Outcomes Following Arthroscopic Repair of Posterior Labral Tears in Patients Older Than 35 Years

DEXTER K. BATEMAN, MD; ERIC M. BLACK, MD; MARK D. LAZARUS, MD; JOSEPH A. ABBOUD, MD

Abstract

Although the results of arthroscopic management of posterior labral pathology in young athletes have been reported extensively in the literature, the clinical outcomes in older patients are unknown. This retrospective review included patients older than 35 years who underwent arthroscopic posterior labral repair. Functional outcome scores were collected, and subgroup analyses were performed to evaluate the impact of patient-specific factors. Forty-three patients met the inclusion criteria; average follow-up was 36.9 months (range, 24-54 months). Mean patient age at the time of surgery was 40.9 years (range, 35-57 years). Average outcome scores at final follow-up were Quick Disabilities of the Arm, Shoulder and Hand Scale (QuickDASH), 19±22; Simple Shoulder Test (SST), 9.9±3; Western Ontario Shoulder Instability Index (WOSI), 601±546; and Single Assessment Numeric Evaluation (SANE), 79.6%±23.4%. No significant differences in outcomes were observed in patients with preoperative symptomatic instability, active workers’ compensation claims, or traumatic injury (P>.05). The presence of intraoperatively definable chondral damage (Outerbridge grade III or higher) was associated with significantly worse final functional outcomes (QuickDASH: 29 vs 11.9, P=.03; SST: 8.5 vs 10.9, P=.02; WOSI: 875 vs 407, P=.01; and SANE: 70.6% vs 86%, P=.05). One patient (2%) experienced a minor postoperative complication, and 3 patients (7%) required subsequent procedures: 2 total shoulder arthroplasties and 1 revision labral repair. The results of arthroscopic posterior labral repair in patients older than 35 years were variable and worse than those previously reported in younger patients. The presence of chondral damage at the time of the index procedure was a negative predictive factor. [Orthopedics. 2017; 40(2):e305-e311.]

Posterior labral tears are a relatively uncommon yet significant cause of shoulder pain, weakness, dysfunction, and symptomatic instability.1-6 Isolated posterior labral tears often occur in the young athletic population, particularly in those who incur recurrent posteriorly directed forces onto a forward flexed, abducted, and internally rotated arm.4,7,8 Repetitive weight lifting or other athletic motions resulting in posterior axial loads may progressively damage the posterior band of the inferior glenohumeral ligament and adjacent capsular framework.5,6,9 Cumulative microtrauma to the posterior capsulolabral complex, one of the primary static restraints to posterior humeral translation, may lead to posterior glenohumeral insta-
bility. Alternatively, acute traumatic events or atraumatic causes such as generalized ligamentous laxity and alterations of the bony shoulder architecture may also play a role in the development of posterior instability.

Several authors have reported favorable results with arthroscopic management of posterior labral pathology, with or without instability. However, these investigations focus mainly on athletes younger than 30 years who have either repetitive microtrauma or traumatic posterior instability. In this specific population, high clinical outcome scores, patient satisfaction, and return to sport have been reported.

The reported results for surgical repair of posterior labral tears in older adults are limited. Differences in mechanism of injury, tissue healing capacity, and other age-related changes may result in inferior outcomes for middle-aged adults undergoing labral repair compared with younger overhead athletes.

The purpose of this study was to evaluate the clinical results of arthroscopic repair of posterior labral tears in patients 35 years and older using validated functional outcome measures, as well as to report the incidence of complications and revision procedures. It was hypothesized that these patients would have worse outcomes than those previously reported in their younger counterparts. In addition, it was hypothesized that the presence of patient specific factors such as preoperative subjective instability, mechanism of injury, workers’ compensation claims, and chondral loss would negatively influence outcomes.

**MATERIALS AND METHODS**

**Patients and Data Collection**

This retrospective cohort study included patients who underwent arthroscopic labral repair at the authors’ institution. After receiving institutional review board approval, all patients who underwent arthroscopic labral repair between January 1, 2010, and December 31, 2013, were identified via a Current Procedural Terminology (CPT) search using code 29806 (arthroscopy, shoulder, surgical capsulorrhaphy).

Patients met inclusion criteria if they were 35 years or older at the time of surgery and underwent arthroscopic repair of the posterior labrum (either exclusively or in combination with other areas of the labrum). Minimum follow-up was 24 months. The posterior labrum was defined as inclusive of the 6-o’clock position to the 10-o’clock position on the glenoid (in the case of a right shoulder) or the 2-o’clock to 6-o’clock position (in the case of a left shoulder). Patients undergoing revision labral repair and circumferential (panlabral) repair were excluded.

