# **Athletes With Anterior Shoulder Instability**

# A Prospective Study on Player Perceptions of Injury and Treatment

Leslie A. Fink Barnes,<sup>\*†</sup> MD, Charles M. Jobin,<sup>‡</sup> MD, Charles A. Popkin,<sup>‡</sup> MD, and Christopher S. Ahmad,<sup>‡</sup> MD

Investigation performed at Columbia University Center for Shoulder, Elbow and Sports Medicine, New York, New York, USA

**Background:** Many in-season athletes choose to delay or avoid surgery in order to continue playing and avoid downtime such as missed games or seasons.

**Purpose:** To learn about the attitudes toward the injury and treatment of in-season shoulder instability in competitive athletes who have suffered a shoulder dislocation.

Study Design: Cross-sectional study; Level of evidence, 3.

**Methods:** A study-specific questionnaire about athletes' perceptions of injury and treatment was administered to injured players. Secondary outcomes included the American Shoulder and Elbow Surgeons (ASES) score and the Western Ontario Shoulder Instability Index (WOSI). Mean scores and standard deviations were calculated, and between-group analyses with *t* tests were performed to compare the ASES and WOSI scores. The Mann-Whitney *U* test was used for analyses performed on the following groups: early operative versus nonoperative management; age <18 versus  $\geq$ 18 years; first-time dislocators versus recurrent dislocators; self-reducing subluxations versus dislocations requiring assistance; and dominant arm affected versus nondominant arm.

**Results:** There were 45 patients included in this study (33 male, 12 female) with a mean age of  $18 \pm 2.8$  years. Several sports were represented, with the most common being football, baseball, soccer, and rugby. In this study of in-season athletes with shoulder instability, 13 (28.9%) chose early surgery, 4 (8.9%) chose surgery at season's end, while 28 (62.2%) chose physical therapy followed by a wait-and-see approach, with 13 (46.4%) of these patients ultimately requiring surgery. Athletes who chose non-operative treatment were statistically more likely to believe that their shoulder would heal on its own (P < .001) or with physical therapy (P < .025); they were also more likely to agree that they would rather stop sports than undergo surgery (P < .04). Athletes with worse ASES and WOSI scores at injury were more likely to choose surgery (P < .03 and P < .05, respectively). Athletes with >1 dislocation were less likely to believe that the shoulder would heal without surgery (P < .025). Most athletes agreed that seasonal timing and recruitment prospects were an important factor in their decision in favor of surgery (P < .038), and most agreed that their doctor influenced their ultimate treatment decision (P < .006). Most athletes also agreed that a repeat dislocation would cause further injury to the shoulder.

**Conclusion:** Treatment decisions were most strongly related to the athletes' perceptions of injury severity and the influence of the treating surgeon.

Keywords: shoulder instability; athletes; psychological aspects of sport; in-season dislocation

Anterior shoulder dislocations are common among adolescent and young adult athletes.<sup>18</sup> According to several studies, once a teenager has experienced a shoulder dislocation, he or she has a high likelihood of repeated instability episodes.<sup>3,9</sup> The young male athlete, in particular, is at the greatest risk of developing recurrent instability.<sup>22</sup> The rate of recurrent instability can be as high as 87% in patients aged 15 to 20 years.<sup>21,24</sup> Athletes are particularly prone to instability because of repetitive physical contact in combination with maneuvers that require the shoulder to be in a position vulnerable to dislocation, such as abduction and external rotation.<sup>17</sup>

Successful treatment of shoulder instability is particularly important because a link between recurrent dislocations and arthritis has been established.<sup>10</sup> It is known that recurrent episodes of instability lead to further shoulder

The Orthopaedic Journal of Sports Medicine, 9(9), 23259671211032239 DOI: 10.1177/23259671211032239 © The Author(s) 2021

This open-access article is published and distributed under the Creative Commons Attribution - NonCommercial - No Derivatives License (https://creativecommons.org/ licenses/by-nc-nd/4.0/), which permits the noncommercial use, distribution, and reproduction of the article in any medium, provided the original author and source are credited. You may not alter, transform, or build upon this article without the permission of the Author(s). For article reuse guidelines, please visit SAGE's website at http://www.sagepub.com/journals-permissions.

damage, such as cartilage injury or bone loss.<sup>7,12</sup> Nonoperative treatment options include immobilization in a sling, physical therapy, and bracing with delayed return to activity.<sup>4</sup> However, the success of nonoperative treatment has been unsatisfactory in young, active people in terms of return to sport and avoidance of redislocation.<sup>20</sup> This may be because significant pathology present after the first dislocation, in addition to the potential for repeated exposures to sports-related trauma, lead to a high rate of recurrence. In several studies, a Bankart lesion was present even after the initial anterior shoulder dislocation in 79% to 100% of patients.<sup>1,3,12,14,25</sup>

By contrast, the success rate of surgery with arthroscopic stabilization can be 80% to 90% among young patients if defined as no recurrent instability with return to preinjury level of sport.<sup>1,2,5,6,8</sup> However, surgery has inherent risks, including bleeding, infection, and risks of anesthesia. Surgical intervention also incurs a greater cost and requires additional recovery with a significant period of immobilization followed by physical therapy. As a result, many athletes choose to delay surgery until the season is over, or sometimes indefinitely.

