Glenohumeral Instability: Evaluation and Treatment

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Abstract

Glenohumeral instability encompasses a spectrum of disorders of varying degree, direction, and etiology. The keys to accurate diagnosis are a thorough history and physical examination. Plain radiographs are frequently negative, especially in subtle forms of instability. Computed tomography (CT), CT arthrography, magnetic resonance imaging, arthroscopy, and examination under anesthesia may occasionally yield important diagnostic information. Nonoperative treatment of shoulder instability consists of reduction of the joint (when necessary), followed by immobilization and rehabilitative exercises. The length and the value of immobilization remain controversial. Rehabilitative programs emphasize strengthening of the dynamic stabilizers of the shoulder, particularly the rotator cuff muscles. Both arthroscopic and open techniques can be used for operative stabilization of the glenohumeral joint. Results of these repairs are assessed not only in terms of recurrence rate, but also in terms of functional criteria, including return to athletics. Some standard repairs have declined in popularity, giving way to procedures that directly address the pathology of detached or excessively lax capsular ligaments without distorting surrounding anatomy. Capsular repairs also allow correction of multiple components of instability.

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Glenohumeral instability is a common shoulder disorder, particularly in young, athletically active individuals. Historically, the orthopaedic literature has concentrated on the most common and dramatic form of instability, the anterior dislocation. Numerous reports have described the pathologic lesions underlying recurrent instability and have proposed a variety of operative procedures to prevent recurrence. Over the past 10 to 20 years, increased attention has been paid to recurrent subluxation and posterior and multidirectional instability. Basic science studies on the anatomy and biomechanics of the glenohumeral joint, the dynamic (muscular) stabilizers, and glenohumeral kinematics have added further information about normal and abnormal shoulder function. Newer diagnostic modalities, such as computed tomography (CT), computed arthrotomography (arthro-CT), magnetic resonance (MR) imaging, and arthroscopy, have added further information about the pathology of the subtler causes of glenohumeral instability. The purpose of this review is to outline a method of evaluating and treating various types of glenohumeral instability.

Evaluation

History

A careful history and physical examination are the mainstays of diagnosing glenohumeral instability. Details about the onset of symptoms are especially helpful in making the diagnosis and in classifying it among the various subgroups of instability. The examiner should ascertain whether there was an initial episode of major trauma (such as a violent wrenching of the arm during a football tackle or wrestling takedown), relatively minor trauma (such as throwing a ball or performing a swimming stroke), or no trauma at all (such as reaching overhead).

Knowing the position of the arm at the time of the initial event is helpful in establishing the predominant direction of the instability (anterior or posterior). Often the patient cannot remember the arm position at the time of injury, particularly when there has been a sudden major impact. However, information about which arm positions reproduce symptoms is more readily obtained and points to the diagnosis. Pain or apprehension with use of the arm in a combined position of abduction, external rotation, and extension suggests anterior instability. Symptoms with the arm in a relatively flexed, adducted, and internally rotated position suggest posterior instability. The examiner should inquire about the extent of

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the initial event and of subsequent events: Was there a locked dislocation requiring a reduction by a physician or other person, or could the shoulder be self-reduced, as in a transient subluxation? Are radiographs from the time of injury available, documenting the presence and direction of a dislocation?

Information about prior treatment should also be obtained, including type and position of immobilization, length of immobilization, and the specific nature of any rehabilitative program. If the patient has had a failed instability repair, it is important to have a thorough history from before as well as after the failed repair. Also, the operative report is crucial to help evaluate what was actually done. These patients often present with a complex clinical picture with multiple factors contributing to the failure.

