Risk Factors for Revision Posterior Shoulder Stabilization in Throwing Athletes

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Background: Revision posterior shoulder capsulolabral repair has inferior outcomes compared with primary surgery. Risk factors for revision in throwing athletes are unknown.

Purpose/Hypothesis: The purpose of this study was to characterize the revision rate and risk factors for revision surgery in throwing athletes. It was hypothesized that female athletes and those with smaller glenoid bone width would be at higher risk for revision surgery.

Study Design: Case-control study; Level of evidence, 3.

Methods: A total of 105 throwing athletes who underwent arthroscopic posterior capsulolabral repair of their throwing shoulder were reviewed at a minimum of 2-year follow-up, and patients who required a revision were compared with those who did not. Collected data compared between the revision and no-revision groups included age, sex, contact sport participation, and return to sport (RTS). American Shoulder and Elbow Surgeons (ASES) score, Kerlan-Jobe Orthopaedic Clinic (KJOC) score, stability, pain, strength, range of motion (ROM), and patient satisfaction. Radiographic parameters including glenoid bone version, cartilage version, labral version, bone width, labral width, glenoid labral version and width weight were also compared between both groups.

Results: Nine throwers required revision (8.6%) at an average of 2.8 years postoperatively. There were more female athletes in the revision than no-revision group (55.5% vs 23.4%; $P = .03$). There was no significant difference in age, proportion of contact athletes, rotator cuff tears, glenoid bone version, cartilage version, labral version, labral version weight, bone width, labral width, or labral width weight. Both groups had similar preoperative, postoperative, and change in ASES, KJOC, pain, strength, stability, and ROM scores. The proportion of patients with full strength and with full ROM, as well as patients who were satisfied with outcomes was similar between groups. Fewer patients in the revision group returned to sports compared with those in the no-revision group (14.3% vs 83.6%; $P < .001$), although return to sports at same level was not significantly different between groups (14.3% vs 37.2%; $P = .41$).

Conclusion: The revision rate of arthroscopic posterior shoulder stabilization in throwers was 8.6%. Female athletes were at higher risk for revision, and return to sports was lower in patients who underwent revision surgery.

Keywords: throwing athletes; posterior capsulolabral repair; revision surgery; risk factors

Posterior labral tears are less common than are anterior or superior labral tears. However, the treatment in throwing athletes is complex because of the high demands that the throwing shoulder requires. Patients often do not present with a frank dislocation but rather with an insidious decrease in performance or with an increase in pain with throwing.[9] It has been recognized that overhead throwing athletes may be at higher risk for posterior labral tears compared with the general population.[14] Arthroscopic posterior capsulolabral repair has demonstrated improvements in clinical outcome scores and return to play of up to 88% for nonthrowing athletes.[2,6,10,11,16,18,26] Similar improvements in clinical outcomes postoperatively and return to play have been found in throwing athletes.[20]

While most athletes experience improvement after arthroscopic posterior shoulder stabilization, those who do not and have a retear or recurrent symptoms requiring revision surgery commonly fare worse. Bradley et al[5]

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demonstrated that nonthrowers who underwent revision surgery had lower postoperative outcome scores and a lower proportion of patients who returned to play at the same level when compared with those who underwent primary surgery. The risk factors and characteristics of throwing athletes in whom primary arthroscopic posterior shoulder stabilization fails are unknown. Because of the complexity of the throwing shoulder, appropriate surgical intervention and capsulolabral tensioning is difficult. Furthermore, reinjury may be common, as the posterior labrum functions as a tension band during the throwing motion, leading to repetitive tension on the repair.[20] The purpose of this study was to characterize the rate of revision and risk factors for revision in throwing athletes undergoing arthroscopic posterior capsulolabral repair. The hypothesis was that female athletes and those with smaller glenoid bone width would be at higher risk for revision surgery.

