2021 PRIMARY CARE HAWAII CONFERENCE

Caring for the Active and Athletic Patient

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Common Chronic Shoulder Problems: A Primary Care Approach

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Disclosure Information

The information presented in this activity represents the opinions of the author and not those of the Department of Defense or the Uniformed Services University

Francis G. O'Connor, MD, MPH, has no financial interests or relationships to disclose.

Learning Objectives

- **Review** Key Functional Anatomy of the Shoulder Joint
- **Identify** key Elements of the Shoulder Physical Examination
- **Compare and Contrast** Common Chronic Shoulder Disorders and the Recommendations for Diagnostic Criteria and Referral
- **Develop** Evidence-Based Management Plans for Patients with Chronic Shoulder Disorders that can be Treated in the Ambulatory Setting

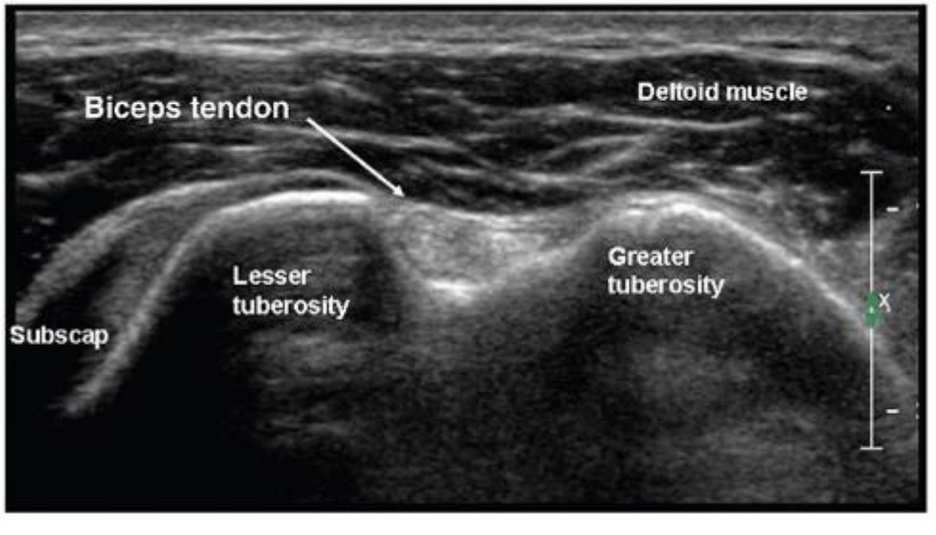
Functional Clinical Anatomy

Shoulder Anatomy

- Greatest range of motion of any joint
- **Compromises stability for mobility**
- Relies on ligaments, muscles and tendons for stability

Bony Anatomy

- Humerus
  - Head
  - Greater tuberosity
  - Bicipital groove
  - Lesser tuberosity
  - Proximal shaft

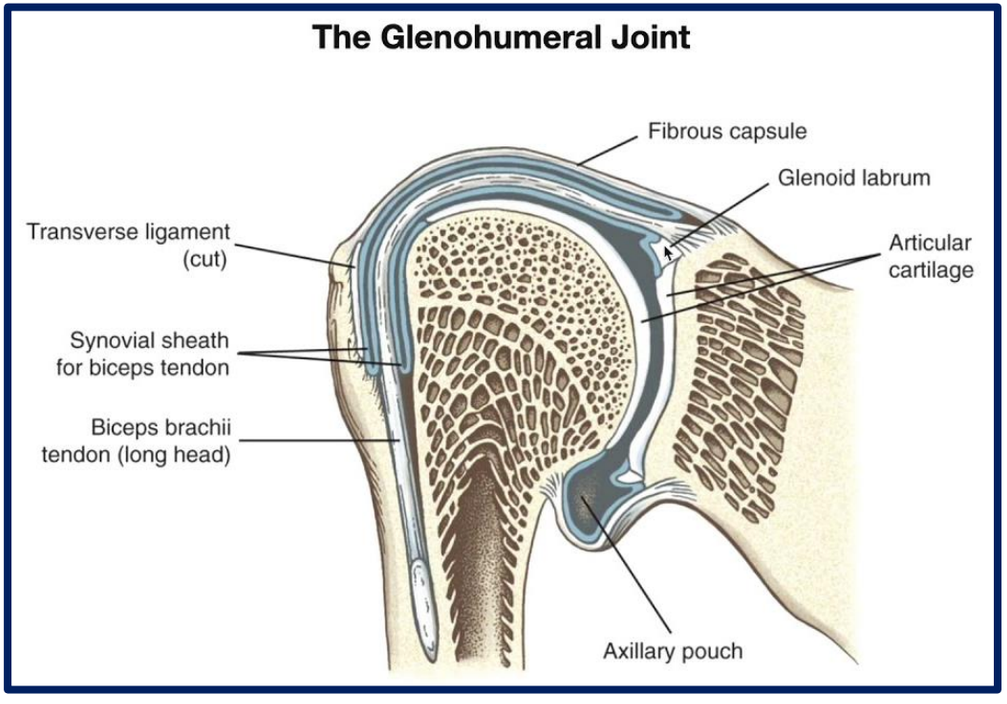


Bony Anatomy

- Scapula
  - Spine
  - Acromion
  - Coracoid
  - Glenoid
  - Scapular Notch
- Overlies ribs 2-7
- Angled 30-45° anterior to coronal plane

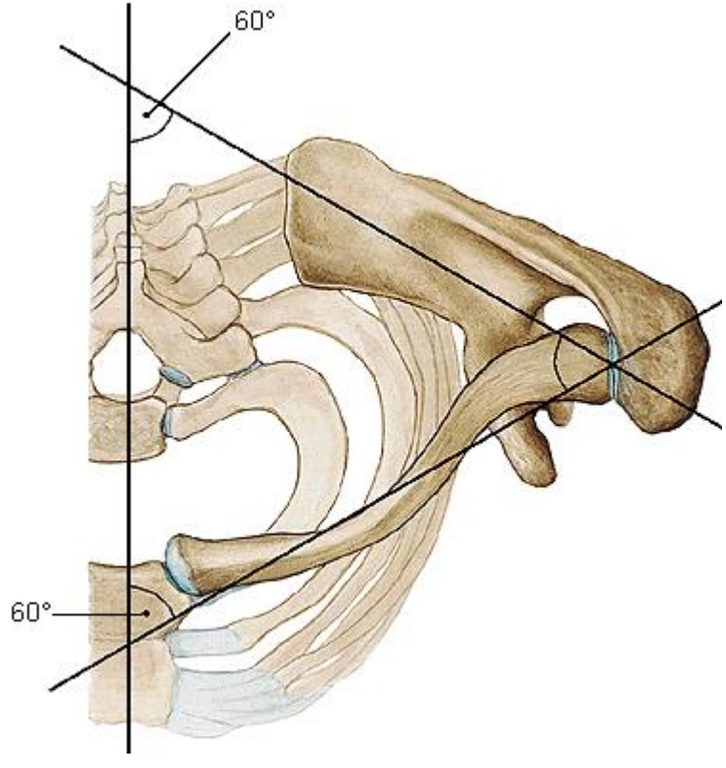
Joints

- Glenohumeral
  - Extreme mobility
  - 30% humeral head in contact with glenoid
  - Static and dynamic stabilizers



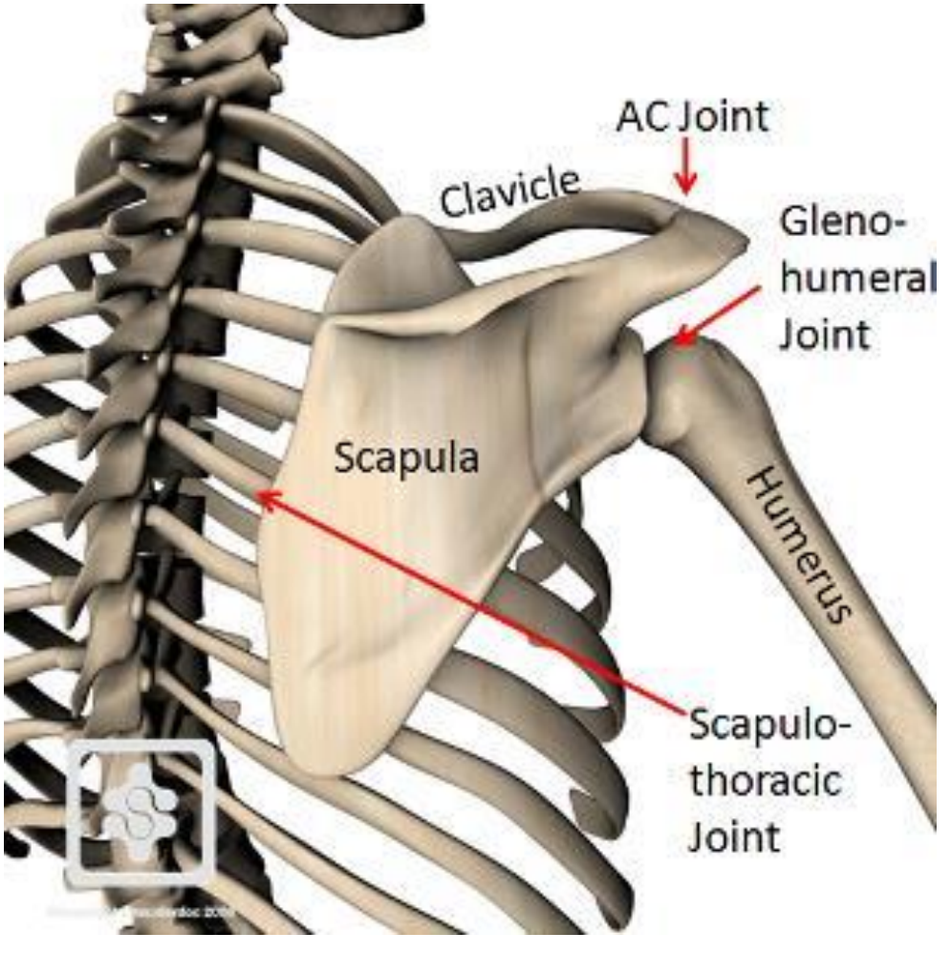
Joints

- Acromioclavicular Joint
  - Synovial joint
  - Augments ROM
  - Acromioclavicular/ coracoclavicular ligaments stabilize
  - Osteolysis/Arthritis



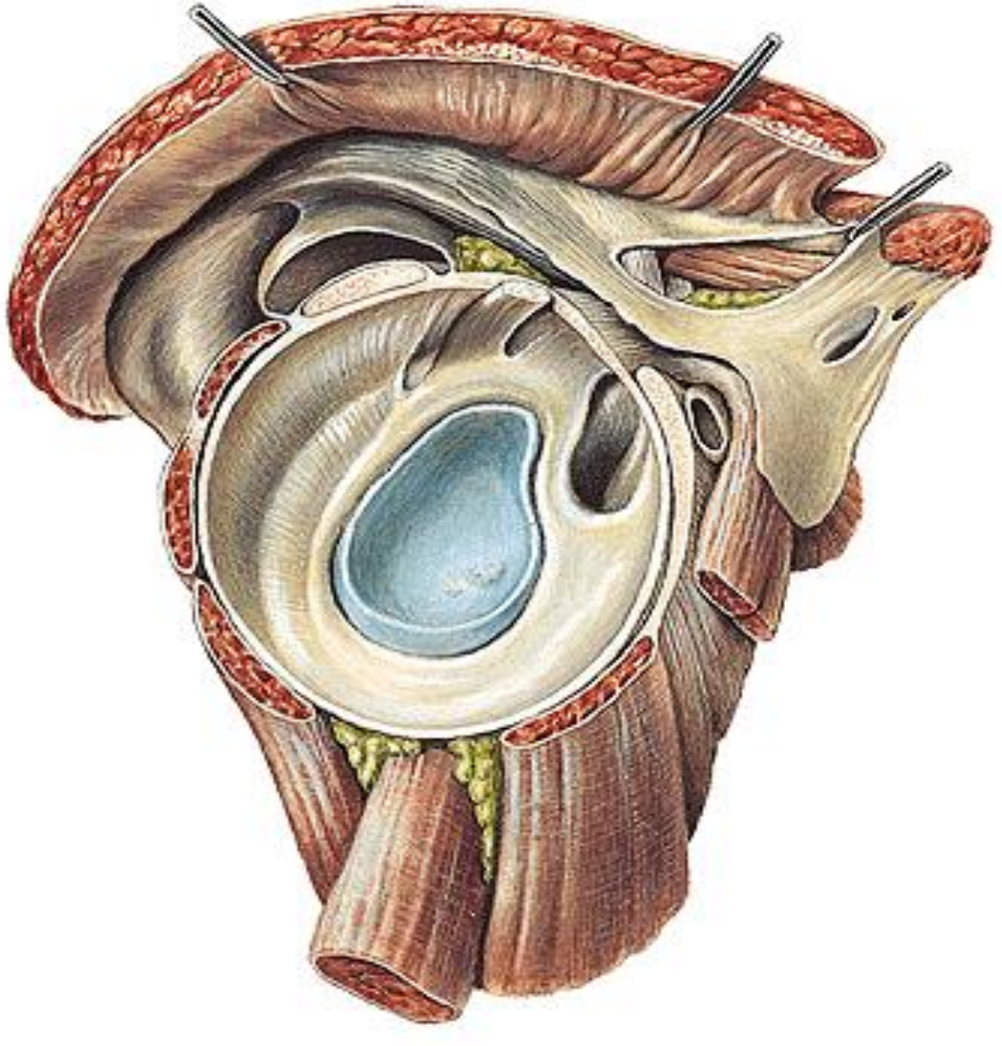
Joints

- Scapulothoracic Joint
  - Not a true joint
  - Allows abduction >120^{o}
  - 1:2 abduction vs. glenohumeral joint



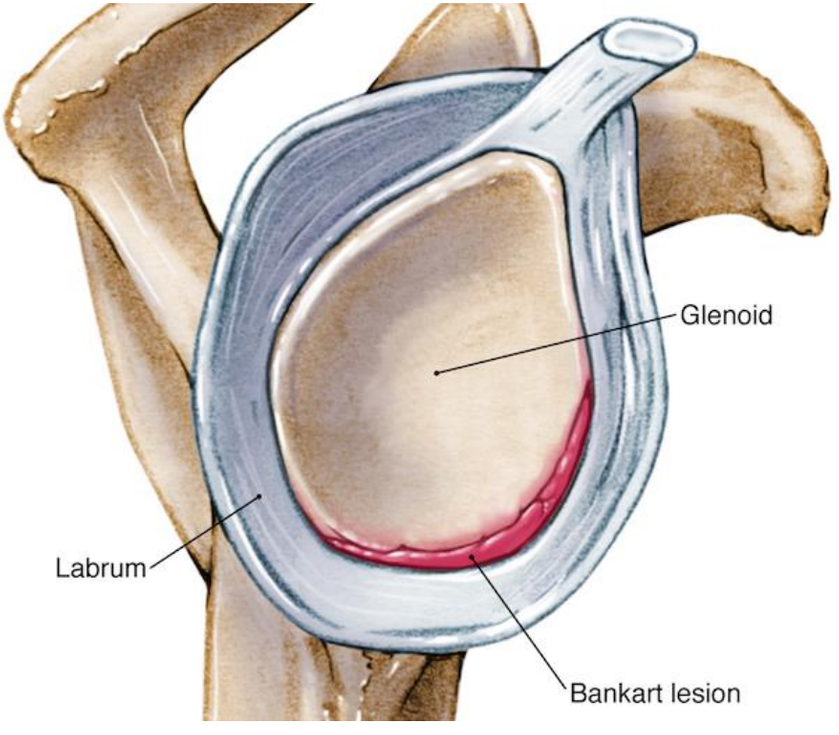
Applied Clinical Anatomy

- Static and Dynamic Stabilizers
  - labrum
  - glenohumeral ligaments
  - rotator cuff



