Chapter 45

Recurrent Anterior Dislocations

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Introduction

Instability of the shoulder is best classified using four parameters: mechanism (traumatic, atraumatic, repetitive microtrauma), direction (anterior, posterior, inferior, multidirectional), onset (acute, recurrent), and degree (microinstability, subluxation, dislocation). The most common sequela following acute unilateral anterior dislocation of the shoulder is recurrent anterior dislocation, which, simply stated, is recurrent symptomatic translation of the humeral head on the glenoid, resulting in a loss of articular surface contact. Although several conditions involving varying degrees of recurrent instability exist, this chapter focuses specifically on the natural history, anatomy, biomechanics, evaluation, and treatment of traumatic, unidirectional, recurrent anterior dislocations of the shoulder.

Natural History

The natural history following an initial anterior shoulder dislocation is relevant because patients typically are younger and participate in high-demand activities; both factors increase the risk of recurrence. Numerous studies, including those of young military cadets from West Point, report a recurrence rate of 50% to 90% in this high-risk population. The recurrence rate is substantially lower in individuals age 40 years or older (between 10% and 20%), but this difference may simply reflect a lower activity level. Unfortunately, this lower recurrence rate in older individuals is offset by the concomitant increased risk of neurologic and rotator cuff injury.

An understanding of the anatomy and biomechanics of the shoulder, as well as an appreciation of the numerous risk factors that can impact the success of treatment, is mandatory in determining appropriate management.

Anatomy and Biomechanics

Stability of the glenohumeral articulation requires a complex balance between static and dynamic forces. Selective cutting studies have provided important data regarding the contribution and importance of the inferior glenohumeral ligament (IGHL). Not surprisingly, the position of the shoulder determines which static stabilizers yield the greatest contribution. The superior glenohumeral ligament (SGHL) works in conjunction with the coracohumeral ligament, which runs parallel to it, preventing inferior translation in the adducted, internally rotated position. The middle glenohumeral ligament, which may be absent in up to 30% of individuals, is most effective in providing stability in lesser degrees of abduction. In the middle ranges of abduction, the compression-concavity phenomenon, which requires an intact labrum and a well-functioning rotator cuff, provides critical dynamic stabilization. The most provocative position, abduction combined with horizontal extension and external rotation, requires that the IGHL be intact to provide adequate stability. Anatomic and biomechanical studies have shown that the IGHL is stiffest and thickest at its insertion into the glenoid. The thinner posterior band of the IGHL rotates to an inferior position and, in conjunction with the axillary pouch, provides additional support to the anterior structures when the shoulder is maximally stressed (Fig. 1).

Stress-to-failure cadaveric studies have recorded failure at the glenoid insertion site in approximately 40%, midsubstance ruptures in 35%, and failure at the humeral attachment of the glenohumeral ligaments in up to 25% of specimens tested. In addition, capsular attenuation in the form of elongation occurs within the glenohumeral ligaments prior to failure, especially with recurrent episodes of anterior instability. There is incontrovertible evidence that a solitary Bankart lesion (the "essential lesion" of acute anterior dislocations) is insufficient to cause recurrent dislocations and that associated capsular elongation is a necessary component of recurrence. Retensioning of this posttraumatic capsular laxity, as well as repair of the Bankart lesion, must be fully addressed in any surgical approach.

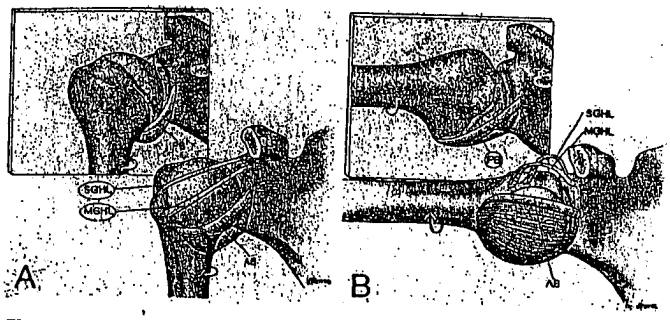

Figure 1 A, The SGHL and MGHL tighten with adduction and rotation. B, Tensioning of IGHL and posterior band as the shoulder is abducted and externally rotated; note relative laxity in the SGHL. SGHL = superior glenohumeral ligament, MGHL = middle glenohumeral ligament, AB = anterior band, PB = posterior band. *(Reproduced with permission from Warner JP, Boardman ND: Anatomy, biomechanics, and pathophysiology of glenohumeral instability, in Warren RF, Craig EV, Altcheck DW (eds): The Unstable Shoulder. Philadelphia, PA, Lippincott-Raven, 1999, p 65.)*

