

ARTHROSCOPIC SHOULDER STABILIZATION

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Bankart^{1 2} described detachment of the glenoid labrum and operations to repair it.

Other authors^{3 4 5 6} described capsular laxity as an important feature of anterior instability.

Shoulder arthroscopy provides a new look at patients with anterior instability. Anatomical repairs directed at the specific pathology should lead to better results with less tissue trauma.

CLASSIFICATION

A classification system, focused through the arthroscope, is essential. Classify shoulder instability according to direction, cause, degree, frequency, and patient control

Direction

- Anterior
- Posterior
- Inferior
- Multidirectional

Cause

- Traumatic
 - Acute
 - Repetitive
- Non-traumatic

Degree

- Subluxation
- Dislocation

Frequency

- Acute
- Recurrent

Patient control

- Voluntary
- Involuntary

Matsen⁸ uses two acronyms for classification.

TUBS

- Traumatic
- Unidirectional

AMBRI

- Atraumatic
- Multidirectional

Bankart lesion
Surgery

Bilateral
Rehabilitation
Inferior Capsular Shift

NATURAL HISTORY

Recurrent dislocation or subluxation often follows the initial traumatic dislocation specially in active patients less than 30 years old.

Immobilization after the acute dislocation makes no difference in the long term results.⁹

Supervised rehabilitation has no effect on the redislocation rate.¹⁰

The prevalence of bilateral involvement in the population is 25%.¹¹

Simonet and Cofield studied the prognosis of 116 patients who sustained a first-time anterior glenohumeral dislocation with a follow-up 2 to 11 years.¹² The recurrence rate was 33%. with the majority requiring surgery. Of those patients that did not develop a recurrence, 55% were stable and 12% developed symptomatic instability.

FACTORS FOR STABILITY

Anatomical

Labrum increases socket depth

Labrum bonding strength

Adhesion

Negative atmospheric pressure

Dynamic

Suprapinatus

Subscapularis

Infraspinatus

Long head of biceps

Static

Superior glenohumeral ligament

Middle glenohumeral ligament

Inferior glenohumeral ligament

Coracohumeral Ligament

Anatomical variations

Variations of the anterior ligament patterns may predispose some individuals to develop recurrent instability.^{13 14}

Type	Normal Instability (n=182)	Instability (n=287)	Finding
I	66%	76%	Classic ligament pattern
II	7%	7%	Confluent MGHL-IGHL
III	19%	1%	Cordlike MGHL with large foramen
IV	8%	15%	Absent ligaments

PATHOLOGY

Pathology of Acute Dislocation

The arthroscopic examination of patients with an acute shoulder dislocation furnishes a new understanding of pathology. Baker and Uribe divided 45 patients less than 30 years old with acute dislocations into three subclasses.¹⁵

Class I Capsular Stretch Injury(6)

Class II Capsular Tear with Partial Labrum Detachment(11)

Class III Complete Labrum Tears(28)

Other findings included Hill-Sachs lesions (36/45 patients), rotator cuff tears, loose bodies, tuberosity fractures, glenoid rim injuries and axillary nerve injuries.

A study from the United States Army Academy at West Point (Wheeler)¹⁸ found labrum detachments in all nine patients with acute dislocations.

The author has repaired acute ruptures of the inferior glenohumeral ligament with disruption of the axillary pouch in three patients over the age of 28. The variable pathology seen in patients with acute dislocations dictates that surgical treatment must address the specific tissue injury. The same operation will not treat all patients with shoulder instability.

