



*Dynamic Chiropractic* – May 8, 1992, Vol. 10, Issue 10

## **Sports Injury: Anterior Shoulder Dislocation**

### **Etiology**

By Thomas E. Hyde, DC, DACBSP

Dislocation of the humerus occurs most commonly in the anterior inferior direction. The arm is generally held in external rotation with slight abduction, producing anterior inferior dislocation. If elevation is added to the arm, this may further enhance this type of dislocation.

Kulund, states that the acromion process acts as a fulcrum on the humeral head which breaks through the weak anterior capsule, resulting in labrum tears from the glenoid. This may subsequently cause strain injuries to the subscapularis and supraspinatus.

Newberg, states that the shoulder is the most commonly dislocated joint in the body, accounting for approximately 85 percent of all dislocations. This 85 percent occurs at the glenohumeral space with an additional 12 percent occurring at the acromioclavicular joint and three percent at the sternoclavicular joint. Newberg says that 95 percent of all glenohumeral dislocations are anterior and generally result from a fall on an abducted, externally rotated arm, driving the head of the humerus anteriorly.

Newberg further states that the younger the patient, the more likely subsequent dislocations will reoccur with the incidence of occurrence being 80-90 percent, when the first dislocation occurs before the age of 20. This incidence of repeat dislocation drops to the point of being 10-15 percent past the age of 40.

Collins states that 10 percent of the anterior dislocations are associated with fractures of the greater tuberosity, occurring as a result of avulsion of the supraspinatus. He feels this occurs as a result of the supraspinatus attempting to hold the humeral head and the glenoid cavity. Collins says that one out of every seven anterior dislocations causes damage to the brachial plexus, most commonly affecting the axillary nerve. Generally, this seems to be a traction type of injury which heals, but it may be permanent if the damage is severe enough. With this type of dislocation, a Bankart lesion and a Hill-Sachs defect must be

ruled out. A Bankart lesion results in displacement of the anterior rim of the glenoid labrum, while a Hill-Sachs deformity represents a defect in the posterior lateral aspect of the humeral head, resulting in a compression fracture, allowing the humeral head to slip out of its socket.

### **Orthopedic and Neurological**

The athlete who has sustained an anterior inferior dislocation is not difficult to diagnose. Generally, the athlete presents with severe pain and an inability to move the arm. Joint range of motion is limited and the patient is very apprehensive. Often, the patient will hold the arm over the head or it may be hanging to the side. The athlete will be unable to touch the opposite shoulder. Often, a large defect is seen with indentation of the deltoid. It is imperative that examination of the neural and vascular components distal to the dislocation be assessed prior to reduction. In checking the neurological structures distal to the dislocation, the entire arm is checked to include the lateral, ulnar, radial aspect and the anterior/posterior portion of the arm.

It is generally difficult to assess the motor portion of the arm, as the athlete will present with limited range of motion due to severe pain. The radial pulse is an absolute necessity and must be assessed immediately. Distal circulation may be ascertained by squeezing the fingernails. The nail should return to a pink color within a few seconds of releasing pressure. If this does not occur, you can suspect damage to the peripheral circulation.

According to Roy and Irvin, tissue damage usually results in severe stretching and tearing and may result in damage to the rotator cuff. Complications may result in damage to the nerves that supply the joint proper, especially the axillary nerve and the musculocutaneous or ulnar nerve. As stated earlier, rotator cuff injuries are common and fractures of the humeral head must be ruled out. After assessment of the neurovascular integrity, reduction may take place.

Reduction of this abnormality may be accomplished using several techniques. These techniques consist primarily of the Hippocratic, the modified Hippocratic, and the Kocher maneuver. The Hippocratic method is performed with the patient lying supine. The physician grabs the arm on the side of the affected shoulder and places it in an approximate 30 to 40 degrees abduction, provided the patient will relax well enough to accomplish this degree of abduction. The foot is then placed against the chest wall, while a gentle pulling along the longitudinal axis of the shoulder takes place. The injured athlete will often have to be coaxed into relaxing and reassured that no sudden jerks will take place. The traction should be held for approximately 60

seconds. This maneuver may be repeated several times.

