

SHOULDER INSTABILITY

The shoulder joint is notable in that it has the greatest range of motion of all the joints in the human body. Bony restraints to motion are minimal. Therefore, the surrounding soft tissue envelope is the primary stabilizer that holds the ball of the shoulder (humeral head) in the socket (glenoid). After injury or overuse, the soft tissues that protect the shoulder may become injured or stretched and the result may be that the shoulder begins to slip out of place. When the shoulder comes completely out of place, this is known as a dislocation. If the shoulder slips only part way out of the socket and then comes right back into place, this is a condition known as "subluxation".

THE BASIC SCIENCE OF SHOULDER STABILITY:

Most authors agree that shoulder instability is rarely associated with abnormalities in bony alignment. Instead, the most common causes of shoulder instability are related to soft tissue defects. The shoulder capsule is large, loose, and redundant to allow for the large range of shoulder motion. The capsule contains discrete capsular ligaments which are important in understanding shoulder instability. There are three main ligaments in the anterior (front) part of the shoulder which help prevent subluxation or dislocation. These ligaments are known as the "superior glenohumeral ligament (SGHL), the middle glenohumeral ligament (MGHL), and the inferior glenohumeral ligament complex (IGHLC). Damage to the IGHLC which supports the bottom part of the shoulder capsule like a hammock is related to most cases of shoulder instability. Defects or injuries to the SGHL and MGHL may also contribute to instability. Its anatomical appearance reminds one of the position that a washer occupies at the end of a water hose. The capsular ligaments attach to the labrum and the labrum also increases the depth of the socket. The labrum is often damaged in patients with instability. In some patients, injury to the labrum may cause painful clicking which needs to be addressed if surgical treatment is to be considered. The shoulder musculature is also important in keeping the ball of the shoulder (humeral head) in the socket. The rotator cuff muscles (supraspinatus, infraspinatus, subscapularis and teres minor) help compress the ball of the shoulder into the socket and increase the force needed to translate the ball out of the socket.

In addition, the muscles that attach to the shoulder blade (scapula) are important to shoulder instability. The shoulder socket is actually part of the shoulder blade and the muscles which attach to the shoulder blade provide a stable pedestal for arm motion and stability. In most patients, discrete anatomical deficiencies in the capsular structures in the shoulder joint appear to be responsible for the great majority of unstable shoulders. In some patients, poor muscle tone may also contribute to instability. Treatment is generally aimed at correcting deficiencies in capsular structures or in muscle strengthening.

CLASSIFICATION OF SHOULDER INSTABILITY:

Shoulder instability may be classified in several ways. Most important are the direction of instability and the cause. The shoulder may have abnormal motion in one of several directions. By far, the most common type of instability is the anterior type. In this situation, the ball tends to move abnormally toward the front of the body. Less commonly, the ball can move abnormally toward the back of the body (posterior dislocation or subluxation), or toward the armpit (inferior instability). In addition, some patients may experience laxity of the shoulder in which the ball moves in several different directions at one time. This is a condition known as multi-directional instability. In terms of the cause of the symptoms, most patients with instability will have a specific traumatic event such as a fall or an injury in a contact sport which causes the shoulder to become loose. However, there are other individuals who will have problems with their shoulder without a specific injury and still others who develop problems only after repetitive use such as throwing and swimming. It is important to differentiate the cause of instability in determining treatment.

ANTERIOR DISLOCATION:

More than 98% of shoulder dislocations occur in the anterior (frontward) direction. The most common cause of an anterior dislocation is an indirect force applied to the arm in which it is forced away from the body and rotated over the head. However, four percent of anterior dislocations may occur without trauma. The diagnosis of an anterior dislocation is usually fairly straightforward. The arm is kept at the side with the hand rotated away from the body. The arm cannot be rotated inward and cannot be lifted away from the body. The ball of the shoulder may be felt in the armpit and the back of the shoulder may feel hollow.

If an injury of this type is encountered by a knowledgeable health care professional, immediate reduction of the ball back into the socket is recommended. If there is no one with experience in reducing dislocations present, the patient should be transported immediately to the nearest emergency room.

After an initial dislocation, most experts recommend that the patient be placed in a sling for four to six weeks. The available basic science data suggests that immobilization of this duration is required for any chance of proper capsular healing. This period is followed by a rehabilitative program that emphasizes strengthening of the rotator cuff and the muscles that attach to the shoulder blade. Positions of extreme motion are limited for three months after the removal of the sling.

Despite sling immobilization, most young patients who experience a dislocation that is associated with trauma will continue to have problems with the shoulder. Several studies have shown that patients under the age of twenty who suffer an

initial dislocation have an approximately 90% chance of suffering another dislocation. In patients over forty years of age, the risk of another episode of dislocation is much lower. This is probably due to changes in activity in individuals as they age. Because of the high risk of recurrent dislocation in young people, some authors have advocated consideration of surgical treatment in initial dislocation to try to prevent further episodes in the future. Early intervention is especially applicable to throwing athletes and those who participate in overhead sports such as tennis and racquetball.

