

# Shoulder Instability Management: A Survey of the American Shoulder and Elbow Surgeons

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## Abstract

Despite an abundance of peer-reviewed literature, there is wide surgical practice variability for symptomatic shoulder instability. In this study, we identified consensus trends among specialists in glenohumeral instability. A survey was distributed to 417 members of the American Shoulder and Elbow Surgeons (ASES). Surveys consisted of 3 sections: surgeon demographics, presentation of 5 case scenarios, and instability management. Consensus responses were defined as more than 50% of participants giving a single response with more than 2 answer choices or more than 67% of participants giving a single response when 2 answer choices were available. We assessed 125 completed surveys (29.9% response rate); 68% of questions reached a consensus answer. Arthroscopic Bankart repair was the preferred technique for young noncontact (82%), young contact (57%), and weekend-warrior athletes (60%). In the setting of glenoid bone loss, 72.8% recommended the Latarjet procedure. Remplissage was the procedure of choice (60%) for engaging Hill-Sachs lesions. The ASES members favored arthroscopic Bankart repair in the absence of glenoid bone loss or engaging Hill-Sachs lesion, regardless of age (20 to 35 years) or nature of sport (contact vs noncontact). For Hill-Sachs lesions, consensus response favored remplissage, while a Latarjet procedure was advocated for glenoid lesions.

Despite an abundance of peer-reviewed resources, there is wide variation in the surgical management of shoulder instability.<sup>1,2</sup> Current American Academy of Orthopaedic Surgeons (AAOS) clinical practice guidelines regarding the shoulder address only generalized shoulder pain, glenohumeral osteoarthritis, and rotator cuff injuries,<sup>3,4</sup> and treatment algorithms focus on conservative treatment, rather than surgical recommendations.<sup>4-7</sup>

Shoulder instability most commonly results from 1 or more of 4 common lesions (capsular laxity, glenoid bone loss, humeral bone loss, and capsulolabral insufficiency).<sup>8</sup> While it is a relatively common condition that represents 1% to 2% of all athletic injuries,<sup>9,10</sup> little consensus exists about surgical indications, ideal treatment algorithms, or optimal operative technique. This is a critical issue because more than 50% of patients with glenohumeral instability will undergo surgical intervention.<sup>11</sup> Chahal and associates<sup>6</sup> surveyed 44 shoulder experts and reported strong consensus about diagnosis, but little agreement regarding surgical management. Owens and colleagues<sup>1</sup> have also evaluated current trends for surgical treatment of this pathology. Randelli and associates<sup>5</sup> attempted to categorize operative management based upon case-specific shoulder scenarios through online surveys. Their survey, however, covered a broad range of shoulder injuries rather than instability in particular. In this study, we assess trends for surgical management of glenohumeral instability in a case-based survey of shoulder experts.

## Materials and Methods

### Survey Information

An online survey (Survey Monkey) of 417 active members of the American Shoulder and Elbow Surgeons (ASES) was administered on May 1, 2014. Respondents were blinded to the institution and co-investigators conducting the survey. The

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survey link was distributed via email because it has been shown to be a more efficacious conduit than standard postal mail.<sup>12</sup> The case-based, 25-question survey (**Appendix**) was designed to assess respondents' selection of surgical intervention. Section 1 determined member demographics, including fellowship training, arthroscopy experience, and years of practice. Section 2 involved the presentation of 5 case scenarios. For each case, respondents were asked to identify the optimal surgical procedure in both primary and revision settings. Section 3 posed several general questions regarding shoulder-instability management.

