Batter’s Shoulder: Clinical Outcomes and Return to Sport

Kevin O’Keefe*, Edward Haupt, W Christian Thomas, Joseph King, Kevin W Farmer, Michael Moser and Bradley Schoch

Department Orthopaedic Surgery and Rehabilitation, University of Florida, Gainesville, FL, USA

*Corresponding Author: Kevin O’Keefe, Department Orthopaedic Surgery and Rehabilitation, University of Florida, Gainesville, Florida, USA.

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Abstract

Background: Batter’s shoulder has been defined as an acute posterior subluxation of the lead shoulder during the baseball swing causing a traumatic tear of the posterior labrum. There are limited data correlating repair techniques with the return to play information, but none utilizing standardized outcome measures. The purpose of this study is to examine a case series of patients for post-operative return-to-play and obtain follow up using standardized outcome measures.

Methods: We retrospectively identified 10 patients with a batter’s shoulder injury. Patients were included if they met the criteria for batter’s shoulder injury. We identified 10 patients who met all the criteria. We attempted to contact via telephone to complete Western Ontario Shoulder Instability (WOSI) and Disability of Arm Shoulder and Hand (Quick DASH) evaluations. We successfully reached 5 of the patients. The minimum follows up was 1 year and the maximum was 11 years.

Results: All 5 patients in our cohort were able to return to play at the previous level without limitation. Patients reported a very low percentage limitation on the WOSI and Quick DASH questionnaires and results are detailed below. ROM and strength were not affected.

Conclusion: Batter’s shoulder is an infrequent cause of posterior labral tearing leading to a painful swing which can limit sports activity. In our limited series, all patients treated with the arthroscopic repair were able to return to play at the previous level, confirming a significantly improved prognosis for a batter’s shoulder injury, in contrast, to return to play after other causes of posterior labral tears.

Keywords: Batter’s Shoulder; Western Ontario Shoulder Instability (WOSI); Disability of Arm Shoulder and Hand (Quick DASH)

Introduction

Batter’s shoulder was originally described by Phillips and Andrews as an injury that results from an acute posterior instability event during a baseball swing [1]. The injury can also occur in other athletes involved in sports requiring a forceful swinging motion [2]. The injury scenario always involves the lead arm and results in posterior subluxation/dislocation with spontaneous reduction. This can damage the posterior labrum, predisposing patients to recurrent subluxation events and persistent pain. While it remains relatively uncommon, this injury can be disabling and result in loss of competitive function.

Posterior shoulder instability accounts for only 2% to 12% of patients with shoulder instability, making it far less common than anterior instability [3]. Most commonly, posterior instability is the result of repetitive posteriorly directed loads applied to the arm in forward flexion, adduction, and internal rotation leading to attritional laxity of the posterior capsule [3-6]. Unlike attritional posterior labral tears, a batter’s shoulder is caused by a single acute trauma resulting in a pathologic posterior labral tear.

Batter’s shoulder is believed to be caused by rotational forces and torsional stress on the posterior shoulder restraints [1]. Significant energy is imparted into the ball during a baseball or golf-swing with rotational velocities exceeding 900 degrees/second [7,8]. These forces are further magnified when the bat or golf club fails to strike the ball resulting in a lack of counterforce to the dynamic posterior pulling force, causing an increase in shear force across the glenohumeral joint [9]. After the initial injury, the resulting symptoms are often vague posterior shoulder pain during swinging or a marked decrease in power generated during the swing [1].

Return to play for athletes with traditional posterior labrocapsular instability has been reported between 55 - 71% [10-12] with failure rates as high as 40% [11]. Return to play after batter’s shoulder is less well known but has been cited at 75 - 91% [9]. Most of the previous studies are over 10 years old and may not represent modern repair techniques currently being employed.

**Purpose of the Study**

The purpose of this study is to report the clinical outcomes, complications, and return to play in a series of patients treated for batter’s shoulder using modern labral repair techniques.