Having established the history of prior events and treatment, the physician next inquires about present symptoms, such as whether there is pain, where the pain is located, and what activities or motions cause it. Frequently, patients with shoulder instability have pain only at the time of episodes of instability or with certain arm positions, although some present with a constant ache. However, the location of the pain, by itself, rarely allows one to make the diagnosis of instability. For example, anterior shoulder pain is frequently associated with anterior glenohumeral instability, but it is also present with the subacromial impingement syndrome. Furthermore, patients with anterior instability will sometimes present with pain that is predominantly posterior, perhaps due to secondary rotator cuff tendinitis or synovitis. The location of the pain in the context of the arm position or the activity that evokes the pain is more helpful in making the diagnosis. In throwing athletes, for example, knowing which phase of the throwing motion elicits symptoms can assist in clarifying the predominant direction of instability; usually, anterior instability is more symptomatic during late cocking, and posterior instability is more symptomatic during the follow-through.

An inquiry about other symptoms is made, such as whether there is a sensation that the shoulder slips out and back in or catches and clicks with certain activities. Rowe and Zarins[1] have described the "dead-arm" syndrome, in which patients with transient anterior subluxations have sudden "paralyzing pain" and briefly lose control of the extremity when the arm is externally rotated in abduction and extension. Patients with inferior subluxations may manifest similar neurologic complaints or a sensation that the shoulder is slipping out of joint when they are carrying heavy objects, such as suitcases, with the arm at the side.

Finally, inquiries are made about functional losses due to the shoulder complaints. Such functional losses vary widely, ranging from an inability to perform even routine activities of daily living due to pain or apprehension to interference with only high-demand overhand sports activities, such as throwing and swimming.

The issue of voluntary control over the instability must also be adequately addressed in taking the history. Rowe and associates[2] and others[3] have warned that treatment of shoulder instability will certainly fail in patients with psychiatric problems who use their ability to voluntarily dislocate the shoulder as a means of gaining attention. In these patients, it is essential to identify the psychological pathology (although this may not be readily apparent) and to refer the patient for appropriate psychological evaluation and treatment.

Not all voluntary instability is of this "willful" or psychiatric type, however. Fronek and associates[4] have identified two types of voluntary posterior subluxation of nonpsychiatric etiology. In the muscular type, selective activation of muscles appears to be the mechanism; in the positional type, the individual can demonstrate the instability by placing the arm in a provocative position. Identification of the type of voluntary component is necessary because treatment options differ: the positional type is treated surgically if exercises have failed, while the muscular type is best addressed with biofeedback techniques.

We have seen another group of patients with a voluntary component to their instability in the absence of emotional disorders. Typically, these patients report that only after trauma and multiple episodes of instability did they develop the ability to voluntarily subluxate, by placing the arm into a flexed, adducted, and internally rotated position. In our experience, this voluntary type has responded well to surgical repair when conservative measures have failed. It is crucial, then, to identify a voluntary component of instability and to understand its likely cause.

Physical Examination

A careful physical examination is the other essential element in making an accurate diagnosis of instability. Both shoulders are carefully examined, so that the symptomatic and asymptomatic sides can be compared with respect to laxity, strength, and range of motion. It is usually helpful to begin with the asymptomatic side, as the examination of this side will not elicit symptoms (unless the instability is bilateral) and will allow the patient to relax better during performance of similar maneuvers on the

symptomatic shoulder. In particular, the contralateral shoulder is tested for signs of laxity in the anterior, posterior, and inferior directions, since many patients with multidirectional instability will exhibit bilaterally loose shoulders. In a similar manner, other signs of generalized ligamentous laxity are sought: the ability to reach the ipsilateral forearm with the abducted thumb (thumb-to-forearm test), hyperextension of the elbows, hyperextension of the metacarpophalangeal joints, and hypermobility of the patella. Evaluation for excessive laxity of asymptomatic joints is especially helpful in the patient with a failed repair, as the symptomatic shoulder may be too painful or stiff to examine.