Patient preference has been shown to play an important role in decision-making for the treatment of anterior shoulder dislocations; therefore, it is important to elucidate the factors that influence an athlete's decisions.<sup>15</sup> With both operative and nonoperative treatment as viable options, this study used a novel questionnaire and patient-reported outcomes to explore patients' insight into their injury and prognosis, as well as to understand other factors that influence treatment decisions, in a prospective series of high school and college athletes with in-season shoulder instability. It was hypothesized that attitudes will differ among patients who choose early surgical stabilization versus delayed surgery or nonoperative management and that these attitudes are affected by external factors such as injury severity or future participation aspirations.

#### METHODS

This was an institutional review board-approved prospective study of attitudes toward injury and treatment decision making in high school and college athletes who experienced a traumatic anterior shoulder dislocation within their competitive season. Participants were identified in the practices of 3 fellowship-trained sports medicine surgeons (C.S.A., C.A.P., C.M.J.) as athletes with anterior shoulder instability occurring during their competitive athletic season, presenting over a 2-year period of enrollment. Both first-time and recurrent dislocators were included. Patients were enrolled in the study after providing informed consent.

Participants were asked to complete a questionnaire at the time of their initial orthopaedic consultation soon after injury. At the orthopaedic consultation, history and a physical examination were obtained and imaging findings were reviewed with the patient. All patients underwent radiography and a magnetic resonance imaging (MRI) scan. After a discussion on the natural history and treatment options for traumatic anterior shoulder dislocations, both recurrent and first-time in-season dislocators were offered surgical stabilization with arthroscopic Bankart repair or nonoperative management with a rehabilitation program focused on proprioception.

The patients then answered questions on demographic and injury information, current sports participation, and future expectations, as well as completing the American Shoulder and Elbow Surgeons (ASES) Shoulder Scale and the Western Ontario Shoulder Instability Index (WOSI). In addition, they completed a novel, study-specific questionnaire regarding their attitudes and beliefs about the injury and treatment options (see the Appendix). Patients were assessed until the end of their season or until they underwent surgery, whichever was longer.

The ASES incorporates a visual analog pain scale and functional ability questions and is rated on a 100-point scale, with higher scores indicating less pain and better function.<sup>13,16</sup> The minimal clinically important difference (MCID) in the ASES score is 6.4 points.<sup>16</sup> The WOSI is a disease-specific quality-of-life measurement tool for patients with shoulder instability. WOSI scores are presented as percentage of a normal, healthy shoulder (0%)represents no deficit and 100% the worst deficit). It has been shown to be highly reliable and sensitive to changes in perceived health status in patients with shoulder instability.<sup>11,23</sup> The MCID is 5 points, and it correlates with the ASES score.<sup>11,23</sup> In the study-specific questionnaire, patients answered questions about sports participation, factors that influenced in-season treatment decisions, perception of injury severity, and effectiveness of different treatment types, with which the participant agreed or disagreed based on a 5-point Likert scale (see the Appendix).

<sup>‡</sup>Columbia University Center for Shoulder, Elbow and Sports Medicine, New York, New York, USA.

Final revision submitted March 15, 2021; accepted March 30, 2021.

<sup>\*</sup>Address correspondence to Leslie A. Fink Barnes, MD, Department of Orthopedic Surgery and Sports Medicine, Temple University Lewis Katz School of Medicine, 3401 N Broad Street, Philadelphia, PA 19140, USA (email: leslie.barnes@temple.edu).

<sup>&</sup>lt;sup>†</sup>Department of Orthopedic Surgery and Sports Medicine, Temple University Lewis Katz School of Medicine, Philadelphia, Pennsylvania, USA.

