MANAGEMENT OF SHOULDER GIRDLE DISORDERS

- Functional anatomy
- Mechanics
- Impingement Syndrome
- Bicipital Brachii Tendinitis
- Adhesive Capsulitis—Frozen Shoulder
- Scapular Impairment
- Thoracic Outlet Syndrome
- Acromioclavicular Joint Sprains and Degeneration
By

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Objectives

At the completion of this lecture the student will be able to:

1. Describe the anatomy of the joints, ligaments, muscles that comprise the shoulder complex.
2. Describe the biomechanics of the shoulder complex, including muscle force couples, and the static and dynamic stabilizers.
3. Perform a comprehensive examination of the shoulder complex, including history, palpation of the articular and soft-tissue structures, specific passive mobility tests, and special tests.
4. Evaluate the key findings from the examination data to establish a physical therapy diagnosis and prognosis.
5. Summarize the various causes of shoulder dysfunction.
6. Evaluate the intervention effectiveness to determine progress and modify an intervention as needed.
7. Plan an effective home program and instruct the patient in its use.
Functional anatomy

Components of shoulder complex
1-Clavicle
2-humerus
3-scapula
4-manubrium of the sternum
5-first costal cartilage
Articulations
These components are linked and form three synovial joints, which are:

1. Glenohumeral (GH) joint
2. Acromioclavicular (AC) joint
3. Sternoclavicular (SC) joint

Additionally, a functional non-synovial articulation called the **scapulothoracic joint** (ST joint) is considered as a part of the shoulder complex.
**Glenohumeral Joint**

Shoulder joint (GH joint) has **more mobility than stability**.

Shallow ball and socket joint (golf ball on a tee)

The humeral head, in the anatomic position, faces medially and superiorly.

The head forms almost half a sphere

- The glenoid cavity faces laterally, Forward(pear-shaped)
- Glenoid labrum serves to deepen the glenoid cavity
**Articular capsule:**
It completely encircles the joint, being attached, above, to the circumference of the glenoid cavity beyond the glenoidal labrum; below, to the anatomical neck of the humerus. It is thicker above (superior) and below (inferior) than elsewhere, and is so remarkably loose and lax.

**Ligaments:**
- Glenohumeral (superior, middle, inferior)
- Coracohumeral
- Coracoacromial
- Transverse humeral
- **Coracoacromial arch**
  - a protective arch formed by the acromion and the coracoid process of the scapula with the coracoacromial ligament spanning between them, preventing upward displacement the head of the humerus from the glenoid fossa.
The rotator cuff muscles

There are 5 muscles: (SITS)

1. Supraspinatus
2. Infraspinatus
3. Teres minor
4. Subscapularis
5. Long head of biceps

Function – centralizing and stabilizing the humeral head within glenoid fossa
**Periscapular muscles**

- **Muscles from the scapula to the trunk**
  
  This group of muscles have the function of moving the scapula in relation to the thoracic cage. They are:
  - Pectoralis minor - depresses shoulder
  - Serratus anterior - protracts scapula
  - Levator scapulae - elevates scapula
  - Rhomboids - retracts scapula
  - Trapezius - elevate, depress, retracts, medially rotates scapula

- **Muscles from the scapula to the arm**
  
  These muscles move the humerus in relation to the scapula. They are:
  - Coracobrachialis- flexes glenohumeral joint
  - Teres major - Extends, adducts and medially rotates
The shoulder is stabilized by both static and dynamic stabilizers, which work in synchrony to maintain shoulder stability in performing the extreme activities required by the shoulder in sports and heavy manual work.

The static stabilizers comprise:

- Labrum
- Capsule
- Ligaments
- Bones.
The dynamic stabilizers are:

1- The muscles
   - the muscles of the shoulder are divided into the scapular muscles which transfer energy generated from the trunk and lower limbs into the arm
   - and the rotator cuff muscles which are the fine tuning muscles maintaining the center of rotation of the humeral head.

2- proprioceptive effects: it has been shown that the glenohumeral joint capsule has numerous mechanoreceptors particularly within the anterior and inferior capsule
Scapulohumeral Rhythm

- The full range of shoulder motion normally is combination between the motion in glenohumeral and scapulothoracic joint.
- A natural rhythm/ratio between GH joint and scapulothoracic joint --- **2:1**
- That’s means for every 2 deg of shoulder abduction/flexion, the scapula must upward rotate roughly 1 deg. (vice versa for adduction/extension)

- The full ROM of shoulder abduction/flexion= 180 deg, which combination between 120 deg shoulder abduction/flexion (glenohumeral joint) + 60 deg scapular upward rotation (scapulothoracic joint).
**Muscular Force-Couple**

- The rotator cuff muscles act with the deltoid muscle in a force couple mechanism during elevation to guide the humerus in its movement on the glenoid cavity.

- The force of elevation, together with active inward and downward pull of the short rotator muscles, establishes the muscle force-couple necessary for limb elevation.