METHODS

Institutional review board approval was obtained before the initiation of this study. Charts of patients who underwent posterior shoulder stabilization surgery between 2000 and 2017 were retrospectively reviewed. Patients were included if they were throwing athletes who had undergone arthroscopic posterior capsulolabral repair for unidirectional posterior shoulder instability with a minimum 2-year follow-up. Nonthrowing athletes, patients with multidirectional instability or habitual dislocators, and patients with <2-year follow-up were excluded. A throwing athlete was defined as one who exposes his or her shoulder to the repetitive stresses of the throwing motion.[13] All patients who underwent surgery had not improved after participating in a physical therapy program that included range of motion (ROM) and strengthening exercises as well as treatment for scapular dyskinesia. Timing of surgery was determined by the surgeon (J.P.B.) based on patient preference, sport played, level of competition, and timing of sport participation. Throwers who underwent revision surgery were compared with control throwers who did not require revision surgery. All patients who met the inclusion criteria were included in the study. The results of a smaller group of throwers who did not undergo revision surgery have been published previously.[20] They were included as part of the larger control group in this study to aide in understanding the outcomes of revision surgery.

Numerous risk factors including characteristic information, clinical outcome data, and radiographic data were assessed. Characteristic information collected from chart review included age, sex, sports played, contact sport participation, level of participation, time between primary and revision surgery, and length of follow-up.[9]

Clinical outcome data were also obtained via patient survey at 2 time points: before primary surgery and at latest follow-up. Questionnaire responses collected included the American Shoulder and Elbow Surgeons (ASES) shoulder score as well as the Kerlan-Jobe Orthopaedic Clinic (KJOC) shoulder and elbow score.[1,25] Subjective scores of pain,

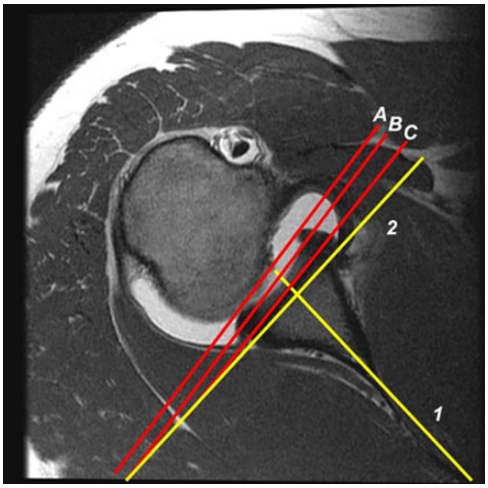

Figure 1. Axial magnetic resonance imaging scan with respective glenoid version measurements: First, a scapular reference line (*1*) is drawn from the middle of the glenoid to the medial scapula. Version was measured relative to a line perpendicular (*2*) to the scapular reference line. Labral version (*A*) was measured as the angle between a line connecting the apex of the anterior and posterior labrum and line *2*. Chondral version (*B*) was measured as the angle line connecting the apex of the chondral surfaces at the chondrolabral junctions anteriorly and posteriorly and line *2*. Bone version (*C*) was measured as a line connecting the apex of the subchondral bone anteriorly and posteriorly and line *2* (Reprinted with permission from Mauro et al[19]).

stability, strength, and ROM were also collected and compared. These subjective measures have been published in previous studies[5,19,20] relating to outcomes of posterior capsulolabral repair. Whether the patient thought the surgery was worthwhile was also determined. Return to sports (RTS) including return to play at the same level, a lesser level, or not at all was assessed. The reason for not returning to play at the same preoperative level was also recorded, if applicable.

Preoperative radiographic parameters on magnetic resonance imaging (MRI) scans compared included bone, cartilage, and labral version; labral version weight; bone and labral width; and labral width weight as described by Mauro et al[19] (Figures 1 and 2). The labral version and width weight represented the effect of the labrum in proportion to the version and width of the overall bone-labral complex and were calculated as [(*labral version* – *bone version*)/*bone version*] and [(*labral width* – *bone width*)/*bone width*], respectively. The presence of a biceps tendon or rotator cuff injury was also evaluated.

