POSTERIOR INSTABILITY OF THE SHOULDER Vasu Pai

Posterior instability is less common among cases of shoulder instability, accounting for 2% to 10% of all cases of instability. More common in sporting groups: young athletic patients, football players, rugby players, weight lifters, paddling sport athletes, and climbers. The diagnosis itself may be easily overlooked as patients present relatively infrequently (vs anterior instability), with a confusing spectrum of clinical symptoms, and may have been referred with a diagnosis other than shoulder instability. The causes vary from acute traumatic instability to atraumatic instability to repetitive microtrauma.

Anatomy and biomechanical considerations

1. The posterior capsule itself, which contains the posterior band of the inferior glenohumeral ligament (PIGHL), is relatively thin, unlike the thicker ligamentous composition of the anterior capsule.

2. The capsulolabral structures are the primary static stabilizers in the shoulder joint, and damage to these structures can result in instability.

Posterior shoulder instability has been associated with not only bony glenoid retroversion, but also with chondrolabral retroversion, and with increased postero-inferior capsular size.

3. Important in posterior shoulder instability are the dynamic stabilizers, the subscapularis muscle.

In the common football lineman blocking injury, the arm is placed in a flexed (90°) and internally rotated position, which places the PIGHL in an anterior-posterior orientation and under tension.

Several studies have shown stretch of the capsule and PIGHL beyond the initial

resting length as a potential cause of posterior and multidirectional instability.[1 Matsen J Bone Joint Surg Am. 2006; 88(3):648, .2. Pollock. Clin Orthop Relat Res. 1993;291:85-96 3. Turkel. J Bone Joint Surg Am. 1981;63(8):1208-1217.]

The labrum acts as a static stabilizer to the glenohumeral joint by increasing the concavity-compression mechanism of the humeral head in the glenoid socket and increasing the depth of the humeral articulation [J Bone Joint Surg Am. 2005;87:92-98].

Recently with cadaveric studies has shown than an injury to anterior structures, including the rotator interval is not present in a posteriorly dislocated shoulder.

PATHOGENESIS

3 broad etiological categories[The American Journal of Sports Medicine, Vol. 39, 857 [2011]

1. **Repetitive microtrauma** to the shoulder. Commonest: Repetitive bench press lifting, overhead weight lifting, rowing, swimming, blocking linemen in football, or other athletic activities. In these activities, the shoulder is placed in a flexed and internally rotated position.
2. **Acute traumatic events:** Patients with an acute traumatic posterior instability can usually recall an injury that immediately precedes the onset of symptoms. An example is a football lineman who sustains a blocking injury and posterior instability event with the arm forward flexed and internally rotated. Other traumatic instabilities might result from electrocution or seizures, or high-weight bench pressing. These types of acute, traumatic injuries may potentially predispose the patient to recurrent episodes of posterior instability in the future.
3. **Purely atraumatic causes**: The rarest cases of posterior instability are those that are atraumatic, and this type of injury is predisposed in patients with generalized ligamentous laxity. Gradually, pain and a sensation of instability will develop in these patients.

CLINICAL PRESENTATION

1. Generalized shoulder pain within the posterior aspect of the shoulder.
2. Decreased athletic performance and/or loss of strength
3. Specifically, patients may describe a reduced bench press capacity, an inability to do the same number of push-ups
4. In the young patient (generally 30 years of age) with multiple vague shoulder complaints and a sports history to support the potential injury, it is incumbent upon the physician to rule out posterior shoulder instability until proven otherwise.

Patients with posterior shoulder instability may also describe an ability to ‘‘voluntary subluxates” their glenohumeral joints posteriorly. Two types of voluntary glenohumeral instability have been described: voluntary positional and voluntary muscular[Habitual].

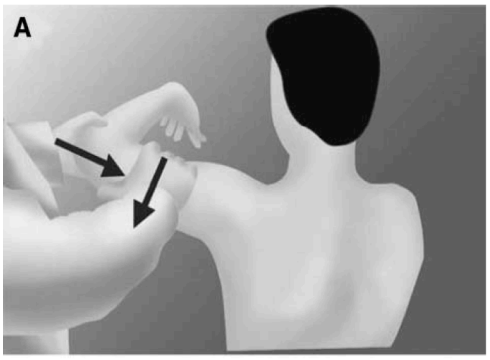
Patients who can positionally (flexion and internal rotation) reproduce their instability should not be excluded from surgical treatment[J Bone Joint Surg Am. 2000;82(1):16-25.].