One or more of the authors has declared the following potential conflict of interest or source of funding: L.A.F.B. has received education payments from Arthrex and hospitality payments from Smith & Nephew. C.M.J. has received education payments from Arthrex; research support from Acumed; consulting fees from Acumed, Biomet, Consortium of Focused Orthopedists, DePuy, Integral Life Sciences, Integrated Shoulder Collaboration, and Wright Medical; and speaking fees from Acumed, Biomet, Wright Medical, and Zimmer. C.A.P. has received research support from Arthrex, education payments from Gotham Surgical, and other financial or material support from Smith & Nephew. C.S.A. has received research support from Arthrex, Major League Baseball, and Stryker; consulting fees from Arthrex; and royalties from Arthrex and Lead Player; and has stock/stock options in At Peak. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

Ethical approval for this study was obtained from Columbia University (protocol: IRB-AAAK1356-Y2M00).

TABLE 1 Demographic Data on Study Participants

| Variable             | Value                        | Variable               | Value |
|----------------------|------------------------------|------------------------|-------|
| Age, y               |                              |                        |       |
| Mean ± SD<br>(range) | $18 \pm 2.8  (14\text{-}26)$ | Imaging findings, $\%$ |       |
| Age $\geq$ 18, n     | 18                           | Labral tear            | 95.60 |
| Age <18, n           | 27                           | Cartilage damage       | 66.70 |
| Sex, n               |                              | Bony Bankart           | 20    |
| Male                 | 33                           | Capsular injury        | 20    |
| Female               | 12                           | Dislocation            |       |
|                      |                              | frequency, %           |       |
| Sport, n             |                              | First time             | 60    |
| Football             | 8                            | Recurrent              | 40    |
| Baseball             | 6                            | Dominant side          |       |
|                      |                              | injured, n             |       |
| Soccer               | 6                            | Yes                    | 19    |
| Rugby                | 5                            | No                     | 26    |
| Lacrosse             | 4                            | Seasonal timing, n     |       |
| Basketball           | 4                            | Preseason              | 6     |
| Softball             | 3                            | Beginning              | 19    |
| Wrestling            | 2                            | Middle                 | 10    |
| Volleyball           | 1                            | End                    | 7     |
| Ice hockey           | 1                            | Postseason             | 3     |
| Field hockey         | 1                            |                        |       |
| Gymnastics           | 1                            |                        |       |
| Diving               | 1                            |                        |       |
| Equestrian           | 1                            |                        |       |
| Snowboarding         | 1                            |                        |       |

In order to detect the MCID in the ASES scores, a power analysis determined that approximately 17 patients would be needed in each group, using an alpha of .05 and beta of 80%. Mean scores and standard deviations were calculated, and between-group analyses with *t* tests were performed to compare the ASES and WOSI scores. The Mann-Whitney *U* test was used for analyses carried out on the following groups: early operative versus nonoperative management; age <18 versus  $\geq$ 18 years; first-time dislocators versus recurrent dislocators; self-reducing subluxations versus dislocations requiring assistance; and dominant arm versus nondominant arm affected.

#### RESULTS

Overall, 45 athletes (33 male, 12 female) participated, with a mean age of  $18 \pm 2.8$  years. There were 8 football players, 6 baseball players, 6 soccer players, 5 rugby players, 4 each of lacrosse and basketball players, 3 softball players, 2 wrestlers, and 1 each of volleyball, ice hockey, field hockey, gymnastics, diving, equestrian, and snowboarding athletes. Demographic data are reported in Table 1. The mean time between injury and presentation was  $27 \pm 17.8$  days. Mean follow-up was  $9.2 \pm 7.15$  months. The mean ASES score after injury was  $57.90 \pm 23.43$ , and the mean WOSI score after injury was  $47.2\% \pm 20.6\%$  of a normal score. These values are recorded in Table 2. On radiographs, a bony Bankart was identified in 20% of athletes (9 patients); a

| TABLE 2                                 |              |
|---|--------------|
| ASES and WOSI Scores in the Athletes    | $\mathbf{s}$ |
| After Shoulder Dislocation <sup>a</sup> |              |

|                              | All               | Choosing<br>Nonoperative<br>Treatment | Choosing<br>Surgery | Р    |
|------------------------------|-------------------|---------------------------------------|---------------------|------|
| ASES total                   | $57.90 \pm 23.43$ | $62.55\pm22.59$                       | $46.28\pm22.15$     | <.03 |
| score<br>WOSI total<br>score | $47.20\pm20.60$   | $52.93 \pm 19.26$                     | $37.18 \pm 21.60$   | <.05 |

<sup>*a*</sup>Data are reported as mean  $\pm$  SD. Bolded *P* values indicate statistically significant difference between athletes choosing nonoperative treatment vs surgery (*P* < .05). ASES, American Shoulder and Elbow Surgeons; WOSI, Western Ontario Shoulder Instability Index.

torn labrum was identified on MRI in 95.6% of patients (43 athletes). Cartilage damage was identified in 66.7% (30 patients), and capsular injury was identified in 20% of MRI scans (9 people). For two-thirds of the athletes (30 players), it was their first dislocation.

