Sports Related Imaging of the Shoulder

Robert R Bleakney

Joint Department of Medical Imaging
University Health Network, Mount Sinai and Women’s College Hospitals
Shoulder: Glenohumeral Joint

Greatest ROM of any joint in the body
Tremendously versatile & mobile
Mobility – at expense of stability
Normal function dependent upon
  • balance between static and dynamic constraints of the joint
Injury that disturbs balance →
• Biomechanical changes
• Instability

Clinically manifest:
Poorly localized pain/weakness
Mechanical symptoms
• popping, catching, grinding
• GHJ dislocation
Stabilizing Restraints: Shoulder

Active (extrinsic)
- Rotator cuff and other musculature

Passive (intrinsic)
- Osseous geometry
- Labrocapsular complex
  - Labrum, Capsule & Glenohumeral ligaments
Labrum

Fibrocartilagenous tissue
Stabilizer - GH joint

Encircles glenoid
Increases depth/volume
  glenoid 50%

Pressure seal

Primary attachment
  • LH Biceps, GH ligaments
MR Imaging

Fibrocartilagenous labrum

Usually of low signal on MR sequences

Best evaluated
  • MR arthrography
Glenohumeral Ligaments

Critical passive stabilizers GHJ

Condensations joint capsule

**Superior GHL**

**Middle GHL**

- Most variable in size
- Thickened or absent

**Inferior GHL**

- Ant & Post bands, Ax recess
**Inferior GHL**

Lax – neutral position
Taught – abduction
   “Hammock” humeral head

Major passive stabilizer GHJ
Stability Anterior joint capsule
Etiology Shoulder Instability

Traumatic        Microtraumatic       Atraumatic

Unidirectional   Multidirectional

Less laxity      More laxity

Rationale MR Imaging - Define anatomic lesion(s)
- Cause instability, Result of instability
Anterior Dislocation

Injury Osseous + ST restraints

Posterior superior
- Humeral Hill Sachs lesion
- RTC contusion/tear

Anterior Inferior
- Fx Glenoid rim (oss bankart)
- **Labrocapsular injuries**
  - detachments from glenoid
Management perspective
Information critical to surgeon

Labral tearing - Extent/Pattern
Capsular glenohumeral lig lesion (HAGL)
Rotator cuff lesion
Osseous deficiency
Bony Bankhart
GLAD
glenoid labral
articualr disruption
Fibrocartilagenous Bankhart
Labral Capsular Abnormalities:
Classic Bankart lesion

- Avulsion of labrum from osseous glenoid
- Periosteal attachment torn

* Distinguishing feature from others
Pitfall - Buford Complex
Pitfall - Buford Complex
Bankart lesion

- Anatomic extent tear

Tear extension
  - ? Posterior extension
  - ? Involve biceps anchor

Plan anatomic repair
  - Arthroscopic repair
  - Portal placement
Perthes lesion

- **Nondisplaced avulsion of labrum from glenoid**
- Scapular periosteal attachment intact

* ABER
ALPSA lesion

- **Anterior Labroligamentous Periosteal Sleeve Avulsion**
- Avulsion labrum from glenoid + displacement
- Intact scapular periosteum

* fragment displaces & rotates inferomedially
Failure anterior labroocapsular tissues may also occur
- Humeral origin GHL

HAGL lesion

- More common – 1\textsuperscript{st} time dislocators > 35yrs

< 30 yrs - labral tears
Tears RTC

- Usu treated arthroscopically
  - full thickness tears

- Identification subscap tears
  - NB advanced info surgeon
    - 70º scope
  - Open repair
Osseous Lesions

- Greater tuberosity/coracoid
- Osseous Bankart
- Hill Sachs lesion

Clinical significance

Potential compromise
static stability GHJ
Osseous Bankart

Compromise static stability

→ Impaired containment humerus

• >25-30% AP glenoid
• SI length > max radius glenoid
Osseous Bankart

Compromise static stability

→ Impaired containment humerus

- >25-30% AP glenoid
- SI length > max radius glenoid
Posterior Glenohumeral Instability

Usually 2° traumatic dislocation

**Direct trauma**
Anterior trauma - shoulder
Axial load - flex, add, int rotated arm

**Indirect trauma**
Violent muscle contraction
(seizures, elect shock)
Posterior Dislocation

Rare Injury
< 5% GHJ dislocations

Anterior
• Humerus reverse Hill Sachs
• RTC contusion/tear

Posterior
• Reverse Bankart Fx (glenoid)
• Labrocapsular injuries
Labral lesions - posterior dislocation

- Similar spectrum findings anterior dislocation

Reverse Bankart lesions
POLPSA lesions
Reverse HAGL (uncommon)
Multidirectional Instability

- Refers to instability in >1 direction
- Related to ↑ looseness/laxity of supporting capsuloligamentous structures

Congenital - atraumatic (bilateral) or
Developed – microtraumatic athletes
Acquired – multidirectional instability

• Seen in pts active in overhead sports (baseball, tennis, gymnastics, etc)

• Repetitive stretching capsule to extreme ranges of motion

→ microtraumatic injury capsule, ligaments, labrum alterations joint proprioception predisposition to joint dislocation
MR Imaging: Findings
Multidirectional instability

- Capacious joint capsule
- Joint subluxation
- Labral tearing
- +/- Hallmarks - jt dislocation
- Retroversion glenoid

? cause or consequence
Hockey player – “Shoulder instability”
- Hx symptomatic joint subluxation
Hockey player – “Shoulder instability”
– Hx symptomatic joint subluxation
SLAP Lesions

Tears superior labrum ant-to-post involving biceps anchor

Etiology - Traction (LHB)
- Compression (grinding)

Initially classified 4 types
Subclassification 10+ types

Sublabral recess
SLAP
**SLAP I**

Fraying superior labrum

- Intact stable anchor
- Common – older pts, athletes

**SLAP II**

Superior labral tear, detachment biceps anchor

- Most common true tear
- May resemble sublabral recess

(irregular margins, separation labrum, extension post to anchor, lateral extension)
SLAP III
Bucket handle tear sup labrum
  • Intact biceps anchor

SLAP IV
Tear sup labrum extending into biceps tendon
  • Unstable biceps anchor + tendon
Summary

Physiologic and MR Imaging
Anatomic restraints GHJ
  • Labroligamentous soft tissues
  • Osseous (humerus, glenoid)

MRI findings
  • Glenohumeral dislocation
  • Postoperative Instability repair

Features – Important to surgical planning and management