### Statistical Analysis

Data were stored using Microsoft Excel (Microsoft) and analyzed using SAS Software version 9.3 (SAS Institute, Inc.). Demographic survey responses were reported using descriptive statistics. Responses to clinical survey questions were reported using frequencies and percentages. To identify when a majority consensus was achieved for a given question, responses were flagged as reaching consensus when more than 50% of participants gave the same response.<sup>13</sup> In the event that only 2 response options were available, reaching consensus required 67% of respondents to choose a single answer (since, by default, a consensus would be reached with only 2 response options). Because this was an analysis of all respondents, an a priori power calculation was not performed. Associations between training and practice demographics and responses to clinical questions were investigated using chi-square analyses. All comparative analyses were two-tailed and used  $P = .05$  as the threshold for statistical significance.

## Results

### Demographics

One hundred and twenty-five (29.9%) ASES members responded to the survey. Of the respondents, 71.2% reported at least 15 years of experience, and 71% performed more than 150 shoulder cases annually. Surgeons came from academic institutions (41.6%), private practice (24.8%), or mixed (33.6%). The majority of respondents were fellowship-trained in shoulder/elbow surgery (52.8%), while fewer had completed a sports-medicine fellowship (24.0%). For arthroscopic procedures, responses were nearly divided between those who preferred beach-chair positioning (47.2%) and those who preferred the lateral decubitus position (46.4%). The majority (70.4%) of respondents

practiced in the United States and with a relatively even distribution among states and region. The remaining 29.6% of those surveyed practiced abroad.

### Degree of Consensus Responses and Cases

Of the 25 survey questions, 6 questions were omitted from consensus calculations because these were designed for demographic categorization rather than professional opinion (questions 1-5, 8). Thirteen of the remaining 19 questions (68%) reached consensus response. All clinical case scenarios (5 of 5) reached consensus for selection of technique for the primary procedure; however, only 40% (2 of 5) of cases had a consensus in the revision setting.

In case 1, a young soccer player (noncontact athlete) with negligible bone loss, arthroscopic Bankart repair was recommended by 81.6% of respondents. In the event of revision surgery, only 22.4% recommended arthroscopic Bankart repair, and the remainder split between open Bankart repair with possible capsular shift (36%) or Latarjet procedure (32.8%).

In case 2, a college American football player (contact athlete) with negligible bone loss, arthroscopic Bankart repair was recommended by 56.8%. In the event of revision surgery, a majority of members (51.2%) suggested a Latarjet procedure.

In case 3, the weekend warrior with significant bone loss, most respondents recommended a Latarjet procedure for both primary (72.8%) and revision surgery (79.0%).

In case 4, a weekend warrior with multidirectional instability, 60% of respondents suggested arthroscopic Bankart repair, 21.6% recommended rotator interval closure, and 10.4% chose a capsular shift. As a revision procedure, there was less agreement, with a split between open Bankart repair (39.2%) and capsular shift only (39.2%).

In case 5, the weekend warrior with large engaging Hill-Sachs lesions, 60% of respondent selected a remplissage procedure. If revision was required, a Latarjet procedure was the choice of 48.8% of respondents (**Table**).

### General Questions

For contact athletes, most respondents (87.2%) would allow return to play in the same season and recommended surgery after the end of the season. After surgical intervention, 56.8% prescribed 4 weeks of immobilization. When counseling a

return to contact sports, 51.2% recommended waiting for 4 to 6 months.

The ASES members were divided on conservative management of instability injuries. Responses included immobilization in internal rotation (39.2%), no immobilization (39.2%), and external-rotation bracing (21.6%).

Finally, members thought the most important factor in choosing surgical technique was the patient's pathology, then age; the least influential criteria was the patient's sports participation.

**Analysis of Training Demographics and Surgical Technique Preferences**

Chi-square analyses demonstrated that respondents who completed a sports fellowship were more likely to do at least 50% of cases arthroscopically (odds ratio [OR], 15.3;  $P < .001$ ) and were more likely to use the lateral decubitus position (OR, 2.8;  $P < .021$ ). Furthermore, American respondents had a higher likelihood of having completed either a sports fellowship (OR, 12.8;  $P < .001$ ) or a shoulder/elbow fellowship (OR, 4.6;  $P = .002$ ) when compared with foreign respondents.

