Shoulder Instability, Impingement, and the Rotator Cuff

TOM BUSH DNP, FNP-BC, FAANP
CLINICAL ASSOCIATE PROFESSOR
UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
SCHOOLS OF NURSING AND MEDICINE
Objectives

• Recognize signs and symptoms of common shoulder disorders
• Demonstrate provocative maneuvers for diagnosis of specific conditions
• Formulate management strategies for common disorders
• Identify conditions that require collaboration and consultation
Orthopedics and Sports Medicine
Orthopedics and Sports Medicine
Shoulder Overview

• Chronicity (acute injury Vs insidious onset)
• Chief complaint (pain/motion/instability)
• Patient age
• Age and chief complaint are most valuable predictors in primary care setting
• Most disorders can be diagnosed by history, exam and plain radiographs
Age Is Key Variable

- Younger than 30 likely to report symptoms of instability from dislocation/subluxation of glenohumeral joint or AC joint
- Middle-aged (30-50) more commonly report impingement. Frozen shoulder may occur in diabetics and thin females in this age group
- Older than 50 more likely to have RCT, DJD or frozen shoulder
Case #1

- 22 year old female with shoulder pain and instability
  - Lying in bed and shoulder “gave out” resulting in ED visit over the weekend
  - History of being “double jointed” with 2 prior episodes of shoulder dislocation
    - Treated with a sling for two weeks after both episodes
- Recent college graduate
  - Currently working as waitress
Glenohumeral Instability

• 50% of all major dislocations
  • Anterior 95%
    • Direct blow to externally rotated, abducted humerus
    • Fall on outstretched arm
  • Posterior 2-4%
  • Inferior (luxatio erecta) 0.5%

• Age at initial dislocation is prognostic
  • Recurrence of 55% in those 12-22 years
  • 37% in those 23-39 years
  • 12% at 30-40 years
Anterior dislocation
Glenohumeral Instability

• Imaging
  • AP, axillary & Y views
  • Factors associated with fracture
    • Age over 40
    • First dislocation
    • Traumatic mechanism
      • 97% negative predicative value

Hendy, 2000
Normal position

Subclavicular position
(often have more complex injuries)

Subcoracoid position
(most common)

Subglenoid position
(often have more complex injuries)

Sherman, 2016
Axillary View
Outlet or “Y” View
Hill-Sachs deformity may occur in 35-40% of anterior dislocations

Sherman, 2016
Greater tuberosity fracture may occur in 10% of anterior dislocations
Bankart lesion

- Fracture in 5% of anterior dislocations
- Soft tissue Bankart lesions 90% in those under 30 with anterior dislocation
- MR arthrogram for evaluation of rotator cuff and labral pathologies
Reduction techniques

• Informed consent
  • Fracture, cuff tear, axillary neurovascular injury, infection
    • Document NV function prior to reduction

• Analgesia/Sedation
  • None
    • Best if acute, recurrent and/or atraumatic
    • Techniques that do not require traction
  • IV procedural sedation
    • Narcotic and anxyolitic/amnestic
    • Monitor VS and protect airway

• Intra-articular injection
  • 20ml lidocaine from lateral or posterior approach
  • Lower cost with fewer resources
Analgesia and Sedation

• IV sedation compared with local injection using Stimson technique (N=30)
  • No difference in pain score, success of reduction or time required to reduce shoulder
  • Lidocaine group spent half the time in ED, fewer resources, less cost
• My preference
  • Lidocaine, marcaine, NaHCO$_3$

Miller, Cleeman, Auerbach, & Flatow, 2002
Anterior dislocation

- Stimson technique
- Patient prone
- Arm hangs with 10-15lbs of traction
- Spontaneous reduction usually occurs within 30 minutes

Sherman, 2016
Scapular Manipulation
External rotation/Milch technique

Gradual, gentle external rotation over 5-10 minutes

If no reduction after full external rotation, abduct and add gentle traction and direct pressure over humeral head
Traction-countertraction
Glenohumeral Instability

- Apprehension test
- Relocation sign
- Anterior release
  Anterior instability
- Sulcus sign
  Inferior instability
- Sensorimotor
  Sensation over deltoid/fire deltoid
- Generalized ligamentous laxity
  “Double jointed”
Posterior dislocation
Inferior shoulder dislocation (luxatio erecta)
Inferior shoulder dislocation (luxatio erecta)
Inferior shoulder dislocation (luxatio erecta)
Complications

