Shoulder Injuries

Shoulder complex made up of three joints and one articulation
- Glenohumeral joint
- Acromioclavicular joint
- Sternoclavicular joint
- Scapulothoracic articulation

• GH joint is inherently unstable (golf ball on tee)
• Other structures help with stability
  - Joint capsule/ligaments (static)
  - Glenoid labrum (static)
  - Rotator cuff (dynamic)
• All subject to injury leading to instability and dysfunction
## Biomechanics

- Complex motion requiring extreme coordination of multiple muscles
- Poor biomechanics (e.g., scapular dysfunction) leads to increased stresses on specific structures and leads to injury and disability
- Importance to detail on history and exam

## History

- Chronic (overuse) vs. Acute (traumatic)
- MOI
- Location and character of pain; nocturnal pain
- Feelings of instability
- What activities/motions make pain worse/better
- Radicular symptoms

## Acromioclavicular (AC) sprains

- MOI: fall onto tip or point of shoulder
- 6 different types described
- Exam
  - TTP on AC joint
  - Distal clavicle may be prominent
  - Increased pain with adduction ("scarf" test)
Sternoclavicular (SC) sprains

- May be simple sprain or true dislocation
- MOI
  - Most common is indirect force from anterolateral or posterolateral aspect of shoulder (fall onto shoulder with another person landing on top) → results in sprain or possible anterior dislocation
  - Direct blow to medial clavicle from the front → possible posterior dislocation
- Exam
  - TTP at SC joint; prominence of medial clavicle in anterior dislocation
- Radiographs
  - Usually require CT imaging

- Radiographs
  - Zanca view for AC joint
  - Axillary view for anterior or posterior displacement
  - Stress views (archaic)
- Treatment
  - Type I-II → conservative (NSAIDs, sling for comfort, early ROM, rehab)
  - Type IV-VI → surgery
  - Type III → gray zone
Treatment

- Sprain
  - Ice, NSAIDs, Time
- Anterior dislocation
  - Can reduce with posterior bump and gentle arm traction
  - May need sedation
- Posterior dislocation
  - SURGICAL EMERGENCY due to possible compromise of airway, major vessels

Rotator cuff injuries

- “SITS” muscles
  - Supraspinatus
  - Infraspinatus
  - Teres minor
  - Subscapularis
- Dynamic stabilizers of the GH joint
- Acute vs. Chronic
  - Tears
  - Tendinitis
  - Impingement syndrome

Rotator Cuff Tendinitis & Impingement

- Overuse leads to breakdown and weakness of cuff muscles, loss of dynamic stabilization, and impingement
- Supraspinatus most commonly involved
- Direct blow (fall) can cause acute RC inflammation
- Risk factors
  - Repetitive motion of shoulder above horizontal plane
  - Shoulder instability
  - Rotator cuff weakness (previous surgery, trauma)
  - Type II/III acromion, subacromial spur
Rotator Cuff Tears

- Rare in young patients, more common after age 40
- May be traumatic (younger) or overuse (older)
- Supraspinatus/infraspinatus most common
- Exam
  - RC weakness/possible atrophy
  - Pain with resistance; "empty can" test; "drop arm" test; "lift-off" test
  - Scapular dysfunction
- Imaging
  - Ultrasound, MRI, MR arthrogram

Treatment

- Physical therapy/rehabilitation essential
- Ice/oral NSAIDs for mild cases
- Consider subacromial corticosteroid injection
- Younger patients with impingement usually have underlying instability
- Older patients with impingement often have subacromial spur
- May require surgery for subacromial decompression or for instability procedure

Imaging

- Radiographs
  - Check for subacromial spur, calcification in tendon
  - Outlet view to assess acromial type
  - MRI/MRA if suspecting cuff or labral tears

Exam

- Painful arc
- Positive impingement signs (Hawkins, Neer)
- Specific muscle testing may reproduce pain

History

- Trauma, repetitive overhead activities?
- Location of pain (often lateral, deep, may radiate to upper arm)
- Nocturnal pain (very common for RC pain)
- Neurologic symptoms, feeling of instability?
Labral Tears

- Glenoid labrum is a ring of fibrocartilage around the edge of the glenoid fossa
- May be injured acutely (dislocation) or from chronic repetitive stresses (throwing)
- Location
  - Anterior inferior (Bankart) → acute
  - Superior Labrum Anterior/Posterior (SLAP) → chronic

- Treatment
  - Extensive rehabilitation for partial tears (focus on RC strengthening and scapular stabilization)
  - Surgery for complete tears in young active patient or for persistent pain
• MOI
  • Dislocation/subluxation
  • Fall onto outstretched arm
  • Repetitive overhead throwing
  • Shoulder instability
• Signs/symptoms
  • Painful clicking
  • May have locking
  • Similar symptoms to impingement syndrome

