

## What Now? Shoulder Treatment after diagnosis

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### Presentation Goals

- Review the roles of the RTC and scapular muscles.
- Discuss **non operative rehabilitation** of shoulder pathologies and determine the most **effective and specific exercise program**.
- Explore how **cervical and thoracic treatment** benefits shoulder pathologies.

### Why is this important<sup>1/2</sup>

- Shoulder pathologies are **second** only to back pain in prevalence of musculoskeletal conditions.
- Effective shoulder treatment is based on understanding shoulder mechanics.

### RTC Role<sup>1</sup>

The **supraspinatus**....

1. Provides glenohumeral compression.
  2. Counters deltoid superior humeral head translation.
  3. Primary movement is abduction.
  4. Provides a small amount of ER above 90°.
- \*The supraspinatus EMG activity is highest below 60° of scaption.

## RTC Role<sup>1</sup>

The **infraspinatus** and **teres minor**...

1. Provide glenohumeral compression.
2. Resistance to superior and anterior humeral head translation.  
\*Minimizes subacromial impingement and capsular strain during movement.
3. Primary movements are extension and ER.  
\*These muscles provide the most amount of ER force below 60° of abduction.

## RTC Role<sup>1</sup>

The **subscapularis**...

1. Provides glenohumeral compression.
2. Primary movement is IR, extension, adduction.
3. Resistance to superior humeral head translation ► **enhancing anterior shoulder stability.**

## RTC Role<sup>1</sup>

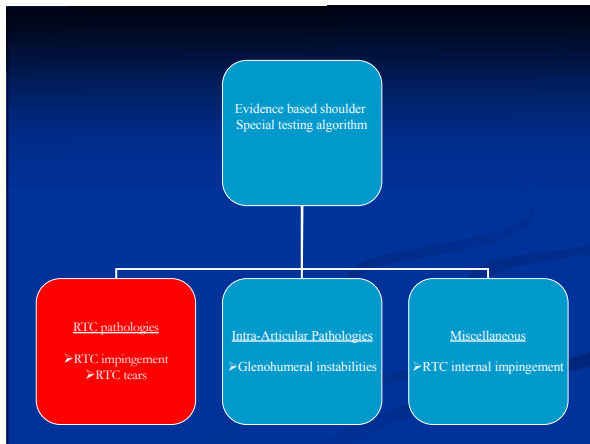
The **deltoids**...

1. Flex, abduct, and extend the arm.
2. Powerful scaption plane abductors between 60° to 90°.  
\*Anterior/middle deltoid produce superior humeral head translation.  
\*Posterior deltoid stabilizes without causing humeral head migration.

## Scapulothoracic Role<sup>1/2</sup>

The **scapulothoracic** muscles promote proper scapulohumeral rhythm of the glenoid and humeral head.

- **Serratus anterior:** Stabilizes the medial and inferior border of the scapula preventing winging (IR) and anterior tilt.
- **Lower trapezius:** Depresses the scapula and decreases impingement risk by countering the upper trap pull.



### RTC pathologies<sup>3</sup>

- Altered shoulder kinematics.
- Increased superior humeral head translation.
- Decreased subacromial space.

An anatomical illustration of a human shoulder joint, showing the humeral head, scapula, and clavicle. A red highlight is placed on the subacromial space, indicating the area of concern for RTC pathologies.

### RTC Pathologies: Impingements<sup>1/4</sup>

- RTC impingements (Neer stage I-II) account for up to 60% of all shoulder pain.
- RTC Impingements involve degeneration and/or mechanical compression of the subacromial structures.
  - These structures are the RTC tendons, long head of the bicep, and the subacromial bursa.

\*Responds well to non operative treatment.

### RTC pathologies: Tears<sup>1/4</sup>

- RTC tears (Neer stage III-IV) can occur naturally after the 3<sup>rd</sup> decade or from a sudden trauma.
- Determining the degree of RTC tear will direct whether the patient is a referral or conservative treatment case.
  - \*Large RTC tears result in 50% reduction in muscle strength when compared to the uninvolved side.<sup>3</sup>

## RTC pathologies<sup>1/3</sup>

- Treatment of RTC pathologies begins with addressing the involved **RTC muscles with specific exercises**.
- Address any capsular restriction with the appropriate GH joint mob.
- **Minimize** superior shear force of anterior/middle deltoid.

## RTC Role<sup>1</sup>

The best **supraspinatus** exercises are....

1. Full can with scapular retraction below 60°.
  - \*Highest supraspinatus EMG activity.
  - \*Avoid empty can exercises.
2. Prone full can (advanced)
  - \*Minimal middle deltoid activation.
3. High muscle activity in rows and push ups.

## RTC pathologies<sup>1</sup>

The best **infraspinatus/teres minor** exercises are....