• Unsuccessful 5-10% of cases
  • Interposition of soft tissue or fracture fragment

• Nerve injuries
  • Usually resolve within 3-6 months
  • Treatment is typically conservative

• Vascular injuries
  • More common in older patients with prolonged dislocations
  • Post reduction angiography

• Rotator cuff tear
  • More common after age 40

Sherman, 2016
Follow up

• Follow up in 7-10 days

• Immobilization
  • sling and swath, collar and cuff
  • Short term immobilization after acute dislocation
    • 1-2 weeks if older than 45
    • 3-6 weeks in younger patients
    • Pendulum exercises
Glenohumeral Instability

• Rehabilitation
  • Physical therapy goals
    • Restore full pain free range of motion
    • Avoid provocative positions for 6 weeks
    • Strengthening of the rotator cuff
    • Return to sport in 3-4 months

• Younger age at first episode leads to higher rate of recurrence
  • Teach self reduction technique

• Arthroscopic Bankart repair
  • Less than 30 in high demand activity
Case #2

• CC: 44-year-old female with complaints of right shoulder pain for 6 weeks
• No trauma history
• Symptoms began after playing tennis
• Pain radiates toward elbow
• Minimal relief with NSAIDs
• Beginning to interfere with ADLs
• Night pain interferes with sleep
Impingement Syndrome

• Extremely common shoulder complaint
• Impingement and inflammation of rotator cuff and bursa between humerus & lateral structures of shoulder
• Gradual onset of anterolateral pain that may radiate to elbow or hand
• Crepitus and pain thru 60-120 abduction arc.
• Continuum of chronic bursitis to RCT
Impingement Syndrome

- Nocturnal symptoms common
- Muscles may atrophy if longstanding
- May report history of overuse
- Incidence increases with age
  - Wear & tear is accumulative
    - 95% of tears associated with impingement
      - Neer (1983)
- Common with overhead activity/sports
- Cycle of impingement, inflammation, edema and further impingement
Impingement Syndrome

- Physical exam
  - Shoulder range of motion
    - Should be full
    - Painful overhead motion
  - Provocative maneuvers
    - Neer impingement
    - Hawkins impingement

- Nearly 90% sensitive
- Poor specificity
- Greater than 90% negative predictive value

MacDonald, 2000
Simons, Kruse, & Dixon, 2016
Impingement Syndrome

- Rotator cuff strength
  - Supraspinatus
  - Infraspinatus
  - Subscapularis
- Muscle testing often painful
- May have pain without weakness with small rotator cuff tear

Simons, Kruse, & Dixon, 2016
Impingement Syndrome

• Differential diagnosis
  • Rule out angina!
    • Acromioclavicular DJD- tender over AC joint
    • Frozen shoulder- severe loss of motion
    • Glenohumeral DJD- evident on radiographs
    • Cervical radiculopathy
      • Sx improve with hand over head, deltoid weakness, sensory loss
    • Rotator cuff tear
      • weak supra/infraspinatus
    • Biceps tendinosis
      • pain over bicipital groove
      • positive Speed’s test
Impingement Syndrome

• Treatment
  • NSAIDS for 14 days
  • Rest from offending activity
    • Avoid exercises above the level of shoulder
  • Physical therapy for capsule stretching and rotator cuff strengthening
  • Subacromial injection
  • Nonoperative success near 90%
  • Consider subacromial decompression
Impingement Syndrome

• Subacromial injection
  • Large volume of fluid
    • No less than 10cc
• Perform provocative maneuvers again
  • Quantify improvement
• Retest rotator cuff strength
  • Improved strength with less pain suggests intact rotator cuff
### Corticosteroid Preparations

Duration inversely proportional to solubility.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Potency</th>
<th>Onset</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone (Cortisol)</td>
<td>1</td>
<td>Fast</td>
<td>Short</td>
</tr>
<tr>
<td>Prednisolone terbutate (Hydeltra)</td>
<td>4</td>
<td>Fast</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Methylprednisolone acetate (Depo-Medrol)</td>
<td>4</td>
<td>Slow</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Triamcinolone acetonide (Kenalog)</td>
<td>5</td>
<td>Moderate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Triamcinolone hexacetonide (Aristospan)</td>
<td>5</td>
<td>Moderate</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Betamethasone (Celestone)</td>
<td>25</td>
<td>Fast</td>
<td>Long</td>
</tr>
</tbody>
</table>
Corticosteroid/Anesthetic

