Evaluation and Management of Common Shoulder Disorders

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Disclosures

- Boston Red Sox
- American Orthopaedic Society for Sports Medicine
Goal: Simplify Evaluation of the Painful Shoulder

- Can be challenging
- Overlapping diagnoses
- Multiple complaints
  - Neck
  - Shoulder
  - Back
  - Arm
Shoulder vs Neck Pathology

- Very common to have neck pain with shoulder problems
- Cervical spine disease: often associated with symptoms below elbow
- PE of shoulder can exclude cervical disease
Shoulder Disorders: Overview

- Anatomy
  - Surface
  - Deep
- History
- Common Shoulder Disorders
  - Evaluation
  - Management
- Injections
Shoulder: Bony Anatomy

- **Three major bones**
  - Humerus
  - Clavicle
  - Scapula

- **Four major joints:**
  - Acromio-clavicular
  - Gleno-humeral
  - Scapulo-thoracic
  - Sterno-clavicular
Shoulder: Muscular Anatomy

- Nine major muscles
- Synchronous action results in shoulder motion
- Imbalance results in pain
Shoulder: Muscular Anatomy

- Supraspinatus coursing under acromion
- Infraspinatus
- Subscapularis
- Teres Minor
- Biceps tendon directly under supraspinatus
Shoulder: Rotator Cuff Anatomy

- Subscapularis
- **Supraspinatus**
- Infraspinatus
- Teres Minor
Shoulder: History

- Age
- Hand dominance, occupation
- Chief complaint: pain, weakness, stiffness, or instability
- Location
- Onset
- Precipitants
- Prior treatment: meds, PT, injections
- Disability/Progression
- Neurologic complaints
Common Shoulder Disorders

- Rotator cuff impingement
- Rotator cuff tears
- Adhesive capsulitis
- Osteoarthritis
- AC Joint Disorders
- Calcific Tendinitis
- Shoulder Instability
Case 1

- 35 yo physician with shoulder pain
- No trauma
- Prompted ER visit
- Radiates down arm
- No complaints of weakness
Physical Examination

- Inspection
- Palpation
- Range of Motion
- Strength Testing
- Provoking Maneuvers
Shoulder: Exam - Inspection

- Atrophy
- Ecchymosis
- Deformity
- Swelling
Shoulder: Exam - Palpation

- Tenderness
- Cervical Spine
- AC joint
- Greater tuberosity
- Bicipital Groove

HS Gill et al, AJSM 2007
Shoulder: Exam - Range of Motion

- Always compare sides
- **Compare active vs passive motion**
- Forward flexion
- External rotation at side
- Internal rotation vertebral level
Shoulder: Exam - Range of Motion

- **Forward flexion**
- **External rotation at side**
- **Internal rotation vertebral level**
Shoulder: Exam - Strength

- Always compare sides
- **Supraspinatus**: arm in plane of scapula, abducted 90 degrees
- External rotation at side
- Internal rotation
Shoulder: Exam - Impingement

- **Neer sign:**
  - Sensitivity: 85%
  - Specificity: 50%
- Painful arc of motion: forward elevation
- Compression of rotator cuff between underlying humerus and overlying acromion

*Park, et al, JBJS 2005*
Shoulder: Exam - Impingement

- **Hawkins sign:**
  - Sensitivity: 75%
  - Specificity: 45%

- **Painful arc of motion:**
  - Forward elevation 90 + internal rotation

*Park, et al, JBJS 2005*
Neck: Exam

- Spurling’s maneuver
- Check strength of both extremities
- Assess sensation
- Assess for hyperreflexia
- Compare sides!!!
Let’s go to the model
Case 1

- Exam: + Spurling’s maneuver
- Exam: - impingement signs
- Exam: normal strength
- Diagnosis: neck related NOT shoulder
Case 2

- 45 yo male injured his shoulder while throwing football
- Feels a click
- Pain with sleeping
- Pain with reaching overhead
- Can’t play with kids
Case 2

- ROM is symmetric but FE above 120 degrees is painful
- Impingement signs are present
- Strength is normal
Common Shoulder Disorders

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Shoulder: Rotator Cuff Disease

- Subscapularis
- Supraspinatus
- Infraspinatus
- Teres Minor
Rotator Cuff Disease: Impingement Syndrome

- **Tendinosis/Bursitis** at the supraspinatus
- Under the acromion
- History: pain overhead, behind back, sleep
- Physical findings:
  - Impingement signs
  - No weakness