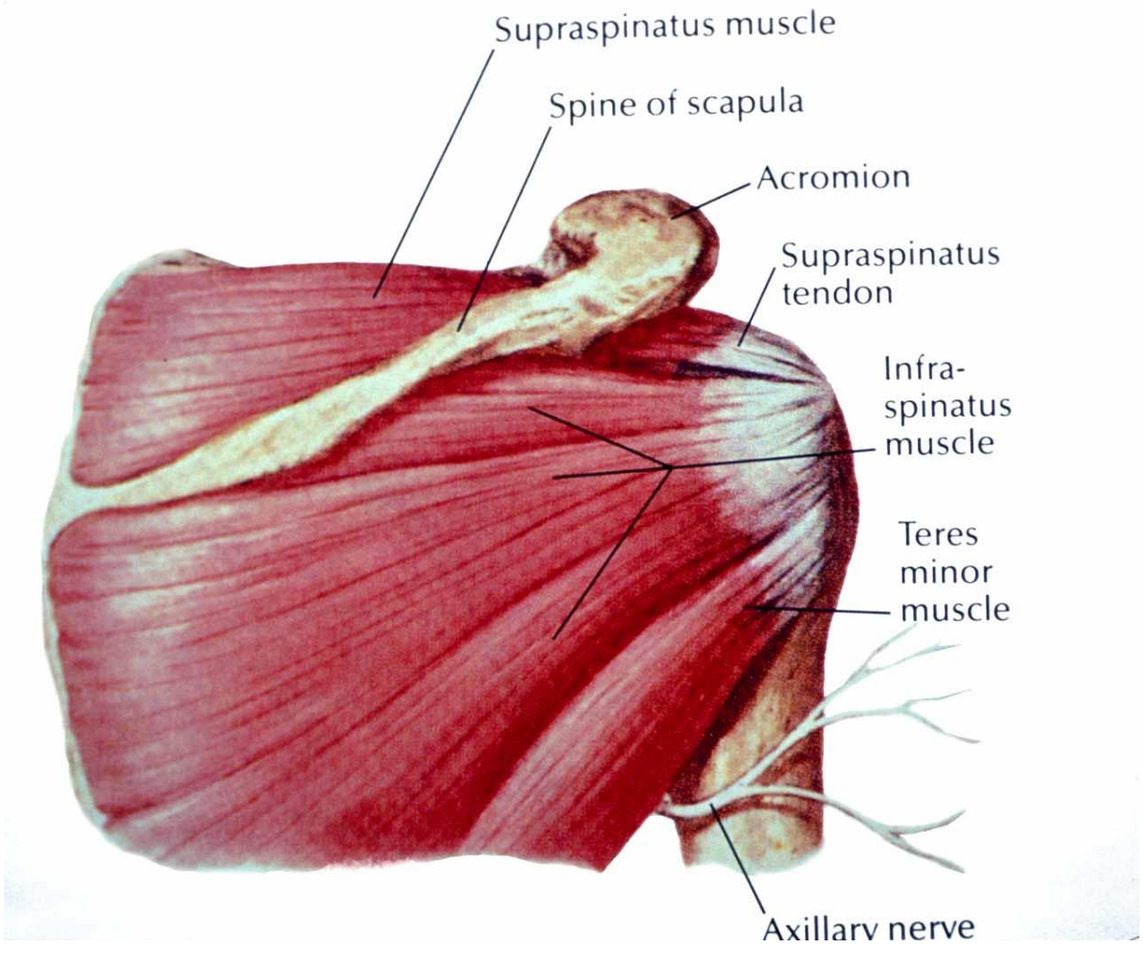
Static Glenohumeral Stabilizers

- Articular surface conformity—negative pressure and hydrostatic forces
- Glenoid labrum
  - Dense fibrous structure at glenoid margin
  - Extends articular surface, deepens glenoid
  - **Bankhart** lesion is disruption at anterior-inferior labrum decreases resistance to translation 20%



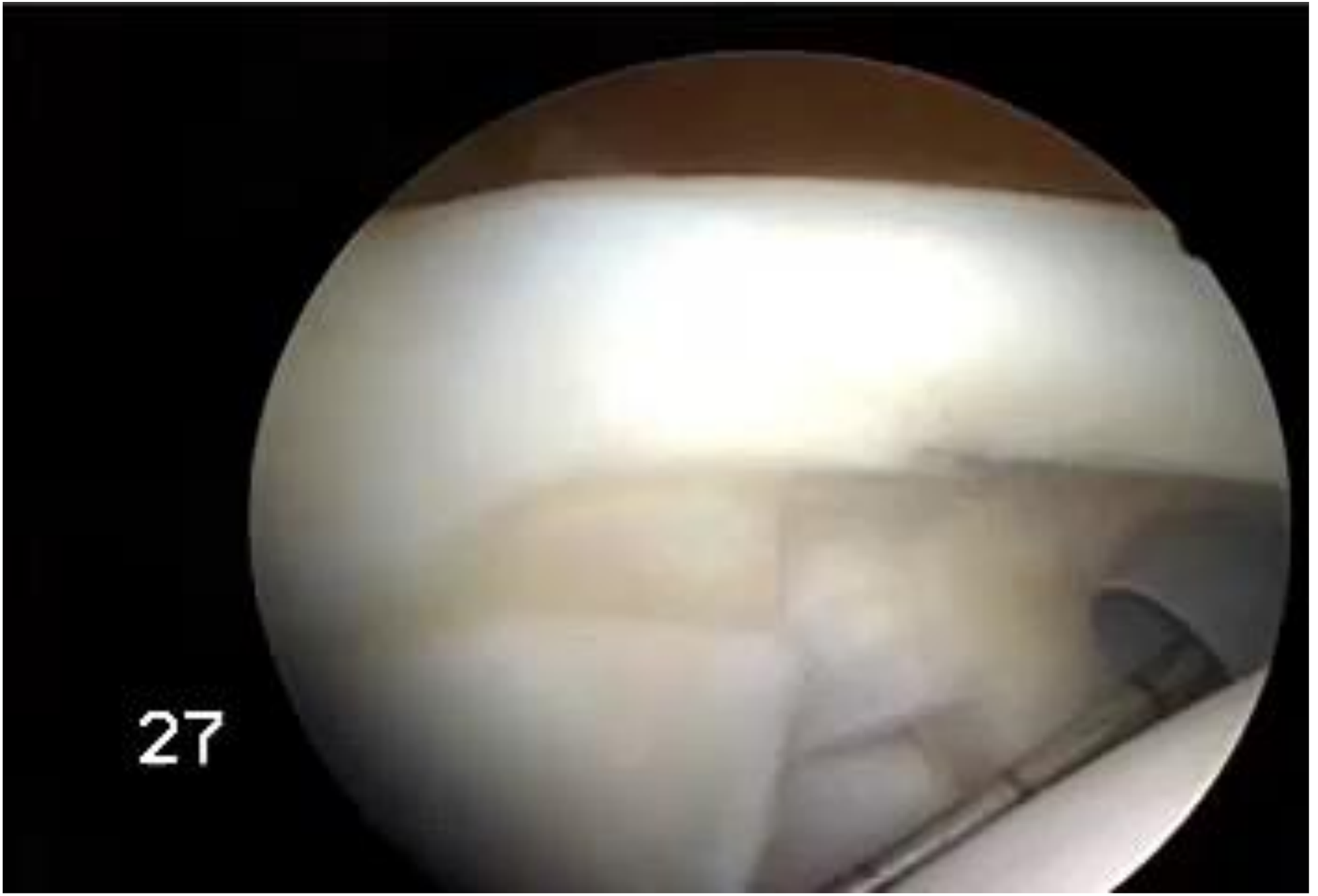
Dynamic Glenohumeral Stabilizers

- Rotator Cuff
  - Smaller than more superficial muscles
  - “Steering” mechanism for humeral head
  - Depresses humeral head into glenoid



Dynamic Stabilizers

- Long head of biceps brachii
  - Humeral head depressor
  - Reduces anterior translation
  - Origin at superior labrum
  - Associated with Superior Labrum Anterior to Posterior **“SLAP”** lesion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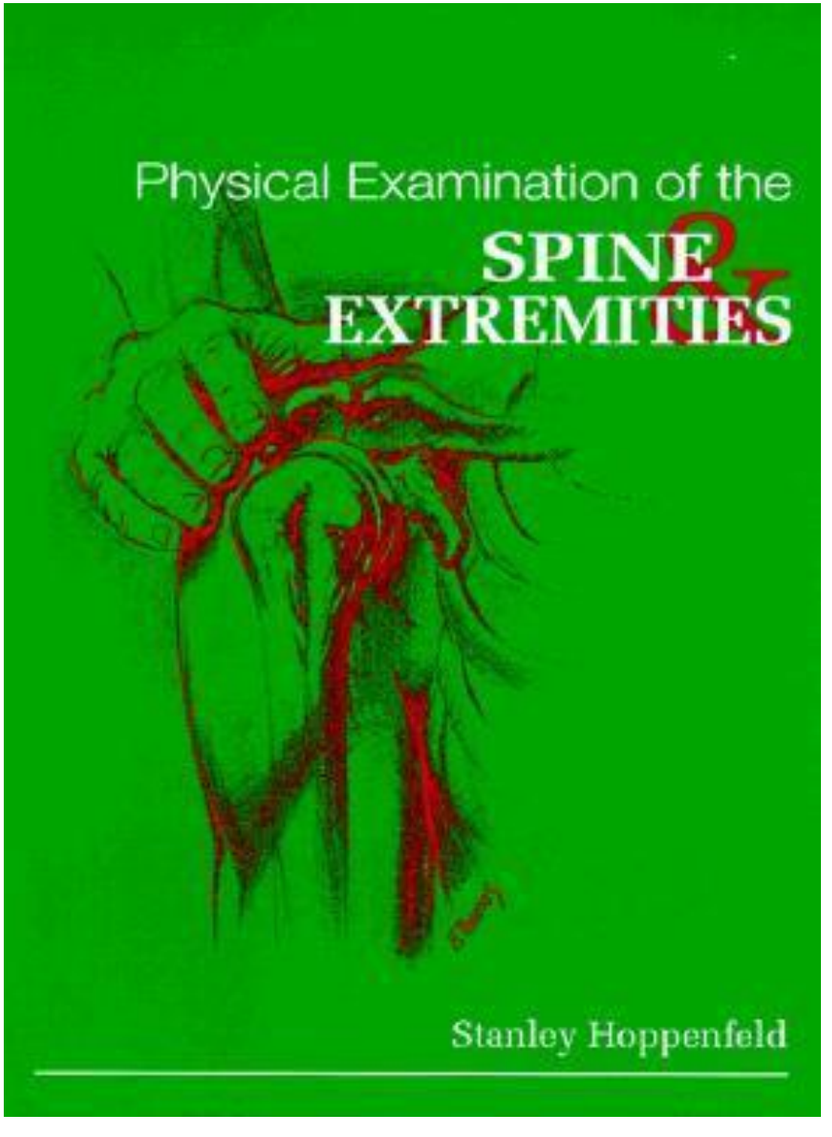
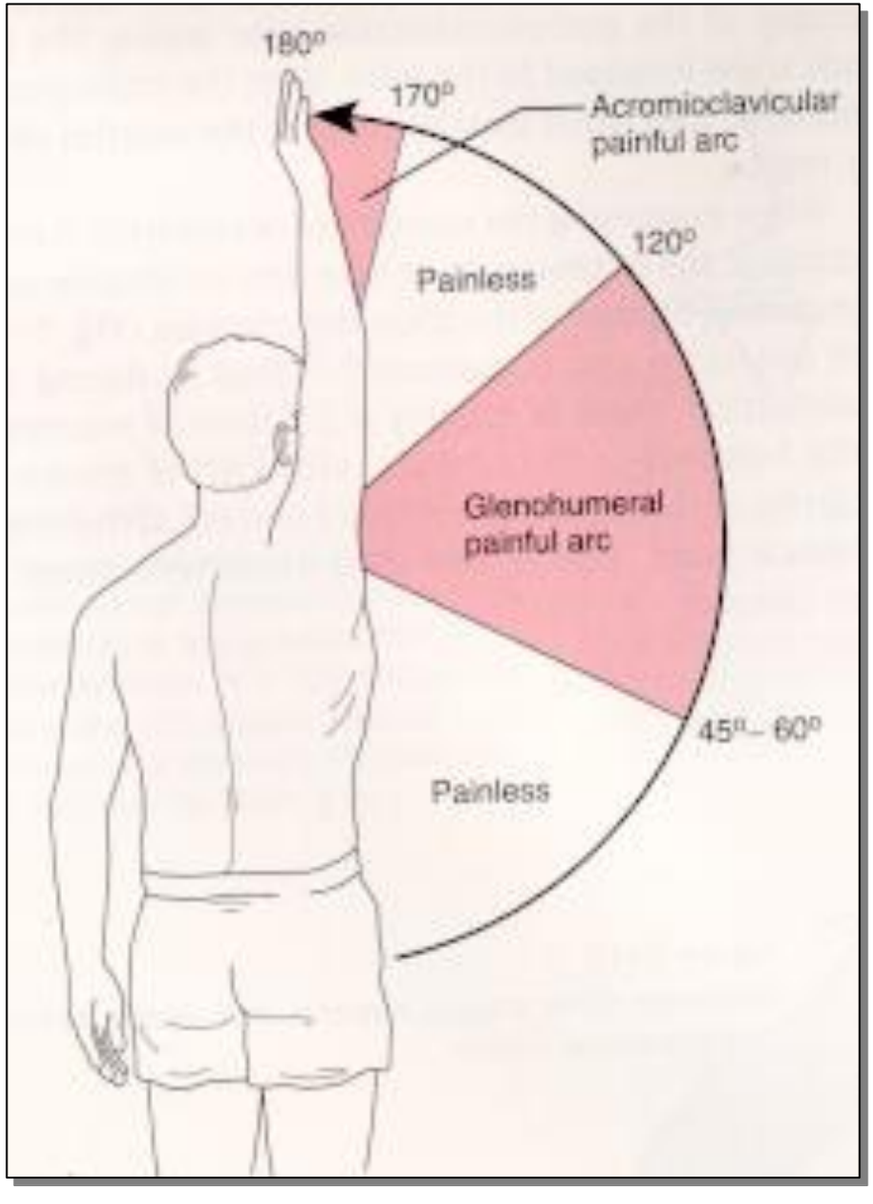
Physical Examination