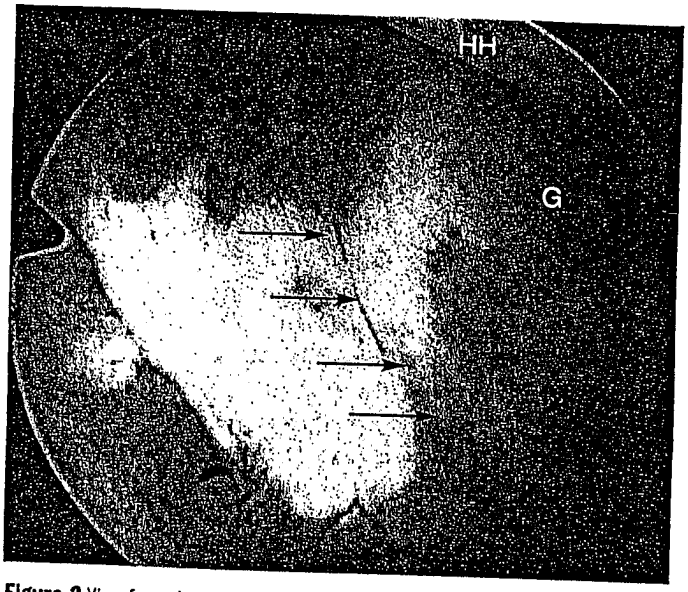

Figure 2 View from the anterosuperior portal; anterior labral-ligamentous periosteal sleeve avulsion lesion (*arrows*) is seen with medial and inferior displacement of the entire periosteal sleeve. G = glenoid, HH = humeral head.

Differing articular curvatures of the glenoid and humeral head have been discussed as a cause for recurrence. Recent imaging studies that include both subchondral bone and articular cartilage configuration, however, have shown that their radii of curvature match closely. Maximal surface-area contact of only 25% to 30% between the humeral head and glenoid at any position of rotation remains the single most significant anatomic factor contributing to instability. This limited surface-area contact has been described as a "golf ball sitting on a tee."

Evaluation

Patients with recurrent anterior dislocations have a common initiating event: a dislocation caused by significant trauma with the arm overhead or away from the side. At the time of injury, the arm is in abduction, horizontal extension, and external rotation. An indirect rotational force applied in this provocative position results in ligament failure and, ultimately, dislocation. Reduction under sedation in the emergency department is required for most patients. Subsequent episodes of instability may occur with much less force, sometimes while the patient is simply sleeping with the arm overhead.

Patients who eventually develop recurrent instability usually regain full range of motion shortly after dislocation, and pain subsides within 24 to 48 hours. In patients with persistent pain, a careful evaluation for associated rotator cuff or biceps anchor injury is warranted. On physical examination a markedly positive apprehension test elicits a grave sense of instability, rather than pain. Pain as the primary response is considered nonspecific and can be present in a variety of shoulder pathologies. A positive sulcus sign may indicate some element of associated generalized ligamentous laxity, as well as possible damage to the SGHL. The load-and-shift test in the sitting or lateral decubitus position can detect instability, although patients may resist provocative testing. Stress testing may reveal an element of posterior laxity. This phenomenon does not represent a multidirectional component; rather, it reflects recurrent posterior capsular injury that can be associated with recurrent anterior dislocation.

Diagnostic Testing

AP, axillary, and scapular "Y" views are standard. The Stryker notch view can better define the presence and size of a Hill-Sachs lesion. The West Point axillary view, obtained with the patient prone and the beam directed cephalad, detects an anterior bony Bankart lesion. With an acute injury, the patient may not be able to abduct the arm sufficiently to obtain a good axillary view. In these patients, an AP view with the beam directed 45° caudally (Garth view) also can help establish the presence of a bony Bankart lesion. Although CT can be useful in assessing glenoid version and defining bony defects, the diagnostic modality of choice in the evaluation of shoulder instability is the magnetic resonance arthrogram. Contrast within the joint enhances the evaluation of soft-tissue pathology, and there is some evidence that placement of the arm in the abducted-externally rotated position facilitates detection of capsulolabral and Hill-Sachs pathology.