• Corticosteroids and anesthetic
  • Anesthetic reduces incidence of atrophy
    • Diluent
  • Reduce crystal irritation
    • Steroid crystals may be proinflammatory
  • Confirm proper placement/diagnosis
    • Immediate relief of symptoms
Corticosteroid

• Corticosteroids suppress inflammation
  • Decrease collagenase, prostaglandin and granulation tissue formation
  • Block glucose uptake in tissue
  • Enhance protein breakdown
  • Decrease protein synthesis
    • Muscle
    • Bone
    • Skin
    • Connective and lymphoid tissue
Corticosteroid/Anesthetic

• Corticosteroid/anesthetic controversy
  • Toxic effects of anesthetics on chondrocytes in vitro
    • Short acting anesthetics most heavily implicated
  • No difference between groups in autologous chondrocyte cultivation with different anesthesia types
  • No loss of chondrocyte viability for steroids alone
  • Effect may be synergistic
  • Increased risk for post operative infection for many months after an injection
    • Some surgeons may delay arthroplasty for 6 months to more than a year following joint injection

Ravisher, Barlic, & Drobnic, 2014
Joint and Soft Tissue Injection

• Should be considered an adjuvant to systemic and local treatment methods
  • DMARDs
  • NSAIDS
  • Hot and cold compresses
  • Splints, rest
  • Exercise
  • Physical and Occupational therapy
Adverse Outcomes

• Bleeding
  • Considered safe in patients on anticoagulants
• Temporarily elevated blood glucose
• Transient cortisol suppression
• Post injection infection is uncommon
  • 1 in 14,000 intra-articular injections
  • 1 in 50,000 soft tissue injections

Roberts & Hauptman, 2016
Adverse Outcomes

• Lipodystrophy
  • Typically resolves without treatment
  • May take a several months
• Loss of skin pigmentation
• Tendon rupture
• Rebound inflammation
• Accelerated joint destruction unlikely

Roberts & Hauptman, 2016
Billing Issues

• Injection most valuable office procedure
  • No extra equipment costs
  • Little extra time
• Evaluation and management code
• Procedure code
• Include modifier 25
• Bill for medication
Case #3

• CC: 58 year old male with complaints of bilateral shoulder pain for 6 weeks
• No trauma history
• Symptoms began after painting the ceiling
• Pain radiates toward elbows
• Minimal relief with NSAIDs
• Beginning to interfere with ADLs
• Night pain interferes with sleep
• Pain and weakness on exam
• What do you want to examine first?
Cervical Spine- An Overview

- Document sensation/muscle strength of biceps, triceps, deltoid and hand
  - Deep tendon reflexes
- Spurling and Lhermitte signs
- Radicular neck & arm pain/parasthesia
  - C5= base of neck & lateral shoulder
  - C6= thumb & radial arm
  - C7= index/long fingers & triceps
  - C8= ring/little finger & ulnar arm

Robinson & Kothari, 2016
Rotator Cuff
Rotator Cuff Tear

- Group of four muscles that rotate arm and stabilize humeral head against glenoid
  - Supraspinatus
  - Infraspinatus
  - Subscapularis
  - Teres minor
- Uncommon under age 40
- 95% of tears associated with impingement

Neer, 1983
Rotator Cuff Tear

• Clinical signs & symptoms
  • Night pain with inability to turn on affected side
  • Weakness and mechanical symptoms with overhead activity
  • Pain and weakness in abduction arc of 60-120
    • Arm may drop to side if tear is massive
  • May be atrophic supraspinatus and infraspinatus
  • Passive range of motion greater than active
  • Tenderness over greater tuberosity
Rotator Cuff Tear

- Trauma history
  - Chronic overhead use may present insidiously
- Weakness on exam
- May see acromial spur on outlet view
- MRI
  - Tendinopathy or cuff tear
Shoulder Imaging

• Plain radiographs
  • AP
    • AC joint
    • May see calcific tendinosis

• Grashy
  • GH joint

• Outlet
  • Acromion

• Axillary views
  • GH joint
AP View
Grashey View

True AP (45° lateral) patient can be sitting, standing, or lying down.
Outlet or “Y” View
Outlet or "Y" View
Axillary View
Rotator Cuff Tear