Operative treatment was dictated by the preoperative evaluation, examination under anesthesia, and intraoperative findings. Patients were placed in the lateral decubitus position, and modern capsulolabral reconstruction tools and techniques including suture anchor fixation were used.[12] Rotator cuff tears <50% thickness were debrided, while those that were ≥50% thickness were repaired. The

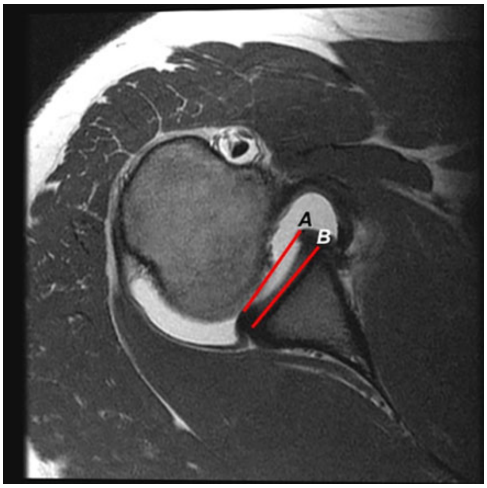

Figure 2. Labral width (*A*) was measured as the distance between the apices of the anterior and posterior labrum. Bone width (*B*) was measured as the distance between the apices of the subchondral bone anteriorly and posteriorly (Reprinted with permission from Mauro et al[19]).

postoperative protocol was previously described, with typical return to play at 6 months.[6]

Statistical analysis for the preoperative and latest follow-up continuous variables including ASES, KJOC, stability, and pain scores were performed using Student *t* test. Categorical variables including ROM, strength, whether the surgery was worthwhile, and RTS were analyzed using either chi-square test or Fisher exact test for smaller data sets. Statistical significance was set at $P < .05$. Microsoft Excel Version 16.4 was used for statistical analysis.

RESULTS

The charts of 547 patients who underwent arthroscopic posterior capsulolabral repair of their throwing shoulder between 2000 and 2017 were reviewed, and 105 patients met the inclusion criteria and were included in the final analysis. Of these 105 patients, 80 (76.2%) were male and 25 (23.8%) were female. The average age at surgery was 19.2 years (range, 14-44 years). Average follow-up was 8.3 years (range, 2-18 years) (Table 1).

Nine patients underwent revision surgery (8.6%) at an average of 2.8 years. Of these patients, 7 had complete ASES and KJOC outcome data, and 6 had complete subjective scores. Follow-up data were available on 60 of the 96 (62.5%) patients who did not undergo revision, 18 had complete both ASES and KJOC data, and 42 only had complete ASES data available for comparison. The average age was similar between the revision and no-revision groups (20.1 vs 19.2 years; $P = .30$), as was the proportion of patients who participated in a contact sport (0% vs 19.7%; $P = .36$). The proportion of female athletes in the revision group was higher than that in the no-revision group (55.5% vs 23.4%; $P = .03$). The sports played by these athletes included baseball (51.4%), softball (23.4%), football (quarterback) (15.9%), and other (9.3%). In the revision cohort, all 5 of the female athletes played softball, and all 4 of the male players played baseball. In the no-revision group, the breakdown of sports played among the females included softball (80%), track and field (throwing events) (10%), volleyball (5%), and unspecified (5%), while the breakdown for male athletes was baseball (64.5%), football (quarterback) (23.7%), softball (5.3%), and other (6.5%). In the revision group, reasons cited for revision included persistent pain (44.4%), recurrent pain/decreased performance without definite injury (33.3%), a subsequent football injury (11.1%), and struck by a motor vehicle 11.1%. The average follow-up was longer in the no-revision group compared with that in the revision group (9.8 years vs 5.5 years; $P = .004$) (Table 2).

TABLE 1
Patient Characteristics

Characteristics	Value
Sex, n	
Male	80
Female	25
Age, y, mean (range)	19.2 (14-44)
Follow-up, y, mean (range)	8.3 (2-18)
Level of participation, %	
Professional	1.5
College	18.2
High school	72.7
Recreational	7.6
Revision surgery, n (%)	9 (8.6)

TABLE 2
Comparison of Risk Factors for Revision Surgery[a]

	Revision	No Revision	*P*
Female sex, %	55.5	23.4	**.03**
Age, y	20.1	19.2	.30
Contact sport participation, %	0	19.7	.36
Follow-up, y	9.8	5.5	**.004**

[a]Bolded *P* values indicate statistically significant between-group difference ($P < .05$).