In this study of in-season athletes with shoulder instability, 28.9% (n = 13) chose early surgery, 8.9% (n = 4) chose surgery at season's end, and 62.2% (n = 28) chose physical therapy followed by a wait-and-see approach, with 46.4% of these patients (n = 13) ultimately requiring surgery after the season due to recurrent instability or failure to improve with physical therapy. Most of the injuries occurred in the beginning or middle of the season. Of these athletes, 53% (n = 24) had collegiate or professional aspirations, and 75% (n = 34) were starting players on the team.

Athletes who chose nonoperative treatment had a greater belief that their shoulder would heal on its own (P < .001) or with physical therapy (P < .025); and more often preferred to stop sports rather than undergo surgery (P < .04). Athletes with worse ASES and WOSI scores at injury were more likely to choose surgery (P < .03) and P < .05, respectively). Athletes with >1 dislocation were less likely to believe that the shoulder would heal without surgery (P < .025). Most athletes agreed that seasonal timing and recruitment prospects were an important factor in their decision, in favor of surgery (P < .038), and most agreed that their doctor influenced their ultimate treatment decision. Most athletes also agreed that a repeat dislocation would cause further injury to the shoulder. The overall questionnaire results are recorded in Table 3.

#### Early Operative Versus Delayed Operative or Nonoperative Management

Patients who chose nonoperative treatment had better initial ASES and WOSI scores after their injury. Patients who had a mean ASES score of  $\geq 62$  were more likely to choose nonoperative treatment initially, while those with a mean ASES score of 46 soon after injury were more likely to choose early surgery ( $62.55 \pm 22.59$  vs  $46.28 \pm 22.15$ ; P < .03). Patients who chose early surgery had a mean

TABLE 3 Overall Results of Athlete Questionnaire<sup>a</sup>

| Sur | Score   |                 |
|-----|---|-----------------|
| 1.  | The amount of time left in the current season was important in my treatment decision.   | $3.38 \pm 1.58$ |
| 2.  | The amount of time to be healthy for the start of<br>the next season was important in my treatment<br>decision.                   | $4.21 \pm 1.18$ |
| 3.  | I wanted to play in an upcoming sport or another<br>league/season of the same sport so I declined or<br>delayed surgery.          | $2.25 \pm 1.62$ |
| 4.  | College or professional recruitment affected my interest in playing this sport.   | $2.33 \pm 1.37$ |
| 5.  | In order to improve my college or professional<br>recruitment, I decided to continue playing in the<br>same season I was injured. | $2.25 \pm 1.57$ |
| 6.  | My doctor influenced my decision on treatment with or without surgery.  | $3.71 \pm 1.37$ |
| 7.  | I feel I will recover from this shoulder injury without surgery.  | $3.21 \pm 1.64$ |
| 8.  | Without surgery, the injury will heal.  | $2.96 \pm 1.60$ |
| 9.  | Without surgery, a brace will work.   | $2.92 \pm 1.14$ |
| 10. | Without surgery, physical therapy will work.  | $3.71 \pm 1.12$ |
| 11. | I am fearful that my shoulder will dislocate again.   | $3.50 \pm 1.32$ |
| 12. | I think that another dislocation will cause further injury to my shoulder.  | $3.92\pm0.97$   |
| 13. | Expectations to play from the coach influenced my treatment decision.   | $2.92 \pm 1.41$ |
| 14. | Expectations to play from my parents or guardians influenced my treatment decision.   | $2.08 \pm 1.2$  |
| 15. | Expectations to play from other teammates or friends influenced my treatment decision.  | $2.50\pm1.50$   |
| 16. | I would rather end my sports career than have surgery.  | $1.42\pm0.65$   |
| 17. | I think this injury will end my sports career.  | $1.54\pm0.59$   |
| 18. | I think my shoulder will be back to $100\%$ if I get the correct treatment.   | $4.25\pm0.79$   |
| 19. | I am fearful that if I have another dislocation, it will affect my ability to get back to $100\%$ health.                         | $3.33 \pm 1.17$ |

<sup>*a*</sup>Data are reported as mean  $\pm$  SD. Scores ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

WOSI score of 37, while those who chose to delay surgery had a mean initial WOSI score of 53 ( $52.93 \pm 19.26$  vs 37.18  $\pm 24.60$ ; P < .05). Those who elected immediate stabilization relative to nonoperative treatment or delayed surgery felt more strongly that their doctor influenced the treatment decision ( $4.18 \pm 0.77$  vs  $3.18 \pm 1.19$ ; P < .006).