Arthroscopic Evaluation

In patients with recurrent anterior dislocations, several common pathologic findings are noted at the time of arthroscopic evaluation. One prospective study evaluated intra-articular pathology in 212 patients with at

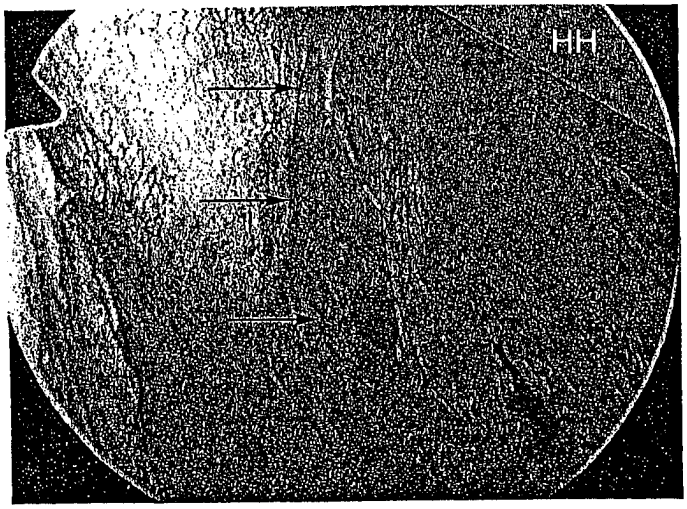

Figure 3 Outline of midsubstance capsular tear (*large arrows*) with intact labrum (*small arrows*). HH = humeral head.

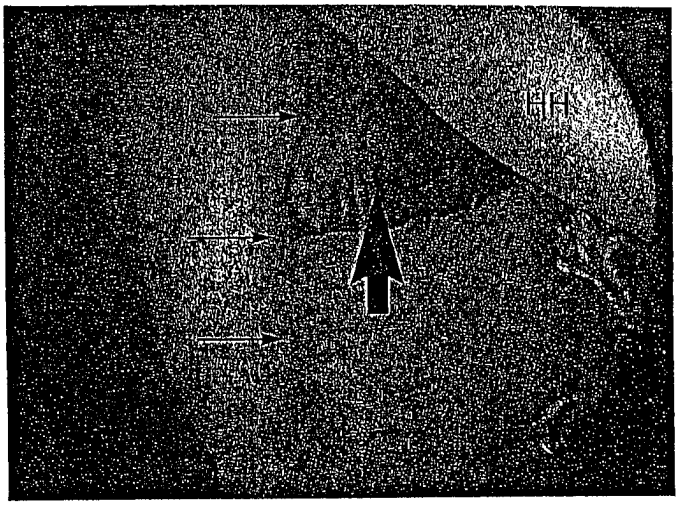

Figure 4 Outline of humeral avulsion of the glenohumeral ligament lesion (*large arrow*). Subscapularis muscle fibers are visible through the defect, while anterior band (*small arrows*) remains intact. HH = humeral head.

least one anterior dislocation, revealing Bankart lesions in 87%, Hill-Sachs lesions in 68%, glenohumeral ligament attenuation in 55%, a torn rotator cuff in 14%, and superior labral injuries in 7%.

Failure of the IGHL is the most common pathology and can take several forms. Failure usually occurs at the glenoid rim with the classic Bankart lesion. The periosteal sleeve of the IGHL attachment displaces medially and inferiorly, which then results in an anterior labral-ligamentous periosteal sleeve avulsion injury (Fig. 2). A midsubstance capsular tear, with or without a Bankart lesion, can result in recurrent instability and represents the capsular lengthening that complicates recurrent dislocations (Fig. 3). Capsular laxity and a Bankart lesion must both be addressed during surgery. A humeral avulsion of the glenohumeral ligament lesion is seen in patients in whom the glenohumeral ligaments fail at the humeral attachment (Fig. 4). Careful inspection of both sides of the glenohumeral ligament is necessary to avoid missing this lesion, which reportedly occurs in up to 8% or 9% of patients with recurrent instability.

Hill-Sachs and bony Bankart lesions often occur with anterior shoulder dislocations. A recent study has highlighted the considerable morbidity and increased surgical failure rate in patients with engaging Hill-Sachs lesions or bony Bankart lesions that result in an "inverted pear" glenoid. An engaging Hill-Sachs lesion is defined as a bony humeral lesion that engages the anterior glenoid with the shoulder in abduction and external rotation. This bony engagement is determined by the orientation of the Hill-Sachs lesion. The inverted pear glenoid is defined as a glenoid in which the normal upright pear shape of the glenoid has lost enough anterior-inferior bone to assume the shape of an inverted pear. The arthroscopic repair failure rate was noted to be 67% when either of these lesions were present, compared to a 4% recurrence rate in patients without bony compromise. The authors recommended that in patients with an engaging Hill-Sachs lesion, an open capsular shift should be performed. In patients with an inverted pear glenoid, a Latarjet coracoid bone block glenoid reconstruction is the procedure of choice.