The revision and no-revision groups had a similar proportion of patients who had clinical failures based on ASES <60 or stability score >5 (20.0% vs 28.5%; $P = .60$). In the no-revision group, 3 patients (5%) had clinical failures based on ASES score; 5 patients, based on stability score (8.3%); and 4 patients (6.7%), based on both scores. In the revision group, no patients had clinical failures based on ASES score; 1, based on stability score (16.7%); and 1, based on both criteria (16.7%).

Both groups improved significantly in ASES score postoperatively. The revision and no-revision groups had similar ASES scores at the preoperative (38.1 vs 46.7; $P = .20$) and postoperative (74.7 vs 80.4; $P = .51$) time points and had a similar change in ASES score (32.4 vs 36.7; $P = .81$). In the analysis of the ASES scores of the no-revision group, 64.9% scored excellent; 21.1%, good; 14.0%, satisfactory;

TABLE 3
Clinical Outcome Comparison[a]

Outcome Measure[b]	Preoperative Score		Latest Follow-Up Score		
	Mean ± SD	Range	Mean ± SD	Range	*P*
No-revision group (n = 60)					
ASES	46.7 ± 15.2	3-82	80.4 ± 15.2	50-100	**<.001**
KJOC	32.2 ± 20.9	5-80	52.6 ± 28.7	10.5-100	**.03**
Pain	7.2 ± 2.2	0-10	3.6 ± 2.8	0-10	**<.001**
Stability	7.4 ± 2.3	0.5-10	3.0 ± 2.3	0-9	**<.001**
ROM	1.4 ± 1.0	0-3	2.2 ± 0.7	0-3	**.006**
Strength	1.5 ± 0.6	1-3	2.4 ± 0.6	1-3	**<.001**
Revision group (n = 6)					
ASES	38.1 ± 15.2	25-68.3	74.7 ± 19.3	40-98.3	**.004**
KJOC	31.0 ± 16.5	18.2-58.5	51.9 ± 21.8	33.2-83.5	.17
Pain	7.7 ± 1.4	5-9	2.6 ± 3.3	0-8	**.02**
Stability	7.4 ± 1.9	4-9	4.8 ± 3.9	1-9	.22
ROM	1.4 ± 1.3	0-3	2.0 ± 0.6	1-3	.32
Strength	1.6 ± 0.6	1-3	1.9 ± 0.6	1-3	.08

[a]Bolded *P* values indicate statistically significant between-group difference ($P < .05$). ASES, American Shoulder and Elbow Surgeons; KJOC, Kerlan-Jobe Orthopaedic Clinic; ROM, range of motion.

[b]Scoring: ASES (range, 0-100): >80 = excellent; 61-80 = good; 40-60 = satisfactory; <40 = poor; KJOC (range, 0-100): 100 = best; pain (range, 0-10): 10 = worst pain; stability (range, 0-10): 0-2 = excellent; 3-4 = good; 5-6 = satisfactory; 7-10 = poor; strength (range, 0-3): 0 = none, 1 = limited, 2 = satisfactory, 3 = full; ROM (range, 0-3): 0 = poor, 1 = limited, 2 = satisfactory, 3 = full ROM.

and 0%, poor at final follow-up. With regard to the ASES scores of the revision group, 42.9% scored excellent, 42.9% scored good, 0% scored satisfactory, and 14.2% scored poor at final follow-up. In total, 86.0% of the no-revision group had a good or excellent ASES score, while 85.7% of revision patients achieved a good or excellent ASES score ($P = .999$) (Table 3).

