The Shoulder

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Objectives

- Review shoulder anatomy
- Explain and demonstrate shoulder physical exam
- Diagnosis and management of common problems
  - Rotator cuff tears/tendinopathy
  - Impingement
  - Adhesive capsulitis
  - Labral tears
Anatomy

- 3 bones:
  - Scapula
  - Clavicle
  - Humerus

- 3 joints:
  - Acromioclavicular
  - Glenohumeral
  - Sternoclavicular

http://www.humpalphysicaltherapy.com/Injuries
Anatomy

- Glenohumeral joint: shallow ball and socket
- Allows greater ROM but less stability → rotator cuff muscles help to stabilize
  - Supraspinatus: abduction
  - Subscapularis: internal rotation
  - Infraspinatus: external rotation
  - Teres minor: external rotation
- 17 muscles attach to the scapula to assist in stability
Physical Exam

- History
- Inspection
- Palpation
- Active vs. passive ROM
- Strength testing
- Neurovascular testing
- Special tests
Physical Exam

- Inspection:
  - Need to see both shoulders and compare
- If patient is very uncomfortable or has acute trauma, may need x-rays first
- Keep neck, elbows, wrists, and hands in mind
- Palpation: clavicle, AC joint, scapular spine
Range of Motion and Strength

- **Abduction** → supraspinatus
  - Empty and full can tests
- **External rotation** → infraspinatus and teres minor
  - Lag test
- **Internal rotation** → subscapularis
  - Lift off test and belly press test
- **Elbow flexion and supination** → biceps
Special Tests

- Rotator cuff: strength tests
  - Drop arm and empty/full can
- Impingement: Neer and Hawkins
- Labral tear: Crank and O’Brien
- Instability: Apprehension, Relocation, and sulcus
- AC joint: cross over
- Biceps: Speed’s and Yergason’s
<table>
<thead>
<tr>
<th>History and epidemiology</th>
<th>Examination findings</th>
<th>Likely diagnosis</th>
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</thead>
<tbody>
<tr>
<td>Generally age &gt;40</td>
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<tr>
<td>Pain increases with reaching</td>
<td>Subacromial tenderness</td>
<td>Rotator cuff tendinopathy (very common)</td>
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<td>Frequent repetitive activity at or above shoulder</td>
<td>Pain with Apley scratch tests</td>
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<td></td>
<td>Normal passive range of motion</td>
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<td>Normal strength but pain with testing resisted abduction and/or external rotation</td>
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<td></td>
<td>Pain with impingement testing (Neer and Hawkins tests)</td>
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<tr>
<td>Same as rotator cuff tendinopathy, but weakness present</td>
<td>Same as rotator cuff tendinopathy but weakness often present with resisted abduction and/or external rotation</td>
<td>Rotator cuff tear</td>
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<td>Middle aged and older</td>
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<tr>
<td>Past history of rotator cuff tendinopathy, diabetes, or immobility for any reason</td>
<td>Significant decrease in range of motion, both active and passive</td>
<td>Adhesive capsulitis</td>
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<tr>
<td>Complaint of decreased motion +/- pain</td>
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<tr>
<td>Past history of shoulder trauma</td>
<td>Decrease in range of motion - both active and passive</td>
<td>Glenohumeral osteoarthritis (uncommon)</td>
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<td>Pain increases when carrying objects with elbows bent (eg, shopping bags) or lifting overhead</td>
<td>Bicipital groove tenderness</td>
<td>Biceps tendinopathy</td>
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<td>Sudden onset intermuscular pain</td>
<td>Obvious biceps deformity</td>
<td>Biceps tendon rupture</td>
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<tr>
<td>with &quot;Popayel&quot; deformity (eg, prominent bicipital distal biceps)</td>
<td>Pain with resisted elbow flexion or supination</td>
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<tr>
<td>Recent fall onto adducted arm</td>
<td>AC joint tenderness with possible stepoff</td>
<td>Acromioclavicular injury</td>
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<tr>
<td>Focal AC joint pain</td>
<td>Pain with adduction of injured arm</td>
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<tr>
<td>Focal AC joint pain without recent trauma</td>
<td>AC joint tenderness</td>
<td>Acromioclavicular osteoarthritis</td>
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<tr>
<td>Generally age &lt;40</td>
<td>Sulus test shows increased motion</td>
<td>Multidirectional shoulder instability (may have concomitant rotator cuff tear)</td>
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<td>Overhead athletes</td>
<td>Apprehension, relaxation, and release tests positive</td>
<td></td>
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<tr>
<td>Nonspecific symptoms</td>
<td>Superomedial scapular border tenderness (performed with ipsilateral arm adducted)</td>
<td>Subscapular bursitis</td>
</tr>
<tr>
<td>Poor muscular development, frequent repetitive to-and-fro motion (eg, ironing), and direct pressure (eg, backpack) are common causes</td>
<td>Abnormal, uncoordinated scapulothoracic and glenohumeral motion</td>
<td>Scapular stabilizer muscle weakness</td>
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<tr>
<td>Sedentary (eg, works at desk job); poor posture with rounded upper back</td>
<td>Wall push off may reveal mild scapular winging</td>
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<tr>
<td>Stabilization of scapula by examiner improves shoulder strength</td>
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Case 1