**Methods**

A retrospective review was conducted of all shoulders treated with an arthroscopic labral repair (Current Procedural Terminology (CPT) code 29806) from 2000 to 2018. An electronic medical record query yielded 535 patients based on this single CPT code. Shoulders with multiple procedure codes indicating surgical treatment in excess of the labrum were excluded (171 shoulders). The electronic medical records of the remaining 364 shoulders were then reviewed to confirm the clinical diagnosis of a batter’s shoulder. Three-hundred and fifty-four shoulders were confirmed to have injuries not related to a swinging sport or event, including patients with previous traumatic injuries to the shoulder or injuries from another sport. The remaining 10 patients were confirmed to have sustained a batter’s shoulder (acute instability or subluxation during swinging sports) based on the review of the medical history. Five of these patients did not have follow up greater than 6 months and could not be reached by telephone and were excluded. The study cohort included 3 females and 2 males. All 3 females were competitive softball players (2 collegiate, 1 high school varsity level). Of the males, 1 was a collegiate level baseball player, and 1 was a collegiate level golfer (See figure 1 for a visual summary). The average age at the time of injury was 20.4 years (range 17 - 23 years). The lead shoulder was involved in all cases. All identified patients experienced pain localized to the posterior shoulder, which occurred most significantly during the swinging motion. The minimum follow up was 1 year and the maximum was 11 years.

Demographic data obtained from the medical record included: age, gender, position, level of competition, lead batting arm, hand dominance, and length of follow up. Clinical notes reviewed to confirm the diagnosis, post-operative course, and eventual return to play.

Pre-operative radiographic evaluation included Grashey and axillary lateral radiographs of the affected shoulder as well as MRI (with and without contrast). None of the 5 patients demonstrated bony changes of the glenoid or humeral head on plain radiographs. All MRIs was read by fellowship-trained musculoskeletal radiologists. Four of the five shoulders demonstrated an isolated posterior labral tear (Figure 2) and the remaining patient was taken to the OR based on clinical suspicion and confirmed to have an isolated posterior labral tear intraoperatively (Figure 3).

Data extracted from the operative report included indication for surgery and surgery performed with specific regard to technique and implants utilized. Indications for surgery included: (1) failure of conservative therapy including PT and activity modification; (2) inability to return to the previous level of play. All patients in this cohort underwent arthroscopic labral repair with suture-anchor capsulolabral fixation to the glenoid rim.

Subject Selection Process

EMR query for CPT code 29806 (shoulder arthroscopy)

535 patients underwent arthroscopic labral repair (2000-2018)

171 excluded due to additional pathology addressed at time of surgery

364 remaining underwent chart review to determine nature of injury

354 excluded for injuries not related to swinging sports or swinging motion, or for previous traumatic injuries

10 patients confirmed to have batter’s shoulder injury

5 patients excluded due to <6 months clinical follow up and were unreachable by phone

5 patient cohort

1 male collegiate golfer

1 male collegiate baseball player

7 female collegiate softball players

1 female highschool varsity softball player

Figure 1
Postoperatively, patients were placed in a simple sling. Passive ROM in the scapular plane to 90 degrees, pendulums, and Codman exercises were initiated at the initial post-operative visit on post-operative day 1 - 2. Internal rotation was limited to zero degrees for 4 weeks, and then gradually advanced. The sling was discontinued at 4 weeks and active ROM initiated. Isotonic strengthening started 8 weeks postoperatively. Patients were permitted to do dry swings at 4 months and then return to full batting at 6 months.

We reviewed post-operative follow-up records to ascertain patients’ final range of motion and return to sports as well as document post-operative complications. Four patients were also able to be reached for telephone follow-up. These patients completed both Western Ontario Shoulder Instability (WOSI) [13] and quick DASH (Disability Arm, Shoulder, Hand) [14] scores.

**Results**

All 5 shoulders were able to return to the previous level of play. No post-operative complications were observed, and no shoulder required reoperation for any reason. By the 6 months follow up visit, all 5 patients had regained 5 out of 5 strength in forward flexion, abduction, internal rotation and external rotation with no pain, and full return to pre-operative ROM. A summary of the following data is available in table 1. Four patients completed phone surveys at an average of 5.8 years from surgery (range 1 - 11). WOSI scores are typically reported by the patient making a mark on a 10 cm line, representing a percentage of limitations in various activities, ranging from 0% to 100%. We modified this to obtain the data via phone call by having the patients identify verbally their percentage (0% - 100%) of limitation in various activities. Questions are further divided into sub-score categories. WOSI scores showed an overall average score of 5.6% limitation (range 3.8% - 8.6%). When broken down into subcategories, the physical symptoms sub-score showed an average of 4.75% and the sports/recreation sub-score showed an average of 1.8%.