The symptomatic shoulder is then carefully evaluated. Inspection of the shoulder is undertaken for atrophy of the deltoid, supraspinatus, and infraspinatus muscles. Evidence of mild scapular winging is sought; this sign will occasionally accompany glenohumeral instability, particularly of the posterior type. The shoulder is systematically palpated, starting with the acromioclavicular joint. Repair of an asymptomatically lax glenohumeral joint will not eliminate symptoms when the acromioclavicular joint is the source of the symptoms. Anterior palpation will frequently elicit tenderness in patients with anterior glenohumeral instability; this finding is nonspecific, however, as patients with impingement will also demonstrate tenderness anteriorly. Tenderness on palpation of the posterior joint line is seen in approximately two thirds of patients with posterior instability, as well as in those with glenohumeral arthritis. The range of motion of the symptomatic shoulder is then measured. Typically, there is a full range of motion, although the patient may be apprehensive, particularly during terminal external rotation, especially with the arm in the abducted position.

The stability of the affected shoulder is then tested with various provocative maneuvers that reproduce the patient's instability symptoms. The sulcus test, performed by pulling downward on the neutrally positioned arm, is useful in diagnosing an inferior component of instability. This maneuver is repeated with the arm abducted to 90 degrees as the examiner exerts a downward force on the proximal humerus. To successfully elicit the sulcus sign, the patient must relax the shoulder muscles. For this reason, this maneuver should be performed before other provocative tests that may cause pain and lead to muscle guarding.

Next, laxity in the anterior and posterior directions is assessed by grasping the proximal humerus between the thumb and index fingers with the arm positioned at the side and then exerting a manual force in each direction. Relaxation of the shoulder muscles is essential to gain useful information about the degree of laxity.

The anterior apprehension test is performed by placing the arm in 90 degrees of abduction with the elbow flexed to 90 degrees and then progressively externally rotating and extending the arm with one hand while exerting an anteriorly directed force to the humeral head. Patients with anterior instability will manifest apprehension or pain with this maneuver. If pain alone is elicited, subacromial inflammation must be considered in the differential diagnosis. A subacromial lidocaine injection may help to differentiate between these two entities, although as Jobe has pointed out, both may be present in the same shoulder. Jobe's relocation test, in which a similar maneuver is performed with the examiner's hand instead exerting a posteriorly directed force to the proximal humerus (to stabilize the joint), may also be helpful in sorting out these diagnoses.[5]

Finally, the posterior stress test is performed, in which the examiner stabilizes the scapula with one hand and with the other exerts a posteriorly directed force to the humerus, which is flexed to 90 degrees, adducted, and internally rotated. A positive test produces subluxation with pain or reproduces the uncomfortable sensation that occurs during an episode of instability. This sensation differs qualitatively from the dread and guarding elicited with the anterior apprehension test in those with anterior instability. The patient with posterior instability will allow the completion of the test, although it reproduces the discomfort associated with the instability episodes.

Radiologic Studies

Although the history and physical examination are the essential tools in diagnosing shoulder instability, a number of radiologic modalities may be helpful in clarifying the diagnosis. We routinely obtain standard shoulder radiographs: anteroposterior views in neutral, external, and internal rotation; a lateral, or Y, view in the scapular plane; and an axillary view. A posterolateral impression defect (Hill-Sachs lesion) is frequently seen after traumatic and recurrent anterior dislocations and is best visualized on the anteroposterior view with internal rotation. Glenoid fractures or deficiencies are detected on the axillary view or the apical oblique view described by Garth et al.[6]

When glenoid abnormalities are visualized on plain radiographs, a CT scan is obtained to further evaluate the bony anatomy if operative treatment is planned. The arthro-CT scan offers the advantage of providing information about the labrum and capsular volume, as well as about the bony geometry.[7] We have

found this technique to be especially helpful in evaluating failed repairs for persistent labral defects and capsular tears or laxity.

Magnetic resonance imaging has also been quite successful in identifying anterior labral pathology; it is less successful in detecting posteroinferior labral pathology, perhaps due to capsular redundancy in this region.[8,9] Cine-MR imaging, although still in the investigational stage of development, provides a dynamic assessment of shoulder stability.[10] All of the special imaging studies, however, are expensive and frequently do not add very much information to that obtained from the history and physical examination. They are certainly not recommended for routine use in the evaluation of glenohumeral instability.