Physical Exam

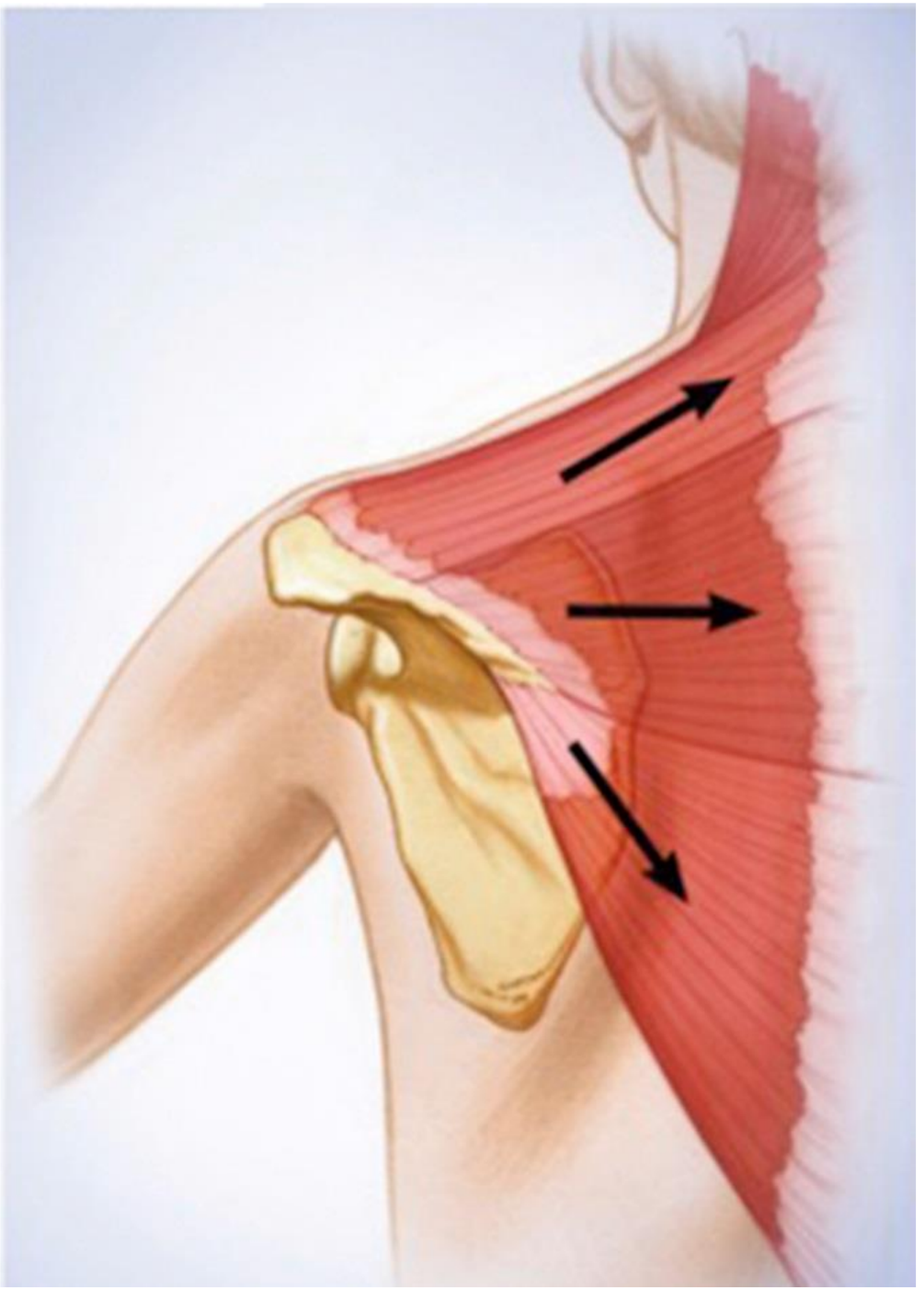
- Inspection
- Palpation
- Range of Motion
- Strength
- Special Tests
- Exam of Related Areas



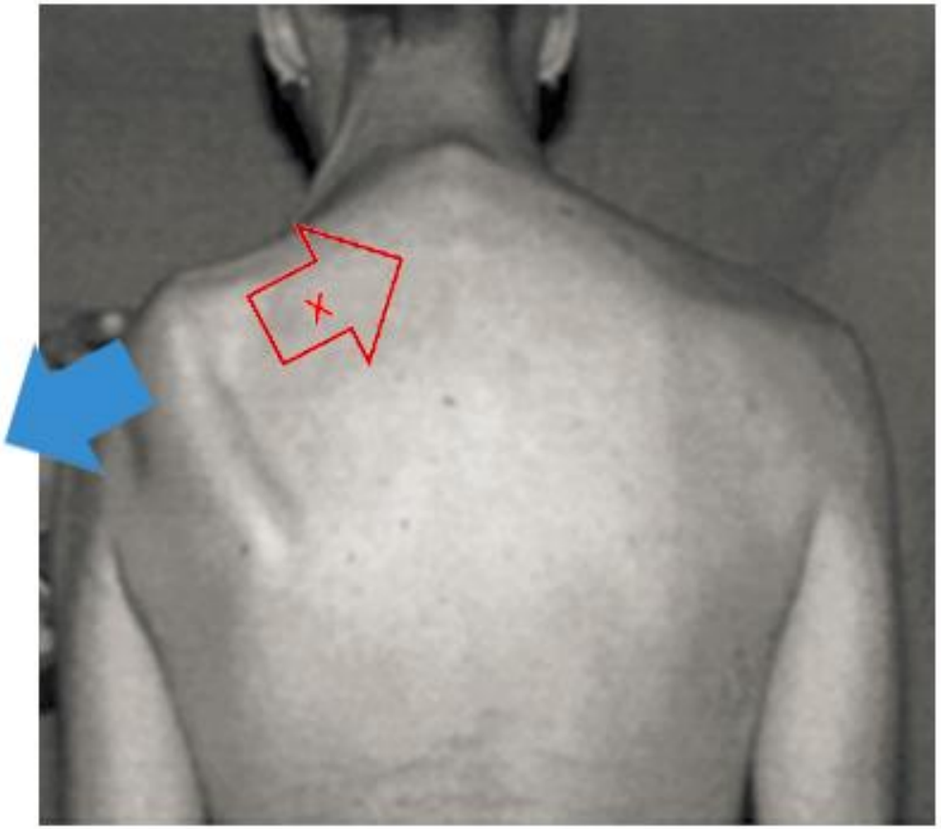
Active Range of Motion



- Painful Arc
- Scapulohumeral rhythm
- Winging
- Drop Arm Test

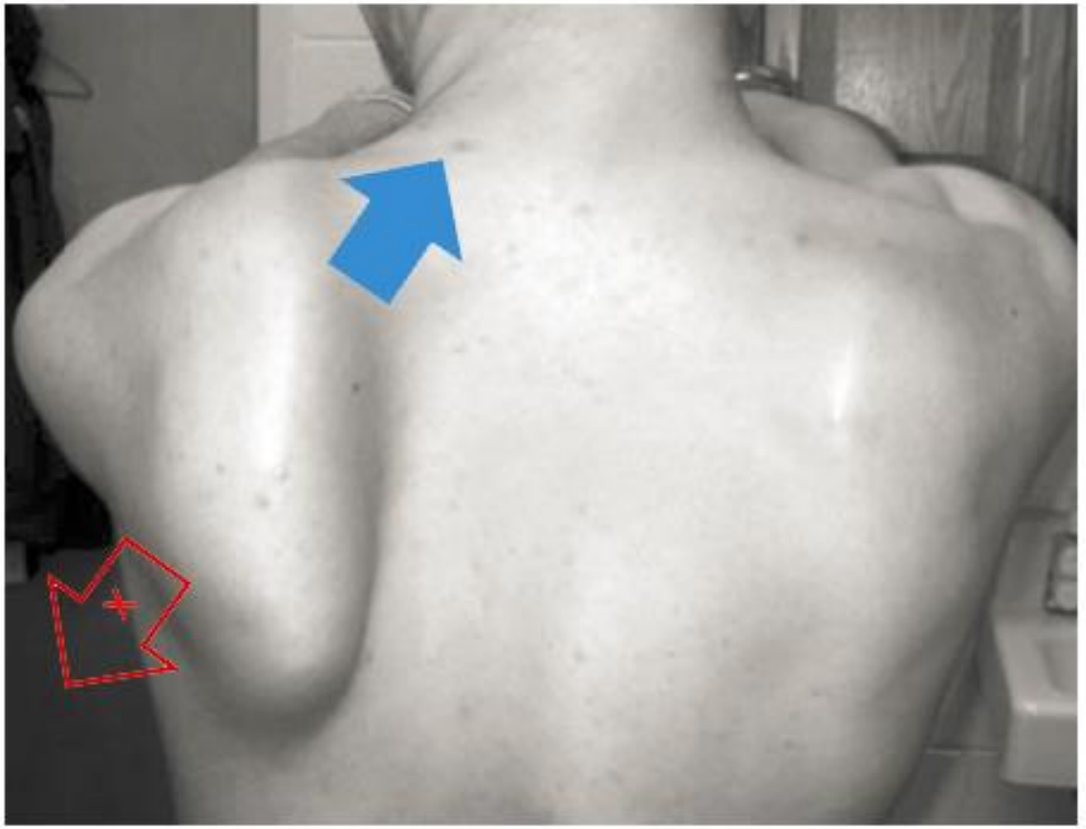


Lateral Scapular Winging



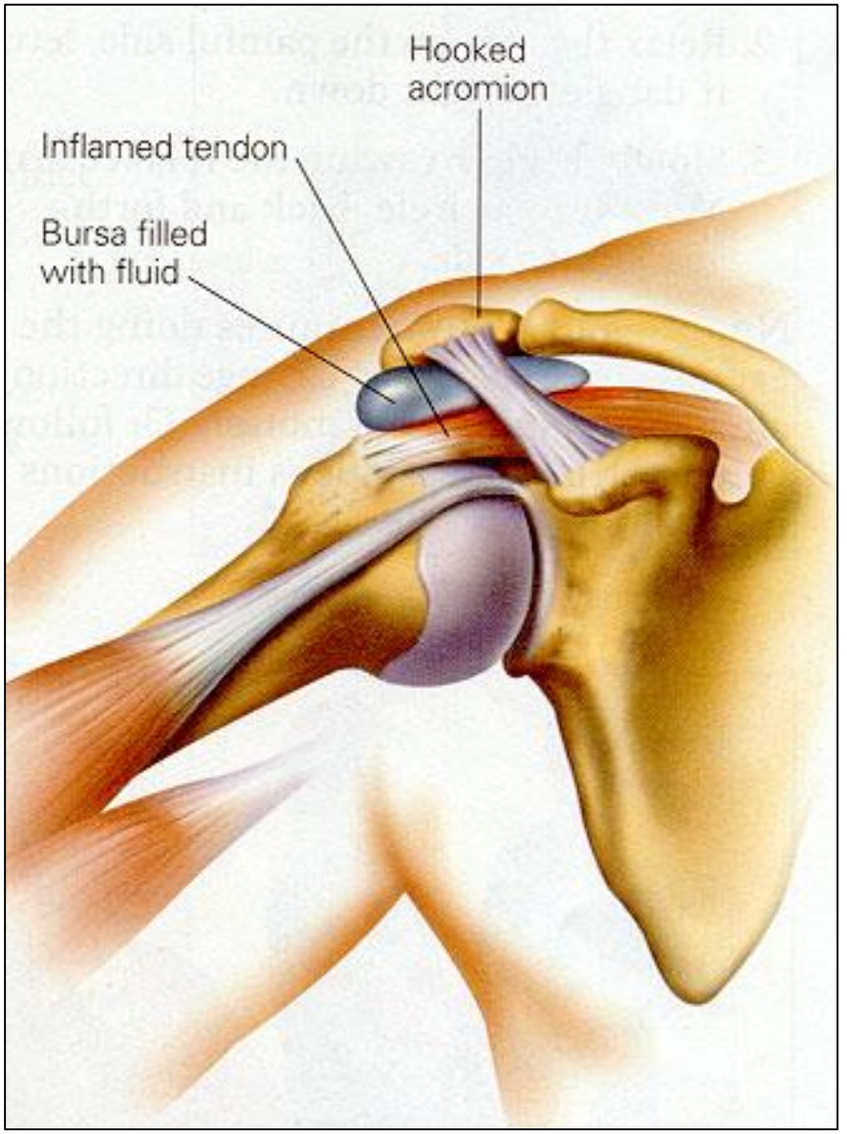
Absent pull of trapezius due to Spinal Assessory Nerve palsy

Medial Scapular Winging



Absent pull of serratus anterior due to Long Thoracic Nerve palsy

Impingement



Special Tests

- **Neer Impingement Test**
  - Detects rotator cuff tendinopathy

Special Tests

- **Hawkins Impingement Test**
  - Detects rotator cuff tendinopathy

Instability

Special Tests

- **Anterior Apprehension Test**
  - Detects anterior instability
- **Relocation Test (Fowler Sign)**
  - Confirms

Labral Pathology

Special Tests

- **O'Brien's Test**
  - Detects labral tears and acromio-clavicular injury

Referred Pain

Special Tests

- **Spurling's Maneuver**
  - Referred pain from a cervical radiculopathy

Reliability of Clinical Tests

- **CONCLUSION:**
  - Based on this update, the use of any single test to make a pathognomonic diagnosis cannot be unequivocally recommended.
  - **Combinations of tests provide better accuracy**, but marginally so.
  - These findings seem to provide support for stressing a comprehensive clinical examination including history and physical examination.
  - There is a great need for large, prospective, well-designed studies that examine the diagnostic accuracy of the many aspects of the clinical examination and **what combinations of these aspects** are useful in differentially diagnosing pathologies of the shoulder.

Hegedus EJ, et al: Which physical examination tests provide clinicians with the most value when examining the shoulder? Update of a systematic review with meta-analysis of individual tests. Br J Sports Med.2012 Nov;46(14):964-78.