In contrast, voluntary muscular (or habitual) instability occurs with the arm in an adducted (nonpositional-dependent) position and is more indicative of ligamentous laxity or an underlying muscular imbalance, and not true posterior instability. Patients with voluntary muscular instability are typically not good candidates for surgical treatment, as they do not represent the true spectrum of recurrent posterior instability[J Am Acad Orthop Surg. 2006;14(8):464-476].

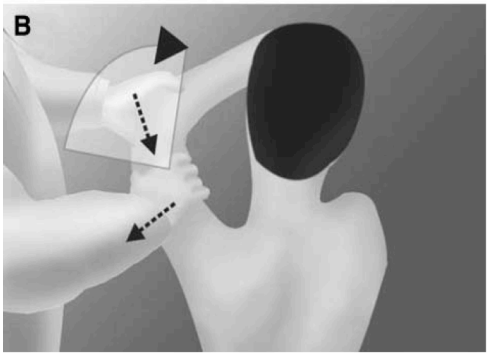
The key to diagnosis is eliciting symptoms of posterior instability in the clinic, which may be confirmed later during a translation examination under anesthesia.

1. Palpation at the posterior glenohumeral joint line is common.
2. With regard to range of motion, while an increase in external rotation and mild loss of internal rotation is sometimes seen in patients with posterior instability
3. Subjective apprehension in posterior instability is uncommon
4.The jerk test, the Kim test, the posterior stress test,and the load and shift test are all common examinations for posterior instability.

The **jerk test** is performed while the examiner stands next to the affected shoulder, grasps the elbow in one hand, and the distal clavicle and scapular spine in the other. After placing the arm in a flexed and internal rotated position, the flexed elbow is pushed posteriorly while the shoulder girdle is pushed anteriorly. The test is positive when a sudden jerk associated with pain occurs as the subluxated humeral head relocates into the glenoid fossa



The Kim test is performed with the patient seated and the arm in 90° of abduction. To perform this test, the

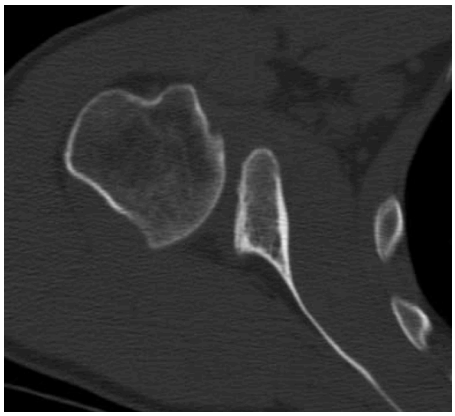


clinician grasps the patient's elbow with one hand, while with his or her other hand, the clinician grasps the lateral aspect of the proximal arm, applying an axial loading force. While elevating the patient's arm to 45°, the clinician applies a downward and posterior force to the upper arm. Pain signifies a positive test.

The posterior stress test is also performed with the patient in a seated position. While stabilizing the medial border of the scapula, the examiner uses his or her free hand to apply a posterior force to the arm while it is held in a 900 forward-flexed, adducted, and internally rotated position. A positive test occurs with subluxation or dislocation with reproduction of the patient's pain or apprehension.

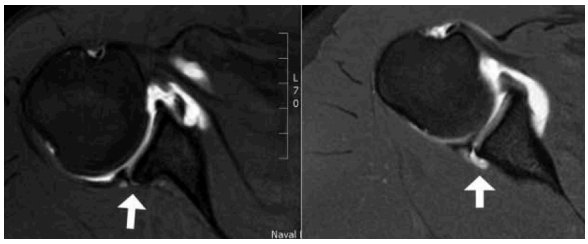
Diagnostic Imaging

1. Plain radiographs in posterior instability are typically normal Occasionally, a reverse Hill-Sachs lesion may be seen
2. CT scan: visualization of the bony structures, and can be used to evaluate glenoid hypoplasia, glenoid bone loss, and/or glenoid retroversion



Glenoid dysplasia on CT

Tear and tear with cyst on the MRI



3. MRA provide visualization of the posterior labrum and capsule as well as the inferior and posterior capsulolabrum

TREATMENT OPTIONS

All patients with posterior instability should be encouraged to start a comprehensive nonoperative treatment program. Appropriate strengthening and proprioception training programs have been shown to diminish pain and/or improve stability in approximately two-thirds of patients with posterior and multidirectional instability

In addition, patients who have failed an adequate trial of nonoperative therapy may be candidates for surgical treatment.