• Physical examination
  • Reproducible pain, possible click, with certain motions
  • Specific labral tests
    • O’brien’s test
    • Crank/chunk test
    • Load & shift test

SLAP Tear
• Seen in overhead throwers (adduction and IR during acceleration phase leads to grinding force on superior labrum)
• Can be acute from fall onto arm
• Pain with biceps resistance
Acute injury from dislocation or subluxation
May be labrum only but may be bony avulsion ("bony Bankart")

**Imaging**
- Plain radiographs may show bony Bankart, calcifications, fractures
- Plain MRI only 50% sensitive
- MR arthrography is study of choice

**Treatment**
- Generally based on age/activity level of patient
- May try rehabilitation/physical therapy
  - Focus on rotator cuff strengthening to improve stability
- Surgical repair required for persistent symptoms
- Most can be done through the arthroscope
Multidirectional Glenohumeral Instability (MDI)

- Inferior laxity along with anterior and/or posterior laxity leading to abnormal translation of humeral head
- Risk factors
  - Repetitive microtrauma from overhead activities (throwers, swimmers)
  - Generalized ligamentous laxity and connective tissue disorders (Ehlers-Danlos)

Signs/symptoms and exam findings

- Often complain of vague pain, instability feeling, “dead arm”; can often voluntarily sublux/dislocate the joint
- Inferior sulcus sign on exam
- May have excessive external rotation
- Increased laxity noted on load & shift test
- May exhibit increased generalized ligamentous laxity
- C-spine and neurologic exam
- Imaging: MDI diagnosed based on history and exam

Treatment

- Prolonged rehabilitation
  - Focus on rotator cuff strengthening, scapular stabilization
- Surgery reserved for patients with persistent pain after failing > 6 months of rehabilitation
Biceps Tendon

- Tendinitis
- Subluxation
- Rupture
  - Proximal (long head)
  - Distal

Biceps Tendinitis

- Long head of biceps in the biceps groove of humerus
- More common in patients over 40 y/o
- Commonly seen in conjunction with rotator cuff impingement
- History: insidious onset of anterior shoulder pain; risk factors include throwing and overhead racquet sports

Exam

- TTP at biceps groove
- Positive Speed’s and Yergason’s tests
- Imaging not needed

Treatment

- Acute: Rest, Ice, NSAIDs, sling for comfort
- Early rehabilitation/physical therapy are key
  - Stretching exercises and soft tissue mobilization
  - May consider iontophoresis or phonophoresis
  - Rotator cuff rehab
- Corticosteroid injection
  - Direct injection generally not recommended due to increased risk of rupture
  - Subacromial injection may help as some will diffuse down biceps tendon sheath
### Biceps Tendon Subluxation
- Proximal long head subluxes out of biceps groove
- Often occurs with subscapularis tear
- Painful anterior shoulder snapping with internal/external rotation
- Exam: will feel tendon sublux out of groove with passive internal/external rotation
- Treatment: initially same as tendinitis; must address any rotator cuff issues; if persistent, may require surgery (tenodesis)

### Biceps Tendon Rupture
- May be proximal or distal
- 90+% are proximal long head
- MOI: forceful flexion and/or supination of elbow against resistance
- Risk factors: increasing age, history of tendinopathy, prior corticosteroid injections, anabolic steroid use
- Acute injury → significant pain and swelling, ecchymosis
- Chronic injury (elderly) → may not have significant pain

### Exam
- "Popeye" arm
- Ecchymosis
- Weakness of elbow flexion and supination (proximal mild, distal marked)

### Treatment
- Distal → surgical repair
- Proximal
  - Elderly may do well with rehab
  - Younger patients often require surgical repair

### Adhesive Capsulitis
- "Frozen shoulder"
- Capsular adhesions and contractions leading to loss of ROM
- May be primary (idiopathic) or secondary (traumatic)
Primary Adhesive Capsulitis

- Risk factors: female, middle age, DM, hyperthyroid
- Stages
  - “Freezing”
    - Onset of pain followed by progressive loss of motion, usually starting with ER and abduction
  - “Frozen”
    - Prolonged period of limited ROM, pain resolves
  - “Thawing”
    - Gradual recovery of ROM, often not to pre-condition levels
- May mimic rotator cuff disease in early stages

Treatment
- Pain medications (often not effective)
- Physical therapy (limited value)
- Intraarticular corticosteroid injections may be of some benefit if given early
- Generally expect spontaneous resolution, but may take 1-2 years

Thank you
Glenohumeral Dislocations

- 45% of all dislocations
- Vast majority are anterior (95%)
- MOI: fall onto outstretched arm; multiple dislocators often from minimal trauma
- Risk factors:
  - Hx of previous dislocation
  - Generalized laxity
  - Specific sports

