Capsulolabral Advancement for the Treatment of Glenoid Chondromalacia

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The capsulolabral advancement procedure performed for glenoid articular defects resulted in a significant decrease in pain and improved UCLA scores, and postoperative range of motion was not significantly diminished.

Shoulder arthroscopy has matured significantly over the past decade, now offering surgeons the opportunity to diagnose and treat the majority of shoulder pathologies arthroscopically.1-4 Degenerative glenohumeral joint disease remains an entity for which arthroscopic measures have not been particularly effective.1,3 In the elderly sedentary patient population, shoulder arthroplasty is a successful and rewarding procedure.9,11 However, for younger and more active age groups, the search continues for effective temporizing measures.1,3,5-8,12-14

While degenerative changes usually encompass both the humerus and the glenoid, occasionally one encounters an isolated peripheral articular lesion of the glenoid alone. This situation can be associated with younger patients with a history of traumatic subluxations or dislocations.14-16 We found no reports that address the isolated peripheral glenoid articular lesion with any arthroscopic treatment other than debridement.

Simple debridement or debridement and capsular release for osteoarthritis of the shoulder has been reported to give good results in 80% to 92% of cases.1,3,5-7,12 However, these positive results seem to deteriorate with time. Poor results have been correlated with higher grades of chondromalacia and with larger lesions.1,14 Arthroscopic debridement may be a reasonable option to delay a more invasive treatment for older sedentary patients, or to address incidental small cartilage defects. However, there should be a better option for the younger, active patient with areas of major chondromalacia (grade 3 to 4).17

The senior author (S.S.B.) has used a resurfacing technique in which the native capsulolabral complex is advanced to cover peripheral degenerative lesions of the glenoid rim. The purpose of this study is to show the preliminary clinical results and describe the technique of capsulolabral advancement for the treatment of grade 3 to 4 glenoid chondromalacia.11 We hypothesize that capsulolabral advancement provides significant postoperative pain relief without loss of motion in shoulders with isolated peripheral articular lesions of the glenoid.

MATERIALS AND METHODS

Ten patients who underwent arthroscopic treatment of isolated glenoid chondromalacia were included in this study. All were suspected of having primarily labral pathology based on magnetic resonance imaging (MRI) and clinical examination findings. Average patient age was 39.6 ± 16.04 years. Demographic data are detailed in Table 1. Nine patients were men and 1 was a woman. Seven cases involved the nondominant arm. Five of the patients reported a recent traumatic event, 1 reported a dislocation 20 years earlier, and 1 had a history of recurrent subluxations. One patient had previously undergone 2 shoulder arthroscopies (a superior labral anteroposterior...
[SLAP] repair and a subacromial decompression (SAD) performed by 2 other surgeons. Two patients reported no specific injury to the shoulder.

Clinical evaluation and preoperative MRI scans were consistent with labral pathology in all patients. Degenerative changes were not appreciated on preoperative plain radiographs or MRI scans.

At pre- and postoperative visits, each patient filled out a comprehensive shoulder evaluation form including the visual analog scale (VAS) for pain and the subjective questionnaire for a modified University of California, Los Angeles (UCLA) score. Strength and active range of motion (ROM) were evaluated and recorded by the senior author. At an average of 17 and 34 months postoperatively, all patients were asked to return to the clinic. If they were unable or unwilling to return for an examination, we performed a telephone interview to assess pain and motion deficits.

All data were analyzed for statistical significance using the SPSS statistical software suite (SPSS, Inc, Chicago, Illinois). Student’s t test was used for comparing means between pre- and postoperative measures. A P value of .05 was set as statistical significance.

### Surgical Technique

After the induction of general anesthesia, the patient was placed in the lateral decubitus position with 5 lbs of balanced suspension applied to the extremity. The arm was maintained in a position of 30° abduction and 15° of forward flexion while an assistant supplemented the position with manual traction as needed. Diagnostic arthroscopy was first performed via a posterior portal, and all pathologic lesions were identified. Each patient had significant localized chondromalacia (Outerbridge grade 3 to 4)17 at the periphery of the glenoid labrum.

Anterior and anterosuperolateral portals were established via an outside-in technique. Pathology involving the anteroinferior labrum often required the 5 o’clock portal18 to allow for appropriate anchor placement at or below the 5 o’clock position. Posterior glenoid lesions required use of a low posterolateral portal. This portal has been previously described18 and is located approximately 4 to 5 cm inferior to the posterolateral corner of the acromion and 4 to 6 cm lateral to the posterior viewing portal. The senior author has found this portal to be useful for the treatment of posterior glenohumeral pathology.

Next, the labrum adjacent to the glenoid articular lesion was mobilized. Using a combination of a shaver and an arthroscopic elevator, the labral tissue was completely detached from the glenoid neck. The area of glenoid chondromalacia was also prepared by using arthroscopic ring curettes to remove any loose cartilage rim from the defect, and then the base of the defect was cut with fine knife. The capsule labral complex was then grasped and provisionally pulled over the glenoid defect. If the freed capsule labral complex had enough excursion to cover the entire degenerative area, capsulolabral advancement was performed. Fixation of the labrum to bone was accomplished with suture anchors.