- Disruption leads to compensation and breakdown
Impingement Syndrome

- The impingement symptom complex primarily involves the coracoacromial arch intruding on the rotator cuff, subacromial bursa, or biceps tendon.
The spectrum of problems caused by impingement can range from subacromial bursitis to full thickness rotator cuff tears.

Overuse is an important factor in most cases.

**Classification**

**Primary ( hypomobile )**
- Is an irritation at the bursal side of rotator cuff tendons.
- Is thought to arise from repetitive or excessive contact of the rotator cuff tendons with other anatomic structures in the shoulder.
Secondary (hypermobile) is described as micro instability leading to difficulty keeping the humeral head centered on the glenoid fossa during movement. This can be due to impairment of:
1- static stabilizers (labrum, capsular ligaments),
2- dynamic stabilizers (weakness of the rotator cuff muscles),
3- scapular stabilizers.

**Internal impingement** of the undersurface of the rotator cuff against the posterior aspect of the labrum in maximum lateral rotation and abduction.
Evaluation

• I. History

• A. Site of pain. Lateral brachial region, possibly referred below to the elbow in the C5 or C6

• B. Nature of pain. Sharp, felt on various movements, such as abduction, putting on jacket, or reaching above shoulder level.

• In Bursitis: constant, dull pain with all movements are reported to be painful.

• C. Onset of pain. Usually gradual with no known trauma, may have been present for many months, or even years.

• In Bursitis: acute pain, however, usually arises during a period of 12 to 72 hours with History of a chronic tendinitis.
II. Physical Examination

A. Observation

• 1. Postural assessment (i.e., forward head, rounded shoulders, flattening of thoracic spine).
• 2. Antalgic movement patterns with dressing activities
• 3. Scapulohumeral rhythm
• 4. Some atrophy may be noted if chronic

• **In Bursitis**: Often unremarkable; possibly some visible swelling laterally at the side of the bursa
B. Palpation

- Tenderness, usually over the involved tendon near its insertion. Usually referred tenderness over the lateral brachial region.

- Soft tissue crepitus may be palpable in patients with degeneration of the rotator cuff and a bony crepitus in patients with osteoarthritis.

- **In Bursitis**: Possibly some warmth and swelling of the region overlying the subdeltoid bursa; usually considerable tenderness in this area.
C. Passive movements

- Pain at full elevation, but full range of motion is usually present.
- May be pain on stretch of the involved tendon (e.g., on full internal rotation in the case of supraspinatus or infraspinatus tendinitis).
- **In Bursitis:** Restricted by pain in a non capsular pattern with an “empty” end feel; no resistance is felt to movement.

D. Active movements

- Often a painful arc is present at midrange of abduction.
- **In Bursitis:** Marked restriction in all planes with evidence of severe pain on attempts to elevate the arm.
E. Special tests

- 1-HAWKINS-KENNEDY IMPINGEMENT TEST

- 2-NEER IMPINGEMENT TEST
A, Painful arc of the glenohumeral joint. In the case of acromioclavicular joint problems only, the range of 170° to 180° would elicit pain. B, Note the impingement causing pain on the right at approximately 85°.
SUPRASPINATUS TEST ("EMPTY CAN" OR JOBE TEST)

DROP ARM TEST.
III. Management.

- **Goals:** Decrease pain and swelling, restore shoulder ROM/flexibility then restore strength, safely return to functional activities (e.g., sport, hobbies, work), and educate effective HEP.

**Treatment:**

1. **Modalities:**
   - Cryotherapy (ice pack, ice bath, ice massage)
   - moist heat
   - Therapeutic ultrasound and low level laser have been theorized to help with pain relief as well as healing of the damaged tendon.
2. Manual therapy:

- Transverse friction massage
- Glenohumeral and scapulothoracic mobilization to restore shoulder ROM, (inferior and posterior glides, or distraction to assist with shoulder elevation, abduction, and flexion.)
Inferior glide.

Posterior glide.

Glenohumeral distraction.

Scapulothoracic mobilization.
3. Specialized techniques: Trial of Kinesio Taping®

4. Therapeutic exercise:
   - ROM: start with pendulum, Codman, and wall climbing exercises in pain-free ROM, P/A/AAROM at shoulder in all planes
   - Stretching: especially pectoralis minor
Active-assisted shoulder abduction.

Active-assisted shoulder external rotation.

Codman’s pendulum.
Pectoralis minor stretch

Towel stretch.

Sleeper stretch.

Cross body stretch.
**Strengthening:**

1. Scapular stabilizers including lower trapezius, middle trapezius, and SA should be initial focus of strengthening program.

2. Rotator cuff strengthening: Start without elevation and advance with elevation as tolerated in 30/30/30 (30 degree flexion, 30 degree abduction, 30 degree external rotation) in the plane of the scapula (“scaption”) in this position the electromyographic output of the supraspinatus is greatest.

