

Anterior Shoulder instability

충남의대 정형외과

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- Shoulder Instability: Spectrum of a disorder
- Etiologies of shoulder Instability
 - Traumatic: most common cause
 - Subluxation in pts with increased laxity
 - Microtrauma secondary to repetitive large force
(in overhead-throwing athletes or swimmers): acquired instability(Neer)

Classification of shoulder instability

- Timing / frequency: acute, chronic
- Degree: subluxation, dislocation
- Direction
 - anterior, posterior, inferior
 - Bi-directional(ant.-inf., post.-inf.)
 - multidirectional
- Etiology: traumatic, atraumatic, acquired
- Volition
 - involuntary
 - voluntary(postional, muscular, psychologic)
- Thomas and Matsen: TUBS, AMBRI
- Rockwood
 - Type I Traumatic subluxation without previous D / L
 - Type II Traumatic subluxation after previous D / L
 - Type III A Voluntary subluxation in pt. With psychiatric problems
 - Type III B Voluntary subluxation in pt. Without psychiatric problems
 - Type IV Atraumatic involuntary subluxation

Unidirectional Instability

- TUBS(96%): Traumatic, Unidirectional instability, Bankart lesion, Surgery
- General contents
 - Classic Bankart lesion
 - Bony Bankart lesion
 - Capsular tear and attenuation

- ALPSA
- Humeral avulsion of GHJ(HAGHL)

Classic Bankart lesion

- Detachment of the capsulolabral complex at the site of the IGHL
- Key role in recurrent anterior instability
- Incidence: 85~100% after an acute shoulder dislocation

Various pathologic lesions of shoulder instability

- Bankart lesion & Hill-Sachs lesion
- Mid capsular tear
- SLAP lesion
- RC tear
- ALPSA
- HAGHL
- Plastic deformation of capsule

Multidirectional Instability

- AMBRII(4%)
 - : Atraumatic, Multidirectional instability, Bilateral, Rehabilitation, Inferior capsular shift, Interval suture

Pathoanatomy

- Congenital factors: generalized ligament laxity
 - Elbow hyperextension: $> 10^\circ$
 - Knee hyperextension: $> 10^\circ$
 - MCP joint extension: $> 90^\circ$
 - Thumb radial abduction: to the forearm
- 3 of 4 factors: potential problem with arthroscopic op.

Physical Examination

- Sulcus sign
- Load and Shift test: ant. Drawer test and post. Drawer test
- Apprehension test
- Relocation test
- Posterior jerk test
- Biceps load test etc

MR Arthrography

- Direct MR Arthrography: injection of saline or Gd-Complex

- Indirect MR Arthrography: exercise after IV Gd-Complex

Shoulder Instability

- Accurate assess and correction for specific pathology in each case
- Restore anatomy and function as best as possible

What is essential lesion ?

- O'Brien: IGHLC
- Incompetence of IGHLC Injury or Redundancy of capsule
Capsular laxity with plastic deformity(Speer, Bigliani)

Nonoperative treatment

- Issues
 - Length of immobilization ?
 - Whether or not to implement rehabilitation exercises ?
 - Which kind of exercise ?
 - Whether the rehabilitation may be playing a role in the Tx. or producing further problems ?
- Indication
 - Multidirectional instability
 - Isolated post. Subluxation without major trauma
- Specific rehabilitation to order for the unstable shoulder
 - Ant. Instability
 - : Increase the endurance of the scapula and cuff muscles(especially, the ant. Subscapularis)
 - Post. Subluxation
 - Concentrating on the external rotators and the scapula
 - Followed with global shoulder exercise
 - Global laxity and multidirectional instability
 - : resistive exercises with the arm in the neutral position
 - : keep the head centered without stressing it at the extremes of motion

For ideal surgical technique

- Type of lesion
- The anatomic structures involved
- Its potential for healing
- Type of fixation needed

Open VS Arthroscopic treatment

- When is NOT wise to do a purely arthroscopic repair ?

- Poor quality(i.e., frayed and thin)
- The patient is an elite or contact athlete and may not be able to afford a surgical failure
- The patient has multidirectional instability But, surgeon's choice and ability!!