Examination Under Anesthesia

An examination under anesthesia may help to clarify the diagnosis in patients in whom instability is suspected but remains uncertain, particularly if operative reconstruction is being considered. For example, a heavily muscled athlete may be unable to relax the shoulder muscles during the office examination; the examination under anesthesia can yield important information about the degree of laxity. The predominant direction of instability (anterior or posterior) can also be clarified, although rarely will the findings contradict the diagnostic impressions gleaned through a careful history and office examination. When performing such an examination, it is crucial to use anatomic landmarks, such as the anterior coracoid and the posterolateral acromion, for orientation and to start each maneuver with the humeral head centered on the glenoid. An anteriorly subluxated shoulder going to a reduced position can easily be mistaken for a reduced shoulder subluxating posteriorly. It is also important to test for stability with the arm in a number of different positions of abduction and rotation.

Examination under anesthesia can be combined with an arthroscopic examination to add further information about the internal glenohumeral anatomy. In this way, anatomic lesions such as labral detachment or excessive capsular laxity can be visualized directly. Subtle signs of occult instability, such as anterior, posterior, or superior labral wear or fraying, can also be detected, as well as undersurface damage to the rotator cuff. The use of these techniques is not routinely necessary for diagnosing glenohumeral instability but can be helpful in selected cases.

Nonoperative Treatment

Nonoperative treatment of a shoulder dislocation consists of closed reduction, followed by a period of immobilization and then a program of rehabilitative exercises. Early studies found that dislocation recurred in 90% of young (less than 20 years old) athletic patients treated conservatively after shoulder dislocation.[11,12] More recent studies have shown lower rates of recurrence (overall, 33%), even in the youngest age group (55% to 66%).[13,14] Simonet and Cofield[14] reported that patients restricted from sports participation and full activity for at least 6 weeks had significantly lower recurrence rates than those who returned earlier, suggesting the benefit of refraining from provocative activities in the early postinjury period.

Two other reports have demonstrated the efficacy of conservative therapy in preventing recurrence, even after traumatic anterior dislocations. Yoneda and associates[15] reported a recurrence rate of 17% in patients who had been treated with 5 weeks of immobilization, followed by an exercise program that limited abduction for 6 weeks. Aronen and Regan[16] reported a recurrence rate of 25% in a group of naval midshipmen treated with immobilization for 3 weeks and then a strengthening program of exercises and activity restriction for 3 months. Because the rate of recurrence is so high in the young athletic population, some have advocated arthroscopy following an initial dislocation for diagnosis as well as treatment of a capsular detachment from bone. However, since there are no published series with long-term follow-up, it is not possible to properly evaluate this approach at the present time.

Burkhead and Rockwood[17] recently reported their experience with treating instability in 140 shoulders with a specific program of muscle-strengthening exercises. With this program, 80% of patients with an atraumatic onset of instability had satisfactory results, compared with only 16% of those with traumatic subluxation. In each subgroup, those with posterior instability responded better than those with anterior subluxation. Although there continues to be controversy about conservative therapy, with careful study its efficacy for different subgroups of patients with instability may be established.

The length of immobilization after an initial episode of dislocation also remains a point of controversy. In a prospective multicenter study, Hovelius[13] found no difference in the rate of recurrence of instability between patients whose shoulders had been immobilized for 3 to 4 weeks and those allowed early use of the arm. Simonet and Cofield[14] also found no influence on the result from either the type of immobilization used or the length of immobilization. It is our preference to employ full-time immobilization for a period of at least 3 weeks in

younger (under 30 years of age) patients who have sustained a primary traumatic dislocation. Range-of-motion exercises for the elbow are carried out several times each day during this period. Older patients, who are at a lower risk for developing recurrent instability but are at a higher risk for developing shoulder stiffness, are immobilized for a shorter period (approximately 1 week). Briefer periods of immobilization (less than 1 week) for symptomatic relief may also be used after episodes of traumatic subluxation.