Those athletes who wanted to play in an upcoming sport or league chose early nonoperative treatment more often on the questionnaire (2.75 ± 1.61 vs 1.77 ± 1.09; P < .038). Recruitment interest affected the decisions of athletes who underwent surgical stabilization more than those who did not undergo surgery (3.15 ± 1.34 vs 2.28 ± 1.37; P < .038). Athletes who chose nonoperative treatment were more likely to feel that the shoulder would recover on its own without surgery (3.5 ± 1.44 vs 1.69 ± 0.95; P < .001) and that the shoulder injury would heal with nonoperative treatment (3.12 ± 1.48 vs 1.85 ± 0.90; P < .001) such as physical therapy (3.43 ± 1.19 vs 2.85 ± 0.99; P < .025).

Patients who selected nonoperative treatment would rather stop sports than undergo surgery by a slight margin  $(1.72 \pm 0.92 \text{ vs } 1.23 \pm 0.44; P < .041)$ , although the majority of participants did not share this view.

#### Age <18 Versus ≥18 Years

Age played a role in the athletes' perceptions and beliefs. There were 18 athletes aged  $\geq$  18 years and 27 athletes aged <18 years. Athletes aged <18 years cited concerns over wanting to play in an upcoming sport or league as being a factor in their decision more often than their older peers  $(2.85 \pm 1.59 \text{ vs } 1.89 \pm 1.28; P < .025)$ . Younger patients believed more often that they would recover without surgery  $(3.26 \pm 1.43 \text{ vs } 2.56 \pm 1.65; P < .035)$ , that bracing would work  $(3 \pm 1.18 \text{ vs } 2.44 \pm 0.86; P < .011)$ , and that physical therapy would work  $(3.52 \pm 1.16 \text{ vs } 3.06 \pm 1.16;$ P < .036). Patients aged >18 years were more afraid that the shoulder would dislocate again (3.89  $\pm$  1.32 vs 3.33  $\pm$ 1.18; P < .018) and believed more than the younger cohort that another dislocation would cause further injury  $(4.28 \pm$  $0.96 \text{ vs } 3.85 \pm 0.82; P < .025$ , although most participants in general agreed with that statement. Patients aged >18years were more likely to believe that their shoulder would return to 100% function if treated correctly ( $4.37 \pm 0.93$  vs  $3.78 \pm 1.06$ ; P < .044). Interestingly, the older group had superior WOSI scores  $(54.43 \pm 23.01 \text{ vs } 39.31 \pm 16.83)$ ; P < .019) at injury than the younger athletes.

#### First-Time Versus Recurrent Dislocators

There were 27 patients with no prior dislocations and 18 athletes with a history of previous dislocations before the season. When comparing first-time to recurrent dislocators, first-time dislocators were more likely than the recurrent dislocators to believe that the shoulder would heal without surgery  $(3.17 \pm 1.40 \text{ vs } 2.29 \pm 1.38; P < .025)$ . Recurrent dislocators were more likely to agree that expectations from parents influenced the treatment decision  $(2.71 \pm 1.15 \text{ vs } 1.79 \pm 0.98; P < .006)$ , although most participants in general disagreed with this statement.

# Self-Reducing Dislocation

Versus Dislocation Requiring Assistance

There were 27 athletes who could self-reduce the dislocation and 18 who required assistance. Self-reducers were more likely to choose to stop sports altogether rather than undergo surgery compared with patients with frank dislocation requiring assistance for reduction (1.94  $\pm$  1.00 vs 1.33  $\pm$  0.62; P < .008).

#### Dominant Versus Nondominant Arm Affected

Handedness played a role in perception of injury severity. There were 19 athletes whose dominant arm was affected by the dislocation, while 26 athletes had injured their nondominant side. Athletes whose dominant arm was affected were more likely to believe that this injury will end their career (1.67  $\pm$  0.74 vs 1  $\pm$  0; P < .040), although on average this was not the prevailing view.

#### DISCUSSION

In this study of player perceptions after in-season anterior shoulder instability, treatment decisions were strongly related to objective measures of injury severity as well as subjective perceptions of injury severity and informational content relayed from the treating orthopaedic surgeon. Patients were more likely to elect nonoperative treatment if they had scores on the ASES and WOSI with lower injury severity. The mean ASES score of a patient choosing nonoperative management was 62 versus 46 in the group who chose surgery (P < .03), while the mean WOSI score was 53 in the nonoperative group and 37 in the surgery group (P <.05). Patients who elected nonoperative treatment also perceived the injury to be less severe, as they were statistically more likely to believe that the shoulder would heal on its own and that they would recover without surgery (P <.001). Some patients who elected nonoperative management did so because they were willing to give up the sport. With respect to external influences, the surgeon had more influence than parents, coaches, or teammates, and this was most evident in patients who elected surgical stabilization (P < .006). The factors that go into a players' decision-making process are critical to elucidate, as Lau et al<sup>15</sup> demonstrated that patient preference plays a strong role in shared decision making for the treatment of anterior shoulder dislocations.