Exam
- Arm often held in external rotation, partial abduction
- Anterior fullness
- Sulcus sign (depression below acromion)
- Assess neurovascular status
  - Axillary nerve → sensation of lateral shoulder; deltoid strength
  - Musculocutaneous nerve → sensation to lateral forearm; biceps strength (elbow flexion and supination)

Imaging
- At least 2 perpendicular views
Treatment

- **Reduction**
  - Often requires analgesia, sedation, especially with increasing time to reduction
  - Hippocratic method: not recommended in modern times
  - Traction method
    - Stimson: prone with weight applied to hanging arm
    - Supine countertraction: traction at 45° abduction with countertraction applied from folded sheet under axilla
  - Leverage method
    - Supine position, externally rotate to 90° and slowly abduct arm (Hennipen, Modified Kocher)

- **Postreduction**
  - NV check
  - Sling and swathe, pain meds
  - Early mobilization to prevent adhesive capsulitis
  - Surgery often required for younger patients with traumatic dislocations
Pectoralis Major Rupture

- Internal rotation and adduction of shoulder
- Tendon forms anterior wall of axilla
- Tears can be partial (grade I-II) or complete (grade III)
- Seen in weightlifters (bench press), wrestlers, boxing
- Sudden onset of pain and often feel snap

Exam
- Swelling/ecchymosis anterior CW and upper arm, may see deformity of CW or anterior axilla
- Weakness of shoulder IR, adduction
- Imaging: MRI to determine severity and need for surgery

Treatment

- Partial tears (grade I-II)
  - Ice, pain medications, activity limitation initially
  - Physical therapy
    - Protected ROM and gradual strengthening
- Complete tears
  - Generally require surgical repair, especially in younger, active patients

Suprascapular Nerve Palsy

- Uncommon injury
- Risk factors: volleyball players, backpackers
- Arises from upper trunk of brachial plexus (C5-6)
- Points of impingement
  - Suprascapular notch (transverse scapular ligament)
  - Spinoglenoid notch
- Ganglion cyst at spinoglenoid notch assoc with SLAP tears
### Motor to supraspinatus and infraspinatus
- Sensory to AC and GH joints

### Exam
- Infraspinatus/Supraspinatus atrophy and weakness
- TTP at suprascapular notch
- Complete cervical and neurologic exams

### Neurodiagnostic studies
- Non-operative therapy recommended in absence of a well-defined lesion

### Clavicle Fractures
- Most common bone fractured in children and adolescents
- Risk of brachial plexus and pulmonary injury
- Proximal, middle, distal third fractures
- Middle third fractures rarely require surgery
- Ortho referral for proximal fractures and type II distal fractures (displaced)
- Sling or figure-of-8 harness
- Watch for tenting of the skin

### Scapular Fractures
- High energy trauma
- Associated injuries common (head, lungs, ribs, spine)
- Body, spine, glenoid neck, glenoid fossa, acromion, coracoid process
- Most do well with sling immobilization with early ROM
- Orthopaedic referral
  - Displaced glenoid neck fracture
  - Glenoid fxs involving > 25% of the articular surface or subluxed humeral head
  - Displaced coracoid fxs
  - Displaced acromion fxs
Proximal Humerus Fractures

- Common in elderly with osteoporosis
- Fall on outstretched arm
- Beware of NV injuries (remember your anatomy!)
- X-rays: AP, axillary lateral, scapular-Y

Neer classification
- 4 fragments
  - 1. greater tuberosity
  - 2. Lesser tuberosity
  - 3. Head
  - 4. Shaft
Neer classification: 4 parts
- “One-part” fx: all nondisplaced fractures
  - Less than 1cm displacement and less than 45° angulation
  - 80% of all proximal humerus fractures
- “Two-part” fx: one fragment is displaced
- “Three-part” fx: two fragments are displaced
- “Four-part” fx: all 4 fragments are displaced
- All displaced fxs (Neer 2-4 parts) should be referred for surgical correction
- All Neer one-part fxs can be managed by primary care physicians (except for those with associated NV injury or anatomical neck fxs)

Midshaft Humerus Fractures
- MOI = direct blow or fall
- Torsional force results in spiral fx (suspect physical abuse if seen in children)
- Check NV status, especially radial nerve (wrist/finger extension, dorsal hand sensation)
- Concomitant elbow/shoulder injuries

Treatment
- Initial immobilization with a sling (standard or “collar and cuff”)
- Early ROM with pendulum exercises (within one week)
- May require physical therapy
- d/c sling within 2-4 weeks
- Refer to orthopedics if not progressing
- Complications
  - Neurovascular injury
  - Avascular necrosis of the humeral head
  - Frozen shoulder

Midshaft Humerus Fractures
- Generally treated with closed reduction, use of a hanging arm cast or humerus coaptation splint until fx site is “sticky”, then use of a functional brace
- Avoid excess traction in true transverse fxs
- Can accept angulation (up to 20° AP and 30° medial-lateral angulation)