Chronic Shoulder Pain

Differential Diagnosis of Chronic Shoulder Pain

- Atraumatic Shoulder Pain
  - Osseous Involvement
    - AC Osteoarthritis
    - Glenohumeral Osteoarthritis
    - Primary Impingement
  - Soft Tissue
    - Rotator Cuff Tendinopathy
    - Calcific Tendinopathy
    - Adhesive Capsulitis
  - Referred Pain
    - Cervical Spine Disease
    - Suprascapular Neuropathy
    - Thoracic Outlet Syndrome

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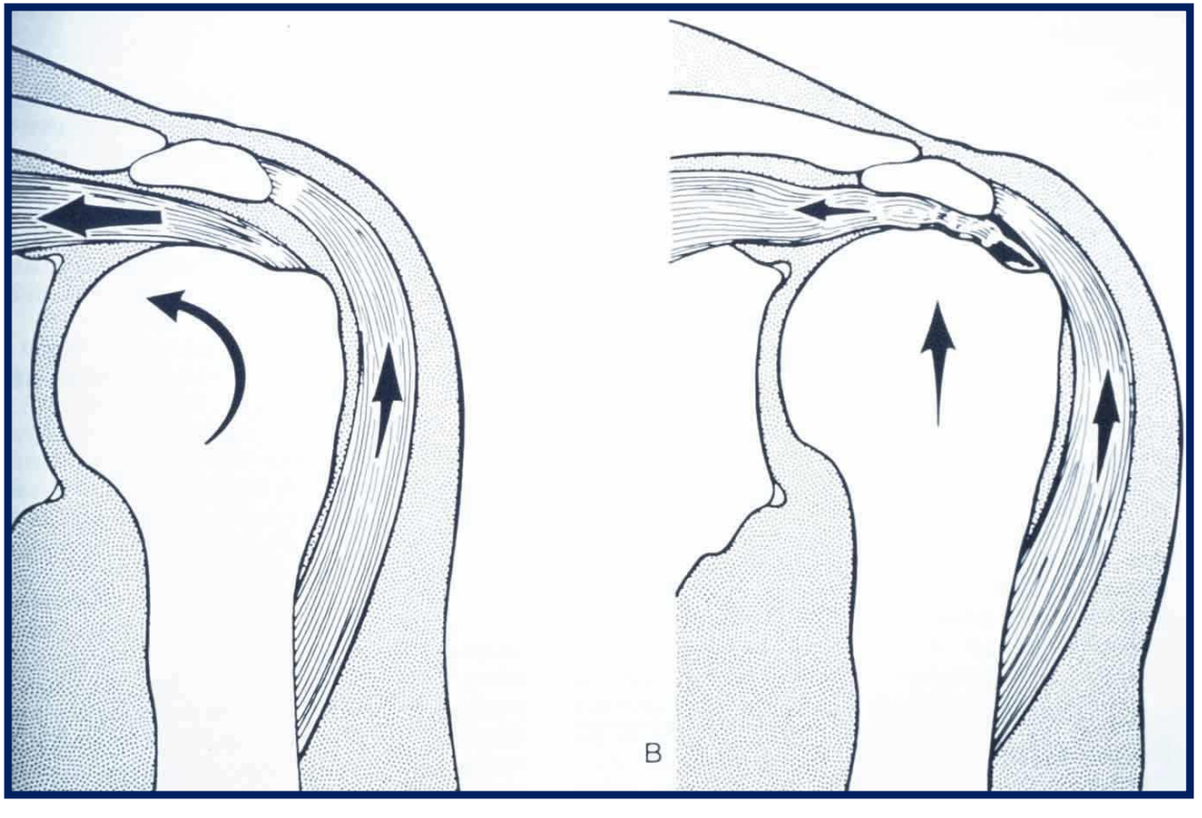
Subacromial Impingement Syndrome

Key Concepts and Terminology

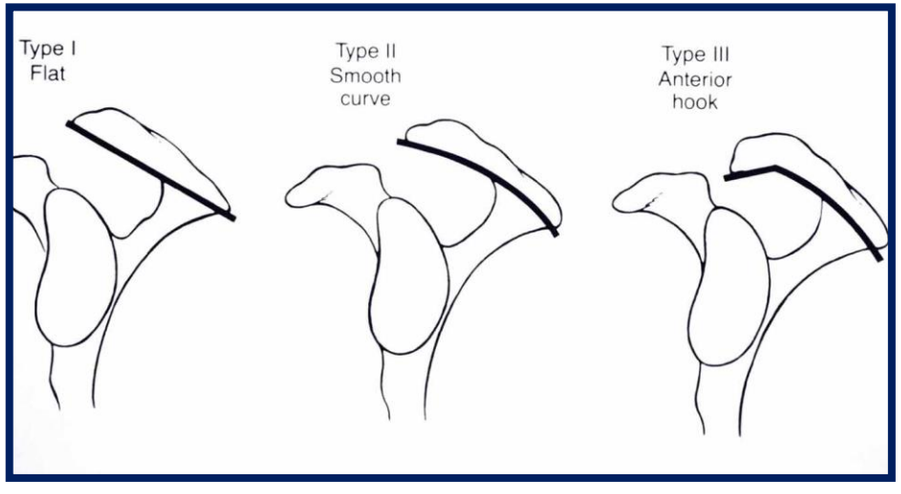
Force Coupling

- A **force-couple** relationship is the act of muscles or muscle groups moving together, in a synergistic manner, to produce movement around a joint.

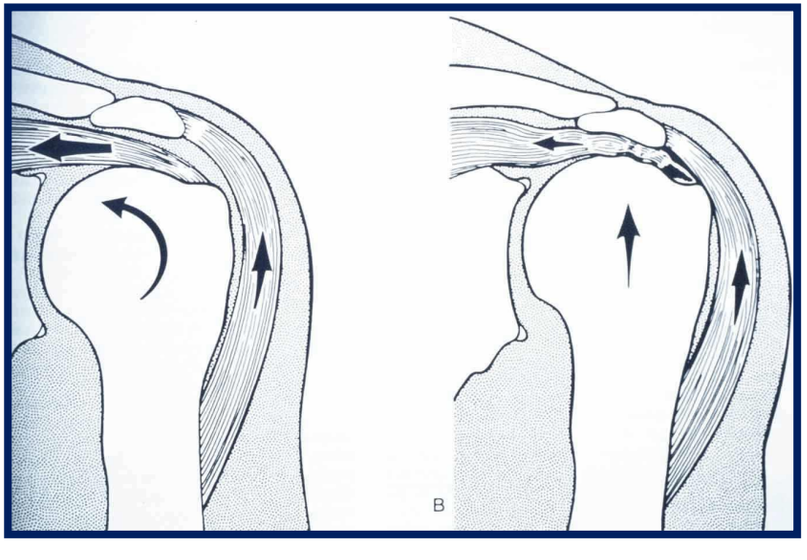


Primary versus Secondary Impingement

Primary Impingement: implies a structural abnormality that statically encroaches the subacromial space: acromial spurring; acromial sloping; tight posterior capsule; poor posture.

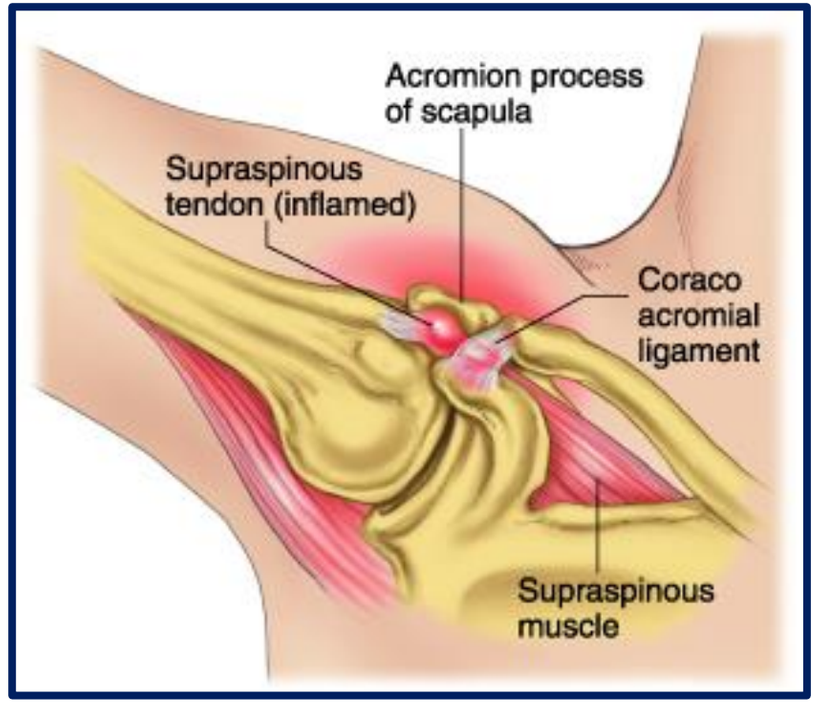


Secondary Impingement: implies a structural abnormality that results in dynamic encroachment of the subacromial space: instability (glenohumeral ligament or labral; rotator cuff weakness, scapular dyskinesia.

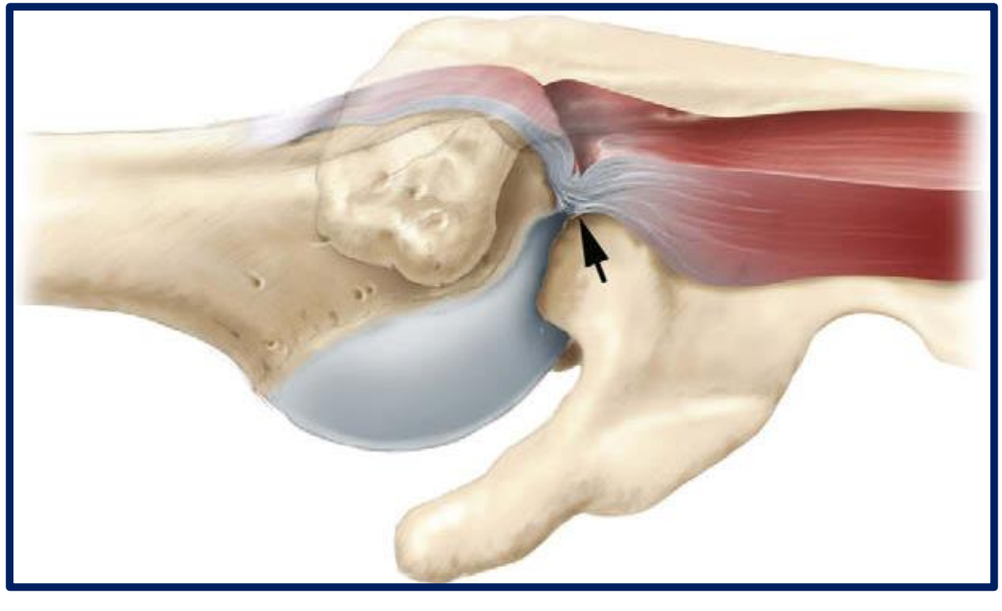


Internal versus External Impingement

External Impingement: implies a dynamic or structural abnormality that results in encroachment of the subacromial outlet; results in **bursal sided** rotator cuff injury. Classified as **primary or secondary**.

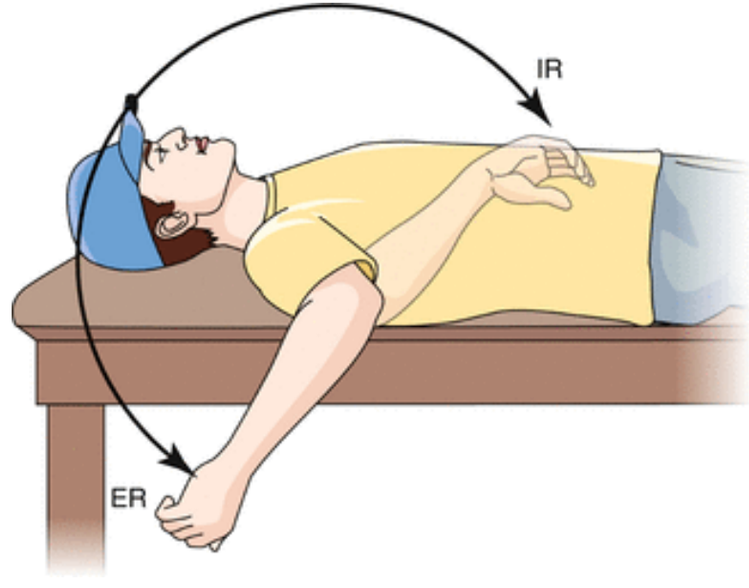


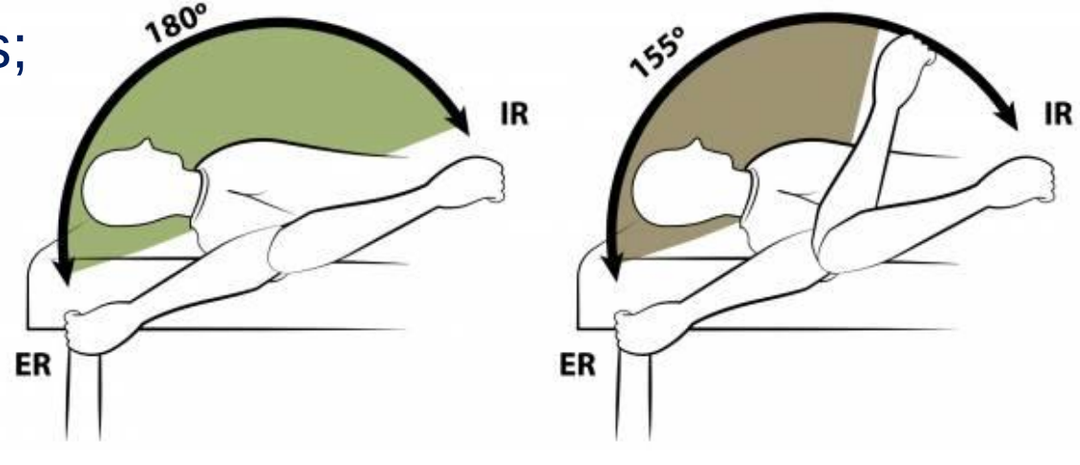
Internal Impingement: characterized by repetitive contact between the posterior aspect of the greater tuberosity of the humeral head and the posterior-superior aspect of the glenoid border when the arm is placed in extreme ranges of abduction and external rotation; leads to impingement of the **articular sided rotator cuff** tendons and the glenoid labrum.