Another significant finding of this study was that despite younger athletes having higher rates of recurrent instability and possibly benefiting from early stabilization surgery,<sup>6,19,21</sup> many competitive athletes in our study chose to delay surgery in order to finish the season. While most patients agreed that repeated dislocations were undesirable and could further damage the shoulder, these decisions demonstrated that there is pressure on both the athlete and physician to have the athlete return to sport as quickly as possible despite the high recurrence rates of glenohumeral instability without appropriate intervention. In this study, seasonal timing and recruitment aspirations affected the players' decision for surgery, with seasonal concerns more likely to be cited as a reason for delaying surgery and recruitment aspirations more relevant in patients who elected early surgery. These aspirational players were different from some athletes identified in this study who were willing to give up a sport altogether in order to avoid surgery. The results of this study highlight the multitude of considerations that athletes and their physicians face when confronting an in-season shoulder dislocation.

In a previous observational study by Buss et al,<sup>4</sup> 30 inseason athletes who experienced a primary or recurrent anterior shoulder dislocation or subluxation were evaluated for 2 years. After the instability episode, patients immediately underwent physical therapy and returned to play when they had symmetric strength and a functional range of motion that allowed for full participation at their position. Of the athletes, 87% were able to return to competitive play for the remainder of the season, with a 41% recurrence rate and a mean of 1.4 recurrent dislocations per athlete in the same season.<sup>4</sup> Those authors indicated that 53% went on to have surgery in the subsequent offseason, and the rest deferred surgery for the duration of the study period. We found a similar rate of stabilization surgery occurring in the off-season.

Other studies have shown that athletes who delay or decline surgery may compromise their ultimate outcomes if they sustain another dislocation.<sup>2,21</sup> For this reason, athletes with shoulder instability may elect surgical stabilization in a timely fashion before a repeat episode of shoulder instability occurs.<sup>3</sup> Almost all patients (>95%) in this study had abnormalities on imaging studies, in accordance with previous findings that intra-articular damage can occur after the first dislocation and is even more likely after recurrent dislocation.<sup>1,3,12,14,25</sup> This finding reinforces the evidence that advanced imaging is often warranted in athletes who experience a traumatic shoulder dislocation, even after the first episode.

The main limitation of this study is that both first-time dislocators and recurrent dislocators were included. Additional limitations of the study include the small study population, although it is comparable with other, similar series of in-season athletes and we had sufficient patients based on our power analysis. Additionally, the variety of sports represented did not allow for sport-specific recommendations. Not all sports were represented in this study. Also, the study-specific questionnaire has not been validated independently, but standardized validated instruments were used in the study as well. Although the inclusion of 3 treating surgeons decreased the individual bias, there may have been bias in management given the treatment within a single institution. While there was no standardized script, it was the authors' practice during the study that both recurrent and first-time in-season dislocators were offered surgical stabilization or nonoperative management with rehabilitation, with ultimate engagement in shared decision making with the patients to determine the preferred course of action. Interestingly, no patients in this study group were noted to have glenoid bone loss, which would have had additional treatment implications. Finally, longer-term follow-up would be useful to assess if these views held by the athletes changed over time or correlated with outcomes such as successful prevention of future recurrent dislocation or participation in sport at their desired level.

#### CONCLUSION

Treatment decision making regarding in-season shoulder dislocation is complex and multifactorial. This prospective study of in-season athletes with shoulder instability better defines the injured athlete's attitudes toward shoulder dislocation and treatment, including perceptions about surgical stabilization versus nonoperative management. Treatment decisions were most strongly related to the athletes' perceptions of injury severity, objective measures of injury severity, and influence of the treating orthopaedic surgeon. Education on the severity of the shoulder dislocation injury, expected success rates from operative and nonoperative treatment, and time frame for recovery, as well as the treating surgeon's influence, are important for shared decision making.

#### ACKNOWLEDGMENT

The authors acknowledge Alec Talsania for his assistance with manuscript submission.