Instability Due to Repetitive Microtrauma

Instability associated with repetitive microtrauma occurs not only in athletes but in carpenters and other workers who perform repetitive activity. Drs. Glousman and Jobe have used arthroscopy to define four phases of instability and impingement.¹⁶

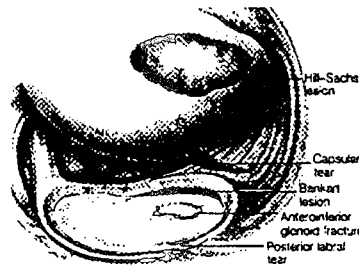
	Classification	Impingement	Apprehension Labrum Sign	Cuff Sign	
I	Pure Impingement	+	—	+	0
II	Anterior Instability and Pure Impingement (Labral-Capsular Trauma)	+	+	+	+
III	Anterior Instability and Associated Impingement (Hyperelasticity)	+	+—	+	0
IV	Pure Anterior Instability	+	+	0	+

The arthroscope distinguishes stage II from stage III with the former

having labral damage and humeral head chondromalacia, and the later having laxity of the anterior ligaments.

Surgical pathology of Instability

The essential pathology of instability is an incompetent inferior glenohumeral ligament.



Bankart lesion
Capsular tear
Capsular laxity
Hill Sachs
Glenoid rim fracture

EXAMINATION UNDER ANESTHESIA

Laxity test under anesthesia may show increased translation when compared with the opposite shoulder. The amount of laxity on clinical examination is variable from patient to patient. Measurements of glenohumeral translation with a six-degree-of-freedom spatial sensing system show considerable overlap among individuals with a stable shoulder, traumatic instability, and atraumatic instability.¹⁷ The indications for stabilization should be based on the patient's history and demonstration of instability symptoms on physical examination.

TREATMENT

Treatment repairs the underlying pathology. The goal is reconstruction of anatomy to normal by open or arthroscopic techniques. The surgeon, in conference with the patient, chooses open or arthroscopic repair.

Open Repair

Open repair of the inferior glenohumeral ligament-labrum complex has a 90% success rate. These include bankart labrum repairs, capsular procedures that either reduce capsular volume or reconstruct the capsule and labrum. Jobe adds a labrum reconstruction to the capsular repair.¹⁸ Other procedures substitute for the glenohumeral ligaments or expand the glenoid with a bone block.

Arthroscopic procedures

Repair of the torn inferior glenohumeral ligament labrum

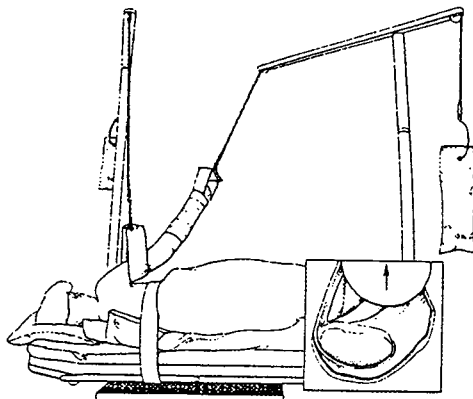
complex and a capsular shift are the goals of an arthroscopic procedure. Controversy and the learning process involve the method of internal tissue fixation. Johnson innovated this procedure with metallic staple fixation¹⁹ while Wiley^{20 21} used a removable metal revet. The desire for more secure fixation led to the arthroscopic screw technique.²² Suture repair techniques avoided the use of metal and allowed multiple bites of tissue to be moved and secured to bone.^{23 24 25} Intra-articular knot tying evolved from the suture techniques. Suture anchors of various material, sizes, and shape are another way to reattach tissue to bone. Creation of a "labrum" to deepen the glenoid and enhance the vacuum effect is another goal of arthroscopic repair.

ARTHROSCOPIC SURGICAL TECHNIQUE: THE SIX ESSENTIAL STEPS²⁶

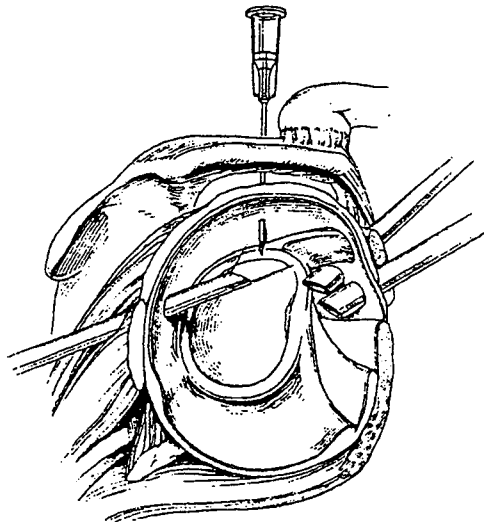
Six steps are essential for arthroscopic stabilization. Methodical adherence to these steps and principles will lead to satisfactory results.

