Shoulder: Orthopaedic Perspectives

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Disclosure

• I have no relevant financial disclosures

• I am not a radiologist
What won’t be in this talk

- Physical exam findings
- Surgical techniques
- Outcomes of treatment
- How to read an MRI
What will be in this talk

• Shoulder from the perspective of the treating surgeon
  – Common pediatric shoulder problems
  – What it looks like on the inside
  – How I use imaging
  – What I want to know from you
In this talk

• Pertinent anatomy

• Anterior Instability

• Peri-clavicular injuries

• Glenoid dysplasia
The Shoulder

• Unique joint
  – Huge ROM
  – Very stable

• Differs from hip and knee
  – Shallow socket
  – No ligaments tensioned
Pediatric Shoulder

- 25 million in school sports
- 20 million in rec sports
- 2.5 million sports injuries/yr
- 10% shoulder
Pediatric vs Adult shoulder

• Differences in
  – Anatomy
  – Late epiphyseal closure
Pediatric vs Adult shoulder

• Differences in
  – Injuries
Pediatric vs Adult Shoulder

- Differences in
  - Injuries
Pediatric vs Adult Shoulder

- Differences in
  - Injuries
Normal Shoulder Anatomy

Static stabilizers
Glenohumeral ligaments

- Subscapular tendon
- Biceps tendon
- Middle GHL
- Infraspinatus muscle
- Posterior labrum
- Subscapular muscle
- Teres minor tendon
Normal Shoulder Anatomy

- Labrum
  - Cavity compression
  - 50% of socket depth
  - Anchors IGHL
  - Anchors biceps tendon
Normal Shoulder Anatomy

• SGHL
  – Inferior translation

• MGHL
  – Anterior and posterior translation

• IGHL
  – Primary restraint to anterior translation
IGHL
Normal Shoulder Anatomy

- Biceps tendon
- Humeral head

1. Superior Glenohumeral Ligament
2. Subscapularis
3. Middle Glenohumeral Ligament
4. Inferior Glenohumeral Ligament
5. Biceps Tendon
Normal Shoulder Anatomy

• Bare area of glenoid
Common shoulder problems

1. Shoulder instability
   1. Hill sachs/bankart
   2. HAGL
2. Medial clavicle fx
3. Distal clavicle fx
4. BPP – Glenoid dysplasia
Anterior Shoulder Instability

• 18 year old snowboarder
  – Dislocated shoulder
  – First time injury
Anterior Shoulder Instability

- Why does it matter?

- 1st time dislocators
  - Non-operative treatment = 80% recurrence
  - Correct surgical = 14% recurrence
Anterior Shoulder Instability

• Range of possible injuries
  – Bankart
  – Bony Bankart
  – Hill-Sachs
  – SLAP
  – GLAD
  – ALPSA
  – HAGL
Anterior Shoulder Instability

- Shoulder series radiographs
  - AP, axillary lateral
  - Clavicle, AC joint
  - Reduction
  - Bony bankart
  - Hill-sachs lesion
Anterior Shoulder Instability

- Range of injuries

- I need to know what I will see at surgery
  - Plan surgery
  - Counsel family
Bankart Lesion
Bankart Lesion
Bony Bankart

• What I want to know
  – What % of the width of the glenoid
    • 25%
  – Determines scope vs open repair
  – High risk of failure if not addressed
Bony Bankart

- CT
  - 3D gives excellent measure of size

- MRI
  - Can measure size
  - Soft tissue
Bony Bankart
Bony Bankart
Bony Bankart

• What I need to know
  – What is the % relative to the bear spot?