Glenohumeral Internal Rotation Deficit (GIRD)

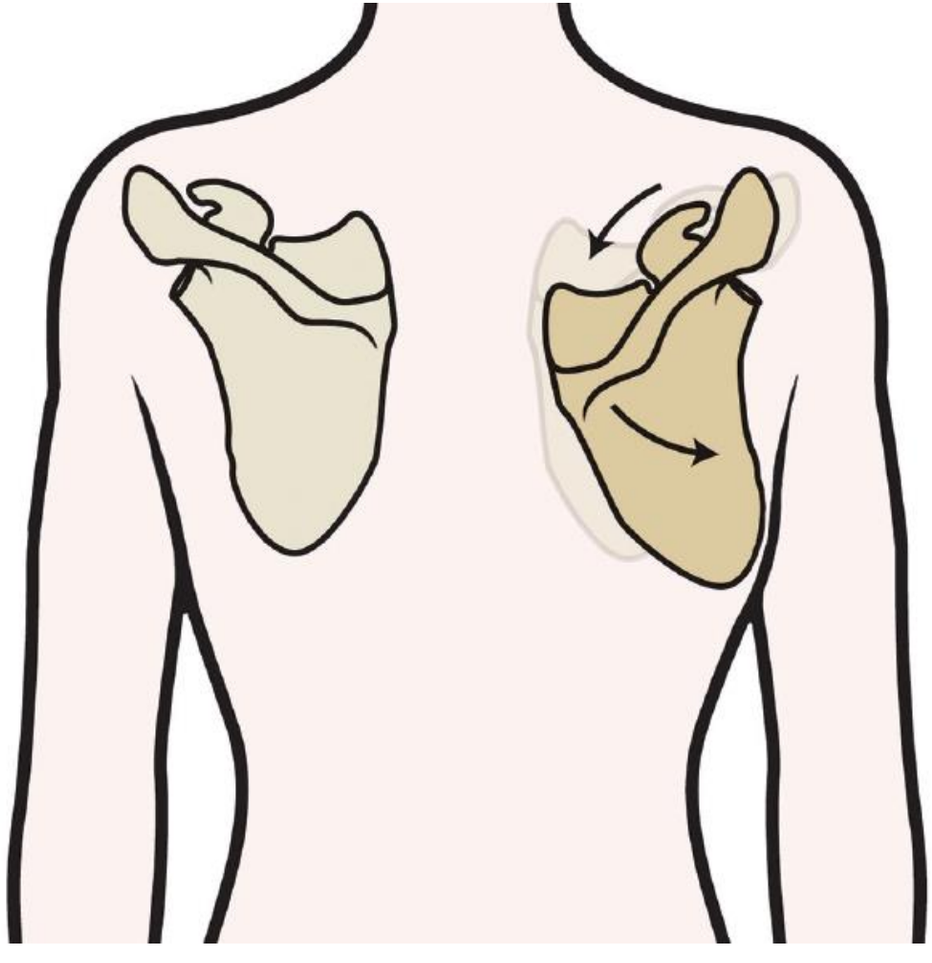
- Characterized by **altered glenohumeral range of motion**; decrease in internal rotation and increase in external rotation:
  - if the GIRD (loss of internal rotation) is less than external rotation gain (ERG), the shoulder maintains normal kinematics;
  - if the GIRD exceeds the (ERG), this leads to deranged kinematics;
  - decrease in internal rotation is usually greater than a 25° difference as compared to non-throwing shoulder.





SICK Scapula Syndrome

- **Scapular dyskinesis** in overhead athletes complaining of shoulder pain introduced the acronym **SICK** (**S**capular malposition, **I**nferior medial border prominence, **C**oracoid pain and malposition and dys**K**ynesis of scapular motion).



Burkhart SS, Morgan CD, Kibler WB. The disabled throwing shoulder: spectrum of pathology. Part III: The SICK scapula, scapular dyskinesis, the kinetic chain, and rehabilitation. Arthroscopy 2003 Jul–Aug;19(6):641-61.

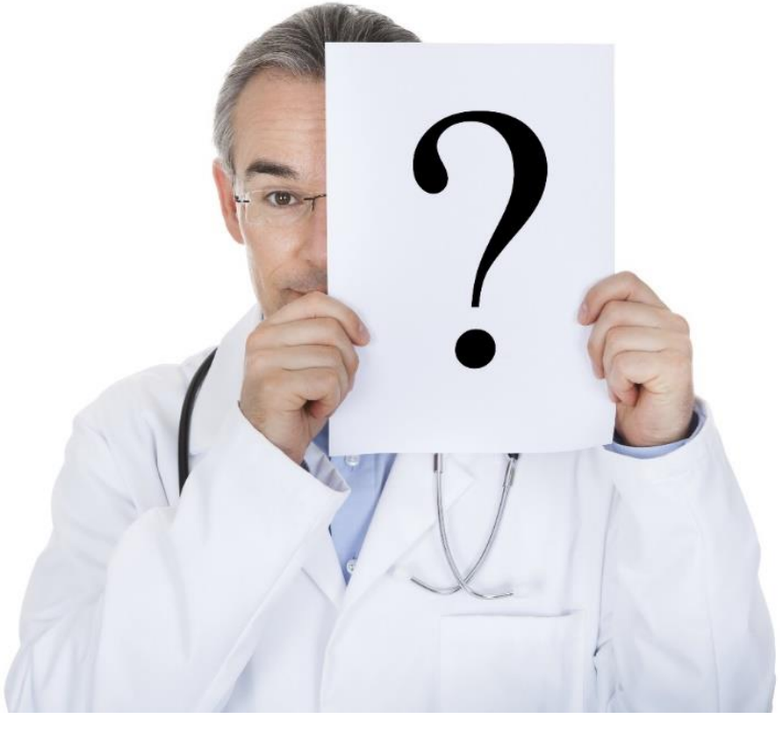
Epidemiology

- One of the most common clinical problems encountered in primary.
- In the US, shoulder pain responsible for over 4.5 million primary care visits annually.
- Shoulder impingement is estimated to account for up to 85% of all shoulder complaints.
- 1/3 Occupational; 1/3 Athletic; 1/3 idiopathic

Anderson G et al: American Academy of Orthopedic Surgeons. The burden of musculoskeletal diseases in the United States: prevalence, societal, and economic cost. Rosemont (IL): American Academy of Orthopedic Surgeons; 2008.

Pathophysiology

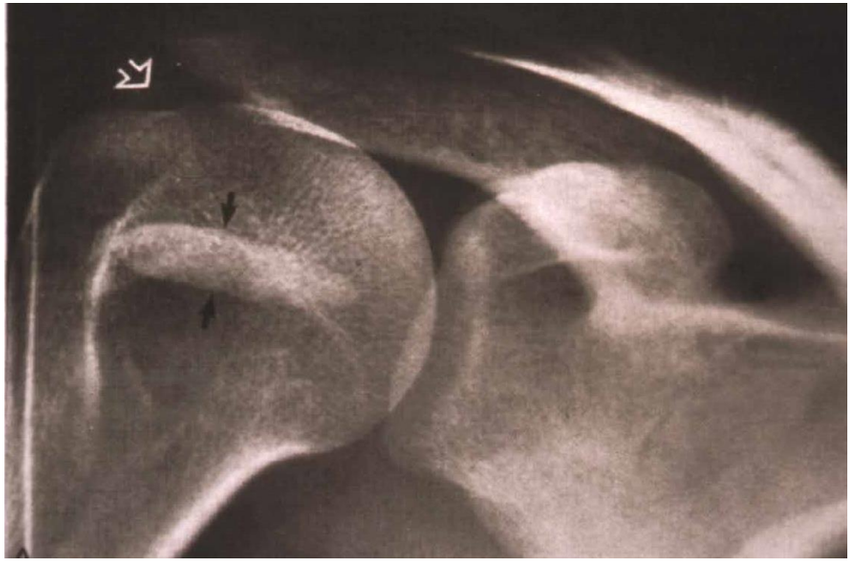
- Subacromial impingement results from an “inflammation and degeneration of the anatomical structures in the region of the subacromial space.”
- Different hypotheses have been forwarded to describe subacromial impingement; **a clear explanation has not been found**.

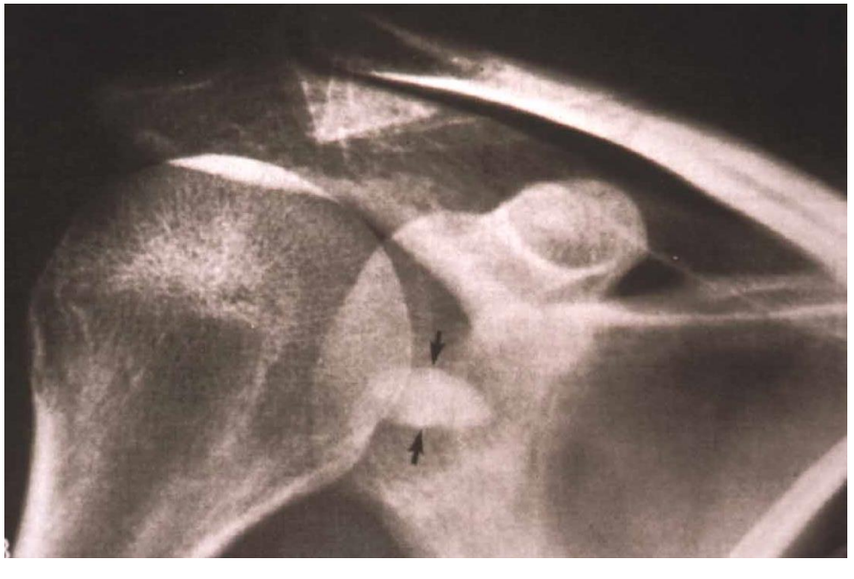


Consigliere P et al: Subacromial impingement syndrome: management challenges. Orthopedic Research and Reviews 2018: 10; 83-91.

Differential Diagnosis

- Instability
- Cervical Disease
- Myofascial Pain
- Acromioclavicular Disease
- Suprascapular Nerve Injury
- Adhesive Capsulitis





Clinical Presentation

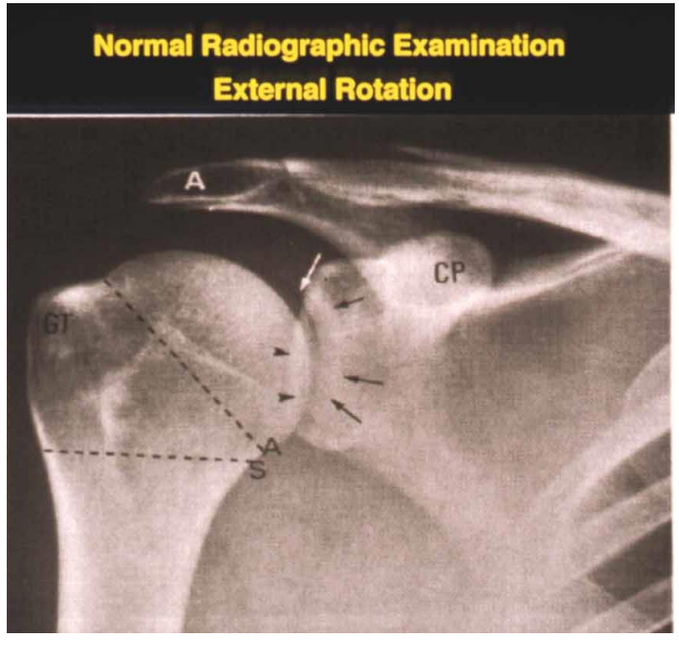
- Gradual onset of anterior shoulder pain; night pain with difficulty sleeping on shoulder.
- **Poorly localized tenderness**.
- Clinical exam:
  - Painful arc
  - Positive Hawkins and Neer Tests
  - Impingement Injection Test

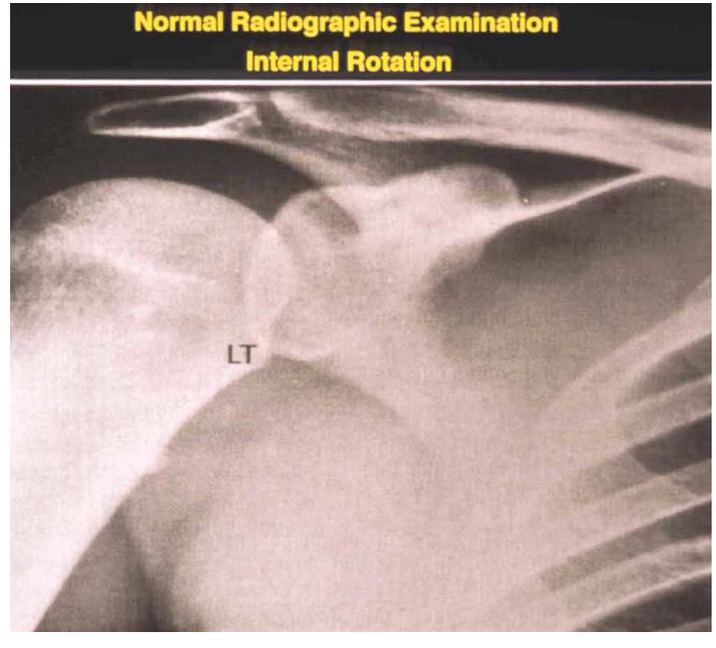
Clinical Presentation

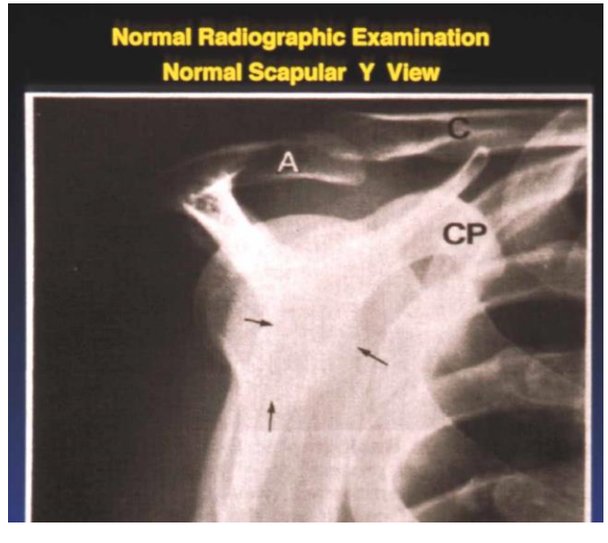
- Eccentric manual muscle testing
- Assessment for Referred Pain

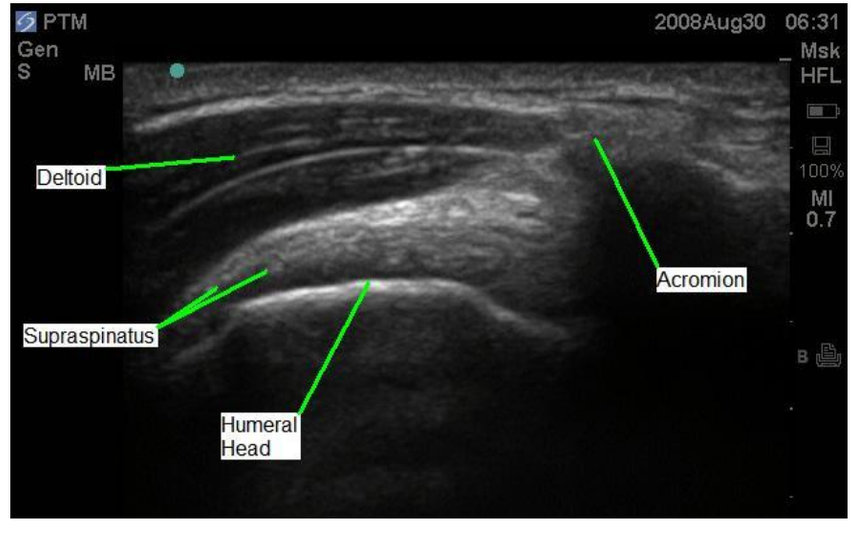
Diagnostic Imaging

- **Plain Films**
  - Routine shoulder series
  - Outlet views
- **Advanced Imaging**
  - US
  - arthrograms
  - MRI