Indication for open Bankart repair

- Capsular tear at the humeral attachment
- Large glenoid rim fracture: > 30% of the glenoid circumference
- Tuberosity avulsion fracture
- Failed arthroscopic revision Bankart repair

Open surgery

- A number of technical decision-making issues
 - Cosmetic approach ?
 - Coracoid osteotomy ?
 - Capsular division method ?
 - Repair of the Bankart lesion ?
 - Tightening the capsule / Tension to apply ?
- Open procedure
 - Bankart procedure
 - Putti-platt procedure
 - Bristow procedure
 - Eden-Hybinette procedure
 - Capsular shift
- Satisfactory rate: 75~97%
- Past ant. open procedures mostly to
 - Limit motion
 - Significant functional losses
- Results of open surgery for anterior instability: produce a success rate over 90%
 - 96.5% success rate(Rowe, 1978)
 - 97% (Thomas and Matsen, 1989)
 - 95% (Altchek, 1991)

Major advantage of arthroscopic repair versus open repair

- Possibility to identify and treat concomitant disease
- Lower morbidity and reduced pain
- Shorter surgical time
- Improved cosmesis

Obvious contraindications to arthroscopic capsular repair

- Bony insufficiency of the glenoid from acute fracture or chronic erosion
- Large Hill-Sachs lesion
- Capsular rupture within its mid-substance or at its insertion
- The presence of poor quality capsular tissue

Arthroscopic treatment indications

- Large Bankart lesion
- The labrum tissue is of good quality and can be manipulated easily
- Short duration with few dislocations

Results of arthroscopic techniques for anterior instability

- success rates are similar to those employing open techniques
- 7% recurrence rate(Bacilla, 1997)
- 8% recurrence rate(Gartsman, 2000)

Advantages of arthroscopy

- Less painful, Less invasive
- Less morbidity
- Less scar
- Less cost
- Greater preservation of ROM
- Reconstruction of associated pathology: R.C., Biceps, SLAP

The usefulness

- Direct visualization
- Direct instrument palpation
- Confirm the diagnosis of instability

Important things of Arthroscopic stabilization

- Sufficient capsular mobilization from 1 to 7 O' clock
- Multiple sutures
- Sufficient inferior capsular shift
- Capsular laxity(instability) remained after stabilization, additional procedure (thermal capsular shrinkage, plication etc) must be followed

Arthroscopic Treatment

- Transglenoid: Inf. Capsular shift & advancement
- Anterior anchor: Capsular advancement

Arthroscopic Technique

- Transglenoid or Transscapular Suturing Technique
 - : Morgan, Caspari, Macci, Yoneda, Modification(Rhee's)
- Anterior Fixation Technique
 - Metal implant
 - Biodegradable tack
 - Intraosseous Implant: retrievable
 - : mini-Revo, Fastak, Mitek II, Statak, Corkscrew, Knotless anchor
- Transglenoid fixation vs Suture anchor techniques(Kandziora et al; Arthroscopy 2000)
 - At present, the TGS technique can be regarded as a standard method of arthroscopic labral re-fixation
 - The results of anchors have been published more recently

Transglenoid Suture technique

- Transglenoid Pros
 - Ability to shift / tension capsule even in friable laxed GHJL
 - Multiple sites of capsular purchase
 - No implants
 - Ability to test repair and add / reposition sutures
- Transglenoid Cons
 - Absorbable suture
 - Only 1~2 points of fixation to glenoid rim
 - Suprascapular nerve jeopardy
 - "Soft" fixation if tied on fascia posteriorly

Problems in Transglenoid technique

- Suprascapular nerve Jeopardy
- Insecure fixation(soft) from indirect tie on infraspinatus fascia
- Absorbable suture material(PDS)
 - Low primary stability resulting from the elastic knot
 - In the literatures, the average recurrence rate of TGS: 21.8%(8.7~49%)

Suture anchor rationale

- Failure rate of arthroscopic repair: less than 10%
- Recent reports of arthroscopic stabilization
 - failure rate as low as the best open repair series
 - high return to participation in sports

Arthroscopic stabilization with suture anchor

- Technical skill

- Anchor placement
- Suture passage
- Arthroscopic knot typing

Various pathologic lesions of shoulder instability: Midcapsular tear

- Rarely reported
- Our study: 11 over 182 cases of TUBS

Various pathologic lesions of shoulder instability: SLAP

- Observed first by Andrews(in 1985)
- Snyder(in 1990)-Superior Labrum from Anterior to Posterior
- Mechanism of Injury
 - Traction to long head of biceps in deceleration phase of throwing
 - Fall onto an outstretched arm, Sudden pull on the arm
 - Hyperflexion injury(Poulos in gymnasts)
 - Repeated trauma or tension, Degenerating due to age

Classification(Snyder) of SLAP

- Type I Fraying, degenerative, torn
- Type II Labrum-biceps complex detached from glenoid
- Type III Bucket handle tear
- Type IV Bucket handle tear & split or displacement or detached of biceps tendon partially
- Complex Combination(II + III or IV)