Superior labral anterior to posterior (SLAP) lesions may occur in up to 10% of patients with instability and may be difficult to diagnose preoperatively. Once present, SLAP lesions can further contribute to a dislocation diathesis. Type II SLAP lesions occur most frequently and should be repaired back to the superior glenoid at the time of arthroscopic instability repair. If open surgery for instability is contemplated, it is advisable to precede the open repair with an arthroscopic evaluation of the joint to rule out a SLAP lesion or other associated pathology.

Concomitant rotator cuff injury has been well documented as a potential complication of recurrent anterior dislocations, especially in middle-aged and older patients. Persistent pain and weakness following a dislocation episode mandates a meticulous evaluation of the rotator cuff, with particular attention paid to the subscapularis tendon. Injury to the subscapularis tendon occurs in at least 80% of patients age 60 years or older with an anterior dislocation of the shoulder.

Treatment

Nonsurgical Treatment

Nonsurgical treatment of recurrent anterior dislocations typically is only moderately successful and highly dependent on drastic activity modification in the younger,

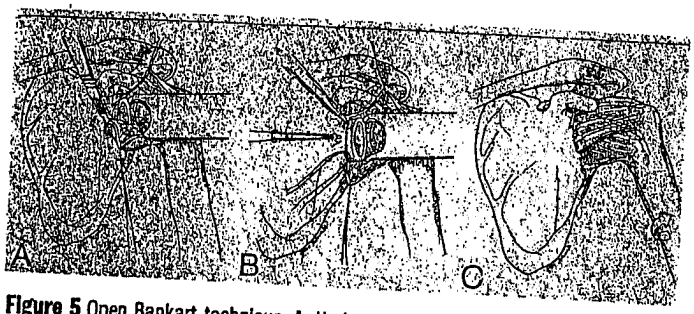

Figure 5 Open Bankart technique. **A,** Horizontal capsulotomy exposing Bankart lesion. **B,** Placement of suture anchors to facilitate labral reattachment. **C,** Capsular shifting to address attenuation. *(Reproduced from Altchek DW, Dines DM: Shoulder injuries in the throwing athlete. J Am Acad Orthop Surg 1995;3:164.)*

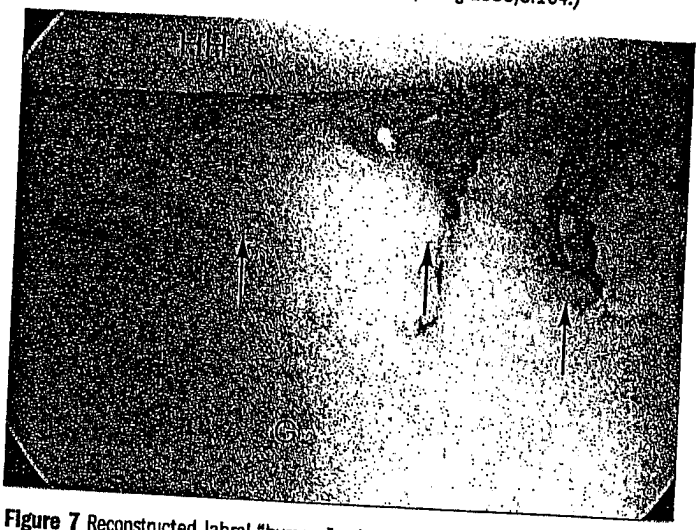

Figure 7 Reconstructed labral "bumper," enhancing concavity-compression stability (*arrows*). HH = humeral head, G = glenoid.

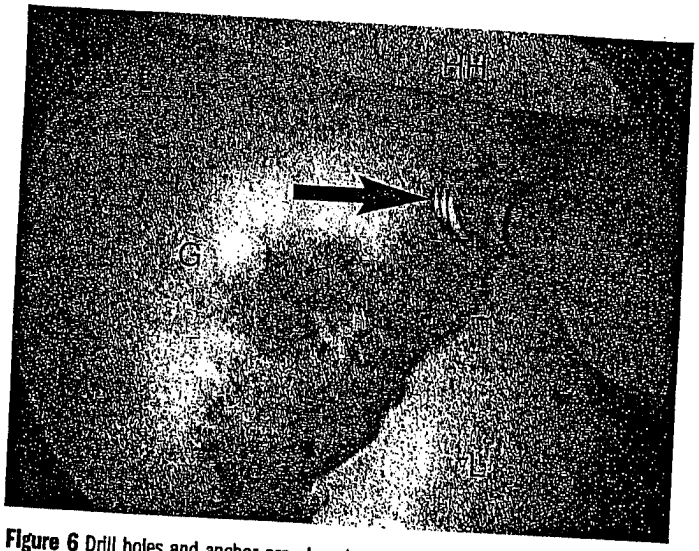

Figure 6 Drill holes and anchor are placed at the glenoid face-neck junction to recreate normal labral anatomy and capsular tensioning. The arrow indicates the most inferior anchor placement. G = glenoid, HH = humeral head, L = labrum.