The specific goals of conservative treatment are to strengthen the dynamic (muscular) stabilizers of the shoulder, to gradually regain full motion, and to avoid provocative arm positions or activities during the early postinjury period. By avoiding the provocative position (i.e., combined abduction, external rotation, and extension in anterior instability; combined flexion, adduction, and internal rotation in posterior instability), further stress to the injured static capsular restraints is prevented while the shoulder is rehabilitated.

Strengthening of the rotator cuff and deltoid muscles, as well as the pectoralis major and latissimus dorsi, can be accomplished through a program of resistive exercises, starting with isometrics and progressing to isotonic and isokinetic methods. Burkhead and Rockwood[17] have outlined a simple program that utilizes surgical tubing of varying progressive resistances, followed by the use of weights attached to a pulley. Jobe and Moynes[18] recommend the use of free-weight exercises that are performed concentrically and eccentrically. Isokinetic equipment can also be used for further strengthening of these muscles.

The scapular musculature is also addressed in the rehabilitation program. Moseley and associates,[19] using electromyographic analysis to study the scapular muscles during various exercises, found that shoulder flexion, scapular plane elevation, shoulder shrug, rowing, shoulder abduction, and the push-up were all effective and have advocated that these exercises be included in the rehabilitation of shoulder instability.

Arthroscopy

As noted earlier, arthroscopy can be used effectively as a diagnostic tool in association with an examination under anesthesia. The use of arthroscopic techniques in the treatment of glenohumeral instability has been evolving as well. Altchek and associates[20] have reported favorable short-term results following arthroscopy for debridement of the flaps of a torn labrum. We have found similar improvement after labral debridement, but agree that the results appear to deteriorate with the passage of time.[21] The rationale of labral debridement is to remove interposed tissue and reduce inflammation in the joint. With lessening of pain, the patient is better able to participate in a rehabilitative exercise program. This type of arthroscopic treatment does not directly alter the underlying instability that may exist in many shoulders with labral pathology. Rather, by removing the inflamed tissue in the joint, as well as in the subacromial space in patients with overlap syndromes (e.g., impingement secondary to instability), it may allow effective rehabilitation and avoid the need for later ligament reconstruction.

When the instability is less subtle and a detachment of the ligaments from their glenoid insertion (i.e., Bankart lesion) is encountered, arthroscopic stabilization can be carried out. Several methods have been reported, including those that employ staples, sutures, and biodegradable tacks. Johnson[22] introduced the technique of arthroscopic stapling and has reported a 3% failure rate using his latest techniques. Matthews and associates[23] found good or excellent results in only 67% of their first 25 cases, which included both dislocations and subluxations. Four of their six failures occurred in the subluxation group. In general, the results of arthroscopic metal staple capsulorrhaphy have been associated with a high incidence of complications and failure.

Results with transglenoid suture techniques have been more encouraging. Morgan and Bodenstab[24] reported on the use of a transglenoid suturing technique in 25 cases of recurrent traumatic unidirectional anterior dislocation. In this preliminary report, all shoulders had an excellent result at an average of 17 months postoperatively, and there were no complications. Altchek and associates[20] have also reported excellent preliminary results with arthroscopic stabilizations utilizing either a transglenoid suture technique or a biodegradable tack. These authors have used arthroscopic techniques for unidirectional anterior instability, but have recommended open techniques in cases with inferior or multidirectional components. They point out the difficulty of selecting the appropriate degree of tension to correct capsular redundancy using arthroscopic techniques in these subgroups of patients with shoulder instability.