**Surgical Technique**

Arthroscopic labral repair was performed by 1 of 5 surgeons fellowship trained in shoulder reconstruction. Surgery was performed with the patient in the lateral decubitus (n=10) or beach chair (n=33) position under general anesthesia with or without a regional nerve block. Intraoperative range of motion and glenohumeral laxity testing of both shoulders were performed prior to repair. A standard rotator interval portal was used for visualization, with posteroinferior and posterosuperior working portals used for anchor placement and labral fixation. An anterior accessory portal was used for suture shuttling.

Labral fixation was accomplished using suture anchor fixation with 2.4-mm (Bio-SutureTak; Arthrex, Naples, Florida; n=37), 2.9-mm (PushLock; Arthrex; n=2), and 3.0-mm (Bio-SutureTak; n=4) anchor sizes, depending on surgeon preference (Figure 1). The anchor fixation device determined whether the repair was knotted or knotless. In cases with posterior chondral damage of the glenoid, loose cartilage flaps were debrided and the labrum typically was over sewn into the defect (Figure 2). Anterior and superior labral pathology was repaired as indicated.

Postoperatively, patients were immobilized in a neutral position sling for 4 to 6 weeks, at which time a gentle stretching program was instituted. By 12 weeks, full strengthening was initiated, and all restrictions were lifted by 6 to 8 months.

**Follow-up Assessment**

Postoperatively, patients underwent follow-up assessment at standard intervals of 2 weeks, 6 weeks, 3 months, and 6 months. For the purposes of this study, patients with follow-up longer than 24 months were contacted via telephone or mail and were asked to complete a questionnaire regarding their operative shoulder. Shoulder outcomes were assessed using the Quick Disabilites of the Arm, Shoulder and Hand Scale (QuickDASH), the Simple Shoulder Test (SST), the Western Ontario Stability Index (WOSI), and the Single Assessment Numeric Evaluation (SANE).

Subgroup analyses were conducted to determine the impact of preoperative symptomatic instability, mechanism of injury (traumatic vs atraumatic), workers’ compensation claims, and intraoperatively noted chondral damage. Complications and need for revision surgery also were documented.

Outcomes were stratified according to the technique described by Provencher et al: excellent, greater than or equal to 90%; good, 80% to 89%; fair, 70% to 79%; and failure, less than 70%. The need for revision surgery was considered to constitute a clinical failure.

**Statistical Analysis**

The Mann-Whitney U test was used to compare continuous variables, and the Fisher exact test was used to compare categorical data. Statistical significance was set at P<.05.

Subgroup analyses were performed to evaluate the impact of several prognostic indicators on final functional outcome scores. Patients treated under a workers’ compensation claim (n=18), patients with symptomatic preoperative instability (n=10), and patients with chondral defects (Outerbridge grade III or higher) noted intraoperatively
(n=17) were compared with control cohorts (the remaining patients in this study without the characteristic in question). Patients who underwent isolated posterior labral repair (n=11) were compared with patients who also underwent concomitant procedures (n=30). The subgroups did not differ significantly from their respective control group in terms of demographic characteristics, length of follow-up, and number of anchors used during surgery.

RESULTS

Study Population

The database search identified 55 patients 35 years and older who met the inclusion criteria with posterior labral pathology and underwent arthroscopic repair during the 4-year time frame with postoperative follow-up longer than 24 months. Of these, 43 patients (78%) were available for formal follow-up.

Baseline demographic characteristics are summarized in Table 1. The cohort included 39 men and 4 women, with a mean age of 40.9 years (range, 35-57 years) at the time of surgery. The dominant extremity was involved in 32 patients (74%). All patients failed a trial of conservative treatment including physical therapy for at least 3 months prior to surgery.

Thirty-two patients had a definable traumatic incident at initial presentation that precipitated their shoulder pain, including sports (martial arts and weight lifting), motor vehicle accidents, mechanical falls, or work-related incidents (catching or lifting heavy loads). The presenting complaint always included pain and instability.

Eleven patients (26%) described subjective preoperative instability, with 2 patients having documented posterior dislocations that required physician-assisted reduction. Physical examination showed evidence of shoulder instability in 9 of these patients during initial clinical evaluation; the remaining 2 patients exhibited posterior instability only under general anesthesia.