active population. Recent studies of these higher-risk individuals with recurrent instability who participate in a well-supervised nonsurgical treatment program have demonstrated failure rates approaching 90%. Surgical stabilization is warranted in patients who have disabling instability or are unwilling to indefinitely limit their activities.

For older, less active individuals, a short period of immobilization followed by a rehabilitation program is the appropriate treatment regimen.

Surgical Treatment

Historically, the success of open stabilization of the unstable shoulder has been judged by recurrence rates, and success rates approaching 90% to 95% have been routinely reported. The Magnuson-Stack (detachment and lateralization of the subscapularis tendon insertion) and Putti-Platt (division and shortening of the subscapularis tendon, with attachment of the lateral stump of the divided tendon to the glenoid rim/capsule) procedures are nonanatomic interventions designed to limit external rotation. The Bristow procedure was designed to use the tip of the coracoid as a buttress for the anterior capsule while tethering the inferior half of the subscapularis tendon. Although these procedures were popular at their inception, late significant morbidity has been described, including permanent loss of external rotation, excessive constraint with premature glenohumeral arthrosis, loss of motion and velocity in the overhand athlete, and hardware loosening, migration, and breakage.

The open Bankart technique has been refined and improved. The subscapularis-splitting approach reduces subscapularis weakening and scarring. Anatomic repair of ligament to bone, facilitated by suture anchors, attempts to preserve normal anatomy (Fig. 5). Capsular tensioning is performed when appropriate to address laxity. Accelerated rehabilitation protocols, which focus on safely making gains in motion and strength, allow overhand athletes to return to a competitive level expeditiously.

Despite the low recurrence rate reported with open surgical stabilization, concerns about loss of external rotation, surgical morbidity, and difficult rehabilitation remain. Recently, arthroscopic stabilization techniques have been used to address these concerns.

Arthroscopic Treatment

Early attempts at arthroscopic stabilization initially yielded encouraging results; however, with longer follow-up, recurrence rates were alarmingly high, with some studies reporting failures in up to 50% of patients. Analysis of these failures has identified a number of risk factors, including too short a period of postoperative immobilization (eg, less than 3 weeks), use of too few anchors, anchor placement on the glenoid neck rather

than the edge of the articular surface (Fig. 6), participation in contact sports, young patient age, glenohumeral ligament quality, generalized ligamentous laxity, engaging Hill-Sachs lesions, bony Bankart lesions (inverted pear glenoid), and capsular attenuation.

As with the open approach, the arthroscopic technique also has been refined, and recent studies have indicated significantly improved success rates without an increase in morbidity or loss of motion. Refinements include careful placement of at least three anchors onto the glenoid face-neck junction to recreate a labral "bumper" that deepens the glenoid concavity (Fig. 7), use of plication sutures, rotator interval closure or possible use of thermal energy to address capsular elongation, and secure repair of the Bankart lesion. These refinements have resulted in success rates that equal and, in some cases, exceed those associated with traditional open stabilization.

The current use of thermal shrinkage, radiofrequency energy that heats and shrinks elongated capsular tissue, remains controversial. Although the basic science of the tissue response has been studied and described, the long-term effects of heating capsular tissue currently are unknown. Furthermore, the appropriate postoperative rehabilitation protocol has yet to be determined. Many questions remain unanswered regarding late tensile strength, as well as potential proprioceptive deficits following thermal intervention.

The decision to use the open versus arthroscopic approach should be predicated on the surgeon's assessment of the recurrence risk factors that apply to each individual patient, the surgeon's comfort with either technique, and the patient's wishes once the combination of risk factors, surgical nuances, and potential complications have been discussed. For a successful outcome, patient selection is key, followed by meticulous surgical technique that addresses all of the pathology encountered, including Bankart lesions and capsular laxity.