RECURRENT ANTERIOR DISLOCATION:

As mentioned, it is very common, particularly in younger people, for an initial dislocation to result in a situation in which there are several repeated episodes in which the ball comes out of the socket. After an initial dislocation, prolonged immobilization in a sling is of no apparent value. The patient is simply immobilized until the pain resolves and then started on a rotator cuff and shoulder blade musculature strengthening program.

A rehabilitation program which emphasizes strengthening of the rotator cuff in the shoulder blade musculature is much more likely to be successful in patients who have instability without a specific episode of trauma. Studies have shown that in these patients, exercises will help resolve symptoms in more than 80%. On the other hand, patients who have had a specific traumatic episode which led to problems with the shoulder, exercises are helpful in only 15 to 20%. Many of these patients with traumatic injuries will end up requiring surgical treatment to control their problems with instability.

OPERATIVE TREATMENT FOR ANTERIOR SHOULDER INSTABILITY:

The indications for surgical treatment of recurrent anterior shoulder instability are highly subjective. They include a desire of the patient to avoid recurrent problems with instability, (including the necessity of reporting to the emergency room on a frequent basis to have the shoulder reduced), problems with recurrent pain, or an inability to perform certain activities because of a fear of further shoulder instability. Failure of a thorough trial of nonoperative treatment can also be considered an indication for surgical treatment.

If it is decided to proceed with surgical treatment, the goals of treatment are similar regardless of the technique utilized to stabilize the shoulder. The primary goals should be to restore shoulder stability and to provide the patient with full pain-free motion. Older techniques of shoulder stabilization tended to limit shoulder range of motion in exchange for providing stability to the shoulder. We now understand that it is probably more important to preserve motion than it is to stabilize the shoulder. Techniques which limit shoulder motion often lead to osteoarthritis while it is unlikely that recurrent dislocation itself leads directly to

osteoarthritis. As a result, current methods are designed to provide both full functional use of the shoulder as well as normal stability.

OPEN STABILIZATION PROCEDURES:

Our basic procedure for the open surgical treatment of recurrent anterior instability involves repair of the anterior capsule and labrum to the glenoid socket. In most cases of instability, the capsular ligaments of the shoulder are either stretched or detached from the glenoid socket. The stabilization procedure is designed to reattach the ligaments and to remove any abnormal laxity. The procedure is performed with the anticipation that the shoulder should not be overtightened and that, eventually, the patient will regain full range of motion which is symmetrical with the opposite side.

This stabilization technique has stood up well against the test of time. The likelihood of further instability after a properly performed open stabilization is less than 3% even if in football players. The procedure requires a four inch scar on the front part of the shoulder. After the operation, the patient is maintained in a sling for two to four weeks. Initially, the patient is begun on a range of motion program and then begins a strengthening program. Generally, four to six months are required before the patient can return to full activity.

At the present time, most of our patients tend to prefer open stabilization techniques due to the low possibility of recurrence. We generally recommend this procedure exclusively in patients who participate in contact sports such as football, hockey, and lacrosse. We do not feel that arthroscopic stabilization techniques are appropriate in patients involved in these high-risk activities.

ARTHROSCOPIC STABILIZATION TECHNIQUES:

Arthroscopic stabilization techniques have stimulated a great deal of interest since their introduction in the early 1980's. Arthroscopic techniques are stable for the advantage of less initial postoperative pain and smaller surgical scars. At the present time, however, the risks of recurrence after an arthroscopic stabilization procedure appear to be higher than that of an open procedure.

Techniques of arthroscopic stabilization are still in their infancy. While we have a significant amount of experience with several different types of arthroscopic stabilization techniques, they should generally be performed only by experienced arthroscopists in well-selected patients. A well-performed open stabilization procedure is certainly preferable to a failed arthroscopic procedure. In addition, patients treated arthroscopically may require a long period of postoperative immobilization than patients treated by open techniques. A patient treated arthroscopically generally has a less secure repair and, therefore, needs to be protected in a sling for a longer period after surgery.

Throwing athletes and patients with only a small amount of shoulder laxity appear to be good candidates for arthroscopic stabilization procedures. In addition, new techniques are becoming available which may allow direct shrinkage of the capsule using a small radio frequency probe. While these techniques may prove to be extremely beneficial, they should, at present, be considered experimental. However, they may overcome one of the greatest disadvantages of arthroscopic stabilization procedures when compared to open stabilization procedures. While it is relatively straightforward to reattach the shoulder capsule to the socket using an arthroscopic technique, it is much more difficult to reduce capsular laxity. This technique of capsular shrinkage may, therefore, provide an excellent complement to currently available techniques.