In terms of KJOC scores, the pre- and postoperative scores were similar for the revision (31.0 vs 51.9; $P = .17$) group, while they significantly improved in the no-revision group (32.2 vs 52.6; $P = .03$). Between the revision and no-revision groups, the preoperative (31.0 vs 32.2; $P = .90$) and postoperative (51.9 vs 52.6; $P = .96$) KJOC scores were similar. The change in KJOC score was also similar between the revision and no-revision groups (18.4 vs 22.2; $P = .70$) (Table 3).

The revision and no-revision groups had similar subjective stability scores preoperatively (7.4 vs 7.4; $P = .96$) and postoperatively (4.8 vs 3.0; $P = .37$), as well as change in stability score (−2.0 vs −4.4; $P = .15$). The postoperative stability scores of the no-revision group significantly improved compared with the preoperative scores (7.4 vs 3.0; $P < .001$), while those of the revision group did not (7.4 vs 4.8; $P = .22$). In the no-revision group, 43.3% had excellent, 38.3% had good, 10.0% had satisfactory, and 8.3% had poor stability. In the revision group, 40% had excellent, 20% had good, 0% had satisfactory, and 40% had poor stability. There was a similar proportion of patients who had good or excellent stability in the revision group compared with that in the no-revision group (81.7% vs 60.0%; $P = .26$) (Table 3).

TABLE 4
Return-to-Sport Comparison[a]

	Revision	No Revision	*P*
Return to sport at any level, %	14.3	83.6	**<.001**
Return to sport at same level, %	14.3	37.2	.41
Surgery worthwhile	87.1	87.5	.999

[a]Bolded *P* value indicates statistically significant between-group difference ($P < .05$).

Pain scores were similar between the no-revision and revision groups before (7.2 vs 7.7; $P = .37$) and after (3.6 vs 2.6; $P = .55$) surgery. The change in pain score was also similar (−4.5 vs −5.4; $P = .70$). The no-revision (7.2 vs 3.6; $P < .001$) and revision (7.7 vs 2.6; $P = .02$) groups had improved pain scores after surgery (Table 3).

In terms of subjective ROM, there was no significant difference in the proportion of patients with postoperative full ROM in the revision and no-revision groups (16.7% vs 38.6%; $P = .40$). In the no-revision group, the average ROM score significantly improved from pre- to postoperatively (2.2 vs 1.4; $P = .006$), while in the revision group, it did not (2.0 vs 1.4; $P = .32$) In the no-revision group, 60.0% had limited ROM and 1.7% had poor ROM. In the revision group, the 66.7% had limited ROM and 33.3% had poor ROM. The revision group had a significantly higher proportion of patients with poor ROM ($P = .02$).

There was also no significant difference in the proportion of patients with full postoperative subjective strength in the revision and no-revision groups (16.7% vs 46.5%; $P = .22$). The average strength score significantly improved in the no-revision (2.4 vs 1.5; $P < .001$) group but not in the revision (1.9 vs 1.6; $P = .08$) group from pre- to postoperatively. There was no significant difference between the no-revision and revision groups in terms of proportion of patients who found the surgery to be worthwhile (87.5% vs 87.1%; $P = .999$) (Table 4).

More patients in the no-revision group were able to RTS at any level compared with the revision group (83.6% vs 14.3%; $P < .001$). However, there was no difference in the rate of RTS at the same level between the no-revision and revision groups (37.2% vs 14.3%; $P = .41$) (Table 4). Of the patients who were not able to RTS at the same level, a higher proportion of patients in the revision group cited their shoulder as the reason compared with that in the no-revision group (100% vs 44.4%; $P = .044$).

No statistically significant difference was seen between the revision and no-revision groups in MRI measurements of glenoid bone version (9° vs 8.2°; $P = .62$), cartilage version (9.5° vs 8.3°; $P = .46$), labral version (10.9° vs 10.2°; $P = .73$), labral version weight (0.26 vs 2.24; $P = .22$), bone width (24.3 mm vs 25.2 mm; $P = .35$), labral width (28.9 mm vs 29.9 mm; $P = .51$), and labral width weight (0.19 vs 0.19; $P = .90$). There was also a similar proportion

TABLE 5
Radiographic Variable Comparison

	Revision	No Revision	P
Glenoid bone version, deg	9	8.2	.62
Cartilage version, deg	9.5	8.3	.46
Labral version, deg	10.9	10.2	.73
Bone width, mm	24.3	25.2	.35
Labral width, mm	28.9	29.9	.51

of patients in the revision and no-revision groups that were found to have rotator cuff tears (0% vs 6.5%; P = .999) and biceps tendon tears (0% vs 4.8%; P = .999) on MRI scans (Table 5).