*Harrison and Flatlow, J Am Acad Orthop Surg 2011*
*Whittle and Buchbinder, Ann Intern Med 2015*
Shoulder: Exam - Impingement

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*Park, et al, JBJS 2005*
Shoulder: Exam - Impingement

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  - Specificity: 45%

- Painful arc of motion:
  - Forward elevation 90 + internal rotation

Park, et al, JBJS 2005
Rotator Cuff Disease: Impingement Syndrome

- Rehabilitation
  - Strengthen rotator cuff and scapular stabilizers
  - Stretch posterior capsule
- Activity Modification
- NSAIDs
- Injections
  - Lidocaine + Cortisone
  - Cures 80%

Harrison and Flatlow, J Am Acad Orthop Surg 2011
Rotator Cuff Disease: Impingement Syndrome

- Surgical Treatment: arthroscopic
- Surgery: rare
- Bursectomy
- Acromioplasty

*Whittle and Buchbinder, Ann Intern Med 2015*
Case 2: Treatment

- NSAIDs
- PT with emphasis on scapular strength
- Steroid injection?
- Rotator cuff tear **VERY UNLIKELY**
Case 3

- 42 yo male falls onto his shoulder while snowboarding
- Difficulty raising arm
- XRays: no fracture
- Plan?
Case 3

- Inspection
  - No atrophy
  - No ecchymosis
  - No deformity
- ROM: passive > active
- RC strength: weak supraspinatus
Common Shoulder Disorders

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- **Rotator cuff tears**
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Rotator Cuff Tears

- Follow Impingement
- Begin Small
- Progress
Rotator Cuff Tears

• Follow Impingement
• Begin Small
• Progress
  • 174 Tears:
    • 61% of full thickness tears and 44% of partial thickness tears progress at median of 5 years

Keener, et al, JBJS 2015
Rotator Cuff Tears

- Follow Impingement
- Begin Small
- Progress

Physical Findings:

Weakness
Supraspinatus Tendinosis
Full-Thickness Rotator Cuff Tear

- Tendon Edge
- Muscle Belly
Rotator Cuff Tears

- Not all tears require surgery (Esp Partial Tears)!
  - MRI study: 54% of asymptomatic cohort > 65 with cuff tear!
  - Assessment of functional goals/comorbid conditions ESSENTIAL
  - Ability to comply / participate in rehabilitation ESSENTIAL

*Sher, et al, JBJS 1995*
Rotator Cuff Repair Improves Strength

- Functional outcomes are equivalent whether tear heals or not
- Strength significantly greater with healing (75% heal)
  - Scapular elevation strength intact vs torn = 5.0 vs 2.6 kg

Keener, et al, JBJS 2010
Case 3

- Weakness after trauma
- Suggests rotator cuff tear
- MRI!!
- Surgery
Rotator Cuff Repair

- Open Surgical Repair
  - Repair to Bone
  - Full Recovery-Months!
- Results
  - 90% Success at Pain Relief
  - 80% Success at Function

Zumstein, et al, JBJS 2008
Rotator Cuff Repair

- Arthroscopic Repairs
  - Technology improved
  - Lower morbidity
  - Success rates similar to open

*Aleem and Brophy, Clin Sports Med 2012*
Clinical Messaging

- Surgery
  - Very effective
  - Can be painful
  - 6 months for recovery
- Should normalize pain and function

Rotator Cuff Tear: Muscle Atrophy with Delay

- Muscle atrophy and fat infiltration occurs with time.
- Surgery unsuccessful once significant atrophy occurs.
- Do not delay evaluation.

Mall, et al, JBJS 2014
Common Shoulder Disorders

- Rotator cuff impingement
- Rotator cuff tears
- **Adhesive capsulitis**
- Osteoarthritis
- AC Joint Disorders
- Calcific Tendinitis
- Shoulder Instability
Adhesive Capsulitis – Frozen Shoulder

- Painful shoulder
- Restricted ROM (Active=Passive)
- Normal Xrays
- Thickening of shoulder capsule
- Classification
  - Idiopathic – especially Diabetes Mellitus
  - Posttrauma
  - Postsurgical

*Neviaser and Hannafin, Am J Sports Med 2010*
The Prevalence of a Diabetic Condition and Adhesive Capsulitis of the Shoulder

Connie B. Tighe, MSN, APRN-BC, and Ward S. Oakley, Jr., MD, MBA

Results: The prevalence of diabetes in patients with adhesive capsulitis was 38.6% (34 of 88). The prevalence of prediabetes was 32.95% (29 of 88). The total prevalence of a diabetic condition in patients with adhesive capsulitis was 71.5% (63 of 88). Previous literature fails to reveal the incidence of newly diagnosed diabetes, 2 of 88 (2%), and prediabetes, 25 of 88 (28.4%) in patients presenting with adhesive capsulitis. Early diagnosis and effective management of DM reduces the risk of microvascular complications. DM is believed to play a role in the development of musculoskeletal complications.