#### REFERENCES

- Arciero RA, Wheeler JH, Ryan JB, McBride JT. Arthroscopic Bankart repair versus nonoperative treatment for acute, initial anterior shoulder dislocations. *Am J Sports Med.* 1994;22:589-594.
- Boileau P, Villalba M, Hery JY, Balg F, Ahrens P, Neyton L. Risk factors for recurrence of shoulder instability after arthroscopic Bankart repair. J Bone Joint Surg Am. 2006;88:1755-1763.
- Bottoni CR, Wilckens JH, DeBerardino TM, et al. A prospective, randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute, traumatic, first-time shoulder dislocations. *Am J Sports Med.* 2002;30:576-580.
- Buss DD, Lynch GP, Meyer CP, Huber SM, Freehill MQ. Nonoperative management for inseason athletes with anterior shoulder instability. *Am J Sports Med.* 2004;32:1430-1433.
- Castagna A, Delle Rose G, Borroni M, et al. Arthroscopic stabilization of the shoulder in adolescent athletes participating in overhead or contact sports. *Arthroscopy*. 2012;28:309-315.
- Dickens JF, Rue JP, Cameron KL, et al. Successful return to sport after arthroscopic shoulder stabilization versus nonoperative management in contact athletes with anterior shoulder instability: a prospective multicenter study. *Am J Sports Med*. 2017;45(11): 2540-2546.
- Dumont GD, Russell RD, Robertson WJ. Anterior shoulder instability: a review of pathoanatomy, diagnosis and treatment. *Curr Rev Musculoskelet Med.* 2011;4:200-207.
- Good CR, MacGillivray JD. Traumatic shoulder dislocation in the adolescent athlete: advances in surgical treatment. *Curr Opin Pediatr.* 2005;17:25-29.
- Hovelius L, Augustini BG, Fredin H, Johansson O, Norlin R, Thorling J. Primary anterior dislocation of the shoulder in young patients. A tenyear prospective study. J Bone Joint Surg Am. 1996;78:1677-1684.
- Hovelius L, Saeboe M. Neer Award 2008: arthropathy after primary anterior shoulder dislocation—223 shoulders prospectively followed up for twenty-five years. J Shoulder Elbow Surg. 2009;18:339-347.
- 11. Kirkley A, Griffin S, McLintock H, Ng L.The development and evaluation of a disease specific quality of life measurement tool for shoulder

instability. The Western Ontario Shoulder Instability Index (WOSI). *Am J Sports Med.* 1998;26:764-772.

- Kirkley A, Werstine R, Ratjek A, Griffin S. Prospective randomized clinical trial comparing the effectiveness of immediate arthroscopic stabilization versus immobilization and rehabilitation in first traumatic anterior dislocations of the shoulder: long-term evaluation. *Arthroscopy*. 2005;21:55-63.
- Kocher MS, Horan MP, Briggs KK, Richardson TR, O'Holleran J, Hawkins RJ. Reliability, validity, and responsiveness of the American Shoulder and Elbow Surgeons subjective shoulder scale in patients with shoulder instability, rotator cuff disease, and glenohumeral arthritis. J Bone Joint Surg Am. 2005;87:2006-2011.
- Larrain MV, Montenegro HJ, Mauas DM, Collazo CC, Pavon F. Arthroscopic management of traumatic anterior shoulder instability in collision athletes: analysis of 204 cases with a 4- to 9-year follow-up and results with the suture anchor technique. *Arthroscopy*. 2006;22: 1283-1289.
- Lau BC, Hutyra CA, Streufert B, et al. Surgeon applications of patient preferences in treatment decision making for first-time anterior shoulder dislocation. Orthop J Sports Med. 2020;8(12):2325967120966145.
- Michener LA, McClure PW, Sennett BJ. American Shoulder and Elbow Surgeons Standardized Shoulder Assessment Form, patient self-report section: reliability, validity, and responsiveness. J Shoulder Elbow Surg. 2002;11(6):587-594.
- 17. Neer CS 2nd, Welsh RP. The shoulder in sports. Orthop Clin North Am. 1977;8:583-591.
- Owens BD, Agel J, Mountcastle SB, Cameron KL, Nelson BJ. Incidence of glenohumeral instability in collegiate athletics. *Am J Sports Med.* 2009;37:1750-1754.
- Owens BD, Dickens JF, Kilcoyne KG, Rue JP. Management of midseason traumatic anterior shoulder instability in athletes. *J Am Acad Orthop Surg.* 2012;20:518-526.
- Paterson WH, Throckmorton TW, Koester M, Azar FM, Kuhn JE. Position and duration of immobilization after primary anterior shoulder dislocation: a systematic review and meta-analysis of the literature. *J Bone Joint Surg Am.* 2010;92(18):2924-2933.
- Robinson CM, Howes J, Murdoch H, Will E, Graham C. Functional outcome and risk of recurrent instability after primary traumatic anterior shoulder dislocation in young patients. *J Bone Joint Surg Am*. 2006;88:2326-2336.
- Sachs RA, Lin D, Stone ML, Paxton E, Kuney M. Can the need for future surgery for acute traumatic anterior shoulder dislocation be predicted? *J Bone Joint Surg Am.* 2007;89:1665-1674.
- Salomonsson B, Ahlström S, Dalén N, Lillkrona U. The Western Ontario Shoulder Instability Index (WOSI): validity, reliability, and responsiveness retested with a Swedish translation. *Acta Orthop.* 2009;80(2):233-238.
- 24. Simonet WT, Cofield RH. Prognosis in anterior shoulder dislocation. Am J Sports Med. 1984;12:19-24.
- Yiannakopoulos CK, Mataragas E, Antonogiannakis E. A comparison of the spectrum of intra-articular lesions in acute and chronic anterior shoulder instability. *Arthroscopy*. 2007;23:985-990.