### Table 1

<table>
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<tr>
<th>Patient No./Sex/ Age, y</th>
<th>Side</th>
<th>Dominant Arm</th>
<th>Area of Chondromalacia</th>
<th>No. Anchors</th>
<th>Associated Nonlabral Procedures</th>
<th>VAS</th>
<th>UCLA</th>
<th>Flexion, deg</th>
<th>Ext Rot, deg</th>
<th>Int Rot, deg</th>
<th>VAS</th>
<th>Med UCLA</th>
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<td>Mean±SD</td>
<td>5.5±1.11</td>
<td>18.5±8.17</td>
<td>61.5±9.66</td>
<td>1.6±0.67</td>
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Abbreviations: ant, anterior; ASAD, arthroscopic subacromial decompression; DCE, distal clavicle excision; ext, external; int, internal; L, left; mod, modified; post, posterior; R, right; RCTR, rotator cuff tear repair; rot, rotation; sup, superior; UCLA, University of California, Los Angeles; VAS, visual analog scale.

*At 17-month follow-up.

*At 34-month follow-up.
If there was insufficient capsulolabral excursion to cover the entire glenoid articular defect, the labrum was advanced as far as possible and fixed with suture anchors. Then a microfracture procedure was performed on the residual glenoid articular defect.

In cases where capsulolabral advancement was feasible, anchors were inserted through the low postero-lateral portal (for postero-inferior lesions) or the 5 o’clock portal (for antero-inferior lesions). We used 1 double-loaded (with #2 Fiber-Wire) 3.0-mm Bio-FASTak (Arthrex, Inc, Naples, Florida) anchor per linear centimeter of lesion to be covered. If the bone quality was felt to be questionable, we used double-loaded 3.0-mm Bio-FASTak (Arthrex, Inc) threaded suture anchors.

Sutures were then passed through the labrum using a combination of the Bankart Viper (Arthrex, Inc) and BirdBeak (Arthrex, Inc) suture passers. Suture passage began at the lowest anchor, and after the 2 sutures from that anchor were passed through the labrum, the sutures were tied. All the sutures were tied with a double-diameter knot pusher (Surgeon’s Sixth Finger; Arthrex, Inc). This device facilitates manipulation of the tissue over the area of glenoid chondromalacia and also provides optimal loop security and knot security. The sutures from each subsequent anchor were passed and tied in a sequential fashion until the entire area of glenoid chondromalacia was covered.

**Postoperative Course**

All patients were discharged between 1 and 2.5 hours postoperatively with the operated arm in a pillow sling. The sling was maintained for 4 weeks. Patients were encouraged to remove the sling several times each day to extend the elbow and to passively externally rotate the arm to the straight-ahead neutral position. Passive stretching exercises were begun at 4 weeks. Strengthening was initiated at 6 weeks postoperatively.

**RESULTS**

All the glenoid degenerative areas were graded as 3 to 4 according to the Outerbridge classification. Five cases involved the antero-inferior quadrant of the glenoid, 4 involved the posterior aspect of the glenoid, and 1 involved the superior glenoid (associated with a type II SLAP lesion). One patient had combined anterior and posterior labral repairs with postero-inferior glenoid chondromalacia. One patient underwent repair of an associated small rotator cuff tear (1 anchor), and 2 patients had an arthroscopic distal clavicle excision. Five patients underwent an arthroscopic acromioplasty (Table 1).

At an average of 17 months postoperatively, all patients were reassessed. The VAS score averaged 5.5 ± 2.07
These 2 had no interim loss preoperatively and 1.6±1.51 postoperatively. This difference was statistically significant (P<.005). The UCLA score averaged 18.5±4.12 preoperatively and 31.1±3.31 postoperatively. This difference also reached statistical significance (P<.001). Nine cases (90%) were graded as good or excellent according to the modified UCLA scoring system, and 1 case was fair. All patients expressed satisfaction with their final outcomes. All patients were able to return to their previous work and recreational activities. At an average of 34.4 months postoperatively, 9 of the 10 patients were contacted via telephone, and the VAS for these patients averaged 1.11. The VAS for these patients averaged 1.11 postoperatively. This difference was significantly improved (P<.005) from the preoperative VAS score for these 9 patients, which was 5.4±2.19. Two of the 9 patients returned to the clinic for reevaluation. The remaining patient was lost to follow-up.

At 17-month follow-up, forward elevation averaged 176°±9.66° preoperatively and 176°±6.99° postoperatively. Average external rotation decreased from 61°±7.47° to 56°±8.10° and internal rotation decreased from 63°±6.45° preoperatively to 59°±8.76° postoperatively. All differences in ROM failed to reach statistical significance (P>.9, P>.1, and P>.15, respectively, for flexion, external rotation, and internal rotation) (Table 2). Of the 9 patients contacted at 34-month follow-up, only 2 were able to return for follow-up. These 2 had no interim loss of motion, and their modified UCLA score was 35 each. The other 7 contacted via telephone reported no loss of motion, but this is subjective information.