Conclusions: Awareness of these findings alerts the practitioner to the risk of diabetes and prediabetes in patients presenting with adhesive capsulitis of the shoulder.

Tighe and Oakley, South Med J 2008
Adhesive Capsulitis – Frozen Shoulder

• Treatment
  • Natural history: usually self limited
  • NSAIDS
  • Physical Therapy: gentle capsular stretching
  • Oral steroids
  • Intra-articular injections
  • Arthroscopic surgery if unresponsive

Neviaser and Hannafin, Am J Sports Med 2010
Common Shoulder Disorders

- Rotator cuff impingement
- Rotator cuff tears
- Adhesive capsulitis
- **Osteoarthritis**
- AC Joint Disorders
- Calcific Tendinitis
- Shoulder Instability
Shoulder: Osteoarthritis

- Progressive pain
- Limitation of ROM (Active=Passive)
- Treatment
  - NSAIDs
  - PT
  - Injections
  - Surgery: Joint Replacement

*Singh, et al, Cochrane Database Syst Rev 2010*
Common Shoulder Disorders

- Rotator cuff impingement
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- AC Joint Disorders
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- Shoulder Instability
AC Joint Disorders

- AC joint arthritis: common but not often painful
- Distal clavicle osteolysis: weightlifters
- Pain: overhead, crossarm activities
- Point tender at AC joint
- Treatment: activity modification, NSAIDs, injections, surgery

Common Shoulder Disorders

• Rotator cuff impingement
• Rotator cuff tears
• Adhesive capsulitis
• Osteoarthritis
• AC Joint Disorders
• Calcific Tendinitis
• Shoulder Instability
Calcific Tendinitis

- Calcification of supraspinatus tendon
- Painful arc of motion
- Acute onset: VERY PAINFUL

Treatment
- NSAIDs
- PT
- Injections
- Barbotage
- Surgery

Common Shoulder Disorders

- Rotator cuff impingement
- Rotator cuff tears
- Adhesive capsulitis
- Osteoarthritis
- AC Joint Disorders
- Calcific Tendinitis
- Shoulder Instability
Case 4

- 24 y.o. female falls onto her shoulder while snowboarding
- Deformity of shoulder
- Taken by ski patrol to mountain clinic
- Anterior shoulder dislocation - reduced
Case 4

- Sees you in office
- Neuro exam
- Strength exam
- X-ray
Anterior Instability: Pathoanatomy

- Stability: active and passive elements
  - IGHL (Capsule)
  - Rotator Cuff
    - Active stability
  - Labrum
    - Cartilage ring that deepens fossa
    - Attaches to capsule/ligaments

AAOS Comprehensive Orthopaedic Review. 2009
Anterior Shoulder Instability

- Incidence: 1.7%
- Recurrence rates:
  - <25 y.o. have high rates
  - >40 y.o. have low rates
- 80-90% in teens
Anterior Shoulder Instability: Associated Injuries

- Rotator cuff tears
  - Age >40: 30%
  - Age >60: 80%
- Axillary nerve injury
- Greater tuberosity fractures

Anterior Shoulder Instability: History

- Mechanism of injury
- Arm position at injury
- Dislocation?
- Require reduction?
- Is this recurrent?
- Arm positions to avoid
Anterior Shoulder Instability: Exam

- Generalized Laxity
- Load-and-shift
- **Apprehension sign**
- Relocation test
- Sulcus sign
- Posterior apprehension

*AAOS Comprehensive Orthopaedic Review. 2009*
Anterior Shoulder Instability: Imaging

- **X-rays**
  - Shoulder AP, scapular AP, and axillary
- **MRI/CT + Arthrogram**
Anterior Shoulder Instability: Treatment

- **Nonsurgical**
  - Initial dislocation
  - Brief period of immobilization then PT