The modified Hippocratic method is very similar to the Hippocratic method with the exception that a sling, towel, ace bandage, gauze strap or other device is placed around the chest of the patient as the patient is supine. Again, 30 to 45 degrees of abduction of the affected arm and shoulder is obtained with a general traction along the longitudinal axis. The traction is again applied approximately 60 seconds. This maneuver may also be repeated and generally this method results in realignment of the shoulder. The physician will generally feel the shoulder glide back into the glenoid fossa. This method is the most preferred method in shoulder dislocation reduction.

Kocher's maneuver is performed with the arm externally rotated very gently, while applying downward traction of the humerus. During external rotation with downward traction, the arm will usually slide back into place. Upon feeling the arm slide into place, the physician then brings the arm slightly across the chest in internal rotation and adduction.

### **Anatomy**

The glenohumeral joint is considered a true joint and exists between the humerus and the scapula. The glenoid fossa which acts as a receptacle for the humeral head is located on the anterior, superior lateral margin of the scapula. This fossa is a shallow ovoid. It faces anteriorly, laterally, and upward. The receptacle is shallow and is surrounded by the glenoid labrum, which serves to deepen the cup. This area contains no cartilage, but primarily fibrous tissue, and becomes a redundant fold of the anterior capsule. A small portion of the humeral head only is in contact with the fossa at any given time. This leads to more of a gliding movement as opposed to the ball and socket type joint seen in the hip.

Abduction of the humerus requires depression of the humeral head to clear the suprahumeral arch by the coordinated action of the musculotendinous rotator cuff muscles and the deltoid. The glenohumeral joint space is measured from the external rotation view. The measurements are made along the superior, middle, and inferior aspects of the joint. Once the measurements are obtained, they are combined and averaged. The average joint space should range from four to five millimeters.

Kulund suggests that after repeated anterior dislocations of the shoulder, the athlete may need surgery for repair of the glenoid rim. Techniques to replace the torn shoulder capsule include the Bankhart, DuToit, and Putti-Platt.

The Bankhart procedure involves the drilling of holes through the glenoid rim and reattachment of the torn labrum to the rim via sutures.

The DuToit procedure involves a longitudinal incision through the subscapularis tendon. The surgeon peels off the capsule of the subscapularis and staples the torn capsule to the glenoid.

In the Putti-Platt procedure, both the capsule and the distal portion of the subscapularis tendon are attached to soft tissue around the glenoid rim, resulting in some degree of loss of external rotation. There are other procedures described in the literature for repair or repeated anterior dislocations of the shoulder.

Arthrography of the shoulder may provide additional information, especially when tears of the glenoid labrum are present.

## **Differential Diagnosis: Fracture**

### **Radiology**

The normal shoulder series consists of internal rotation, external rotation, and the baby arm projection. X-rays should be taken from 40 inches. The central ray should pass through the coracoid process and appropriate columniation should be used.

External rotation is taken the same as the internal rotation with the exception that the patient's arm is rotated externally until the elbow epicondyles are parallel to the film. The baby arm or abduction shoulder film is taken with the patient's arm abducted to 90 degrees and the elbow flexed to 90 degrees. The palm of the hand should face the x-ray. The film is taken on a 10 x 12 plate, with an optimum KVP of 70 to 80. These films are taken at 40 inches.

Additional areas to look for include the coracoid process of the scapula, acromium process of the scapula, the glenoid fossa, axillary border of the scapula, subscapular fossa, lesser and greater tuberosity of the humerus, humeral head, pectoralis groove, and axillary fold, as well as soft tissue structures. It is beneficial to develop a scan procedure to include each of the following: 1) soft tissue structures; 2) cortical margins; 3) articular margins joint spacing; 4) medullary cavity; 5) apophyseal regions in the adolescent.