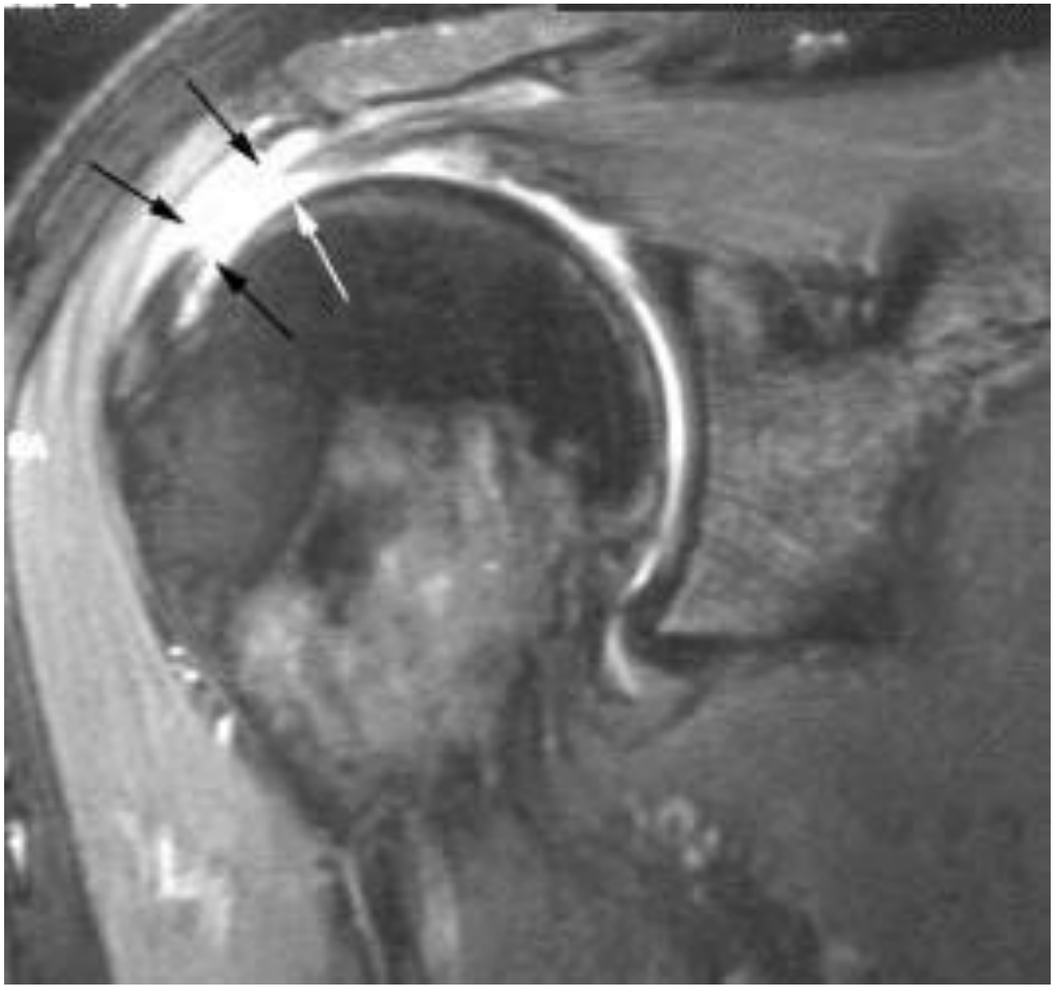






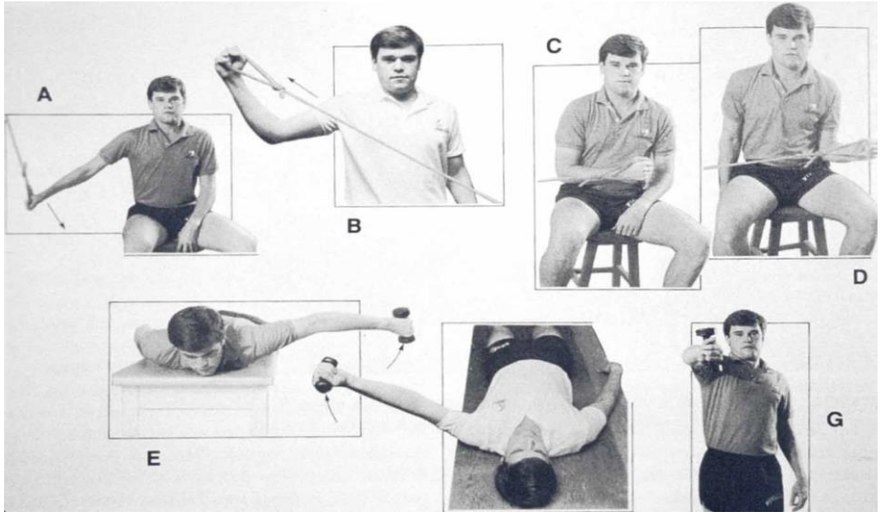
When should you order an MRI? What should you order?

- Management will be affected by the test
- Unclear diagnosis
- Failure to progress
- Surgical planning
- Regional considerations



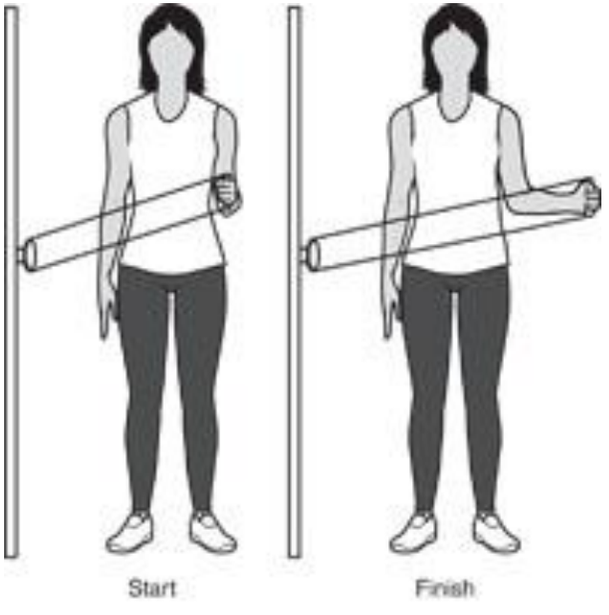
Treatment

- Treatment is **directed by the history and physical** examination.
- Initial goals are to **control pain** and restore pain free **range of motion**; secondary goals are to restore strength and **normal force-coupling**; emphasis on eccentric exercise.
- Surgery as directed by initial assessment and failure to respond to conservative therapy.



The Evidence: Physical Therapy

- Six RCTS extracted from a systematic search.
- Qualitative results of this review suggest **no significant evidence to support the use of specific exercises** over general exercises in a rehabilitative exercise program.



Shire AR et al: Specific or general exercise strategy for subacromial impingement syndrome – does it matter? A systematic literature review and meta analysis. BMC Musculoskeletal Disorders 2017;18;158.

The Evidence: Subacromial Injections

- Subacromial steroid injection may provide a small, short-term benefit compared with placebo. The short-term effectiveness of steroid injection compared with nonsteroidal anti-inflammatory agents (NSAIDs) remains unclear.
- Steroid injections are better than physiotherapy alone in the short term. However, **injection does not appear to provide any meaningful long-term benefit compared with other therapies** (strength of recommendation B):
  - Data are insufficient to make recommendations regarding the proper timing of injection in the sequence of other treatments.
  - Side effects of steroid injection, such as steroid flare and infection, are rare.

Guiterrez G, et al:Does injection of steroids and lidocaine in the shoulder relieve bursitis? The Journal of Family Practice 2004; 53(6).

The Evidence: Platelet Rich Plasma Therapy

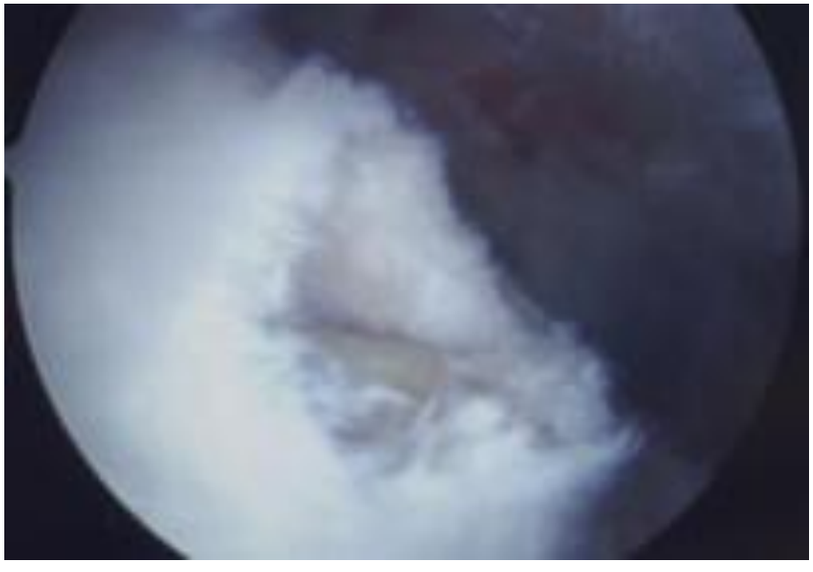
- **AUTHORS' CONCLUSIONS:**
  - Overall, and for the individual clinical conditions, there is currently insufficient evidence to support the use of PRT for treating musculoskeletal soft tissue injuries.
  - Researchers contemplating RCTs should consider the coverage of currently ongoing trials when assessing the need for future RCTs on specific conditions.
  - There is need for standardization of PRP preparation methods.

Cochrane

Moraes VY et al: Platelet-rich therapies or musculoskeletal soft tissue injuries. Cochrane Database Syst Rev. 2014 Apr 29;(4):CD010071.

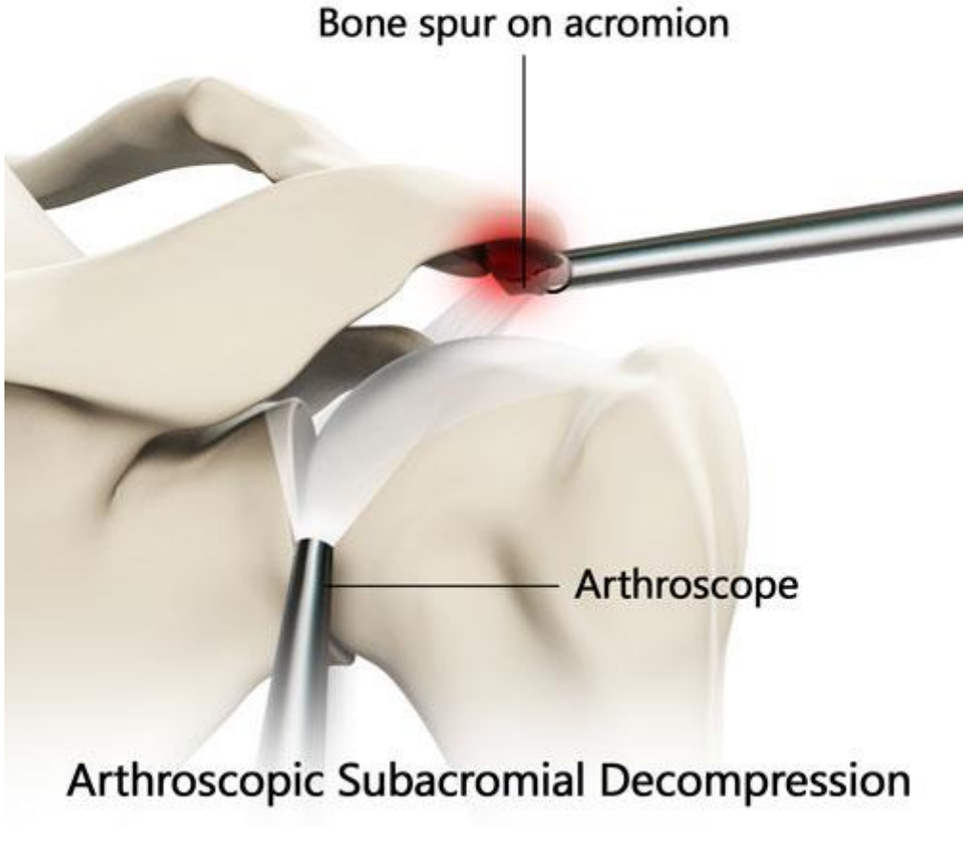
Who to Refer to the Surgeon?

- Obvious full thickness tear
- Unclear diagnosis
- Failure to respond to conservative care
- Progressive atrophy
- Unacceptable quality of life



The Evidence: Surgery

- Evidence suggests **surgical intervention has little, if any, benefit** for impingement pathology in the middle-aged patient.
- Further research is required to identify patents who will benefit from surgical intervention.



Khan M et al: Surgery for shoulder impingement: a systematic review and meta-analysis of controlled trials. CMAJ Open 2019;7(1).

Management of Chronic Tendon Injuries

Shawn F. Kane, MD, University of North Carolina School of Medicine, Chapel Hill, North Carolina
Lucianne H. Olewinski, MD, University of Tennessee College of Medicine, Knoxville, Tennessee
Kyle S. Tamminga, MD, University of North Carolina School of Medicine, Chapel Hill, North Carolina

Chronic tendon injuries are common athletic and occupational injuries that account for many physician visits. Tendons have a complex biology that provides a unique combination of strength, flexibility, and elasticity but also predisposes them to injury. The term tendinopathy is preferred to tendinitis because of the presence of a disordered and degenerative healing process—not inflammation—in the pathologic tendon. Insidious onset of pain and dysfunction is a common presentation for most tendinopathies, and patients typically report that a change in activity affected the use of the tendon. Diagnosis is typically based on history and physical examination findings, but radiography is an acceptable initial imaging modality. Ultrasonography and magnetic resonance imaging may be useful when the diagnosis is unclear. The mainstays of treatment are activity modification, relative rest, pain control, and protection. Early initiation of rehabilitative exercises that emphasize eccentric loading is also beneficial. Despite a lack of high-quality evidence, cryotherapy has a role in controlling pain. Nonsteroidal anti-inflammatorydrugs and corticosteroids have a role in treatment despite the lack of histologic evidence of inflammation. Short-term use of these drugs reduces pain and increases range of motion, which can assist patients in completing rehabilitative exercises. Care should be taken when injecting corticosteroids into and near major load-bearing tendons because of the risk of rupture. Topical nitroglycerin, extracorporeal shock wave therapy, and platelet-rich plasma injections have varying levels of evidence in certain tendinopathies and are additional nonsurgical treatment options. (*Am Fam Physician*. 2019;100(3):147-157.