• Plain radiographs usually normal
  • Appropriate first line of imaging*

• MRI remains the study of choice
  • MRI detects full thickness RC tears with high sensitivity and specificity
Rotator Cuff Tear

- Differential diagnosis
  - Bursitis/tendinitis with impingement
  - Cervical radiculopathy
  - Frozen shoulder/adhesive capsulitis
  - Acromioclavicular DJD
  - Glenohumeral DJD
  - Subacromial abscess is rare
  - Proximal humeral tumor is not uncommon
Rotator Cuff Tear

• Treatment
  • Minor tears may not need repair
    • Not all patients will have symptoms severe enough to want surgery (few tears will heal without surgery)
  • NSAIDS and subacromial injection
  • Physical therapy for strengthening & stretching
  • Avoid offending activity
  • Complete cuff tears require surgery
    • Muscles will atrophy and retract over time
Frozen Shoulder

• Insidious onset of decreased active and passive range of motion
• Contracture of the joint capsule
• Likely due to inflammatory process
• May be associated with chronic disease
  Diabetes
  - Bridgman (1972)
  Post MI, CVA, RA
• Prolonged immobilization for any reason
Frozen Shoulder

• Clinical symptoms
  • Pain and progressive loss of motion with or without known injury

• Physical exam
  • Significant reduction in both AROM & PROM
  • Motion is painful especially at end points
  • Tenderness about the rotator cuff

• Diagnosis
  • Plain radiographs usually normal
Frozen Shoulder

• Differential diagnosis
  • Proximal humerus fracture (evident on x-ray)
  • Impingement/bursitis /cuff tear (ROM may be painful but near normal)
  • Osteoarthritis (evident on radiographs)
  • Instability (normal PROM)
  • Avascular necrosis or tumor(evident on radiographs and MRI)
Frozen Shoulder

• Treatment
  • Avoid prolonged immobilization
  • NSAIDS
  • Analgesia
    • Intra-articular injection does not speed recovery but may improve compliance with PT
  • PT with emphasis on home program
  • Manipulation under anesthesia
  • Arthroscopic capsular release
Case #3

- 28 year old male with acute shoulder injury
  - Crashed his bike yesterday
    - Went over the handlebars and landed on his right shoulder
    - Acute pain and tenderness at the AC joint
  - Right hand dominant
  - Works in IT at a desk job
  - Otherwise healthy
    - No prescription meds
Acromioclavicular Injuries

• AC separation
  • Fall onto tip of shoulder (acromion)
  • Classified as to degree of separation I-VI
    • Low grade treated with sling
    • High grade dislocations may need repair
      • Obvious deformity and instability
  • Tender over AC joint and pain with adduction
Type III acromioclavicular joint injury

Koehler, 2016
Acromioclavicular Injuries

• Radiographs
  • AP views of both shoulders
    • Stress views *may* be helpful to differentiate incomplete vs complete disruption
  • Low grade separation (subluxation) show little or no displacement
  • Grade III and higher injuries show increased distance between acromion and clavicle and between clavicle and coracoid
Acromioclavicular Injuries

• Treatment
  • Low grade injury
    • Sling for few days only
  • High grade injury
    • Require surgical repair
    • Grade III injury may be treated conservatively in the low demand individual
Degenerative Joint Disease

• DJD of acromioclavicular joint
  • Tender to palpation over AC joint
  • Pain with cross arm adduction
  • Arthrosis on plain film
  • Symptomatic relief with steroid injection
  • Distal clavicle resection may be considered especially if surgically treating other pathology
• Simons, S.M. & Dixon, J. B. Physical exam of the shoulder. In: UpToDate, Fields, K. B., Grayzel, J. (Ed), UpToDate, Waltham, MA, 2016
• Simons, S.M., Kruse, D., & Dixon, J. B. Shoulder impingement syndrome. In: UpToDate, Fields, K. B., Grayzel, J. (Ed), UpToDate, Waltham, MA, 2016
• Koehler, S. M. Acromioclavicular joint injuries ("separated" shoulder). In: UpToDate. Fields, K. B. & Grayzel, J. (Eds), UpToDate, Waltham, MA, 2016