Step 1. Diagnostic arthroscopy and bursoscopy

Setup



Lateral Position



Three Portals

Do in all cases
 Define the pathology
 Visualize the procedure

The specific labrum of IGHL pathology may not be fully appreciated until the surgeon releases the tissue from bone.

Decisions

- 1) Confirm diagnosis of instability and perform an arthroscopic stabilization procedure
- 2) Confirm diagnosis and perform an open stabilization
- 3) The diagnosis of instability is incorrect, and instability surgery is not indicated. Proceed with appropriate surgery.

Step 2. Debridement of the glenohumeral joint

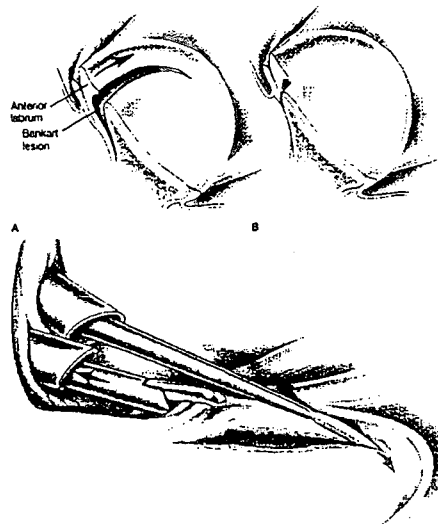
Debridement

- Loose bodies
- Articular defects
- Posterior labrum tears

Step 3. preparation of capsule-ligament complex

Technique

Free up the labrum and capsule if torn. Meticulous attention to mobilization of soft tissue is indispensable for a satisfactory arthroscopic repair.



Visualize

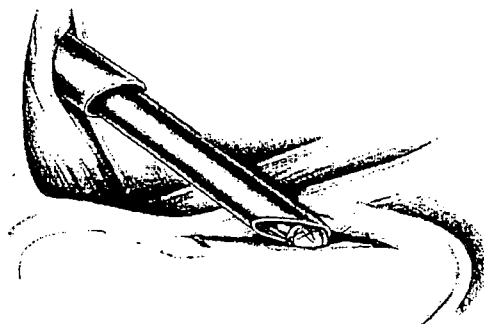
Visualize the operation! If the surgeon cannot satisfactorily picture the arthroscopic repair, switch to open instability repair.



Treatment depends on the pathological findings:

1. If IGHL-Labrum avulsion, then reattach it to bone.
2. If IGHL torn with labrum intact, then repair or reattach.
3. If IGHL torn and healed, then mobilize ligament and shift to its normal place on bone.

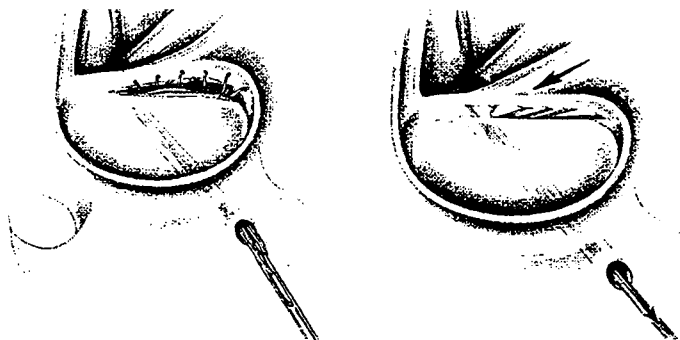
Step 4. Preparation of the glenoid reattachment site



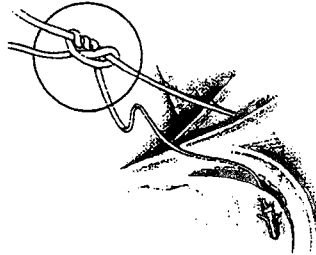
Abrade the anterior glenoid neck to a raw bleeding surface. The goal is to create a 3cm by 1.5cm bony surface, extending from 2 o'clock to 6 o'clock, for soft tissue attachment.