Additionally, a distal portion of the clavicle, the lateral margins of the lung and the apex may be visualized, along with the surgical neck of the humerus and a portion of the chest, the lateral margin of the ribs, both anterior and posterior, the acromioclavicular joint, the coracoid tubercle, and the intertubercular groove of

the humerus.

The Bankhart lesion is seen on the Rokous or Westpoint view. This view allows projection for evaluation of the anterior/inferior glenoid rim. This film is taken with the patient prone and the elbow bent at 90 degrees. The arm hangs down over the side of the table, while the head is turned away from the affected side. The central ray is centered on the axilla and directed cephalad. The tube is angled 25 degrees medial and 25 degrees down. This results in a tangential view of the anterior inferior rim of the bony glenoid.

The Hill-Sachs lesion is best visualized on the maximally, internally rotated AP shoulder film. A "V"-shaped compression fracture is generally seen as described by Hill and Sachs. This lesion may be present in up to 75 percent of patients following shoulder dislocation. If plain film radiology does not show visualization of suspected Hill-Sachs lesions, CT evaluation of the shoulder is in order. Additionally, CT evaluation of a Bankart lesion should be given consideration.

Magnetic resonance imaging (MRI) will allow visualization of the shoulder. This again is a non-invasive procedure and may prove of great benefit to the physician. Arthrography of the shoulder, especially in visualizing glenoid labrum tears and rotator cuff tears remains an alternate method to visualize damage of the shoulder.

O'Donoghue states that dislocations are nothing more than sprains and shoulder dislocations should be treated accordingly. Most orthopedic surgeons recommend immobilization ranging from four to eight weeks.

Rowe stated that immobilization should be carried out for four weeks. He reports that there is still a 90 percent recurrence of anterior dislocation in the younger athlete.

Neer and Welch believe that the first time a shoulder dislocates anteriorly, it should be immobilized for six weeks with the shoulder in internal rotation. This was then followed by an exercise program designed to strengthen the subscapularis and remaining internal rotators. Neer, Welch, and Macintosh studied athletes ranging in age from 18 to 30 whom they immobilized for 6 weeks in internal rotation. Following a ten-year period of observation, there were no reported recurrences of redislocation.

## **Treatment**

A number of authors advocate early movement, to tolerance in opposition to immobilization. Additional reading of conservative treatment for anterior shoulder dislocation can be found in articles by Hammer and Danchik, among others. My personal preference is early mobilization within patient tolerance. This mobilization is begun immediately following injury and is coupled with soft tissue techniques such as Nimmo and transverse friction massage. As the athlete's pain diminishes, range of motion increases, and post-facilitation stretch may be added. Ice in the early stages is critical. Muscle stimulation and interferential current may be used throughout treatment. Chiropractic manipulation of the cervical and thoracic spines are beneficial in recovery of the injured, in my opinion.

It is beyond the scope of this article to incorporate all exercises specifically utilized for rehabilitation of anterior shoulder dislocation. However, an attempt will be made to discuss generalizations.

Early movements should include all ranges of motion which are all pain-free ranges of motion. Later, exercises in water may be begun first without resistance, later followed by exercises with resistance. As soon as the patient athlete can tolerate movement with resistance, tubing exercises should begin. With continued improvement of the athlete, improvement of range of motion, decreased pain, pulley exercises and/or free weight exercises may be added. Following rehabilitation, a thorough strengthening program, along with shoulder flexibility exercises should be implemented.

With prudent care and treatment, the injured athlete who sustains anterior dislocation of the shoulder should be able to return to competitive competition within 6 to 12 weeks. Should the athlete opt for immobilization, exercise should be provided, according to Roy and Irvin, to include the following: 1) hand grip and forearm exercises (pronation and supination flexion and extension of the elbow; 2) isometric abduction and adduction with the arm at the side; 3) isometric internal and external rotation with the arm held in internal rotation; and 4) isotonic internal rotation from 45 to 90 degrees of internal rotation. The initial exercises may consist of pendulum and internal rotation exercises or, as mentioned earlier, any range of motion that is pain-free for the athlete. The last range of motion to be incorporated would be abduction or abduction with external rotation.

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