• Treatment
  – <25% - arthroscopic debridement and soft tissue bankart repair
  – >25% - open treatment

• Latarjet / Graft
Hill Sachs

• Most common finding along with Bankart

• What I want to know
  – Size of the lesion (25%)
  – Does it engage the glenoid rim?
    • Determined at time of arthroscopy
  – Yes = open treatment
Hill Sachs
• IGHL

• Need to know if avulsed off humerus

• Changes surgical approach
Peri-clavicular injuries

• Medial clavicle fracture
  – Often confused with SC dislocation
  – Late closure of medial physis
    • SH 1 or 2 fracture
  – What I need to know
    • Anterior or posterior
    • Underlying structures
  – Serendipity radiograph
  – CT/MRI
Peri-clavicular injuries

• Lateral clavicle fractures
  – Confused with AC dislocations
  – Late closure of lateral physis
  – Need to know amount/direction of displacement
  – Radiographs sufficient
Many don’t need to be fixed
Glenoid Dysplasia

• Most common long term consequence of untreated brachial plexus palsy

• Contribute to posterior shoulder instability
Shoulder Sequela of BPP

Unequal muscle forces…
• Soft tissue contractures
• Posterior shoulder subluxation/dislocation
• Osteocartilaginous deformation
• Glenoid dysplasia
• Proximal humeral epiphyseal flattening
Glenohumeral Dysplasia for BPP…
early and often

• van der Sluijs et al. JBJSBr 2001
  – shoulders treated less than 1 year of age
    • < 5 months old -> 5/7 normal shoulders
    • > 5 months old -> 2/10 normal shoulders

  Early detection = possible prevention of dislocation
Glenoid Dysplasia Imaging

• US (infants)
  – Posterior
  – Dynamic exam
  – No sedation
  – Limited radiation

• MRI or CT
  – Sedation
  – Radiation
  – Static exam
US in glenoid dysplasia

– Posterior approach
– Observe humerus in relation to posterior scapular line
  • In normal shoulders – center of humeral head lies anterior to line
  • In subluxed or dislocated – head lies posteriorly

*Moukoko et al. JBJS 2004*
Treatment BPP Shoulder

- Younger patients
  - No bony deformity
  - Stretching
  - Tendon lengthening/transfers
  - Closed/Open reduction joint

- Bony deformity (older)
  - Proximal humeral osteotomy
  - Possible glenoid osteotomy
Failed early treatment or late presentation (> 7 y.o.)

- Subluxed/dislocated shoulder
- Loss of ER
- Glenoid dysplasia
- I order CT/MRI to evaluate glenoid
- What I want to know:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Radiographic Features</th>
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<tbody>
<tr>
<td>Type I</td>
<td>&lt; 5 degree difference in retroversion</td>
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<tr>
<td>Type II</td>
<td>&gt; 5 degree difference in retroversion</td>
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<tr>
<td>Type III</td>
<td>Posterior humeral head subluxation, &lt;35% anterior to scapular spine axis</td>
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<td>Type IV</td>
<td>Presence of false glenoid</td>
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<td>Type V</td>
<td>Flattening of humeral head, progressive/complete humeral head dislocation</td>
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<tr>
<td>Type VI</td>
<td>Infantile posterior dislocation</td>
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<tr>
<td>Type VII</td>
<td>Proximal humeral growth arrest</td>
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Glenoid Dysplasia
Humeral Rotation Osteotomy

- Gold standard
- Transpose the existing arc of motion into a more functional one
Glenoid Osteotomy

- New technique
- Controversial
- Not well studied
- Similar to salter osteotomy for DDH
Thank you
Questions

1. A patient undergoes an MRI arthrogram for recurrent shoulder instability. Based on the imaging, the surgeon feels that arthroscopic treatment is contra-indicated and recommends open treatment. What is the most likely diagnosis?

A. Glenolabral articular disruption (GLAD)
B. Humeral avulsion of the glenohumeral ligament (HAGL)
C. Superior labrum tear from anterior and posterior (SLAP)
D. Anterior labro-ligamentous periosteal sleeve avulsion (ALPSA)
Questions

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Questions

• A 21-year-old rugby player has recurrent pain and instability of the right. Figure is an image taken during diagnostic arthroscopy viewing from the posterior portal. In addition to a Bankart lesion, what other associated intra-articular condition is most likely present?

A. Rotator cuff tear
B. SLAP tear
C. Posterior labral tear
D. Hill-Sachs lesion
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Questions

3. Which of the following is the most common long term consequence of untreated brachial plexus birth palsy?

A. Humeral length inequality
B. Glenoid hypoplasia and retroversion
C. Scapular winging
D. Anterior shoulder instability
Questions

3. Which of the following is the most common long term consequence of untreated brachial plexus birth palsy?

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