DISCUSSION

The revision rate in throwing athletes after arthroscopic posterior shoulder stabilization was 8.6%. Female sex was found to be a risk factor for revision surgery, as the percentage of female patients in the revision group was more than double than that in the no-revision group. In addition, preoperative outcome and subjective scores were similar between the two groups and did not predict the need to undergo revision. There were no differences in glenoid bone loss or version between the groups.

Revision rates after arthroscopic posterior capsulolabral repair have been reported in the literature. Bradley et al[5] found a revision rate of 6.4% in nonthrowing athletes. In contact athletes, Bradley et al[4] reported a revision rate of 5.4%. McClincy et al[20] demonstrated a failure (ASES <60 or stability >5) rate of 6% in throwing athletes and indicated that all of these patients underwent revision surgery; however, this was a secondary outcome, and specific risk factors for revision were not evaluated. Other series[3,20,22,24,28,29] have included throwers and have shown an overall revision rate of 4% to 30% with variable clinical outcomes. In the present study of throwing athletes only, the rate of revision was 8.6%. The demands of the throwing motion produce a tremendous amount of force on the shoulder,[14,15,17] and the stress from repeated throwing motions may lead to tensile failure of the posterior capsulolabral complex, which may account for the revision rate. Furthermore, as for superior labrum anterior-posterior (SLAP) repairs, RTS after surgery of the labrum for throwers is very challenging.[27] Throwers therefore present unique treatment challenges.

Risk factors for requiring revision posterior stabilization have also been studied. Bradley et al[5] identified female sex, dominant shoulder, rotator cuff injury, ≤3 suture anchors, and smaller glenoid bone width as risk factors for revision. In contact athletes, Bradley et al[4] found that smaller glenoid bone width was the only factor associated with revision. In the current study, female sex was the only factor associated with revision. These data are important when counseling female patients on the expected outcomes of surgery. Glenoid bone width was not found to be associated with revision in throwers possibly because the posterior capsulolabral complex fails because of repetitive microtrauma from the throwing motion rather than a smaller bony glenoid. Therefore, glenoid width may not be as important as it is in nonthrowers, but rather soft tissue may be the main driver of successful outcome. The risk factors identified in other studies including dominant arm injury and rotator cuff injury were not significantly different between groups in the current study.

The results of revision posterior capsulolabral repair have been shown to be inferior.[7] Bradley et al[5] showed nonthrowers who underwent revision surgery had worse ASES, stability, pain, and ROM scores. Similar results were found in contact athletes who underwent revision surgery.[4] In the current study of throwers, ASES, KJOC, stability, strength, pain, and ROM scores were similar and improved in both the revision and no-revision groups. Results from studies of revision surgery in nonthrowers are likely not transferable to throwers because of the increased demands required from throwing shoulders. Pain may be the main reason to undergo revision surgery in nonthrowers. In contrast, many throwing athletes report a sense of decreased stability, ROM, ball velocity, or accuracy before posterior shoulder stabilization surgery.[15] Therefore, throwing athletes may experience improvements in pain and ability to perform daily activities, but the persistent lack of perceived stability and lack of improvement in ROM may be a more important factor in pursuing revision surgery. These factors should be considered when the surgical plan is formulated.