<table>
<thead>
<tr>
<th>Name</th>
<th>Length of Follow-up</th>
<th>Physical symptoms</th>
<th>Sports/Rec./Work</th>
<th>Lifestyle</th>
<th>Emotional</th>
<th>Overall Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>1.1 years</td>
<td>10%</td>
<td>2.5%</td>
<td>17.5%</td>
<td>0%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Patient 2</td>
<td>2 years</td>
<td>2%</td>
<td>0%</td>
<td>12.5%</td>
<td>3.3%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Patient 3</td>
<td>11 years</td>
<td>2%</td>
<td>2.5%</td>
<td>7.5%</td>
<td>10%</td>
<td>43%</td>
</tr>
<tr>
<td>Patient 4</td>
<td>9 years</td>
<td>5%</td>
<td>2.5%</td>
<td>7.5%</td>
<td>10%</td>
<td>5.7%</td>
</tr>
<tr>
<td>AVG</td>
<td></td>
<td>4.75%</td>
<td>1.88%</td>
<td>11.3%</td>
<td>5.8%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Length of Follow-up</th>
<th>QuickDASH</th>
<th>QuickDASH Work</th>
<th>QuickDASH Sport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>1.1 years</td>
<td>9.10%</td>
<td>0%</td>
<td>6.30%</td>
</tr>
<tr>
<td>Patient 2</td>
<td>2 years</td>
<td>9.10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Patient 3</td>
<td>11 years</td>
<td>2.30%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Patient 4</td>
<td>9 years</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 1

The quick DASH results are also reported as a percentage of limitation or disability in a given activity from 0% to 100%. We also used extended quick DASH sport and work modules. The results from each patient can be seen in table 1. Patients reported less than 10% limitation in any category with most reporting no limitation in the majority of categories. The sport module showed minimal limitation for the majority of patients. The work module subset showed 0% limitation amongst all 4 participants. The patient who was not reached by phone had adequate clinical follow up greater than 2 years. Additionally, he has continued his baseball career and is currently playing major league baseball without the need for additional shoulder operations.
**Batter's Shoulder: Clinical Outcomes and Return to Sport**

**Discussion**

Our goal was to perform a case series of batter's shoulder patients to determine their rate of return to play, post-operative clinical data, and obtain longer-term follow up regarding these parameters. Of the 5 studied patients, all returned to the pre-operative range of motion and strength. All 5 returned to play. Our overall return to play rate seems to indicate a better prognosis regarding this specific injury as compared to a cohort of all posterior labral injuries.

Our data suggest that shoulder function and patient outcomes return to normal in our study population. These findings are comparable to previous works specifically regarding batter's shoulder [9]. Our study provides continued data regarding return to play but with the utilization of validated patient-reported outcome measures, which has not been done previously. Our data demonstrate that outcomes are favorable with a posterior labral tear due to a batter's shoulder injury possibly differentiating this entity from the larger group of posterior labral tears. More work is needed in this regard.

This study remains limited by its small size and retrospective design. However, due to the rarity of this condition, these limitations are difficult to avoid. It remains important to add to the limited literature to inform surgeons how this condition differs from more traditional attritional posterior labral tears. Additionally, using surgical CPT codes as the method of identifying the initial list of patients resulted in the exclusion of any patients with this injury that were treated nonoperatively. It remains unclear how responsive this condition is to traditional non-operative management, as all patients in this cohort received surgery due to failing non-operative management.

**Conclusion**

Batter's shoulder is an infrequent cause of posterior labral tearing leading to a painful swing which can limit sports activity. In our limited series, all patients treated with the arthroscopic repair were able to return to play at the same level, confirming an improved prognosis for posterior labral tear due to a batter's shoulder injury.

**Funding**

This study received no outside funding.

**Conflicts of Interest**

Dr. Schoch is a paid consultant for Exactech and receives Royalties from Exactech. Dr. Farmer is a paid consultant for Exactech and Arthrex.

**Bibliography**


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