## APPENDIX

### Athlete Questionnaire

| 1. The amount of time left in th  | ne current season was impo     | rtant in my trea      | tment decision.     |                      |                   |
|---|--------------------------------|-----------------------|---------------------|----------------------|-------------------|
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 2. The amount of time to be he  | althy for the start of the nex | xt season was in      | nportant in my tre  | atment decision.     |                   |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 3. I wanted to play in an upcon   | ning sport or another league   | e/season of the s     | ame sport so I decl | ined or delayed sur  | gery.             |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 4. College or professional recru  | itment affected my interest    | in playing this       | sport.              |                      |                   |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 5. In order to improve my colle   | ge or professional recruitme   | ent, I decided to     | continue playing i  | n the same season l  | was injured.      |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 6. My doctor influenced my dec  | ision on treatment with or     | without surgery       |                     | -                    | ~                 |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 7. I feel I will recover from this  | shoulder injury without su     | rgery.                |                     |                      |                   |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| What are your beliefs toward no   | noperative treatment of you    | ur shoulder inju      | ry:                 | D.                   | 0, 1, 1;          |
| 8. The injury will heal.  | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | D<br>D                         | 4                     | J<br>No doul        | Z<br>D'              |                   |
| 9. A brace will work.   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
| 10 10 10  | 5<br>St                        | 4                     | 3                   | Z<br>D'              |                   |
| 10. Therapy will work.  | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
| 11 I am foorful that my should  | o<br>nuill dialocoto oggin     | 4                     | ð                   | Z                    | 1                 |
| 11. I am learlui that my shoulde  | Strongly ognoo                 | A crime e             | Noutral             | Diagona              | Strongly diagona  |
|   | Strongly agree                 | Agree                 | neutrai             | Disagree             |                   |
| 19. I think that another dialoget   | jon will apuse further injum   | 4<br>w to my shouldou |                     | 2                    | 1                 |
| 12. I timik that another dislocat   | Strongly agree                 |                       | Noutrol             | Digagroo             | Strongly disagree |
|   | 5 5 5                          | Agree                 | Neutrai             | Disagree             |                   |
| 13 Exportations to play from th   | a coach influenced my treat    | mont docision         | 0                   | 2                    | 1                 |
| 15. Expectations to play from th  | Strongly agree                 |                       | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | A                     | 3                   | 0<br>0               | 1                 |
| 14 Expectations to play from m  | v parents or guardians influ   | ienced my treat       | ment decision       | 2                    | 1                 |
| 14. Expectations to play from m   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | A                     | 3                   | 0<br>0               | 1                 |
| 15 Expectations to play from of   | her teammates or friends in    | fluenced my tre       | atment decision     | 2                    | 1                 |
| 10. Expectations to play from of  | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 16. I would rather end my sport   | s career than have surgery.    | _                     | -                   | _                    | _                 |
| 10, 1 would ratio to the my sport   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | 2                    | 1                 |
| 17. I think this injury will end n  | ny sports career.              |                       |                     |                      |                   |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | $\overset{\circ}{2}$ | 1                 |
| 18. I think my shoulder will be l   | back to 100% if I get the cor  | rect treatment.       |                     |                      |                   |
| •   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | $\tilde{2}$          | 1                 |
| 19. I am fearful that if I have another dislocation it will affect my ability to get back to 100% health. |                                |                       |                     |                      |                   |
|   | Strongly agree                 | Agree                 | Neutral             | Disagree             | Strongly disagree |
|   | 5                              | 4                     | 3                   | $\tilde{2}$          | 1                 |
|   |                                |                       |                     |                      |                   |