**Anterior Shoulder Instability:**

**Epidemiology, Pathology, Clinical Presentation, and Treatment**

**Introduction**

The shoulder joint allows for increased mobility at the cost of decreased stability. There are both static and dynamic mechanisms to maintain shoulder stability. Static restraints include the bony ball and socket anatomy, capsule, labrum, and glenohumeral ligaments. 1 The labrum serves to deepen the glenoid cavity as well as provide an attachment site for ligaments. The inferior glenohumeral ligament is responsible for protecting against anterior motion when the shoulder is in abduction and external rotation. 2 Dynamic restraints refer to humeral and scapular musculature, and proprioceptive mechanisms. Combined, these provide compressive stabilization and resist translation of the humeral head in the glenoid in various directions. Shoulder instability occurs when laxity in the joint, from either traumatic or atraumatic origin, creates symptoms or the inability to maintain the humeral head in the glenoid fossa. 1-3 This paper will focus on the epidemiology, pathology, clinical presentation, conservative treatment, and invasive treatment for anterior shoulder joint instability.

**Objectives**

1. Describe the common subjective and objective presentation of patient with anterior shoulder instability.
2. Discuss general implications for the various tissues involved in anterior shoulder instability, including atraumatic, traumatic, and repetitive subluxation or dislocation.
3. Recognize the indications for conservative treatment versus surgery to treat anterior shoulder instability.
4. Identify appropriate physical therapy interventions for anterior shoulder instability.
5. Summarize the basis and goals of various surgical procedures to treat anterior shoulder instability.

**Epidemiology & Pathology**

Anterior shoulder instability may be dichotomized into traumatic and atraumatic origin. The common mechanism of injury for TUBS (instability of traumatic onset, unidirectional anterior with a Bankart lesion that responds to surgery) involves a fall on an outstretched hand, or sudden wrenching movement while the shoulder is in abduction and external rotation. A Bankart lesion refers to the anteroinferior labrum becoming torn and detached. 1,4

Recurrent dislocations can lead to a Hill-Sachs lesion, the most common bony lesion associated with traumatic anterior shoulder instability. 1 One study showed that 93% of subjects with chronic recurrent instability had a Hill-Sachs lesion. 5 This particular lesion is a compression fracture on the posterolateral aspect of the humeral head, caused by contact between the humeral head and the anterior glenoid rim. 6 A shallow Hill-Sachs lesion typically indicates joint laxity and is often accompanied by subluxation, while a deep lesion is frequently associated with dislocation. Evidence has shown that the lesion must encompass at least 30% of the humeral head in order to significantly affect recurrent instability. The lesion itself is not always surgically corrected, but the actual instability may be addressed to prevent further problems. 1

AMBRI (instability of atraumatic cause, multidirectional, with bilateral shoulder involvement requiring rehabilitation and occasionally an inferior capsular shift) is often found bilaterally in patients.4 Bony anatomy, ligaments, and muscles all affect functional joint stability. Atraumatic instability is often associated with generalized ligamentous laxity. 1 Furthermore, a tight posterior capsule can drive the humeral head anteriorly, further contributing to anterior instability. 7 Finally, abnormal neuromuscular control can contribute to anterior instability. The pectoralis major adducts and internally rotates the humerus. A study by Jaggi et al used dynamic electromyography to evaluate aberrant muscle actions in unstable shoulders. The results indicate that the pectoralis major was inappropriately active in 60% of shoulders with anterior instability. 8 The pectoralis major can pull the humeral head anteriorly if it is contracted inappropriately while the shoulder is in a compromised position of abduction and external rotation. There are a number of biomechanical factors that can contribute to anterior shoulder instability, which must be addressed if treatment is to be successful.

**Clinical Presentation**

It is essential to understand the pathology and etiology of a patient’s shoulder instability in order to estimate risk of recurrent injury and to guide management. The patient’s age, activity level, hand dominance, and reports of instability in other joints such as the contralateral shoulder should be noted. 2 Subjectively, the patient with anterior shoulder instability may complain of anterior or posterior shoulder pain, as well as slipping, popping, or sliding. Patients with anterior shoulder instability may report self-limitation of activities, such as lifting, secondary to apprehension of subluxation or dislocation. 4 A patient with traumatic instability will often describe a specific incident such as the traumatic origin described above; however, it may be necessary to delve deeper into the patient’s history if a traumatic onset has led to more chronic instability over months or years.