1. Sidelying ER with a towel role
  - \*Highest EMG activity without capsular strain or muscle substitution.
2. Prone ER at 90° abduction.
3. Standing ER at 45° scapular abduction.

## RTC pathologies<sup>1</sup>

The best **subscapularis** exercises are....

1. IR at 0° degrees abduction (stable)
  - \*Subscapularis to be assisted by the pec major, lats, and teres major.
2. IR at 90° of abduction (less stable).
  - \*Maximizes subscapularis recruitment.
3. Push up plus on a ball>wall.
4. Dynamic hug exercises or D2 PNF.

## RTC pathologies

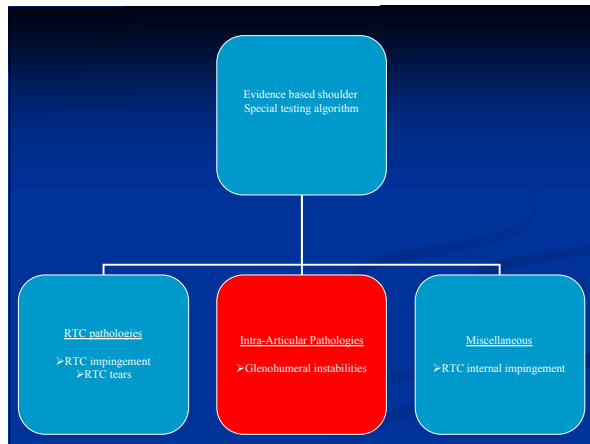
The best **posterior deltoid** exercises are....

1. Prone full can.
2. Prone ER with the shoulder at 90° abduction.  
\*Avoid Empty Can exercises.

## RTC pathologies<sup>1</sup>

**Scapulothoracic** muscles....

- The best **serratus anterior** exercises are:
  1. Push up plus on physio ball.
  2. Dynamic hug
  3. Serratus punch at 120°.
- The best **lower trapezius** exercises are:
  1. Prone full can.
  2. Prone ER at 90° abduction.
  3. Prone horizontal abduction at 90° ER.



## Intra-Articular Pathologies<sup>2/4</sup>

- After diagnosis decide if patient is a **referral** or **conservative candidate**.
- Briefly review the mechanism of I-A pathologies.

## Static shoulder stabilizers<sup>2</sup>

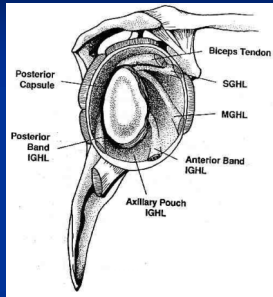
**Labrum:** fibrocartilagenous rim

**Superior GHL:** limits anterior and inferior translation.

**Medial GHL:** limits anterior translation.

**Inferior GH complex:** restrains anterior, posterior, and inferior humeral head translation above 45° abduction.

\*Damage to the labrum or any capsular ligaments results in shoulder instability.



## Intra-Articular Pathologies<sup>2/4</sup>

### ■ Mechanisms of injury:

- Traumatic unidirectional Bankhart Surgery (TUBS)
- Atraumatic multidirectional bilateral rehabilitation inferior capsular (AMBRI)

## Intra-Articular Pathologies<sup>2/4</sup>

### ■ Non operative Treatment for shoulder I-A pathologies focuses on....

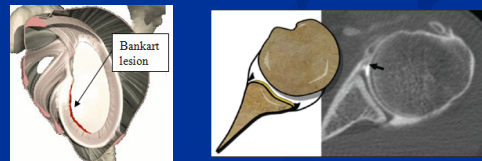
1. Enhancing compression of the humeral head on the glenoid.
2. Restoring scapulothoracic symmetry and proprioception to avoid recurrences.
3. Activity restriction for a period of time.

\*For traumatic instabilities it has been advised to avoid IR sling immobilization.

## Intra-Articular Pathologies<sup>2/4</sup>

### ■ Bankhart lesion: Anterior instability

- Avulsion or detachment of the anterior portion of the inferior glenohumeral ligament complex and glenoid labrum off the anterior rim of the glenoid.



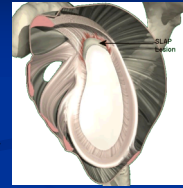
## Intra-Articular Pathologies<sup>2/4</sup>

### Bankart rehabilitation

1. Scapular stabilization are vital due to increased dependence on dynamic stabilizers.
  - \*Scaption, protraction, retraction, and seated press ups exercises.
2. RTC muscle strengthening to address deficits.
  - \*Perform exercise primarily in the scapular plane to decrease anterior shoulder stress.
  - \*Focus on infraspinatus/teres minor exercises.
  - \*Avoid combined abduction and ER positions.
  - \*Avoid abduction exercises for 6 weeks.