**DISCUSSION**

The results of this study suggest encouraging short-term clinical results with the capsulolabral advancement procedure for glenoid articular defects. Our patients had significant improvements in their VAS pain scores as well as their modified UCLA scores. The procedure did not cause significant deficits in postoperative ROM.

Glenohumeral arthritis is a well-known pathologic entity characterized by progressive cartilage damage and adaptive bone changes. Joint replacement is usually considered in older patients when nonoperative measures have failed. Norris and Lachiewicz showed 93% overall survivorship for total shoulder arthroplasties at a mean 10-year follow-up and 87% at 15 years. The revision rate due to glenoid loosening was 5.6%. Despite good results, the prosthetic solutions may be not appropriate in the younger population since a long life expectancy and increased functional activity could mean an increased risk of multiple revisions. Shoulder arthroplasty techniques are also less predictable in terms of postoperative ROM measures. This is worrisome for young, active patients. As with other authors, we believe that less invasive techniques should be sought to address the problem of arthritis in the younger population.

Arthroscopic debridement for early arthritis has shown good short- to intermediate-term results. However, results seem to deteriorate with time. Weinstein et al reported 80% good or excellent results with arthroscopic debridement in 25 patients, but a progressive decrease in pain relief over time was noted in 24% of the patients. There was a trend toward worse results in patients with higher grades of chondromalacia. They concluded that arthroscopic debridement is most useful in the early stages of degenerative disease. Cameron et al reported an overall 88% decrease of pain with arthroscopic debridement and capsular release in 36% of patients with selected grade 4 glenohumeral defects. Results were inversely proportional to the dimension of the lesion. Although these reports are encouraging, the good results achieved via arthroscopic debridement seem to correlate with lower grades of chondromalacia and smaller defects. Results seem to deteriorate with time.

The experience with arthroscopic debridement of the degenerative knee suggests that debridement is not a du-
rable option for degenerative diseases. At best it only temporarily removes harmful proteolytic enzymes. Several procedures have been proposed for cartilage defects in the knee and show good results with medium-to long-term follow-up, including microfracture, autologous chondrocyte implantation, osteochondral autologous transplantation, and meniscal transplantation. Notably, all these techniques decrease the abnormal stresses between the bones and may consequently slow the degenerative process. Using the knowledge we have gained from the knee, we believe that capsulolabral resurfacing of the glenoid may be an effective technique for a nonweight-bearing joint such as the shoulder.

A recent report proposed treating cartilage defects in the shoulder with a combination of microfracture and coverage by a periosteal flap. Five patients underwent this open procedure with satisfactory results. Other studies have examined biologic resurfacing of the glenoid combined with hemiarthroplasty. Burkhead and Hutton proposed the use of the subscapularis-capsule complex and an autogenous fascia lata graft to resurface the glenoid. They obtained pain relief and good to excellent results in 6 patients. Ball et al have suggested an interposition of lateral meniscal allograft with satisfying results.

Several studies have established a link between traumatic shoulder dislocations and subsequent development of degenerative arthritis. In our series, 60% of the patients reported a history of traumatic dislocations. Marx et al reported a ten-fold increase in the need for arthroplasty in patients who had a history of dislocation. In this group of patients, none had received any surgical intervention prior to their arthroplasty. Perhaps if these patients had been identified earlier in the course of their disease, a glenoid resurfacing procedure might have been beneficial.

This study has some limitations. Since 50% of our patients underwent concomitant arthroscopic procedures, such as subacromial decompensation and distal clavicle excision or rotator cuff repair, it is impossible to attribute the improved clinical results to the capsulolabral advancement alone. Furthermore, in the patients with instability, it is impossible to conclude that the pain relief was obtained solely as a result of the coverage of the articular defects, since some pain relief may have resulted from the reduction of diffuse cartilage wear provided by the stabilization. Another limitation is our follow-up period. While all patients were individually examined at an average of 17 months postoperatively, the final follow-up (at an average of 34 months) was made by telephone interview in all but 2 of these cases. This limited our ability to obtain objective data regarding strength and ROM and therefore precludes the determination of a final UCLA score. The final postoperative follow-up was complicated by the fact that a large percentage of our patients traveled a great distance (>400 miles) to be seen by the senior author. It becomes less likely that these patients will make that trip when their shoulders are asymptomatic.

Despite these study limitations, we believe this study offers an exciting potential treatment option for localized glenoid chondromalacia. Although we cannot conclude that the capsulolabral advancement procedure definitely slows the progression of degenerative disease, we believe that it may relieve pain. Our patients demonstrated no significant postoperative limitation in ROM. Although this is a preliminary report, we believe that our data suggest that this procedure may “buy time” for many young patients with early degenerative disease of the shoulder.

REFERENCES


Tips & Techniques


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