**Discussion**

In the absence of formal clinical practice guidelines, most surgeons formulate treatment strategy based upon a combination of experience and peer-reviewed evidence. The cohort analyzed in the current study was highly experienced, with more than 70% performing 150 shoulder cases annually and having more than 15 years of experience. We found a consensus response in 68% of questions and all primary surgical techniques for our shoulder instability scenarios. While expert consensus reported here is not equivalent to evidence-based clinical practice guidelines, it does provide important information to consider when treating anterior shoulder instability.

Specific responses to our case scenarios invite further reflection. Considering young (both noncontact and contact) athletes without bony pathology (cases 1 and 2, respectively), the ASES surgeons recommended arthroscopic Bankart repair for both. Randelli and associates<sup>5</sup> found 71% of survey respondents recommended arthroscopic Bankart repair in a similar setting. It is interesting to note that consensus persisted regardless of

Table. **Consensus Response for Each Case Scenario<sup>a</sup>**

<b>Cast Type (all patients assumed recurrent dislocations and no MDI)</b>	<b>Primary Procedure (% if consensus obtained)</b>	<b>If Revision Needed (% if consensus obtained)</b>
20M college <b>soccer</b> player Minimal bone loss (<10%) Nonengaging Hill-Sachs lesion	Arthroscopic Bankart repair (81.6%)	No consensus
20M college <b>football</b> linebacker Minimal bone loss (<10%) Nonengaging Hill-Sachs lesion	Arthroscopic Bankart repair (56.8%)	Bone-block procedure (51.2%)
35M weekend warrior <b>Glenoid bone loss 30%</b> Engaging Hill-Sachs lesion	Bone-block procedure (72.8%)	Bone-block procedure (79.0%)
35M weekend warrior Minimal bone loss (<10%) <b>Nonengaging Hill-Sachs lesion</b>	Arthroscopic Bankart repair (60.0%)	No consensus
35M weekend warrior Minimal glenoid bone loss (<10%) <b>Large engaging Hill-Sachs lesion</b>	Remplissage (60.0%)	No consensus

<sup>a</sup>100% of primary procedures received a consensus response, but only 40% of revision cases received similar agreement. Abbreviations: M, male; MDI, multidirectional instability.

the sport in which they engaged. Contact athletes have the highest rates of dislocation (up to 7 times higher incidence) compared with the general population.<sup>14</sup> In addition, they have a higher recurrence rate after surgery.<sup>15</sup> It should be noted, however, that although both cases reached consensus, the percentage of experts who recommended an arthroscopic procedure fell from 82% in the noncontact athlete to 57% in the contact athlete. This concurs with a recent review by Harris and Romeo,<sup>16</sup> who recommended similar treatments for athletes without bony defects. In an older patient population with recurrent instability (case 3), responses varied more widely but still reached a consensus on primary surgical techniques. Respondents agreed that, even for patients with multidirectional instability, initial management should consist of arthroscopic capsulolabral repair. Overall, the agreement for arthroscopy for cases 1 through 3 mimics recent US practice patterns, showing 90% of stabilizations are being performed arthroscopically.<sup>17</sup> Additionally, a recent meta-analysis by Harris and associates<sup>18</sup> favored arthroscopic Bankart repair, showing no significant difference vs open stabilization even on long-term follow-up.

Glenoid bone loss is a difficult clinical scenario and that is reflected in this study's findings. The literature suggests that arthroscopic Bankart repair, in this setting, is usually not sufficient and may result in a recurrence rate up to 75%, if bone loss greater than 20% is unaddressed.<sup>19</sup> Our study supports this trend because ASES members recommended a Latarjet procedure when there is substantial bone loss.

While open Latarjet procedure was the consensus for dealing with glenoid bone loss, arthroscopic techniques were strongly favored for humeral head defects. This change in practice patterns results from the introduction of the arthroscopic remplissage technique.<sup>20</sup> Two recent systemic reviews have supported this technique, reporting good functional outcomes for engaging Hill-Sachs lesions.<sup>21,22</sup> Our study had similar agreement, with most respondents recommending remplissage for these patients.