Annotated Bibliography

Anatomy and Biomechanics

McMahon PJ, Dettling J, Sandusky MD, Tibone JE, Lee TQ: The anterior band of the inferior glenohumeral ligament: Assessment of its permanent deformation and the anatomy of its glenoid attachment. *J Bone Joint Surg Br* 1999;81:406-413.

Twelve fresh frozen cadaver shoulders were used to determine the mechanical and histologic properties of the IGHL in addition to testing sites of failure to tensile testing. Strength was measured by tensile testing of the glenoid–soft tissue–humerus (G-ST-H) complex. On tensile testing in abduction and external rotation, eight G-ST-H complexes failed at the site of the glenoid insertion, two at the insertion into the humerus, and two at the midsubstance.

Evaluation

Bokor DJ, Conboy VB, Olson C: Anterior instability of the glenohumeral joint with humeral avulsion of the glenohumeral ligament: A review of 41 cases. *J Bone Joint Surg Br* 1999;811:93-96.

The authors retrospectively analyzed a series of 547 consecutive shoulders treated surgically for instability. In 41 (7.5%) shoulders, the cause of instability was lateral avulsion of the inferior glenohumeral ligament from the neck of the humerus (the HAGL lesion). HAGL lesions were present in 35 of the 130 shoulders without a Bankart lesion (26.9%). Six (14.6%) of the patients with a HAGL lesion had a concomitant Bankart lesion. Patients with HAGL lesions were older on average than those with instability from other causes.

Burkhart SS, De Beer JF: Traumatic glenohumeral bone defects and their relationship to failure of arthroscopic Bankart repairs: Significance of the inverted-pear glenoid and the humeral engaging Hill-Sachs lesion. *Arthroscopy* 2000;16:677-694.

The authors analyzed 194 consecutive arthroscopic Bankart repairs, performed by two surgeons with an identical suture anchor technique. The average follow-up was 27 months (range, 14 to 79 months). Significant bone defects such as an inverted pear glenoid or engaging Hill-Sachs lesion were identified and correlated to recurrent instability. Of the 21 shoulders with recurrent instability, 14 had significant bone defects (3 engaging Hill-Sachs and 11 inverted pear Bankart lesions). For the group without significant bone defects (173 shoulders), there were only 7 recurrences (4%). For the group with significant bone defects (21 patients), there were 14 recurrences (67%). The authors suggest that failure of arthroscopic instability repair is secondary to bony lesions and not to the technique itself. They recommend that engaging Hill-Sachs lesions be treated with open capsular shift and that inverted pear glenoids be treated with the Latarjet procedure.

Cvitanic O, Tirman PF, Feller JF, Bost FW, Minter J, Carroll KW: Using abduction and external rotation of the shoulder to increase the sensitivity of MR arthrography in revealing tears of the anterior glenoid labrum. *Am J Roentgenol* 1997;169:837-844.

MR arthrography of the shoulder that included an additional oblique axial imaging sequence with the patient in the abducted-externally rotated position was performed in 256 patients. Of the 92 patients who underwent surgery, anterior glenoid labrum tears were found in 27. Conventional axial MR arthrograms revealed 13 tears (sensitivity, 48%; specificity, 91%). MR arthrograms obtained with shoulders in the abducted-externally rotated position revealed 24 tears (sensitivity, 89%; specificity, 95%). Review of the images together revealed 26 tears (sensitivity, 96%; specificity, 97%).

Sano H, Kato Y, Haga K, Iroi E, Tabata S: Magnetic resonance arthrography in the assessment of anterior instability of the shoulder: Comparison with double-contrast computed tomography arthrography. *J Shoulder Elbow Surg* 1996;5:280-285.

Forty-seven shoulders with traumatic anterior instability were studied by MR arthrography (MRA) and computed tomography arthrography (CTA). Labral damage evaluated by MRA and by CTA correlated significantly with arthroscopic findings. MRA was more sensitive in detecting torn labra (MRA, sensitivity = 87%, specificity = 75%; CTA, sensitivity = 33%, specificity = 88%). In detecting displaced labra, sensitivity and specificity were 65% and 94% for MRA and 75% and 69% for CTA. The inferior glenohumeral ligament was depicted as a lax structure in 74% by MRA but in only 21% by CTA.

Treatment

Bacilla P, Field LD, Savoie FH: Arthroscopic Bankart repair in a high demand patient population. *Arthroscopy* 1997;13:51-60.

Arthroscopic stabilization using suture anchors, nonabsorbable sutures, and a mattress configuration to allow plication was performed in 40 consecutive patients who were characterized as high risk by virtue of age and sport. All but two patients were age 23 years or younger and engaged in high-demand sports. A recurrence rate of 7% was noted, and 29 of 32 competitive athletes returned to their sport.