- **Surgical Indications**
  - Recurrent episodes
  - Patients <25 y.o. are at high risk
  - Large bony injuries or RC tears

- **Contraindications**
  - Volitional
  - Comorbidities

*Gray's Basic Anatomy. 2012*
Systematic Review of Rehabilitation Versus Operative Stabilization for the Treatment of First-Time Anterior Shoulder Dislocations

Conclusions:

While limited, the available evidence from randomized controlled trials supports operative stabilization as a reasonable alternative to nonoperative treatment for primary acute shoulder dislocation in young, active adults participating in highly demanding physical activities. Recommendations on the optimal surgical intervention cannot be provided. There is no conclusive evidence available to determine whether operative stabilization or conservative rehabilitation is superior for other patient or injury types.

Godin, J., Sekiya, J.K. Sports Health. 2010
Shoulder Corticosteroid Injections

- Office
- Rotator cuff impingement
- Calcific tendinitis
- Ultrasound/Fluoroscopic guided
- Adhesive capsulitis
- Osteoarthritis
Shoulder Corticosteroid Injections

- **Subacromial**
  - Accuracy: 80-90%
- **Glenohumeral**
- **AC joint**

*Marder, et al, JBJS 2012*
Shoulder Corticosteroid Injections: Subacromial

- Rotator cuff disease/Impingement
- Posterior approach
- Betadine or Chlorhexidine prep
- 5cc lidocaine w/o epi
- 1-2 cc of triamcinolone (40mg/ml)
- Angle needle upward parallel to acromion
- Diagnostic & therapeutic

Marder, et al, JBJS 2012
Shoulder Corticosteroid Injections

- **Subacromial**
- **Glenohumeral**
  - Low accuracy for landmark injection
  - Anterior: 64%
  - Posterior: 45%
  - Supraclavicular: 45%
- **AC joint**

*Tobola, et al, JSES 2011*
Shoulder Corticosteroid Injections

- Subacromial
- Glenohumeral
- AC joint
  - Low accuracy
  - 43% intra-articular
  - 23% partially intra-articular
  - 33% extra-articular

Shoulder Corticosteroid Injections: AC Joint

- Acromioclavicular disease
- Anterior approach
- Betadine or Chlorhexidine prep
- 1 cc lidocaine w/o epi
- 1 cc of triamcinolone (40 mg/ml)
- Can be difficult

Shoulder Injections: PRP and Stem Cells

- PRP and Stem Cells
  - Evidence lacking
  - Considered experimental
  - Expensive out of pocket: $500 to $5000++
  - Popularized by athletes
  - NO indications for use at this time

Schneider, et al, Curr Rev Musculoskelet Med 2018

https://www.npr.org/sections/health-shots/2014/06/11/320971966/platelet-rich-plasma-therapy-gains-fans-but-remains-unproven
Clinical Messaging

- If injection
  - Will be more sore for a couple of days
  - Typically starts working after 48-72 hours
- Will improve over the next 6-8 weeks
- Self-limited process
- Reassess and consider an MRI
Special Considerations Before Injection

• **Pts with Diabetes**
  - Injection may raise blood glucose levels

• **Pts with HIV**
  - Wary if on protease inhibitor
    - Ex. Ritonavir/Norvir
  - Can cause iatrogenic Cushing’s response

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**ORIGINAL RESEARCH ARTICLE**

Changes in Blood Glucose and Cortisol Levels After Epidural or Shoulder Intra-articular Glucocorticoid Injections in Diabetic or Nondiabetic Patients


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Injecting epidural and intra-articular triamcinolone in HIV-positive patients on ritonavir: beware of iatrogenic Cushing’s syndrome

*M. Maviki • P. Cowley • H. Marmery*

*Maviki, et al, Skeletal Radiol 2013*
Shoulder Disorders: Summary

• Refer to PT, but consider a delay in specialist referral

• Shoulder pain with good ROM and strength
Shoulder Disorders: Summary

• **When to Refer?**
  - ALL Fractures
  - ALL Dislocations or Instability
  - Traumatic event with NEW Weakness
  - Whenever in doubt
References


• Park, et al. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement. JBJS 2005

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• Sher, et al. Abnormal findings on magnetic resonance images of asymptomatic shoulders. JBJS 1995

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• Mall, et al. Factors affecting rotator cuff healing. JBJS 2014
References

Questions?
Thank You!!

- Questions please
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