Illustration by Catherine Delphia

Kane SF, Olewinski LH, Tamminga KS. Management of Chronic Tendon Injuries. Am Fam Physician. 2019 Aug 1;100(3):147-157.

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	Evidence rating	Comments
Corticosteroid injections near areas of tendinopathy are helpful for short-term but not long-term treatment. However, they have a small risk of tendon rupture.[13,25-27,29,31,49,61]	A	Based on clinical review articles and systematic reviews of randomized controlled trials
With consistent use, topical nitroglycerin can reduce tendon pain associated with activity.[25,42]	A	Based on a systematic review and meta-analysis
Extracorporeal shock wave therapy may be beneficial for plantar fasciitis, greater trochanteric pain syndrome, and calcific rotator cuff tendinopathy that are resistant to initial treatment. It has no clear benefit for noncalcific rotator cuff tendinopathy or lateral epicondylitis.[25,32,50,51]	B	Based on clinical review articles and systematic reviews of lower-quality studies
Eccentric exercises are effective for treating rotator cuff tendinopathy, lateral epicondylitis, patellar tendinopathy, and midsubstance Achilles tendinopathy.[13-15,25,31,55,64,67,68,73,79]	B	Based on clinical review articles, systematic reviews of lower-quality studies, and lower-quality randomized controlled trials

A = consistent, good-quality patient-oriented evidence; **B** = inconsistent or limited-quality patient-oriented evidence; **C** = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to https://www.aafp.org/afpsort.

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Adhesive Capsulitis

Adhesive Capsulitis: Diagnosis and Management

Jason Ramirez, MD, University of Maryland School of Medicine, Baltimore, Maryland

Adhesive capsulitis, also known as "frozen shoulder," is a common shoulder condition characterized by pain and decreased range of motion, especially in external rotation. Adhesive capsulitis is predominantly an idiopathic condition and has an increased prevalence in patients with diabetes mellitus and hypothyroidism. Although imaging is not necessary to make the diagnosis, a finding of coracohumeral ligament thickening on noncontrast magnetic resonance imaging yields high specificity for adhesive capsulitis. Traditionally, it was thought that adhesive capsulitis progressed through a painful phase to a recovery phase, lasting one to two years with full resolution of symptoms without treatment. Recent evidence of persistent functional limitations if left untreated has challenged this theory. The most effective treatment for adhesive capsulitis is uncertain. Nonsurgical treatments include nonsteroidal anti-inflammatory drugs, short-term oral corticosteroids, intra-articular corticosteroid injections, physiotherapy, acupuncture, and hydrodilatation. Physiotherapy and corticosteroid injections combined may provide greater improvement than physiotherapy alone. Surgical treatment options for patients who have minimal improvement after six to 12 weeks of nonsurgical treatment include manipulation under anesthesia and arthroscopic capsule release. (*Am Fam Physician*. 2019; 99(5):297-300.

Illustration by Todd Buck

Ramirez J. Adhesive Capsulitis: Diagnosis and Management. Am Fam Physician. 2019 Mar 1;99(5):297-300.

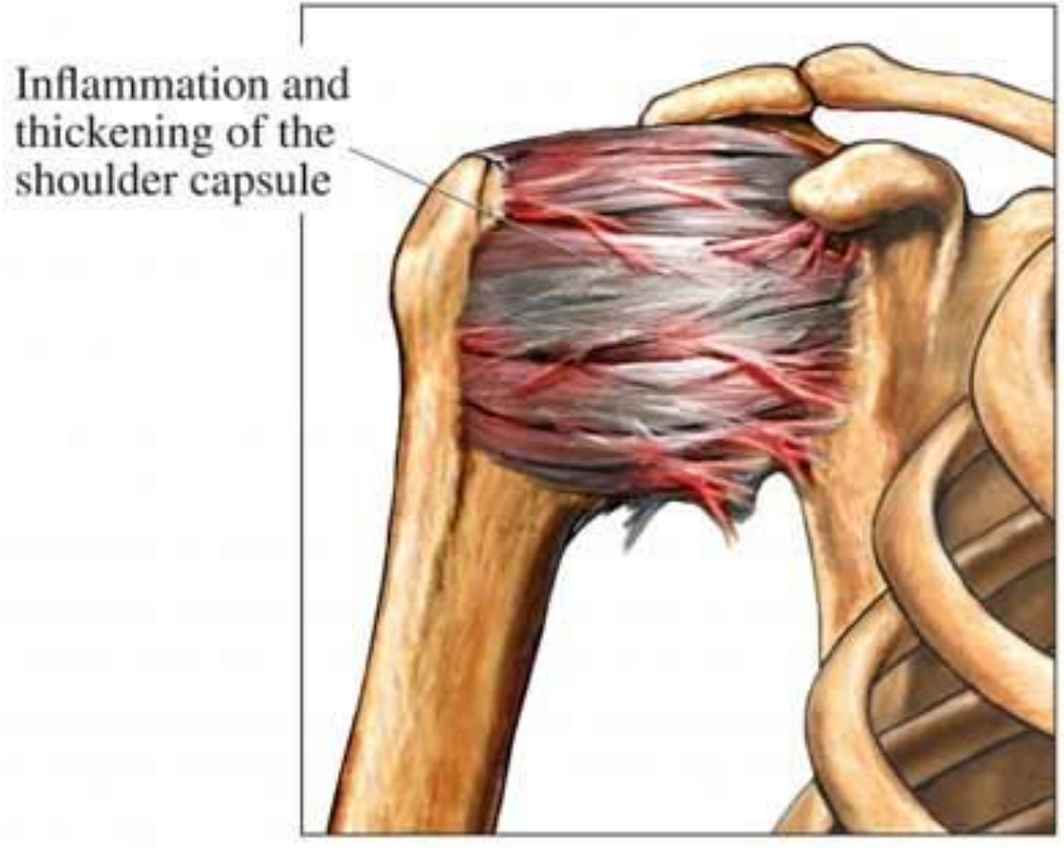
Definition

- **“condition of unknown etiology distinguished by painful restriction of all shoulder movements, both active and passive, characterized by prominent reduction in the glenohumeral range of movement.”**

- **Primary**
- **Secondary**
  - **Intrinsic**
    - Rotator cuff disease
    - Acromioclavicular osteoarthritis
  - **Extrinsic**
    - Cardiac Disease
    - Neurologic Disorders
    - Pulmonary disease
  - **Systemic**
    - Diabetes mellitus
    - Thyroid disease

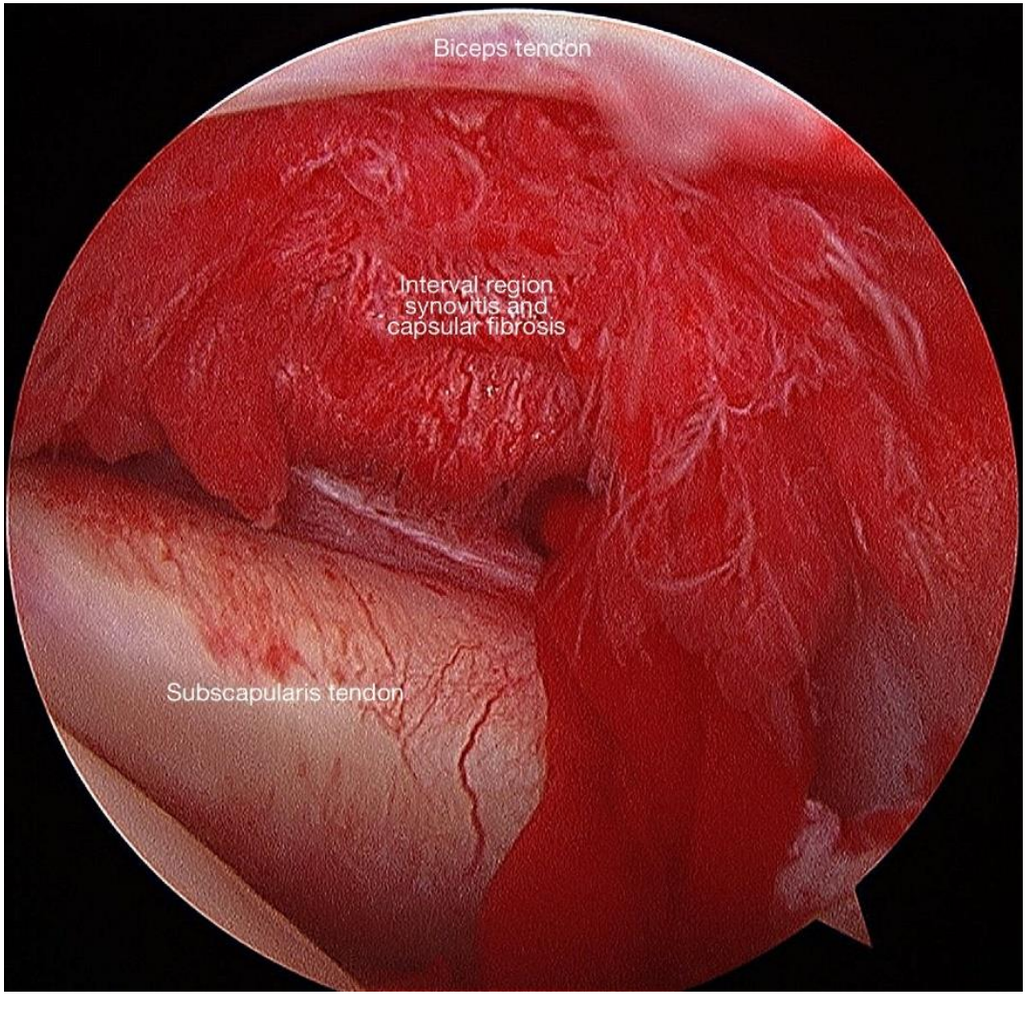
Epidemiology

- **Primary Form**: 2-5% annual prevalence in the general population.
- **Secondary Form**: more common, with nearly 30% of diabetic and neurosurgical patients developing capsulitis.
- **Women** more commonly affected than men.
- Fifth, sixth, seventh decades of life.



Pathogenesis

- **Etiology is unknown**.
  - No evidence arthritis
  - Negative ESR,CRP
  - Negative ANA, RF
- Recent arthroscopic data demonstrates an end stage fibrosis of the anterior capsule at the rotator interval.



Natural History

- **Disease states:**
  - **Freezing**: 10 to 36 weeks; severe pain with gradual loss of motion.
  - **Frozen**: 4 to 12 months, with gradual pain improvement.
  - **Thawing**: 12 months to years; gradual return of motion.

- A 2017 systematic review of seven studies found low-quality evidence that **no treatment yielded some**, but not complete improvement in range of motion after **one to four years of follow-up**.

Natural History

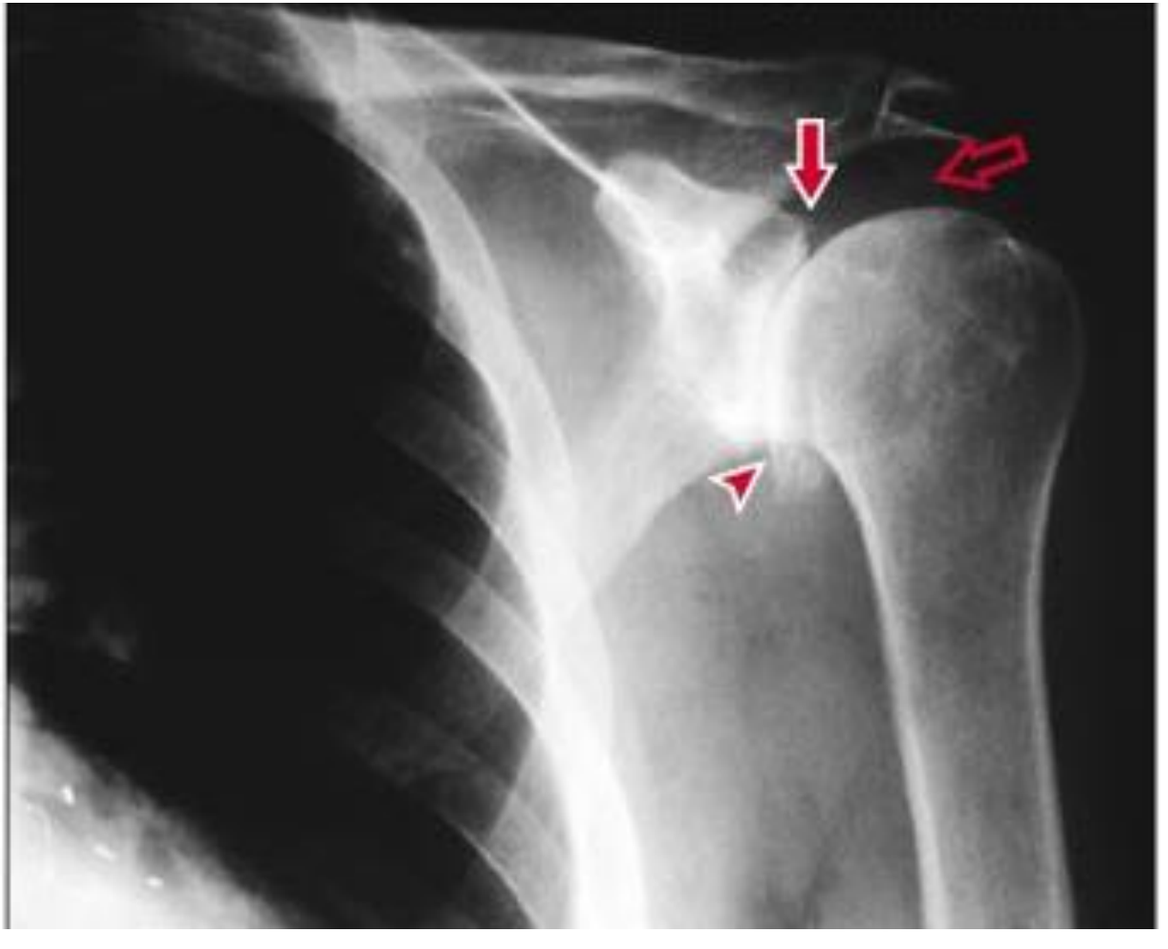
- Initially thought to have a benign prognosis.
- Studies with follow-up approaching 5 years have demonstrated:
  - more than 50% of patients will have a minor loss of external rotation and abduction.
  - 20% demonstrate mild residual pain without loss of motion.
  - 5 to 10% are left with residual pain and a loss of motion.

Clinical Findings

- Poorly localized shoulder pain.
- **Limitation in active and passive ROM**
- Well preserved RTC strength
- R/O referred pain from the neck if presence of neuropathic symptoms.