The rate of RTS after arthroscopic posterior shoulder capsulolabral repair has also been studied. Pennington et al[23] found an overall RTS rate of 93% for those who underwent revision and 82% for those who did not, without any limitations in all athletes. Kercher et al[15] found a RTS rate of 94% at any level and 61% at the same level. However, pitchers had a RTS rate at the same level of 41%, which was lower than that of nonpitchers. Bradley et al[5] found a lower rate of RTS at the same level for nonthrowers who underwent revision (15.4%) than for those who did not (64.3%). In contact athletes, there was a similarly lower rate of RTS at the same level in the revision group (16.7%) than in the no-revision group (72.1%).[4] The data presented here showed that throwing athletes who required revision surgery had a lower rate of RTS than did those who did not (14.3% vs 83.6%), which is concordant with the literature. As with SLAP repairs, throwers should be counseled about the possible inability to RTS after revision surgery.

The complexity of the throwing shoulder can explain the lower rate of RTS in throwers than nonthrowers. Restoration of the posterior capsulolabral complex is important for the throwing athlete, as it provides a dynamic restraint to posterior translation of the humeral head during the throwing motion.[7] The posterior labrum fails under repetitive tensile load during the repeated throwing motion,[14] and capsulolabral repair is typically sufficient to restore its function. However, after a failed repair, the tissue may become attenuated, and revision repair may not completely restore these functions, leading to failure.[7] Therefore, throwers may continue to experience subtle symptoms that impede their ability to return to throwing. This may explain why the revision group had similar outcome scores to those of the no-revision group. These scores are generalized measures for a wide range of shoulder pathology and therefore may not capture the subtle decrease in performance that many throwers report.

In this study, all patients in the revision group who did not RTS cited their shoulder as the reason. This may suggest that after initial posterior capsulolabral repair failed, their symptoms persisted even after revision surgery, although other factors, such as an incorrect diagnosis and improper throwing mechanics, may have contributed as well. Most throwers in the no-revision group who did not RTS at the same level cited reasons other than their shoulder (eg, graduation). This indicates that throwers may delay surgery until the end of their careers possibly because they often present with subtle symptoms rather than acute injuries. Throwers may therefore be able to RTS but may not need to return to the higher level of play.

Variations in the throwing motion may predispose some throwers to failed repair. Chalmers et al[8] found that elbow valgus torque, knee flexion at front foot contact, early thoracic rotation with loss of separation of the hips and shoulders, and decrease in shoulder rotational ROM were associated with decreased pitch velocity and pitcher fatigue. Mihata et al[21] showed that increasing horizontal abduction angles led to greater internal impingement in a cadaveric model. The senior author (J.P.B.) routinely obtains high-speed photography of throwers during the throwing motion. In the qualitative evaluation of the senior author, when comparing throwers who do well after posterior capsulolabral repair with those who require revision, excessive external rotation and hyperangulation out of the scapular plane are appreciated. This throwing motion may lead to excessive posterior labral stress, causing the repaired posterior labrum to peel off the glenoid. This concept is being investigated, and risk factors for failed repair, such as this, represent a future direction for discovering ways to intervene and prevent postoperative recurrence.

Limitations of the current study include the relatively small sample, which makes it difficult to offer definitive conclusions from these data and may have increased the likelihood of a type II error. While the number of revisions was relatively low, this is still a significant amount given the infrequency of this surgery and the rate at which revision surgery is necessary. The main outcome scores utilized in this study were the ASES and KJOC, which are commonly used in the literature; however, the inclusion of other outcome scores (eg, Disabilities of the Arm, Shoulder and Hand; Simple Shoulder Test) as well as more objective outcome measures may have provided more comprehensive outcome data. In addition, the full details of the surgical procedures and the findings at revision surgery were not available for review. Furthermore, despite having 2-year follow-up on all patients, not all patients were able to be contacted for final follow-up.

CONCLUSION

The revision rate of arthroscopic posterior shoulder stabilization in throwing athletes was 8.6% at an average of 2.8 years postoperatively. Female athletes were at a higher risk for revision surgery. The revision and no-revision groups had similar postoperative outcome scores, but the revision group had a lower rate of RTS. Age, rotator cuff injury, glenoid version, and glenoid width were not risk factors for revision. These data are useful to counsel throwers undergoing arthroscopic posterior capsulolabral repair.

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