Open Repair

Anterior Instability

Numerous open operative procedures have been described for the repair of anterior glenohumeral instability. These include repair of a detached glenoid labrum using sutures (Bankart repair) or staples (du Toit), muscle transposition of the subscapularis (Magnuson-Stack), shortening of the subscapularis and anterior capsule (Putti-Platt), transfer of the coracoid (Bristow), osteotomy of the proximal humerus (Weber) or of the glenoid (Meyer-Burgdorff), and reconstruction using a fascia lata graft (Gallie).[25-32] The failure rate for most of these procedures has averaged 3%, as measured in terms of recurrence of dislocation. However, as instability repairs are evaluated by stricter criteria, which emphasize function and motion as well as stability, the limitations of a number of these procedures can be seen. Procedures that limit external rotation, such as the Putti-Platt and Magnuson-Stack repairs, have fallen into disfavor. The loss of motion associated with these repairs causes significant limitations in activities such as sports. Moreover, these restrictions in motion have been implicated in the rapid development of postoperative glenohumeral arthritis in some cases.[33] Complications associated with the use of metal hardware around the shoulder have decreased the popularity of procedures employing screws (e.g., Bristow) and staples (e.g., du Toit).[34] Finally, radiographic studies demonstrating that the bony geometry of the glenohumeral joint is usually normal in shoulders with instability have contributed to the loss of enthusiasm for osteotomies as a treatment of this problem.[35,36]

Increasingly, the emphasis has been on restoring normal anatomy and repairing capsular pathology (i.e., either detachment from the insertion on the glenoid rim or excessive laxity of the capsular ligaments). Bankart[25] described the essential lesion in recurrent instability as the detachment of the glenoid ligament from the bone and found this lesion in all of his operative cases. Great success has been achieved in several large series with reattachment of the glenohumeral ligaments to the glenoid rim using a modified Bankart repair.[37,38]

A number of capsulorrhaphy procedures also address the problem of capsular laxity and excessive joint volume as a result of this laxity. These capsulorrhaphy procedures can be performed using a lateral (humeral) approach to the joint,[3,39,40] an intermediate approach,[41] or a medial approach.[42,43] These procedures allow simultaneous repair of a detached anteroinferior labrum and a reduction in joint volume to restore effective function of the glenohumeral ligaments. The subscapularis is either split or repaired anatomically, but it is not shortened, thus facilitating restoration of full motion. Consequently, a higher percentage of patients are able to return to full activities, including demanding overhand sports.[42-44]

Posterior Instability

There is no consensus on the operative procedure of choice for the patient with posterior instability in whom conservative therapy has failed. Historically, a number of pathologic lesions have been described as the cause of recurrence, including a detached posterior labrum (reverse Bankart lesion), capsular laxity, increased retrotorsion of the proximal humerus, and abnormalities of the glenoid (e.g., excessive retroversion or hypoplasia). A number of operative treatments have been devised to address one or more of these presumed etiologic lesions. Bone stabilization procedures include the use of a posterior bone block to extend the posterior bony architecture,[45] an opening wedge osteotomy of the posterior glenoid,[46] and a rotational osteotomy of the proximal humerus.[47] Recent investigations of the bony anatomy of the glenohumeral joint in cases of shoulder instability, using plain radiographs and CT scans, have failed to demonstrate significant differences in bony indices for most patients.[35,48,49]

In our experience, bone pathology in these cases has been rare, and posterior glenoid bone grafting has been reserved for those few cases in which it occurs. Posterior capsulorrhaphy procedures have been developed to address the excessive posterior and posteroinferior laxity encountered in these shoulders. Boyd and Sisk[50] reported on a combined posterior capsulorrhaphy and posterior transfer of the long head of the biceps. A posterior capsular plication and overlapping of the infraspinatus tendon (reverse Putti-Platt repair) has been reported, but it had a high percentage (>80%) of unsatisfactory results.[51] A capsular shift procedure from a posterior approach has also been employed to treat posterior and posteroinferior instability.[3,49] This procedure aims at reducing excessive capsular redundancy and can be combined with a posterior labral repair in the uncommon cases in which labral detachment is also present (10% of cases). Satisfactory long-term results have been reported in 80% of the latter cases and in 96% of primary repairs.[49] Fronek and associates[4] have achieved similar rates of success using a posterior capsulorrhaphy, which can be supplemented with a bone block when the posterior soft tissues are particularly attenuated.

Multidirectional Instability

Neer and Foster[3] pointed out that standard unidirectional instability repairs are inadequate for treating

multidirectional instability of the shoulder because they do not reduce excessive inferior capsular redundancy and may allow residual inferior instability. Moreover, such repairs may create excessive tightness on one side of the shoulder, leading to fixed subluxation in the direction left unaddressed.