There are several objective exam differences between TUBS and AMBRI shoulder instabilities. TUBS will often present with apprehension, decreased active and passive ROM (range of motion), and muscle guarding when the shoulder is in abduction and external rotation. The anterior TUBS shoulder may be tender to palpation. Conversely, AMBRI will often have normal active and passive ROM with pain at the end ranges, and may not be tender to palpation. 4 Generalized joint laxity may be associated with atraumatic instability. This has been associated with higher rates of recurrent shoulder injury and post-operative failure. 2 Generalized joint laxity can be assessed using the Beighton Score. (Appendix 1) Further objective findings with shoulder instability may include excessive scapulothoracic motion or asymmetry with abduction, indicating weakness of scapular stabilizers. 1,4

There are a number of special tests that are appropriate to determine the type and severity of anterior shoulder instability. (Appendix 2) Specifically, the Anterior Load and Shift test can be used to further assess glenohumeral joint laxity and will typically be positive for AMBRI, while the Apprehension and then Relocation tests are often positive for TUBS. 2,4 Although the descriptions of each test in this paper identify laxity and translation as positive, a response such as “that’s what I feel when my shoulder bothers me” may be more indicative of a true positive clinical finding.4

**Conservative Treatment**

Conservative treatment is a viable option for some patients with anterior shoulder instability. Older patients who undergo physical therapy rather than surgery following traumatic dislocation typically have a good prognosis, but this prognosis is often poor for patients younger than 20. 1 Sachs et al found that 90% of subjects older than 40 and treated conservatively did not have another dislocation during the study’s follow-up average of four years. 9 The typical goals across the literature of conservative treatment for shoulder instability are to maintain motion, improve scapulothoracic rhythm, strengthen the rotator cuff, and increase neuromuscular control. The literature demonstrates varied results for specific rehabilitative protocols. Hayes et al found success rates, meaning no re-injury during the study period, ranging from 7-83% for shoulders with prior traumatic dislocation that underwent programs emphasizing progressive strengthening of the rotator cuff and surrounding musculature. 1 Burkhead et al reported good results in 50% of subjects aged 12-54 with atraumatic anterior instability, after a strengthening program that involved progressive theraband and free weight exercises for the shoulder. The shoulders that typically responded well became noticeably stronger at an average of five weeks. The authors emphasized the necessity of program continuation at least twice per week even after the shoulder has become stable. 10

There is conflicting evidence on the efficacy of strengthening specific muscles to mitigate anterior instability. Sciascia et al acknowledged that glenohumeral muscle activity has decreased amplitude and duration in shoulders with instability as compared with normal shoulders. The authors examined muscle activity with electromyography for specific exercises meant to simulate functional shoulder movements and to stabilize the humeral head, including scaption, prone horizontal abduction, prone external rotation, and push-ups. All of the exercises successfully activated the targeted musculature for the anterior instability group with the implication that clinicians should feel confident that the exercises would improve dynamic stabilization at the glenohumeral joint. 3 Werner et al examined the effects of different subscapularis muscle tensions on humeral head translation in shoulders being loaded with an anteroinferior force. The results indicate that shoulders that translate anterosuperiorly under this force are more likely to dislocate, while shoulders that translate anteroinferiorly tend to remain stable due to the stabilizing effects of the subscapularis. 11 Somewhat conversely, Itoi et al found that the biceps is the most important stabilizing muscle for anterior shoulder instability, while the subscapularis is the least important. They acknowledge that the biceps should be strengthened in addition to a rotator cuff program. 12 Another study by Itoi et al found that both heads of the biceps have a stabilizing effect on anterior instability. 13

Itoi et al used magnetic resonance imaging to examine the effects of shoulder immobilization in various positions on Bankart lesions. The results indicate that the labrum is significantly less displaced when the shoulder is immobilized in 30 degrees of external rotation compared with internal rotation. The authors conclude that immobilization in external rotation allows for closer approximation of the Bankart lesion to the glenoid neck than the common immobilization position of internal rotation. The study’s subjects were then immobilized in external or internal rotation for three weeks, with the results favoring external rotation. 14 Further research on conservative management of Bankart lesions via immobilization is indicated, given there was a low compliance rate in both groups, no randomization, and additional studies have failed to produce similar results. 2,15

**Invasive Treatment**

Young athletes are at the highest risk for recurrent instability following traumatic anterior dislocation, with a 55% redislocation rate. Individuals who are at a higher risk for redislocation are typically younger than 40, have a job that requires overhead work, or are involved with contact sports. There generally is an improvement in outcome measures following surgery in this population. The age factor may be explained by the presence of fewer collagen cross links in younger tissue, allowing for the tissue to have more elasticity. In combination with a dislocation, this elastic tissue may be too loose to provide the appropriate shoulder support and prevent re-injury. 1