Bottoni CR, Wilckens JH, DeBerardino TM, et al: A prospective, randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute, traumatic, first-time shoulder dislocations. *Am J Sports Med* 2002;30:576-580.

The authors performed a prospective, randomized clinical trial in which recurrent dislocation rates were compared between two groups of young athletes who had sustained an acute, traumatic shoulder dislocation—those who received nonsurgical treatment and those who had an arthroscopic Bankart repair. Fourteen patients underwent 4 weeks of immobilization followed by a supervised rehabilitation program. Ten patients underwent arthroscopic Bankart repair with a bioabsorbable tack followed by the same rehabilitation protocol as the nonsurgically treated patients. Average follow-up was 36 months, and three patients were lost to follow-up. Nine of 12 nonsurgically treated patients (75%) developed recurrent instability. Six of the nine required open Bankart repair. Of the nine surgically treated patients available for follow-up, one (11.1%) developed recurrent instability.

Gill TJ, Micheli LJ, Gebhard F, Binder C: Bankart repair for anterior instability of the shoulder: Long-term outcome. *J Bone Joint Surg Am* 1997;79:850-857.

Long-term follow-up of open reconstruction of Bankart lesions, averaging 11 years, yielded excellent or good outcomes in 93% of patients. Instability recurred in 3 of 60 shoulders, each more than 3 years postoperatively. Average loss of external rotation was 12°. A direct association between range of motion and quality of results was established in a new rating system.

Hayashi K, Massa KL, Thabit G III, et al: Histologic evaluation of the glenohumeral joint capsule after the laser-assisted capsular shift procedure for glenohumeral instability. *Am J Sports Med* 1999;27:162-167.

Capsular samples were taken from 42 patients who had undergone an arthroscopic laser capsular shrinkage procedure. Histologic analysis before and after the procedure, ranging from 0 to 38 months, demonstrated hyalinization and cell necrosis immediately postoperatively. Fibrous connective tissue with reactive cells and increased vascularity was noted at 3 to 6 months, and collagen and cell morphology returned to normal between 7 and 38 months following the procedure. Mechanical and biochemical characterization was not performed.

Hayashida K, Yoneda M, Nakagawa S, Okamura K, Fukushima S: Arthroscopic Bankart suture repair for traumatic anterior shoulder instability: Analysis of the causes of a recurrence. *Arthroscopy* 1998;14:295-301.

An arthroscopic transglenoid technique was used to treat 82 patients with traumatic anterior instability. At follow-up 2 years later, excellent results were found in 55 patients (67%), good results in 14 (17%), and poor in 13 (16%). Recurrent dislocations occurred in 13 patients, and recurrent subluxations occurred in 2 patients, for a recurrence rate of 18%. Multivariate analysis revealed that recurrence was associated with a type III Bankart lesion, return to contact sports, attenuated IGHL, and a repair using fewer than four sutures.

Hovelius L, Augustini BG, Fredin H, Johansson O, Norlin R, Thorling J: Primary anterior dislocation of the shoulder in young patients: A ten-year prospective study. *J Bone Joint Surg Am* 1996;78:1677-1684.

Two hundred forty-five patients who had 247 primary anterior dislocations of the shoulder were followed for 10 years in a multicenter study at 27 Swedish hospitals. The ages of the patients at the time of the dislocation ranged from 12 to 40 years. The patients were assigned to one of three slightly different conservative treatment groups. At the 10-year follow-up evaluation, no additional dislocation had occurred in 129 shoulders (52%). Surgical treatment was required for recurrent dislocation in 58 shoulders (23%): 34 of the 99 shoulders (34%) in patients who were 12 to 22 years old; 16 of the 57 shoulders (28%) in patients who were 23 to 29 years old; and 8 of the 91 shoulders (9%) in patients who were 30 to 40 years old. The type and duration of the initial treatment had no effect on the rate of recurrence. Radiographs of 185 shoulders were obtained at the time of initial dislocation, demonstrating a Hill-Sachs lesion in 99 shoulders (54%). This finding was associated with a significantly worse prognosis for recurrence ($P < 0.04$). Radiographs at 10-year follow-up for 208 shoulders were evaluated for postdislocation arthropathy. Twenty-three shoulders (11%) exhibited mild arthropathy and 18 (9%) moderate or severe arthropathy.

Kiss J, Mersich I, Perlaky GY, Szollas L: The results of the Putti-Platt operation with particular reference to arthritis, pain, and limitation of external rotation. *J Shoulder Elbow Surg* 1998;7:495-500.