This study found the lowest rates of expert consensus in the setting of revision surgery, likely caused, in part, by the paucity of available large cohort studies. This is a major void in the literature, and more studies are needed to help guide surgeons on the best techniques to deal with this difficult patient population.

Conservative bracing technique was 1 of the

survey questions lacking a consensus response. Interestingly, 39% of members recommended no immobilization after an instability event. This contrasts with recent literature concerning the best position for bracing. We also found twice as many surgeons recommended internal rotation immobilization over external rotation. This is a subject of debate, with some studies stating improvement with external rotation immobilization,<sup>23</sup> while other studies reported no difference.<sup>24</sup> Overall, recommendations regarding type of immobilization are unclear, which will likely continue until larger studies can be performed.

The literature describing surgical trends in the treatment of shoulder instability is sparse and variable. With regard to other shoulder etiologies, only rotator cuff pathology has used expert consensus. Acevedo and colleagues<sup>13</sup> reported agreement of ASES members surveyed regarding rotator cuff management. There was no consensus among surgeons in more than 50% of questions, despite AAOS published guidelines for rotator cuff treatment.<sup>25</sup> Despite the lack of guidelines for our topic, we found a consensus among respondents with 68% of survey questions.

To date, only 2 studies of shoulder instability management have elicited the opinion of experts in shoulder surgery. Chahal and associates<sup>6</sup> surveyed 42 members of ASES and JOINTS (Joined Orthopaedic Initiatives for National Trials of the Shoulder) Canada on shoulder instability cases and found substantial agreement on diagnosis but little consensus regarding surgical technique. This lack of agreement on procedures differs from our findings and may be related to their complicated case scenarios that generated a wide array of treatment recommendations. Randelli and colleagues<sup>5</sup> surveyed more than 1000 European Society of Sports Traumatology, Knee Surgery, and Arthroscopy members and reported similar agreement on arthroscopic Bankart repair in young male shoulder-dislocation patients, although no other instability scenarios were investigated. Our study is the first to report responses from expert shoulder surgeons on surgical-treatment strategies for an array of common shoulder instability pathologies.

This study had several limitations. First, while our study suffered from a low response rate (29.9%), it was similar to other published studies.<sup>5,13</sup> Second, because the case series included in the survey attempted to capture the most common instability scenarios, they were limited in their scope and failed to address additional etiologies or pathologic

permutations. We believe, however, that a more comprehensive survey would have resulted in respondent fatigue and lowered the response rate. It is unlikely that any survey could capture all variables that come into play during clinical decision-making, and we sought to evaluate the most common shoulder instability scenarios. Third, 30% of respondents were from outside the United States, where the Latarjet procedure is much more popular. While this was not a majority, Latarjet's regional preference may have decreased the consensus response in some scenarios if only the United States was included. Finally, there is inherent bias in a respondent pool that is heavily weighted to shoulder-surgery experts (ASES members) and does not consider the responses of the general orthopedic surgery community as have other studies.<sup>7</sup>

## Conclusion

This study demonstrates that expert shoulder surgeons often agreed on shoulder-treatment principles for anterior shoulder instability. In the setting of primary repair, arthroscopic Bankart repair was favored in the absence of bony pathology, regardless of age (20 to 35 years) or nature of sport (contact versus noncontact). Latarjet procedures were favored in the setting of glenoid bone loss, and remplissage for an engaging Hill-Sachs lesion. Less agreement was observed for revision stabilization. It should be noted that, while consensus was often reached for our cases, there was a wide distribution of technical considerations and surgical preferences even among those who are fellowship-trained and high-volume surgeons, and who can be considered experts in the field of shoulder surgery.