The mean number of anchors per repair was 5 (range, 2-9 anchors). Twelve patients (28%) underwent isolated repair of the posterior labrum, 26 patients (60%) underwent repair of the posterior and superior labrum, and 5 (12%) patients underwent repair of the posterior and anterior labrum. Fourteen (33%) patients underwent additional procedures in conjunction with labral repair, including spinoglenoid cyst decompression (n=4), suprascapular nerve cyst decompression (n=2), humeral head chondroplasty (n=2), rotator cuff debridement (n=2), glenoid osteochondral autograft transfer (n=1), subacromial decompression (n=1), distal clavicle excision (n=1), and loose body removal (n=1).

No intraoperative complications occurred. Postoperatively, 1 patient (2%) experienced wound dehiscence of the posterior portal without signs of infection; this was treated conservatively with local wound care.

Three patients (7%) ultimately required subsequent procedures. Of these, 1 patient underwent revision labral repair for a symptomatic, labral re-tear that was confirmed at 6 months by magnetic resonance imaging; the patient ultimately returned to work full-time. The remaining 2 patients underwent total shoulder arthroplasty at 16
and 25 months postoperatively for intractable pain and progressive glenohumeral arthritis. Both of these patients underwent humeral head chondroplasty during the index procedure for grade IV chondral defects. Although 1 of these patients was treated under a workers’ compensation claim and the second patient was not, both patients returned to work in a limited capacity with permanent restrictions. Final functional outcomes for these 2 patients were obtained following arthroplasty and as such were not included in the data analysis. None of the patients with symptomatic instability had recurrent subluxation or dislocations postoperatively.

**Functional Outcomes**

Average length of clinical follow-up was 36.9 months (range, 24.55 months). Mean shoulder outcome scores at final follow-up, including subgroup analyses, are summarized in Table 2. The presence of glenoid and humeral chondral damage at the index procedure was associated with significantly poorer functional outcomes: QuickDASH (29 vs 11.9; \(P=0.03\)), SST (8.5 vs 10.9; \(P=0.02\)), overall WOSI (875 vs 407; \(P=0.01\)), and SANE (70.6% vs 86%; \(P=0.05\)). No significant differences in functional outcomes were found between patients who underwent isolated posterior labral repair and those who received concomitant procedures \((P>0.37)\).

Stratified outcome scores are shown in Table 3 and Figure 3. Depending on the outcome measure, 34% to 61% had an excellent result, 7% to 22% had a good result, 10% to 12% had a fair result, and 22% to 37% had clinical failure.

**Discussion**

Previously, it was unclear whether patients older than 35 years undergoing posterior labral repair experienced similar rates of functional improvement, pain relief, and return to work and sporting activities compared with younger athletes.\(^9\)\(^,\)\(^7\)-\(^9\),\(^11\)-\(^14\),\(^23\) This study is the first to examine outcomes after arthroscopic repair of posterior labral tears in patients older than 35 years. The findings of the current study indicate that outcomes are generally less satisfactory than those previously described for arthroscopic repair of reverse Bankart lesions with or without instability.\(^5\),\(^11\)-\(^14\),\(^23\) The percentage of patients with a good or excellent clinical result in the present study ranged between 54% and 68%, indicating ongoing functional and quality of life impairment for this relatively young population. Moreover, 22% to 37% of patients had clinical failure based on stratified outcome scores of less than 70%, and 3 patients (7%) required revision procedures, including 2 total shoulder arthroplasties.

Bradley et al\(^9\) reported the results of arthroscopic posterior capsulolabral repair in 200 athletic shoulders (mean patient age, 24.3 years) with symptomatic posterior instability. After mean follow-up of 36 months, patients had significant improvement in pain, stability, and functional outcomes, with 94% of shoulders rated as good or excellent using the American Shoulder and Elbow Surgeons scoring system. No differences were found between contact and noncontact athletes.\(^9\) Smaller cohorts have reported good and excellent results ranging from 81% to 97%, with revision rates at less than 8%.\(^11\),\(^14\),\(^16\),\(^18\),\(^19\),\(^21\),\(^23\),\(^30\)

There is conflicting evidence regarding the extent to which age-related degenerative and physiologic changes impact outcomes following surgical repair of other areas of the labrum.\(^24\),\(^31\),\(^32\) Provencher et al\(^31\) reported the relative risk of surgical failure following superior labrum anterior-posterior repair was 3.45 (95% confidence interval, 2.0-4.9) for patients older than 36 years. Another series describing arthroscopic repair of circumferential labral tears found no association between age and postoperative outcomes, complications, or revision rates.\(^32\) Although the current study did not have a standardized cohort for comparison, the findings support the notion that increasing age negatively impacts the clinical success of arthroscopic posterior labral repair.