Several reports have pointed out that one of the most common causes of failure of instability repair is the failure to appreciate inferior laxity or multidirectional instability preoperatively.[3,52-54] To correct this type of instability, Neer and Foster[3] use the inferior capsular shift procedure, which allows reduction in volume on all three sides of the joint (anterior, posterior, and inferior). The procedure can be performed using either an anterior or a posterior approach. The choice of operative approach is determined by the major or predominant direction of the instability, based on the preoperative history and physical examination and confirmed at the time of surgery with examination under anesthesia. In their preliminary report, Neer and Foster reported satisfactory results in 32 of 33 shoulders (97%) treated with this procedure and followed up for at least 1 year. Cooper and Brems[55] have also recently reported success using the inferior capsular shift for multidirectional instability in 39 of 43 shoulders (91%) after an average follow-up period of 39 months.

Rehabilitation

The specific aims of rehabilitation after instability repairs are similar to those of a conservative therapy program: attaining flexibility, strength, and synchrony of function of the glenohumeral and scapulothoracic muscles. The goals are the prevention of recurrence of instability and the return to full function, including sports activities. The specific program and timetable for progression of the exercises depend on a number of factors, including the type of instability (anterior, posterior, or multidirectional), the quality of the tissue, the type of repair, and the requirements of the patient (e.g., full external rotation in a throwing athlete). These factors will also determine the type and length of immobilization or protection after repair.

After an anteroinferior capsular shift procedure for anterior instability, we protect the shoulder in a sling for 4 to 6 weeks. The sling is removed for elbow range-of-motion exercises several times each day. After 2 weeks, elevation to 90 degrees is allowed; this is progressed so that at 6 weeks elevation to nearly 160 degrees is achieved. External rotation is limited to 20 to 30 degrees for the first 6 weeks and is then progressed, so that full motion is usually achieved by 3 to 4 months postoperatively. Patients operated on for subluxation are progressed more rapidly to avoid residual stiffness. During this period isometric strengthening is begun and advanced to isotonic and isokinetic programs. Sports activities are restricted until the patient has no symptoms of instability and has essentially full motion and strength. Typically, this period of restriction from sports lasts for 6 to 9 months.

In cases of multidirectional instability and after posterior capsulorrhaphy procedures, we protect the shoulder in a polyethylene brace with the arm at the side in neutral rotation for 4 to 6 weeks. This reduces inferior stresses on the joint; after posterior procedures it protects the infraspinatus repair as well. Range-of-motion exercises are usually deferred for several weeks and are progressed more slowly than in unidirectional anterior cases. The surgeon carefully evaluates the ease of return of motion at each postoperative visit and can accelerate or slow down the stretching program on the basis of the findings at these visits. Strengthening exercises are begun 6 to 8 weeks after surgery and are gradually progressed as they are after the anterior repairs. Sports are generally restricted for 9 to 12 months postoperatively.

Summary

Our understanding of glenohumeral instability continues to evolve, as our techniques for studying this entity both clinically and in the laboratory improve and yield increasing information about the stabilizers and kinematics of the shoulder. Despite these technologic advances, the key elements in clinical diagnosis still remain a thorough history and physical examination. Sophisticated imaging techniques, examination under anesthesia, and arthroscopy are also valuable diagnostic tools, but are reserved for cases in which diagnosis remains difficult (e.g., the shoulder is too muscular or too painful to examine adequately in the office) or in failed repairs.

The treatment of instability includes both nonoperative and operative means. Exercise programs that aim to strengthen the rotator cuff and scapular muscles are often the primary treatment for instability. Operative repairs are presently performed both arthroscopically and by using open techniques. Increasingly, operative repairs have focused on correcting damage to the glenohumeral ligaments (either detachment from their glenoid insertion or excessive laxity). All underlying components of the instability must be evaluated and addressed in the repair to give the best chance for a successful result, in terms of both preventing recurrence and restoring full function to the shoulder.

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