POSTERIOR DISLOCATION

Posterior dislocations constitute only two percent of all shoulder dislocations. Because they are so infrequent, this type of dislocation can often be missed on an initial visit to the emergency room or doctor's office. Posterior dislocations can often be associated with electrical shocks or with seizures.

Recurrent posterior shoulder dislocation is unusual. In cases in which the dislocation is noted early after the injury, the ball can usually be placed back in the socket. Patients are immobilized and then started on an exercise program after they are removed from the sling. In some cases of posterior dislocation, the humeral head can be severely damaged. In some of these cases, surgical treatment may be required.

RECURRENT POSTERIOR SUBLUXATION:

Recurrent posterior subluxation is the most common form of posterior instability. Patients with recurrent posterior instability usually have a history of repetitive use rather than a specific traumatic injury. Often, these patients are unaware that the shoulder is actually slipping out of place. Instead, they present because of pain with certain activities. In particular, weight lifters may experience pain during the bench press and offensive linemen may have pain when they place their arms in front of their body in football.

Most patients with recurrent posterior subluxation respond well to an aggressive rehabilitation program which emphasizes strengthening of the rotator cuff. In a small minority of patients, surgical treatment may be required. Because of the rarity of posterior instability, most experts recommend that these patients be referred to an orthopaedic surgeon with special expertise in shoulder surgery. After surgery for posterior instability, a bulky brace is usually necessary for at least six weeks after surgery. The results of surgical treatment for posterior instability have historically not been as good as though for anterior instability.

However, recent techniques have provided several studies showing 80 to 90% good or excellent results in these patients.

MULTIDIRECTIONAL INSTABILITY

The patient with multidirectional instability usually has a large element of inferior (downward) instability in addition to anterior or posterior instability. Many of these patients have generalized laxity of many of their joints. Often, they have complaints involving both shoulders. Classically, these patients have no history of trauma or suffer a dislocation with trauma which would not dislocate a normal shoulder. In loose-jointed athletes, however, trauma may play a significant role in the development of symptoms. Not all loose shoulders are painful and not all require treatment. Symptomatic patients with multidirectional instability are given a thorough trial of shoulder strengthening. Patients who have a traumatic multidirectional instability often respond to nonoperative therapy.

OPERATIVE TECHNIQUE FOR MULTIDIRECTIONAL INSTABILITY:

Patients with inferior laxity may fail to respond to the standard operative procedures designed for shoulder instability. In some cases, these standard procedures may cause excessive tightness on one side of the hypermobile shoulder. Subluxation or dislocation will then occur in the opposite direction, and glenohumeral arthritis may occur. At present, in our opinion, there is no role for arthroscopic stabilization procedures in the treatment of multidirectional instability. As mentioned, however, capsular shrinkage procedures may increase the indications for arthroscopic procedures in patients of this type.

The type of operative approach for multidirectional instability is determined by the patient's history and physical findings. Generally, the shoulder is approached from the side which is associated with the greatest amount of clinical instability. In patients whose instability is primarily anterior, the shoulder is approached from the front and those whose primary component of instability is posterior, the shoulder is approached from the back.

Patients with multidirectional instability often have a very large and patulous shoulder capsule. As a result, the shoulder capsule must be tightened and plicated to prevent the development of recurrent instability.

Because of problems with soft tissue in general and the associated tissue laxity, these patients are generally immobilized for at least six weeks after surgery. Rehabilitation is generally instituted for six to nine months in patients who have had a traumatic cause of instability. In those who have no history of trauma, aggressive activities are withheld for nine to twelve months after surgery.

Results of surgical treatment for multidirectional instability have historically been less successful than those for unidirectional anterior instability. Results have

improved with current technique, however. In a recent article which utilizes the technique which is most commonly used at the Nashville Knee & Shoulder Center, a 97% patient satisfaction rate was noted after surgical treatment for multidirectional instability.

CONCLUSION:

Glenohumeral instability is a common cause of disability. The shoulder joint is extremely mobile and bony stability has been sacrificed to allow this motion. Glenohumeral instability is dependent on upon the soft tissues surrounding the joint. These soft tissue stabilizers operate in a complex fashion. While anterior instability is by far the most common type of problem, posterior and multidirectional instabilities of the glenohumeral joint are also important causes of shoulder disability.

Nonoperative treatment and rehabilitation is based on the principal of dynamic strengthening of the shoulder muscular. If operative intervention is employed, the surgeon carefully defines the problem and addresses the pathologic anatomy accordingly. Standard procedures designed to treat unidirectional anterior instability are likely to fail if used to treat posterior or multidirectional instability and may, in fact, worsen the problem.