Differential Diagnosis

- Osteoarthritis
- Fracture of the proximal humerus
- Impingement syndrome
- Shoulder instability
- Tumor
- Myofascial pain



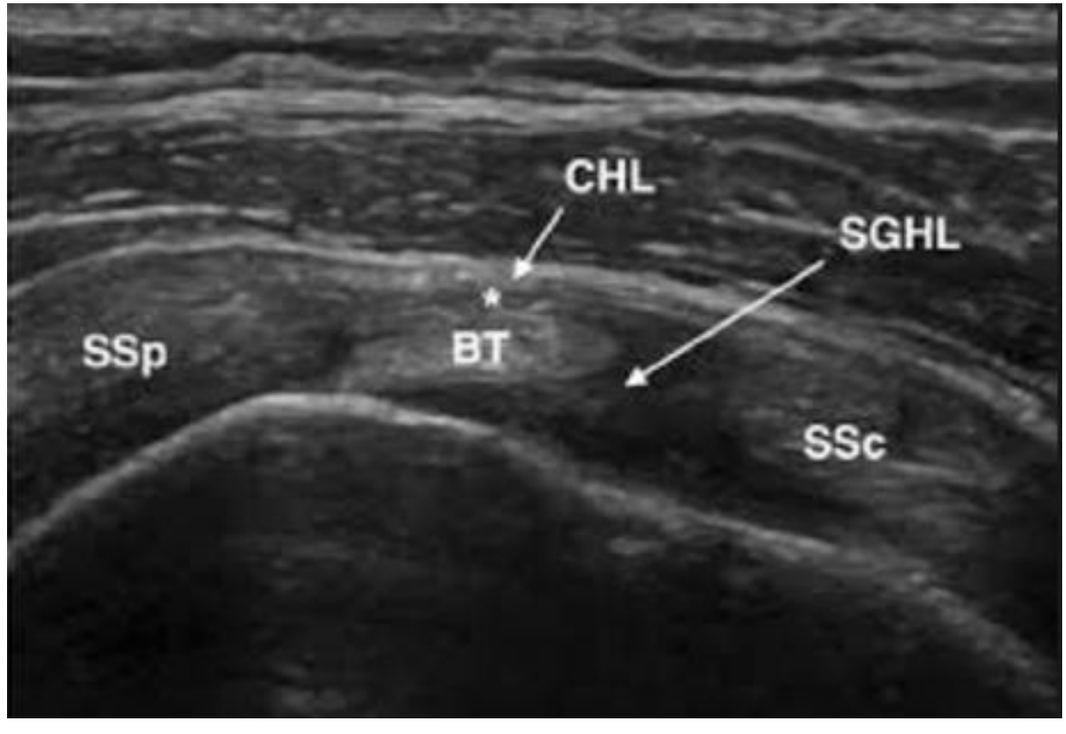
Diagnostic Considerations

- **Clinical Diagnosis**
- Labs to be Considered
  - TSH
  - Fasting glucose
  - HgbA1C

- **Image:**
  - Initial plain films r/o osteoarthritis
  - Bone scan - nonspecific
  - MRI - when:
    - diagnosis unclear
    - r/o other etiologies

Musculoskeletal Ultrasound

- Thickening of the **coracohumeral ligament** and the soft-tissue structures in the rotator cuff interval;
- Increased fluid in the tendon sheath of the long head of the biceps
- **Increased vascularity** around the intraarticular portion of the biceps tendon and the coracohumeral ligament



Management

- Frozen shoulder is a self-limited condition;
- There is little high-quality evidence to guide treatment and consequently no standard management approach exists.

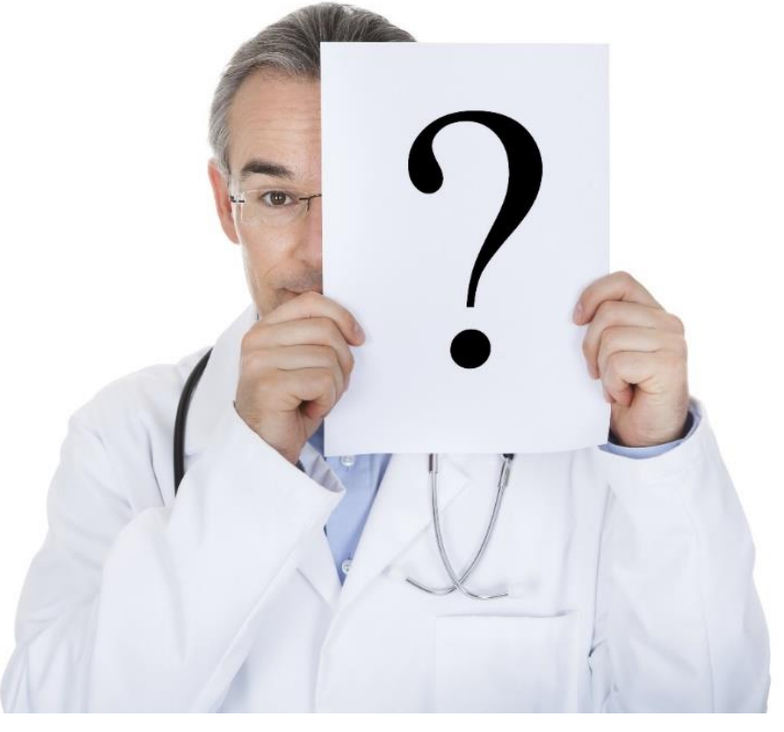
Maund E, Craig D, Suekarran S, et al. Management of frozen shoulder: a systematic review and cost-effectiveness analysis. Health Technol Assess 2012; 16:1.

Treatment Options

- Rest and analgesia
- Active home exercise
- Formal physical therapy
- Oral prednisone
- Corticosteroid injection
- Hydroplasty
- Manipulation under anesthesia
- Surgical capsular release

Physical Therapy

- Although physical therapy is commonly used to treat frozen shoulder, evidence for its effectiveness is limited. **UpToDate 2019.**
- According to a meta-analysis of 32 trials (most of limited quality) involving 1836 participants, the **efficacy of manual therapy or exercise remains unclear,** as most studies reported no clinically or statistically significant differences among treatment groups.



Page MJ, Green S, Kramer S, et al. Manual therapy and exercise for adhesive capsulitis (frozen shoulder). Cochrane Database Syst Rev 2014; :CD011275.

Oral Prednisone

- Oral corticosteroids provide short-term pain relief and improve range of motion in patients with adhesive capsulitis, but the effect may not last beyond six weeks.
- Start at 40 to 60 mg per day, and taper over two to three weeks, 10 mg every 5 to 7 days.

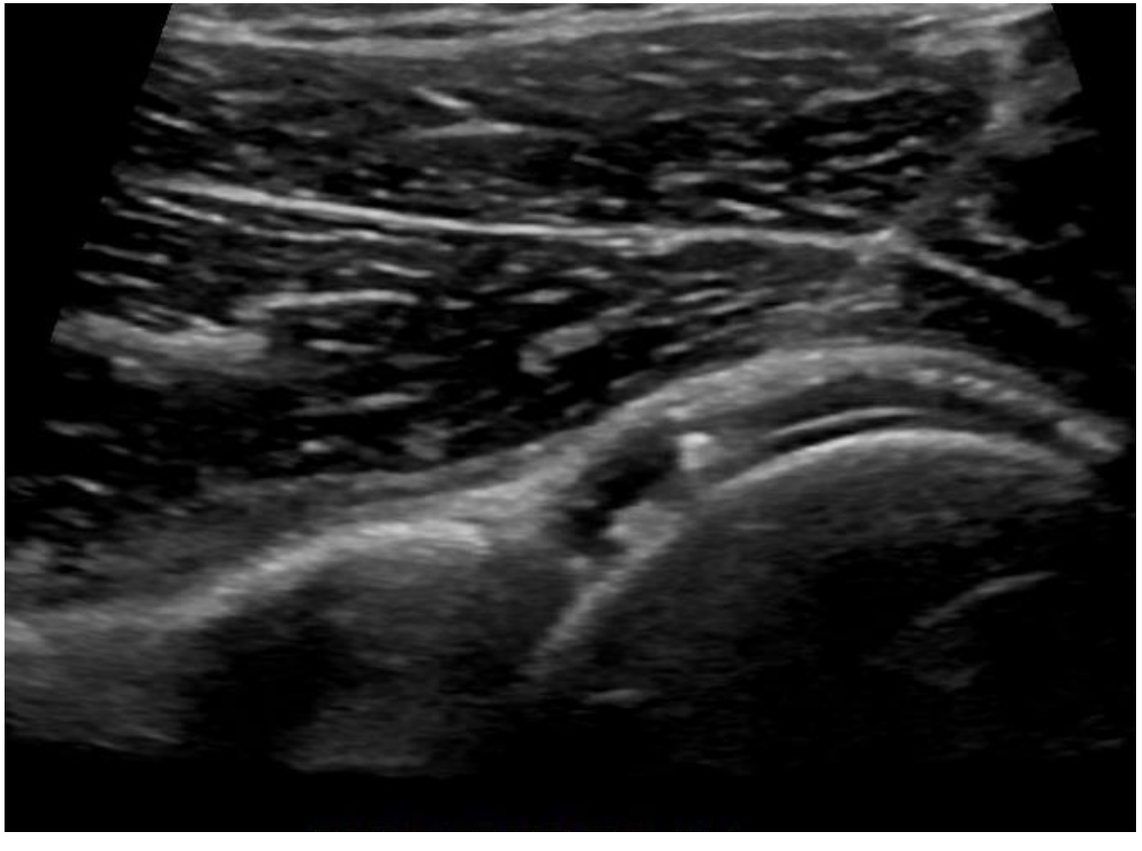
Ewald A: Adhesive Capsulitis: A Review. American Family Physician 2011;83(4):417-422.

Intra-Articular Injections

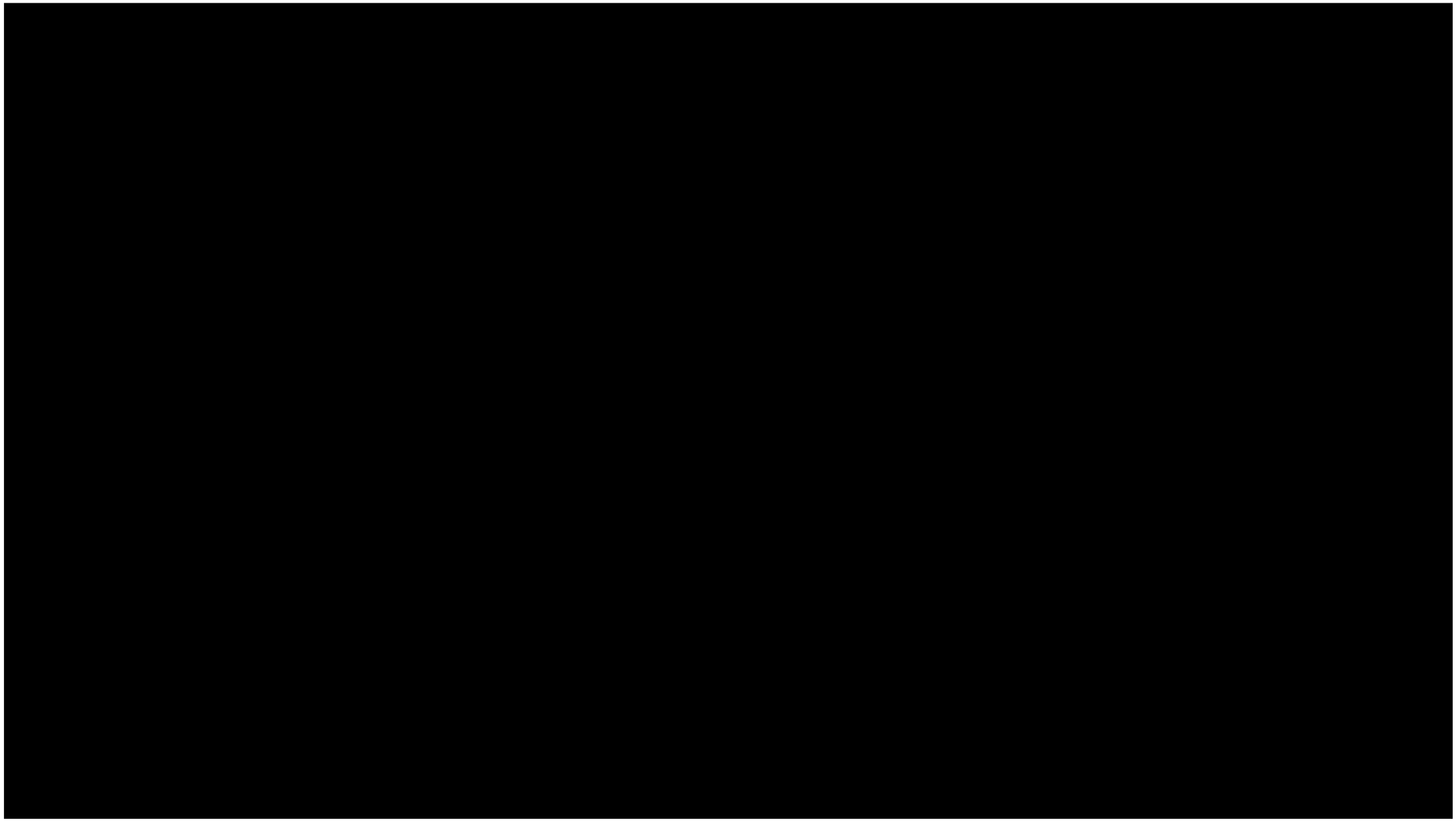
- “Intra-articular glucocorticoid injections appear to be beneficial in the treatment of frozen shoulder, leading to improved range of motion and pain reduction.
- However, the effect is of limited duration.
- Successful treatment probably depends upon the duration of symptoms: patients who receive injections early in their course are more likely to obtain benefit, possibly due to a reduction of synovitis.”
  UpToDate Adhesive Capsulitis 2019

Hydrodilation

- The combination of **hydrodilatation and corticosteroid injection** may potentially expedite recovery of pain free range of motion compared with corticosteroid injection alone, with the **greatest benefit experienced within the first three months of intervention**.



Catapano M, Mittal N, Adamich J, Kumbhare D, Sangha H. Hydro-dilatation with corticosteroid for the treatment of adhesive capsulitis: a systematic review. *PM R.* 2018; 10(6): 623-635.



When to Refer for Surgery?

- **Refer:**
  - RTC FT tear
  - Diagnosis is unclear
  - **No progress in ROM or pain management in 3 months**
- Consideration for **Manipulation under Anesthesia** or **Arthroscopic Capsular Release**

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	Evidence rating	References
Consider testing persons with adhesive capsulitis for diabetes mellitus or hypothyroidism.	C	3, 4
The combination of physiotherapy and corticosteroid injection may provide greater symptom improvement than physiotherapy alone.	B	13
The combination of hydrodilatation and corticosteroid injection may expedite recovery of pain free range of motion compared with corticosteroid injection alone.	B	17

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For Further Information

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