The results of 90 Putti-Platt operations were studied with an average follow-up of 9 years. The redislocation rate was 9%. Eleven percent of the patients had pain at rest, and 35% had pain with activity. Ninety percent of the patients had restriction of external rotation both at the side of the body (average loss 24°) and in 90° abduction (average loss 23°). Osteoarthritis was moderate in 20 shoulders (29%) and severe in 1 shoulder (1%). Eighty-three percent of patients were fully satisfied, 13% were partly satisfied, and 4% were not satisfied with the result of the surgery.

Mologne TS, McBride MT, Lapoint JM: Assessment of failed arthroscopic anterior labral repairs: Findings at open surgery. *Am J Sports Med* 1997;25:813-817.

Twenty patients who had undergone open revision procedures following unsuccessful arthroscopic Bankart repairs were reviewed. At the time of the open surgery, 12 patients (60%) had healed Bankart lesions, 8 (40%) had persistent Bankart lesions, and 15 (75%) had redundant anterior capsules. The authors concluded that failure to treat either the Bankart lesion or capsular laxity at the time of an arthroscopic Bankart procedure may result in recurrent instability.

Nelson BJ, Arciero RA: Arthroscopic management of glenohumeral instability. *Am J Sports Med* 2000;28:602-614.

The authors review current technique and results of arthroscopic management of shoulder instability.

O'Neill DB: Arthroscopic Bankart repair of anterior detachments of the glenoid labrum: A prospective study. *J Bone Joint Surg Am* 1999;81:1357-1366.

Arthroscopic transglenoid stabilization was performed on 41 patients with recurrent anterior dislocations. Average follow-up was more than 4 years. Two patients (5%) experienced recurrent subluxation, and 40 of 41 (98%) returned to their preoperative sport. Twenty-two patients (54%) had full range of motion in all planes.

Pagnani MJ, Warren RF, Altchek DW, Wickiewicz TL, Anderson AF: Arthroscopic shoulder stabilization using transglenoid sutures: A four-year minimum follow up. *Am J Sports Med* 1996;24:459-467.

Thirty-seven of 41 consecutive patients with recurrent anterior instability of the shoulder were retrospectively observed for a mean of 5.6 years after an arthroscopic stabilization procedure had been performed using a transglenoid suture technique. According to the Rowe scoring system, 27 patients (74%) had good or excellent results, and 3 patients (7%) were graded as fair. Seven patients (19%) developed recurrent instability after the procedure and had failed results. Absence of a Bankart lesion at operation was associated with postoperative instability ($P = 0.03$). Four of the 13 patients who participated in contact sports or recreational skiing developed postoperative instability ($P = 0.21$). All failures occurred within 2 years of the procedure.

van der Zwaag HM, Brand R, Obermann WR, Rozing PM: Glenohumeral osteoarthrosis after Putti-Platt repair. *J Shoulder Elbow Surg* 1999;8:252-258.

Sixty-six shoulders were treated with the Putti-Platt procedure with 22-year follow up (range, 10 to 40 years). The average age of the patients was 49.3 years (range, 33 to 74 years). The redislocation rate was low (only 3%), and 71% of the patients had no symptoms in the operated shoulder. Osteoarthrosis of the glenohumeral joint was found in 40 (61%) shoulders. Arthrosis was mild in 23 shoulders (35%), moderate in 13 shoulders (20%), and severe in 4 shoulders (6%). The number of dislocations before surgery was correlated with the severity of arthrosis but not with its incidence.

Yoneda M, Hayashida K, Wakitani S, Nakagawa S, Fukushima S: Bankart procedure augmented by coracoid transfer for contact athletes with traumatic anterior shoulder instability. *Am J Sports Med* 1999;27:21-26.

The authors analyzed the clinical efficacy of the Bankart procedure augmented by coracoid transfer for traumatic anterior shoulder instability in athletes playing contact sports. Eighty-three athletes (85 joints) with traumatic anterior shoulder instability who underwent the combined procedure were studied. The mean patient age at surgery was 21 years, and the mean follow-up period was 5.8 years. Rowe scores were excellent in 58 shoulders (68%), good in 21 (25%), fair in 5 (6%), and poor in 1 (1%). A complete return to contact sports was achieved by 73 of the 83 patients (88%). The average loss of external rotation was 15° with the arm at the side and 7° with the arm in 90° of abduction. The complications were nonunions in two patients, screw breakage in one patient, and axillary nerve injury in one.

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