Operative Treatment

While open procedures have traditionally been viewed as the gold standard for anterior instability, open treatment of posterior instability has not been as successful, with a 30% to 70% failure rate.

Arthroscopic treatment of posterior shoulder instability without significant posterior glenoid or anterior humeral head bone loss is becoming the treatment of choice. This is because of decreased operative dissection and the ability to address concomitant injury, as well as easier access to the posterior capsulolabral complex. Nevertheless, it is important to note that these procedures can be technically demanding, and a thorough understanding of the surgical anatomy and technique is crucial for success.

When there is a substantial amount of bone loss, open procedures including glenoid osteotomy [J Shoulder Elbow Surg. 1996;5(5):393-400], bone blocks [Knee Surg Sports Traumatol Arthrosc. 2007;15(9):1130-1136] or rotational osteotomy of the proximal humerus [J Bone Joint Surg Am. 1972;54:779-786] may be utilized.

Use of the posterolateral portal, as described by Goubier is an excellent way to

approach the posterior and posteroinferior aspects of the shoulder as the instrument is forced to enter the portal in a nearly oblique or vertical fashion, providing excellent accessibility. Furthermore, this portal is typically anatomically safe for surrounding neurovascular structures such as the axillary and musculocutaneous nerves.

Capsular plication is a technique that reduces redundancy of the stretched capsule with a suture (absorbable or nonabsorbable), typically using an intact glenoid labrum as the fixation point. In contrast, a capsulolabral repair with anchors utilizes the glenoid anchor as the fixation point. If it is clear that the posteroinferior glenoid labrum is completely intact, patients with an intact labrum may be amenable to capsular plication without anchors [Am J Sports Med. 2005;33(10):1463-1471].

Determining the amount of capsular plication remains one of the biggest challenges in surgical management of posterior instability. While there is currently some debate on the correct amount, it is generally accepte.

When repairing the posteroinferior capsule, it is crucial to make every attempt to avoid injury to the axillary nerve. When the arm is placed in abduction and external rotation with balanced suspension, the zone of safety during arthroscopic plication increases. Anatomically, the closest point between the glenoid rim and the axillary nerve is approximately 12.5 to 15 mm between the 5:30 (anterior) position and the 6-o'clock position.

Rotator Interval Controversy

In addition to labral repairs and/or plication, the benefits of additional closure of the rotator interval remain controversial. In fact, many surgeons have not closed the rotator interval in conjunction with posterior instability.

CLINICAL OUTCOMES

Recently reported outcomes are more promising. Studies with large cohorts of patients are limited, simply because of the low incidence of this type of injury, making clinical interpretation somewhat difficult.

Available reports indicate that the arthroscopic treatment of posterior stability is an effective means to help even high-level, high-demand patients back to unrestricted activities and/or sports [Arthroscopy. 1998;14:153-163].

Overall, good to excellent results were seen in 89% of throwers and 93% of nonthrowers; however, throwers were less likely to return to their preinjury levels of sport.

Kim [JBJS A 85(8): 1479-87.[2003]

Treated twenty-seven patients who had traumatic unidirectional recurrent posterior subluxation of the shoulder with arthroscopic labral repair and posterior capsular shift, and we evaluated them at a mean of thirty-nine months postoperatively. Patients who had posteroinferior instability, multidirectional instability, or an atraumatic onset or who were undergoing revision were excluded.

There were 25 male and two female patients with a mean age of twenty-one years (range, fourteen to thirty-three years). All patients were involved in sports activity, and all **had had a substantial injury prior t**o the onset of the instability.

Conclusions:

Arthroscopic posterior labral repair and capsular shift to treat traumatic unidirectional recurrent posterior subluxation is a reliable procedure with respect to providing stability, pain relief, and functional restoration in 26 of 27 patients.

CONCLUSION

Posterior instability of the shoulder is a diagnostic and clinical challenge. The relative infrequency of the condition, the minimal reports in the literature, and the lack of clear superiority of surgical techniques make it difficult to determine the best way to evaluate and treat these patients. It is critical to completely understand the origins, to perform careful patient selection, and to

adhere to techniques designed to address the pathologic changes to obtain a successful outcome. The relatively young athletic patient who presents with vague complaints of shoulder pain and decreased athletic performance should be carefully assessed for posterior shoulder instability. Overall, as the knowledge and technical expertise regarding arthroscopic posterior shoulder stabilization procedures become more advanced, it follows that surgical techniques and postoperative outcomes will continue to improve.