The frequently discussed Bankart Repair involves reattachment of the labrum and any associated ligaments to the anterior glenoid. An anterior capsular shift can be performed concurrently with the Bankart or alone for multidirectional instability. This is a procedure that overlaps and shortens the anterior and inferior capsule. In an open Bankart procedure, the subscapularis is detached and then reattached, which can lead to a small loss of external rotation. There are higher reports of redislocation after an arthroscopic Bankart, but the subscapularis is left intact so there is also not as much loss of external rotation. 1 Therefore, arthroscopic surgery may be the preferred option for an overhead athlete who requires more external ROM, while an open procedure may be the best option for an athlete who participates in contact sports. 2 A study by Ahmed et al found that the subject’s age, severity of glenoid bone loss, and the presence of a Hill-Sachs lesion were significantly predictive of a high risk of recurrent instability following Bankart with capsular shift. 16 Generally, both arthroscopic and open Bankart Repairs are shown to have good long-term outcomes and high patient satisfaction. 17,18

The Latarjet Procedure incorporates a ‘triple-blocking effect’ for shoulders with recurrent anterior instability and glenoid bone loss. The coracoid process is harvested and fixed to anteroinferior glenoid rim in order to provide a bony block against anterior dislocation. The conjoined tendon (short head of biceps and coracobrachialis) and subscapularis are made to reinforce the anteroinferior joint capsule and counteract any ligamentous laxity. Lastly, the anterior capsule is repaired. 19 One advantage of the Latarjet Procedure is that it relies on bone-to-bone healing for primary stability. Therefore, earlier and more aggressive rehabilitative activity can be implemented as compared with other surgical options. The Latarjet Procedure has been shown to have lower rates of dislocation and higher rates of patient satisfaction as compared with the Bankart Repair; however, the evidence does not differentiate between shoulders with and without glenoid bone loss. 2

Additional surgical options include capsular shrinkage for lax capsular and ligamentous structures and bone reconstruction for engaging Hill-Sachs lesions. 1,2 Capsular shrinkage is performed via thermal denaturing of collagen and results in shortening of the tissue targeted tissue. 1 Hardy et al combined an anterior labral repair with laser-assisted capsular shrinkage in shoulders with recurrent anteroinferior dislocation. The shoulders were immobilized for four weeks following the procedure to counteract the decreases in strength caused by collagen denaturation, and then began physical therapy. All shoulders were shown to have good short-term results. 20

Post-operative rehabilitation is dependent on the original pathology, the procedure that was performed, and the individual’s level of activity. All post-operative rehabilitation has the goals of progressive mobilization and protection of the surgical repair. 2 In general, cryotherapy, ROM exercises, proprioception, scapulothoracic coordination training, and rotator cuff and surrounding musculature strengthening are implemented. 1 A specific protocol for the Bankart Repair should include gentle contractions and pendulum exercises in the first two weeks, followed by passive and active ROM and then progressive strengthening after post-operative week four. The patient can be unrestricted with light activity (such as swimming) at eight weeks, with non-contact and contact return to sport at four months and six months, respectively. 18 A protocol for the Latarjet Procedure would be similar but with the specific restriction of excessive external rotation in the first month and a faster return to full recreational activities. 2

**Conclusion**

Examination and treatment of anterior shoulder instability are highly dependent on the mechanism of injury, associated joint injury and dysfunction, age of the patient, and activities in which the patient expects to participate in the future. Conservative treatment to address the patient’s limitations is often appropriate for patients over the age of 40 who do not participate in overhead activities or contact sports. There is conflicting evidence on a specific protocol that is most effective in conservative treatment; however, the literature is homogeneous in addressing the need for maintenance of ROM, strengthening around the shoulder joint, and neuromuscular control. Surgical treatment is usually indicated for younger patients who are more at risk for recurrent injury. The procedure performed is largely dependent on the future activity level of the individual as well as the amount of glenoid bone loss within the joint, but many are highly effective with low rates of recurrent injury and high rates of patient satisfaction. Examination and treatment of anterior shoulder instability must be approached on an individual basis for each patient.

**Appendix 1**

Beighton Score

1. Passive dorsiflexion of 5th digit beyond 90 degrees (1 point for each hand)
2. Passive dorsiflexion of the thumb to the flexor surface of the radius (1 point for each hand)
3. Hyperextension of the elbows past 10 degrees (1 point for each elbow)
4. Hyperextension of the knees past 10 degrees (1 point for each knee)
5. Forward trunk flexion with palms placed flat on the ground (1 point)

A score of 5 or more points is defined as joint hypermobility. 21

**Appendix 2**

Special Tests 2,4

*Anterior Load and Shift*

Patient is seated or supine. The humeral head is lightly compressed into the glenoid fossa and force is applied to translate the head anteriorly. Excessive humeral head translation over or out of the glenoid rim is indicative of a positive test.

*Apprehension*

Patient is supine. The shoulder is abducted to 90 degrees with the elbow flexed to 90 degrees and the shoulder is progressively pushed into external rotation. Apprehension or sense of instability from the patient, or dislocation is indicative of a positive test.

*(Jobe) Relocation*

A posteriorly directed force is applied to the humeral head following a positive Apprehension test. Relief of apprehension or sense of instability is indicative of a positive test.

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