## Intra-Articular Pathologies<sup>2/4</sup>

- **SLAP** lesion: Types I-VIII
  - The tear extends both anterior and posterior to the biceps tendon attachment.
  - These occur from either repetitive overhead overuse or trauma.
  - Type II is most common. An avulsion of the superior labrum and long head of biceps tendon from the glenoid.
    - \* Occurs from fall on outstretch arm or lateral shoulder.
    - \* Do not respond well to non surgical management.



## Intra-Articular Pathologies<sup>2/3</sup>

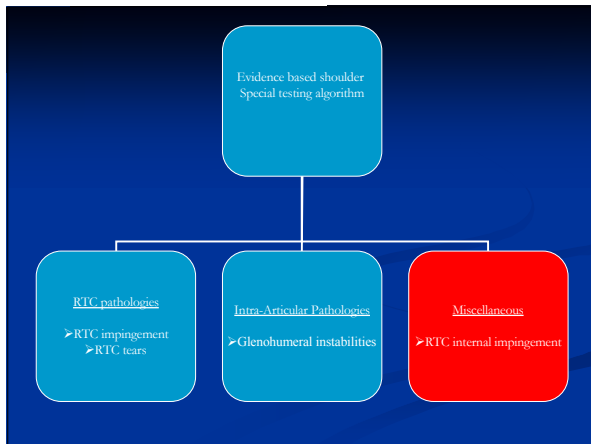
### SLAP rehabilitation...

1. Scapular stabilizers are key
2. RTC strengthening to decrease scapular IR and provide stability to the humeral head.
  - \*Focusing on shoulder IR strength (subscap).
3. If any joint restrictions exist apply GH mobilizations.
  - \*IR loss common for Type II lesions.
4. Progress exercises into instability positions.

## Intra-Articular Pathologies<sup>2/4</sup>

### Posterior instabilities: Reverse Bankhart lesion

1. Scapular stabilizers are key.
2. RTC muscle strength, especially ER (infraspinatus/teres) and posterior deltoid.
  - \*Avoid end ranges of flexion, IR, and horizontal adduction (risk redislocation).
  - \*Non operative results for posterior instabilities < anterior instabilities.



### Miscellaneous RTC<sup>3</sup>

- **Internal impingement**
  - Pinch of the undersurface of the RTC muscles between the greater tuberosity and the glenoid rim at end ranges of shoulder abduction and ER.
  - Seen in **overhead athletes** with a **decreases in IR** due to posterior capsular hypomobility.
  - Non operative treatment successful if it addresses the **underlying GH laxity**.

*\*This impingement is associated with anterior instability due to posterior capsular stiffness.*

### Miscellaneous RTC 3

**Internal impingement** rehabilitation....

1. RTC muscle strengthening to address deficits.
  - \*Focus on infraspinatus/teres minor exercises.*
2. Scapular stabilizers.
3. Address any posterior GH hypomobility.

### Cervical and Thoracic Treatment<sup>5</sup>

- **Regional interdependence:**
  - the concept that “seemingly unrelated impairments in a remote anatomical region may contribute to the patient’s primary complaint”.
  - \*Treat impairments away from the primary source of pain.*

## Cervical and Thoracic Treatment<sup>5</sup>

This is beneficial to shoulder patients because...

Cervical/thoracic joint mob/manipulation alters mechanoreceptor activity resulting in decreased neural inhibition and increased muscle strength.



## Cervical and Thoracic Treatment

- Schnieder et al. found that ipsilateral mobilization of restricted facet joints C5-C7 increased patient ER.<sup>6</sup>
- McClutchive et al. suggest that C5-C7 ipsilateral mobilization of an asymptomatic c-spine decreased reported shoulder pain and increased AROM.<sup>7</sup>

## Cervical and Thoracic Treatment

- Cleland et al. reported that manipulation of T6-T12 increased middle and lower trap strength.<sup>8</sup>
  - The article suggests that poor thoracic extension is associated with decreased shoulder flexion.
    - \*Improving thoracic extension can have an immediate impact on shoulder ROM.
- Boyles et al. found significant decreases in shoulder impingement pain and disability with CT and thoracic manipulations.<sup>9</sup>

## Cervical and Thoracic Treatment

- Bergman et al. found that C-spine and thoracic manipulation and RTC exercises over a 12 week period significantly improved shoulder outcomes vs. exercises only.<sup>10</sup>

## Cervical and Thoracic Treatment

- Literature review shows that manipulation and mobilization techniques to the cervical and thoracic spine can **accelerate shoulder recovery**.<sup>5-10</sup>
- This can be an important addition to shoulder treatment.  
\*Protect shoulder during any manipulation.<sup>10</sup>

## Questions?



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## References

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