Step 5. Attachment of the capsule ligament complex to bone

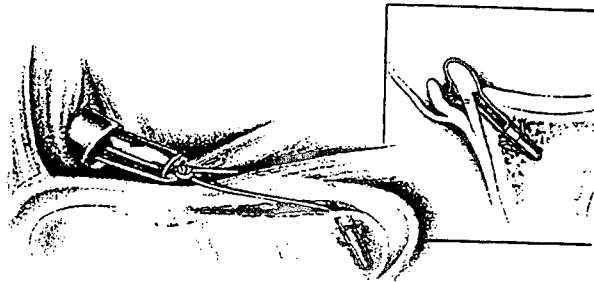
- 1) Suture punch, trans-glenoid technique(Caspari)²⁷



2) Suture anchor techniques



3) Capsular tucks



Step 6. Postoperative care

The rehabilitation Program is less aggressive than open repair. use a shoulder immobilizer or sling for six weeks. Begin pendulum exercises at three weeks with active and passive range of motion at six weeks. The shoulder should have full range of motion by twelve weeks post-operatively. Throwing begins at three months post-operatively, and overhead activity by six months. Athletes should avoid contact and collision sports for one year.

RECURRENT DISLOCATION AFTER ARTHROSCOPIC REPAIR

Recurrent dislocation is the most significant complication. O'Keefe reported that the initial failure strength for the suture repair was twice as strong as the staple repair, but both were less than controls.²⁸ The average failure strength of the inferior glenohumeral ligament complex to bone repair in dogs was 17.75kg in controls, 11kg for the suture, and 4.77kg for the staple.

Arthroscopic results are variable and long term results are

absent. Many redislocations occur between one and five years postoperative.

PROSPECTIVE STUDY OF OPEN VERSUS ARTHROSCOPIC FIXATION

A prospective study by Weber²⁹ evaluated the treatment of anterior instability using both arthroscopic and open methods. He assigned patients to either group based on their preference after informed consent. No recurrences developed in the 26 selecting open treatment. Four(17%) redislocations occurred in 23 patients selecting arthroscopic treatment. Three of these four redislocations had a suture repair. Weber concluded that arthroscopic techniques seem best suited to patients who prefer a less painful procedure. Open repair is for those patients where recurrence is unacceptable.

Wolin had a 27% failure rate in 45 athletes using a suture technique.³⁰ Seven of the 12 failures occurred during the athletes chosen sport, 2 during rehabilitation, and 3 during the activities of daily living. Seven of the 12 failures required revision to open capsular repair. The mode of failure was attenuation of the inferior glenohumeral ligament.

PATIENT SELECTION

Classify type of dislocation

Patients lifestyle

Surgeons skills

Ideal patient

The ideal candidate is a patient, not involved in collision sports, with an acute traumatic recurrent dislocation and a Bankart detachment of the labrum.

Acute dislocation

Arthroscopic repair of traumatic anterior dislocation with tearing of the capsule from the glenoid is feasible. Excellent results should be possible. Arthroscopy of acute shoulder dislocations will enable one immediately and accurately to fix the pathology and may have the best results.

Multidirectional instability

Options include:

- 1) Capsular "tucks" of the IGHL(anterior & posterior bands) and the rotator interval are feasible.
- 2) Caspari type of transglenoid repair from anteriorly and posteriorly.
- 3) Some authors are trying the laser.

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