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Appendix. **Survey Given to Registered ASES Members**

**Demographics Questions:**

- 1) Level of experience?
  - a) <5 years in practice
  - b) 6-10 years in practice
  - c) 11-15 years in practice
  - d) >15 years in practice
- 2) Percent of practice involving arthroscopy?
  - a) <25%
  - b) 25-50%
  - c) 50-75%
  - d) >75%
- 3) What type of practice are you involved in?
  - a) Academic
  - b) Private
  - c) Mix of a & b
- 4) Fellowship experience?
  - a) None
  - b) Shoulder and elbow
  - c) Sports
  - d) Other
- 5) Where do you practice?
  - a) West coast (US)
  - b) East coast (US)
  - c) Midwest (US)
  - d) South (US)
  - e) Outside of United States
- 6) What type of anesthesia do you usually use for your shoulder surgeries?
  - a) Regional block and sedation
  - b) General
  - c) Both
  - d) Other
- 7) For shoulder arthroscopy to treat instability, what position do you use?
  - a) Beach-Chair
  - b) Lateral Decubitus
- 8) How many shoulder cases do you preform annually (open and arthroscopic)?
  - a) <50
  - b) 50-100
  - c) 101-150
  - d) >150

**Shoulder Instability Cases: Assume Operative Intervention Indicated. Assume No HAGL.**

Case 1:  
20M college soccer player  
Recurrent dislocations/subluxations  
Minimal bone loss (<10%)  
Nonengaging Hill-Sachs  
No MDI

Case 2:  
20M college football linebacker  
Recurrent dislocations/subluxations  
Minimal bone loss (<10%)  
Nonengaging Hill-Sachs  
No MDI

Case 3:  
35M weekend warrior  
Recurrent dislocations/subluxations  
Minimal bone loss (<10%)  
Nonengaging Hill-Sachs  
No MDI

Case 4:  
35M weekend warrior  
Recurrent dislocations/subluxations  
Glenoid bone loss 30%  
Engaging Hill-Sachs  
No MDI

Case 5:  
35M weekend warrior  
Recurrent dislocations/subluxations  
Minimal bone loss (<10%)  
Nonengaging Hill-Sachs  
No MDI

Case 6:  
35M weekend warrior  
Recurrent dislocations/subluxations  
Minimal glenoid bone loss (<10%)  
Large engaging Hill-Sachs lesion  
No MDI

**QUESTIONS FOR EACH CASE: (Select preferred procedures)**

- 1) Select your preferred surgical technique.
  - a) Arthroscopic Bankart repair
  - b) Open Bankart repair +/- capsular shift
  - c) Latarjet
  - d) Remplissage
  - e) Rotator interval closure
  - f) Other (please specify \_\_\_\_\_ )
- 2) Same situation, but has failed previous stabilization – select preferred revision procedure.
  - a) Arthroscopic Bankart repair
  - b) Open Bankart repair +/- capsular shift
  - c) Latarjet
  - d) Remplissage
  - e) Rotator interval closure
  - f) Other (please specify \_\_\_\_\_ )

**GENERAL QUESTIONS:**

- 1) Timing to surgical intervention for football player?
  - a) During season
  - b) After season
- 2) If conservative treatment, select position of immobilization.
  - a) External rotation
  - b) Internal rotation
  - c) No immobilization
- 3) Most important factor for selection of surgical technique?
  - a) Age
  - b) Sport
  - c) Pathology
- 4) 2nd most important factor for selection of surgical technique?
  - a) Age
  - b) Sport
  - c) Pathology
- 5) Least important factor for selection of surgical technique?
  - a) Age
  - b) Sport
  - c) Pathology
- 6) Duration of postoperative immobilization?
  - a) 2 weeks
  - b) 4 weeks
  - c) 6 weeks
- 7) Time until allow full return to sports (football)?
  - a) <4 months
  - b) 4-6 months
  - c) >6 months

Abbreviations: HAGL, humeral avulsion of the glenohumeral ligament; M, male; MDI, multidirectional instability.