- 70 year-old retired male who comes in with right shoulder pain for 2 months
- He was reaching behind while driving and his shoulder got twisted
- Limited active ROM due to pain with abduction, flexion, and external rotation but normal passive ROM
- 4/5 strength in right shoulder
- Pain relief and good strength after lidocaine injection
Rotator Cuff Injury

- Repeated abduction and flexion → wear and tear on tendons as it rubs against acromion and coracoacromial ligament
- Supraspinatus is more common
- Risk factors:
  - Repetitive overhead activities and overuse
  - Weakness or fatigue of RC or supporting muscles
  - Instability or hypermobility
  - Trauma
  - Older age
RC Injury

- **History:** pain with overhead activities; pain at night; possible weakness

- **Physical exam:**
  - May have atrophy and sunken appearance
  - Asymmetric motion
  - Painful ROM and possible weakness above 90 degrees of abduction, internal rotation, and external rotation
  - Passive ROM is usually greater than active ROM
  - Tenderness over affected muscles and/or subacromial area
RC Injury

- Lidocaine injection test: subacromial injection of lidocaine
  - Pain relief and normal strength = tendinopathy
  - Persistent weakness = larger tear

- Imaging: x-ray usually not helpful but may show elevated humeral head if chronic
RC Imaging

- MSK ultrasound thought to be gold standard by some
  - Can do dynamic testing when muscle in motion
  - Tendon hypoechogenicity or thickening
  - Limitations: difficult to visualize entire RC
- MRI: conservative therapy fails
RC Treatment

- Acute:
  - Ice and cryotherapy
  - NSAIDs for 5-7 days
  - Rest
  - PT: ROM exercises, stretching, strengthening

- Refer to Ortho:
  - Conservative treatment fails in 6-9 months
  - Tear RC or adhesive capsulitis
  - Debridement, acromioplasty with debridement, or RC repair
  - Usually no surgery if chronic tears
  - Usually 6 months recovery after RC repair
RC Treatment

- Glucocorticoids: may also help to participate more in PT and do daily activities
- Topical glyceryl trinitrate: causes vasodilation
- Experimental:
  - Topical NSAIDs
  - Hyperthermia machines: thought to increase local blood flow
  - Extracorporeal shock wave therapy: calcific tendinopathy
  - Platelet rich plasma
Case 2

- 58 year old male who has right shoulder pain for 6 months
- No specific injury
- Construction worker and used to play baseball
- Pain with abduction past 90 degrees but normal passive ROM and strength
- Positive Neer and Hawkin tests
Impingement

- Compression of structures around GH joint that occur with shoulder elevation
  - 3 types: subacromial, internal, and coracoid
  - Primary or secondary
- Most common cause in middle age men
- Risk factors:
  - Repetitive activities of the shoulder
  - Older age
  - Instability and laxity
  - AC joint pathology
Impingement

- Movement of the shoulder can compress surrounding structures (bursa, labrum, biceps, RC) against acromion, OA changes, and coracoacromial arch
Impingement

- Neer described 3 stages
  - Edema and hemorrhage (usually <25 years old)
  - Fibrosis and tendinopathy (25-40 years old)
  - RC/biceps rupture, bony change/spurs (>40 years old)
- Increased translation of humeral head
- Acromion morphology
- Decreased distance between acromion and humeral head
- Osteophytic change of AC joint
- Throwing: impingement of superior and posterior labrum and RC with ER, extension, and abduction
  - With anterior translation of humeral head, which can be accentuated with GH instability
Impingement

- Symptoms are similar to RC tendinopathy
- Throwers may have pain and stiffness in the late cocking phase or early acceleration phase
  - May have posterior shoulder pain
Impingement

- PE: similar to RC tendinopathy
- Neer and Hawkin maneuvers are sensitive to impingement
- Atrophy and asymmetry
- Limited ROM due to pain but usually good strength unless chronic
- Throwers may have increased laxity and tenderness posteriorly
Impingement Imaging

- X-rays usually not needed
- MSK ultrasound can help in evaluating tendons, muscles, and bursas
- MRI can help to identify inflammation of subacromial structures, compression by bone spurs, AC joint pathology, and low lying acromion
Impingement Treatment

- Initial management similar to RC injury
- Overhead thrower should refrain from throwing for 2-4 weeks, while doing PT
  - Can start graded return to throwing when symptoms resolve
- Referring to Ortho is similar to RC injury but if laxity is present, capsular repair may be done
  - Subacromial or subcoracoid decompression
Case 3