The current study analyzed 3 predictors for poor outcomes in a univariate fashion. The original hypothesis was that workers’ compensation, preoperative instability, and intraoperative evidence of chondral injury would influence outcomes. Antoniou et al\(^14\) found that workers’ compensation patients treated for posterior instability had significantly poorer functional outcomes and returned to full-time work less frequently than non-workers’ compensation patients. There appeared to be a trend toward poorer outcome scores with workers’ compensation patients in the current study, and a larger
### Table 2

#### Outcomes Scores at Final Follow-up

<table>
<thead>
<tr>
<th>Outcome Score, Mean±SD (Range)</th>
<th>Physical</th>
<th>Overall</th>
<th>Emotional</th>
<th>Social Life</th>
<th>Physical</th>
<th>Overall</th>
<th>Emotional</th>
<th>Social Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuickDASH</td>
<td>76±18</td>
<td>73±16</td>
<td>70±16</td>
<td>68±16</td>
<td>76±18</td>
<td>73±16</td>
<td>70±16</td>
<td>68±16</td>
</tr>
<tr>
<td>SST</td>
<td>96±14</td>
<td>93±13</td>
<td>90±13</td>
<td>88±13</td>
<td>96±14</td>
<td>93±13</td>
<td>90±13</td>
<td>88±13</td>
</tr>
<tr>
<td>SANE</td>
<td>96±14</td>
<td>93±13</td>
<td>90±13</td>
<td>88±13</td>
<td>96±14</td>
<td>93±13</td>
<td>90±13</td>
<td>88±13</td>
</tr>
</tbody>
</table>

#### WOSI Outcome Score, Mean±SD (Range)

<table>
<thead>
<tr>
<th>Outcome Score, Mean±SD (Range)</th>
<th>Physical</th>
<th>Overall</th>
<th>Emotional</th>
<th>Social Life</th>
<th>Physical</th>
<th>Overall</th>
<th>Emotional</th>
<th>Social Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers' compensation claim</td>
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<td>23±3</td>
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<td>27±3</td>
<td>25±3</td>
<td>23±3</td>
<td>21±3</td>
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<tr>
<td>No workers' compensation claim</td>
<td>25±3</td>
<td>23±3</td>
<td>21±3</td>
<td>19±3</td>
<td>25±3</td>
<td>23±3</td>
<td>21±3</td>
<td>19±3</td>
</tr>
</tbody>
</table>

#### P-values

- QuickDASH: 0.13, 0.10, 0.07, 0.25, 0.08, 0.25, 0.11, 0.11
- SST: 0.23, 0.21, 0.83, 0.34, 0.28, 0.32, 0.47, 0.66
- SANE: 0.03, 0.02, 0.01, 0.02, 0.02, 0.01, 0.01, 0.05
- Workers' compensation claim: 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00
- No workers' compensation claim: 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00

#### Abbreviations

- QuickDASH: Quick Disabilities of the Arm, Shoulder and Hand Scale
- SST: Simple Shoulder Test
- WOSI: Western Ontario Shoulder Instability Index

#### Significant

- QuickDASH: 0.01, 0.01, 0.01, 0.01, 0.01
- SST: 0.01, 0.01, 0.01, 0.01
- SANE: 0.01, 0.01, 0.01, 0.01
- Workers' compensation claim: 0.01, 0.01, 0.01, 0.01
- No workers' compensation claim: 0.01, 0.01, 0.01, 0.01

#### Notes

- WOSI Outcome Score: 96±14, 93±13, 90±13, 88±13
- Physical: 76±18, 73±16, 70±16, 68±16
- Emotional: 76±18, 73±16, 70±16, 68±16
- Social Life: 76±18, 73±16, 70±16, 68±16
- Overall: 96±14, 93±13, 90±13, 88±13
- P-values: 0.01, 0.01, 0.01, 0.01

#### Final Follow-up

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Data

- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Discussion

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Conclusion

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### References

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Additional Information

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Analysis

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3

#### Future Directions

- QuickDASH: 27±3, 25±3, 23±3, 21±3
- SST: 27±3, 25±3, 23±3, 21±3
- SANE: 27±3, 25±3, 23±3, 21±3
- Workers' compensation claim: 27±3, 25±3, 23±3, 21±3
- No workers' compensation claim: 27±3, 25±3, 23±3, 21±3
Figure 3: Graph showing good or excellent outcomes were reported in 54% to 68% of patients in the study, depending on the outcome scale used. Abbreviations: QuickDASH, Quick Disabilities of the Arm, Shoulder and Hand Scale; SANE, Single Assessment Numeric Evaluation; SST, Simple Shoulder Test; WOSI, Western Ontario Shoulder Instability Index.