The key to rotator cuff rehabilitation is to provide a pain-free environment for revascularization of the tendons of the rotator cuff.
• In cases of tendinitis there is a tendency toward muscle atrophy from reflex inhibition or disuse, and this is often a factor in prolonging the pathologic process.

• A strong rotator cuff assists in depression of the scapula and the humeral head in the glenoid during overhead activities. It is therefore important to attain a strong rotator cuff before initiating shoulder elevation above 90°. Range of motion can be increased gradually as long as impingement is avoided.
Diagonal exercise or the upper extremity.

start with isometrics for internal and external rotators, As range of motion improves and healing progresses, the patient is graduated to isotonic exercises for the rotator cuff muscles with manual resistance, free weights, or elastic tension cord resistance, Diagonal exercise of the upper extremity (PNF)

Diagonal exercise or the upper extremity.

Isometric chair push-ups.
Resisted shoulder horizontal abduction

Resisted eccentric shoulder external rotation.

Resisted empty can exercise.

Resisted full-can exercise.
• Closed-chain training enhances static stability by facilitating compression of the glenohumeral capsule and stimulating joint receptors to provide static control.

• Traditional closed-chain exercises provide an external fixed motion apparatus or use the patient’s body as the external resistance (i.e., basic push-offs and push-ups)

**Push-up plus.**

**Push-offs**
The nontraditional closed-chain exercises include the use of a dynamically fixed distal segment (e.g., dynamic push-ups on ball(s), hand gait on a treadmill, and hand stair climber),

Forward flexion closed kinetic chain exercises with a ball against wall (unstable).
Push up on (A) a Bosu Ball®, (B) small ball using one hand, (C) big ball, and (D) small ball using two hands for proprioception.
Patient education:
Strategies on proper technique for using the shoulder to minimize pain

- A-One practical recommendation for the patient is to work and exercise the shoulder using a “thumbs up” position in the scapular plane (scaption).

- B-The importance of posture correction help maximize the outlet space during shoulder motion, which in turn can minimize symptoms of impingement.
• C – Strategies that can be helpful include not sleeping directly on the affected shoulder to avoid pressure over the painful area and putting a pillow or towel underneath the arm to minimize adduction of the shoulder.

• The adducted position increases tension of the supraspinatus tendon resulting in decreased vascularity, This is known as the “wringing out” phenomenon and is thought to contribute to degeneration of the tendon.

• This position also decreases the subacromial space which may contribute to impingement.

• Reevaluation: in 4 weeks by referring physician.
Bicipital Brachii Tendinitis

• The most common cause of bicipital tendinitis actually results as a secondary involvement of the biceps after primary impingement or tearing of the rotator cuff because of its long intra-articular course.

• Injury to the biceps brachii often occurs from repetitive overuse during rapid overhead movements involving shoulder abduction and external rotation and excessive elbow flexion and supination activities, such as those performed by pitchers, racquet sports players, and swimmers.

• Bicipital tendinitis may also be associated with a partial subluxation of the tendon or laxity of the transverse humeral ligament.
Evaluation

I. History

• A. Usually significant history of tendinitis (previous injection therapy) cuff disease, or impingement syndrome.

• B. Nature of pain. Vague pain in the region of the anterior shoulder joint, proximal humerus and tendon

• C. Subluxation or dislocation. Sensation of popping or catching during arm rotation.

II. Physical Examination

• A-Inspection

  1. Ecchymosis

  2. Palpable visible gap in muscle belly (complete rupture)
3. “Popeye” deformity in proximal long head ruptures (distal movement of the muscle mass)

B-Palpation.

Tenderness and crepitus over the bicipital groove; the findings move laterally with external rotation or medially with internal rotation; anterior cubital fossa (distal rupture).

C. Passive movements.

There may be pain with passive stretching of the biceps in shoulder hyperextension with elbow extension and forearm pronation.
D-Active movements.

- Pain with shoulder internal and external rotation. In internal rotation, the pain stays medial; in external rotation, the pain is located in the midline or just lateral to the groove.

E. Resistive movements and special tests.

- Increase pain with resistance of shoulder flexion.

- positive Yergason’s test.

- Speed’s test
III. Management.

- Surgery for subluxation or dislocation: repair of the transverse humeral ligament. Tenodesis for all distal and proximal ruptures in younger, more athletic patients.

**In the absence of a rupture consider the following:**

- A. Initial: Ice, rest, and anti-inflammatory medications. Rest of approximately a week may be needed followed by gradual progression back to activity.
- B. Friction massage to the long head of the biceps. *(This lesion responds well to deep friction.)*
C. Re-strengthening the internal and external rotators while avoiding horizontal abduction. Shoulder elevation and elbow curls with the shoulder elevated with emphasis on the eccentric phase.

D. Counterforce bracing to proximal biceps belly.
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Thanks

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