- 50 year old female with history of diabetes came in with left shoulder pain after falling 3 months ago
- Taking NSAIDs and resting but the pain was so significant that she was not moving her shoulder
- Wakes her from sleep
- Active and passive ROM limited in all directions
Adhesive Capsulitis

- Defined by AAOS as “a condition of varying severity characterized by the gradual development of global limitation of active and passive shoulder motion where radiographic findings other than osteopenia are present.”
- Also has severe shoulder pain
- Usually in 50s and 60s
- Women > Men
Adhesive Capsulitis

- **Etiology:** idiopathic but usually due to other conditions
  - RC tears, proximal humeral fractures, shoulder surgery or other surgeries
- **Risk factors:** DM, thyroid disease, prolonged immobilization, stroke, autoimmune disease
- **Pathophysiology** is not completely clear but may involve inflammation initially and then fibrosis
  - Seems to affect anterosuperior joint capsule, coracohumeral ligament, and RC interval
Adhesive Capsulitis

- **3 phases:**
  - Initial phase with development of diffuse, severe, and disabling pain that is worse at night and increasing stiffness (2-9 months)
  - Intermediate phase with stiffness and severe loss of shoulder motion but less pain (4-12 months)
  - Recovery phase with gradual return of ROM (5-24 months to complete)

- Pain worse at night and causes global stiffness that affects daily activities
Adhesive Capsulitis

- PE: stiff and painful GH joint
- Reductions in BOTH active and passive ROM in 2 or more planes
  - ER and abduction most affected
- Firm, painful, and premature end to passive ROM
- Injection test: active movement restriction and palpable, painful end with passive ROM after injecting lidocaine
**Adhesive Capsulitis**

- X-rays and MRI: limited use, consider to rule out other conditions
  - MRI can show capsular thickening, reduced capsular volume, and hypointense granulation/fibrous tissue
- Ultrasound can show thickening of coracohumeral ligament and soft tissues of RC interval, increased fluid in the tendon sheath of the long head of the biceps, and increased vascularity around intra-articular portions of biceps tendon and coracohumeral ligaments
Adhesive Capsulitis Treatment

- Usually self limited but may not have complete resolution in some patients
- Can use NSAIDs for pain control
- First few months: shoulder rest with gentle ROM exercises → cortisone injection and more aggressive ROM exercises; consider PT
- Reassess every 2-3 months and may consider manipulation under anesthesia or arthroscopic lysis of adhesions (if not improved 4-6 months)
- 10-12 months: refer to Ortho
Adhesive Capsulitis Treatment

- One study showed improvement in pain and function after PO steroids but this was not maintained past 6 weeks (may not outweigh risks)
- Patients who receive injections early in their course may have more benefit, probably due to reduction in synovitis
- In a study, injections with PT > injections alone
- Intra-articular dilation (distension): anesthetic with infusion of saline to dilate GH capsule
Case 4

- 17 year old football player who has right shoulder pain for 2 weeks
- Started after being tackled onto his right side
- Still able to play but has pain, especially with overhead activities
- Normal ROM and strength but has pain with some of these maneuvers
- Positive O’Brien and Crank tests
Labral Tears

- Labrum is part of cartilaginous ring that extends anterior and posterior to the biceps insertion
- Helps with the depth of the shallow glenoid → increases humeral head contact and stability
- Risks: overhead sports, older age, trauma, overuse

SLAP: superior labrum anterior to posterior
Bankart: anterior inferior tear s/p dislocation
Labral Tears

- Associated with instability, RC tears, and cysts
- Humeral translation and traction on the biceps and capsular ligaments
- Snyder Types:
  - I: fraying of superior labrum but biceps and labrum are still intact; degenerative
  - II: superior labrum and biceps are detached; avulsion
    - Posterior and posterior/anterior type II = throwers
  - III: bucket-handle tears of superior labrum but biceps anchor is still attached to glenoid
  - IV: bucket handle tear of superior labrum extends into biceps tendon
I: degenerative, superior labrum but attached biceps

II: detachment of superior labrum and biceps

III: bucket handle tear of superior labrum but attached biceps

IV: tearing of superior labrum into biceps
Labral Tears

- Traumatic: FOOSH, hyperextension, seat belt
- Overuse accentuates internal impingement
- Symptoms: painful click, popping, catching, pain with overhead activities and acceleration
- PE: positive O’Brien and Crank tests; may have provocative biceps testing with anterior tears
- MRI is dx modality of choice
Labral Tears Treatment

- **Conservative treatment:** NSAIDs, rest, PT
  - Stretch posterior structures; RC strengthening; scapular stabilization

- **Surgery:** if conservative treatment fails
  - Usually debridement for types I and III
  - Type II in younger athletes may have repair
  - Biceps tenotomy or tenodesis and repair in IV

- **Post-op:** immobilization for 3-4 weeks, followed by strengthening
  - RTP 3-6 months
Questions?
Summary

- Physical Exam
- Special Tests
- Think of common problems