Table 3

<table>
<thead>
<tr>
<th>Outcome Score</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Failure</th>
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<td></td>
<td>No.</td>
<td>%</td>
<td>Criteria</td>
<td>No.</td>
</tr>
<tr>
<td>QuickDASH</td>
<td>22</td>
<td>53.7</td>
<td>≤10</td>
<td>4</td>
</tr>
<tr>
<td>SST</td>
<td>25</td>
<td>61.0</td>
<td>11-12</td>
<td>3</td>
</tr>
<tr>
<td>WOSI</td>
<td>14</td>
<td>34.1</td>
<td>0-210</td>
<td>8</td>
</tr>
<tr>
<td>SANE</td>
<td>19</td>
<td>46.3</td>
<td>≥90</td>
<td>9</td>
</tr>
<tr>
<td>Average</td>
<td>20</td>
<td>48.8</td>
<td>-</td>
<td>6</td>
</tr>
</tbody>
</table>

Abbreviations: QuickDASH, Quick Disabilities of the Arm, Shoulder and Hand Scale; SANE, Single Assessment Numeric Evaluation; SST, Simple Shoulder Test; WOSI, Western Ontario Shoulder Instability Index.

The prevalence of concomitant chondral damage (44%) in the current study appears to be significantly higher than in previous series of younger athletes and probably accounts for the higher rate of unsuccessful outcomes. In the current study, routine posterior labral repair and capsulorrhaphy generally was not performed in patients with glenoid and humeral changes. In cases in which there was glenoid chondral loss, the labrum was advanced into the cartilage defect, essentially rendering the defect extra-articular. However, it is evident that the outcomes in such cases were worse than in cases with posterior labral tears and no significant cartilage loss. In addition, in the 2 patients in this study who underwent humeral head chondroplasty for isolated cartilage lesions of the humerus, it is interesting to note that both patients subsequently underwent total shoulder arthroplasty for intractable pain. Therefore, the current authors generally do not perform posterior labral repairs in patients with “bipolar” (humeral and glenoid) cartilage defects.

Glenohumeral chondral defects are common following trauma, acute dislocation, and recurrent instability. Cameron et al. reported the prevalence of Outerbridge grade III-IV chondral changes in 422 patients (mean age, 39.8 years) with shoulder instability undergoing arthroscopic stabilization. Chondral damage was reported in 5% of patients with posterior instability, and increasing age was associated with a significantly higher incidence of chondral lesions. Although the natural history of these cartilage lesions is not well established, they likely play a role in the progression of glenohumeral arthritis. In the current study, patients with chondral damage had significantly poorer functional outcomes at final follow-up, and 2 patients (17%) required total shoulder arthroplasty at a young age (ages 38 and 49 years). It is likely that in these patients, symptomatic posterior instability and labral tears represent an early spectrum of osteoarthritis, and repair should be approached cautiously in such patients. However, without a matched cohort, it is difficult to determine whether surgery influences the time course of arthritic progression.

There are several limitations to the present study. The study cohort, although previously unreported, is relatively small and heterogeneous, which makes broad interpretation and translation of the data difficult. In the absence of comparable previously reported cohorts, multiple subgroup analyses were performed, limiting the power of each risk factor examined. In addition, there were multiple surgeons and concomitant procedures were performed in a majority of cases, which may be confounding factors. Radiographic follow-up, which may help elucidate the progression of these lesions, was not obtained. Finally, a fundamental challenge of treating this patient population involves determining the degree of symptomatic posterior labral pathology that is due to trauma, repetitive stress and overuse, and degenerative glenoid erosion and posterior laxity. These likely represent different time points within the spectrum of arthritic disease, and therefore patients with cartilage wear...
are more likely to experience worse outcomes as a result of irreversible changes despite surgical intervention.

**Conclusion**

The results of arthroscopic posterior labral repair in patients older than 35 years were more variable and worse than those reported for younger athletes. Workers’ compensation status or preoperative instability did not significantly influence the outcomes. However, patients with evidence of chondral injury experienced inferior outcomes.

**References**