Pathology of Type II SLAP

- Failure(separation) of Biceps root anchor with the Superior labrum from bone
- 3 Subtype by Morgan, 1997
 - Anterior: 37%
 - Posterior: 32%
 - Combined: 31%

Various pathologic lesions of shoulder instability: Associated RC pathology

- Frequency: 28%
- All are chronic SLAP
- Almost partial thickness(almost undersurface)
- Posterior SLAP with posterior rotator tear
- Anterior SLAP with anterior rotator tear

Various pathologic lesions of shoulder instability: ALPSA

- Neviasser et al
- Anterior Labro-ligamentous Periosteal Sleeve Avulsion
- Medial reattachment of detached glenohumeral ligamento-labral complex to glenoid neck: shoulder instability

Capsular Laxity

- Rowe et al
 - : 15% of recurrent dislocation
 - : Treatment with capsular plication
- Speer et al: Bankart lesion + capsular laxity
- Treatment with capsular plication

Various pathologic lesions of shoulder instability: HAGHL

- Avulsion of the GHL from the humerus
(Humeral Avulsion of GlenoHumeral Ligament)
- Opposed to the avulsion from the glenoid rim(GAGHL: Bankart lesion)
- Largely ignored in the literature

Thermal shrinkage of the capsule

- The pathology is global laxity
- The capsule can be shrunk in all 3 directions
- The degree of instability is not great
- As an adjunct to arthroscopic direct repair of the Bankart lesion
 - : Original reports of arthroscopic Bankart repair
 - high recurrence of dislocation with 30~44% rate
 - may be a useful adjunct to address redundant or lax capsule in patients with instability

Thermal capsulorrhaphy

- Devices available
 - Ho: YAG laser
 - radiofrequency(RF) generators
 - a. monopolar RF generators
 - b. bipolar RF generators(arthrocare etc)
- Shrinkage effect
 - quite narrow temperature range: 65~75 degrees(most commonly accepted)
 - exceed 80 degrees: physically fell apart
- Time-related change(Hayashi, 1997, Lasers Surg Med)
 - Immediate after procedure
 - : capsular shortening

- : degeneration of collagen fibrils & fibroblast death
- 7 days after: fibroblastic response into damaged tissue
- 30 days after: evidence of collagen regeneration
- Longer term biomechanical property: unknown
- Failure to address capsular laxity adequately during arthroscopic procedure
 - reason for the disparity between open and arthroscopic procedure
- Shrinkage of additional GH capsular volume : obtain of additional stability" → more improved result
- different individuals
 - : marked difference in response to the heat-impossible to predict the level of tissue damage
- Capsular and ligamentous laxity
 - unidirectional or multidirectional instability(MDI)
 - Causes
 - Nontraumatic
 - Repeated microtrauma(acquired)
 - Acute trauma that corresponds damage to capsular structures
- Current application of thermal shrinkage
 - Traumatic ant. instability
 - Recurrent post. subluxation
 - Multidirectional instability
 - Internal impingement
- Critical point of surgical techniques
 - Optimal temperature: 65~75 degrees
 - Water temperature and fluid flow: adversely affect the actual tissue
 - Arm traction: adversely affect tissue response and amount of shrinkage
 - : most surgeon - reduce flow and reduce arm traction during procedure
 - More collagenous tissue, more robust response
 - Grid pattern procedure: prevent the capsular necrosis and promote the tissue healing
- Complications
 - Failure to achieve stabilization
 - Axillary nerve injury(temporary and permanent)
 - Capsular necrosis
 - Capsular disruption
 - Shoulder stiffness
- Decision for indications of thermal shrinkage
 - Accurate recognition of the pattern of the instability
 - Complete assessment of the shoulder instability
 - Patients who do not respond physical rehabilitation
 - * But, patient selection criteria have not been clearly established

Complex nature of shoulder instability
 Various pattern of pathology

The best Indications for thermal capsulorrhaphy

- Anterior-inferior laxity without a large Hill-Sachs defect
- unidirectional instability as an adjunct to capsular fixation
- posterior instability

Less successful indications for thermal capsulorrhaphy

- large posterior humeral head defect: > 20~30% of the head
- bony Bankart lesion
- after previous open stabilization
- deficient or torn rotator cuff

Contraindications of thermal capsulorrhaphy

- ligamentous discontinuity
- collagen or vascular disease
 - lupus, rheumatoid arthritis, patients using corticosteroids