years (range: 15 to 80 months). The mean modified Rowe score (Table 1) was 93.6 (range: 65 to 100). Instability was eliminated in 38 patients (93%). Of the 25 patients who considered themselves recreational athletes, all were able to return to their preoperative participatory level. One patient sustained a traumatic dislocation and had to undergo revision anterior capsulolabral reconstruction. Two patients reported atraumatic recurrent subluxation without frank dislocation. One of these patients also required revision surgery due to persistent symptoms of instability. The other patient’s symptoms resolved with rehabilitation. At last follow-up, the patients who had undergone revision surgery remained stable and had regained their preoperative motion. Of the seven shoulders that had undergone a failed previous stabilization procedure, all seven patients remained stable without pain or recurrent instability.

There was no loss of range of motion in comparison to preoperative values. Postoperative active forward elevation averaged 168° and passive forward elevation measured 172° compared to preoperative values of 160° active and 168° passive forward elevation. Postoperative active external rotation averaged 57° and passive external rotation measured 64° compared to preoperative values of 51° active and 59° passive external rotation. Postoperative internal range of motion decreased slightly to T9 as compared to the preoperative measure of T10.

Discussion

Successful surgical treatment of anterior glenohumeral instability traditionally was measured in terms of the postoperative maintenance of stability. A variety of open stabilization techniques were used with excellent results with regard to recurrent instability.9-17 Many of these procedures, such as the Bankart, Putti Platt, Magnusson Stack, du Toit, and Bristow procedures have fallen out of favor as their results are studied more critically. Long-

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Score</th>
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<tbody>
<tr>
<td>Function</td>
<td></td>
</tr>
<tr>
<td>No limitation in throwing or overhand activities; returned to prior level of competition</td>
<td>50</td>
</tr>
<tr>
<td>No limitation in throwing or overhand activities; returned to preinjury sport, but not at preinjury level</td>
<td>40</td>
</tr>
<tr>
<td>No limitation in overhand activity and throwing, did not return to preinjury sport</td>
<td>30</td>
</tr>
<tr>
<td>Moderate limitation in overhand activity and throwing; could not return to preinjury</td>
<td>20</td>
</tr>
<tr>
<td>Marked limitation in throwing: unable to work overhand</td>
<td>10</td>
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<tr>
<td>Pain</td>
<td></td>
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<tr>
<td>None</td>
<td>10</td>
</tr>
<tr>
<td>Moderate</td>
<td>5</td>
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<tr>
<td>Severe</td>
<td>0</td>
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<tr>
<td>Stability</td>
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<tr>
<td>Negative apprehension with no subluxation</td>
<td>30</td>
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<tr>
<td>Negative apprehension with pain during abduction in external rotation</td>
<td>15</td>
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<tr>
<td>Positive apprehension with positive sense of subluxation</td>
<td>0</td>
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<tr>
<td>Motion</td>
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<td>Full</td>
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<td>Equal to or less than 25% loss in any plane</td>
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<tr>
<td>Greater than 25% loss in any plane</td>
<td>0</td>
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<td>Excellent, 90-100 points; Good, 70-89 points; Fair, 40-69 points; Poor, less than or equal to 39 points.</td>
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Functional outcomes have become an important measure of operative success, and return of overhead function, motion, and elimination of pain play an integral role in overall patient satisfaction. Loss of external rotation has been found to be a rather common denominator in most of the earlier repairs, especially the nonanatomic repairs which seek to over-tighten the subscapularis tendon. Leach and coworkers found the loss of 12° to 19° of external rotation as a result of the Putti-Platt procedure, while Fredrikksson and Tegner reported a mean deficit of 29°. The Bristow procedure, which involves a transfer of the tip of the coracoid process with its muscular attachments to the anterior glenoid producing a sling effect on the humeral head, has produced similar reports documenting restricted postoperative external rotation. Long-term follow-up of the nonanatomic repairs such as the Putti Platt and Magnusson Stack are also associated with mild to severe glenohumeral osteoarthritis.

The inferior capsular shift has improved on these procedures with the prevention of recurrent instability and lower rates of loss of motion. Bigliani and colleagues reported an average loss of only 7° of external rotation. All 31 of the overhead athletes in the study returned to sports, and 71% of these athletes were able to perform at their pre-injury level. Warner and coworkers had similar good results with respect to motion; 11 of 18 patients had full range of motion and the remaining patients had minimal loss of external rotation when compared to their contralateral shoulder.

The anterior capsulolabral reconstruction was performed initially for the treatment of anterior glenohumeral instability in high performance overhead athletes. It differs from previous procedures aimed at correcting anterior instability in that it is a medial-based reconstruction that splits the subscapularis tendon instead of detaching it. Anatomically, muscle attachments and proprioceptive fibers are maintained and the capsular redundancy and labral damage are corrected. Without detachment of the subscapularis tendon, a more aggressive rehabilitation program can be initiated, enhancing the likelihood of regaining full motion, decreasing pain, and thereby improving overall function.

Arthroscopic stabilization of glenohumeral instability has recently received a lot of attention as a valuable means of reducing the morbidity associated with open procedures, yet there are many studies which show that the rate of recurrence has not yet caught up to that consistently reported with open stabilization. Improved arthroscopic technique, evolving arthroscopic implants, improved patient selection, and surgeon experience will inevitably enable arthroscopic stabilization the opportunity to supplant open stabilization as the gold standard of care for anterior glenohumeral instability.

The purpose of the present study was to review the results of anterior capsulolabral reconstruction on patients with posttraumatic glenohumeral instability. Most patients had full or close to full range of motion after rehabilitation. The two patients who required revision surgery returned to full motion after their second rehabilitation. All seven patients who had failed previous stabilization had excellent results with the anterior capsulolabral reconstruction which makes it a valuable revision option. This was a retrospective study done on a moderate number of patients who underwent surgery by one surgeon. The promising results of this study seems to warrant a prospective study with a larger group of patients to definitively document the successful functional outcomes reported within this study.

Summary

The emerging role of arthroscopic stabilization has changed the face of management of anterior glenohumeral instability with its improved functional outcomes and earlier returns to full range of motion with earlier rehabilitation. Historically, open stabilization has been associated with a loss of motion, especially external rotation, given the violation of soft tissues required in an anterior glenohumeral dissection. The anterior capsulolabral reconstruction was shown in the present study to be an effective procedure for posttraumatic anterior glenohumeral instability.

References

8. Jobe FW, Kvitne RS, Giangarra CE: Shoulder pain in the over-


