Cleveland Clinic
Sports Health

Scapular Dysfunction in the Throwing Shoulder

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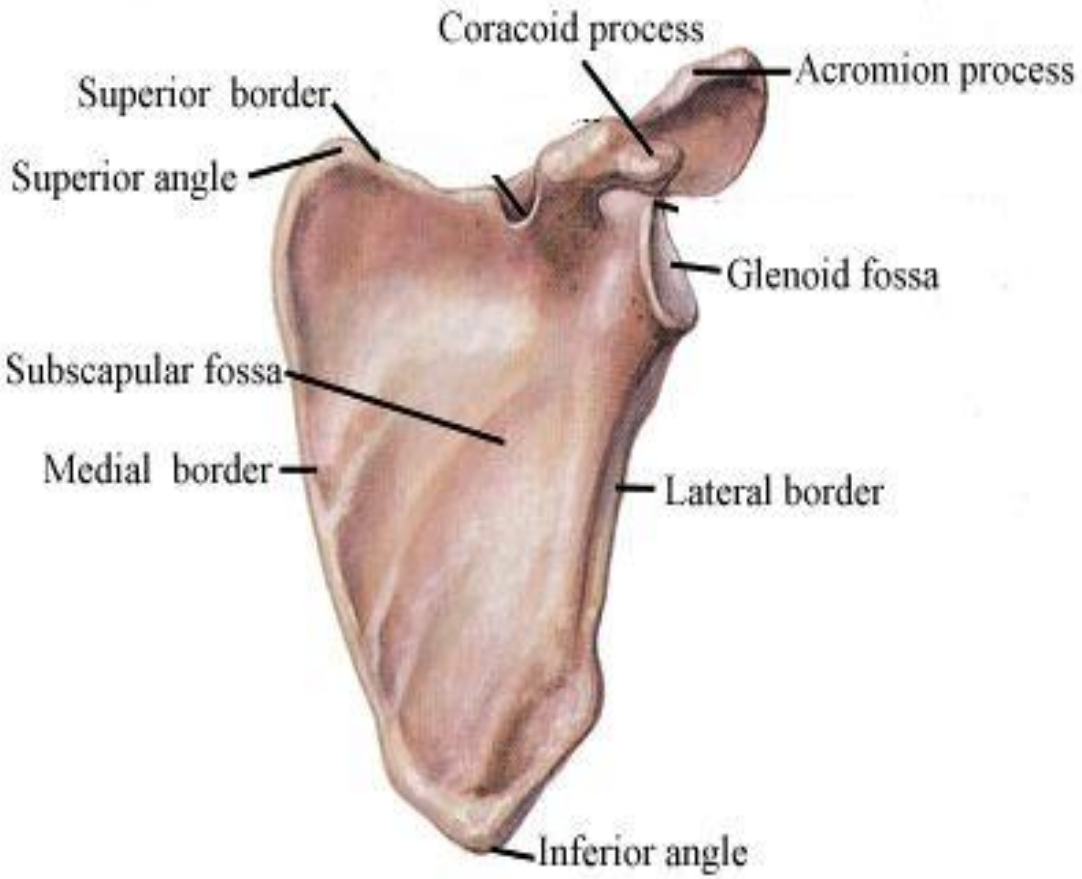
Baseball Medicine I NYC I Nov 2020

The Scapula

- A Congruent Socket
- A Transfer Link
- A Stable Base

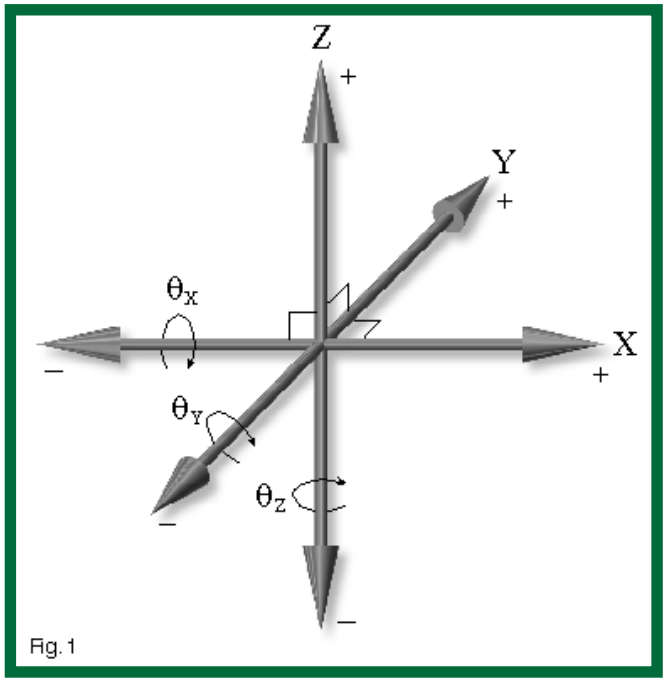


Scapular Function in Throwing

1. Scapula collects energy from the trunk & transfers it to the arm
2. Must retract & protract around thoracic wall for cocking/acceleration to deceleration
3. Proper timing vital
4. Glenoid must be positioned & stabilized for the humeral head to remain stable

Role of the Scapula

- Scapular movement maintains line of pull and length tension relationship of the rotator cuff.
- Allows for joint compression with minimal humeral head translation.



Role of Scapula

- Maintain dynamic stability with controlled mobility (Stable Platform)
- Base of muscle attachment
- Link in proximal-distal transfer of energy

Developing the maximal efficiency state to maintain ball and socket kinematics with large loads, forces and strains imposed

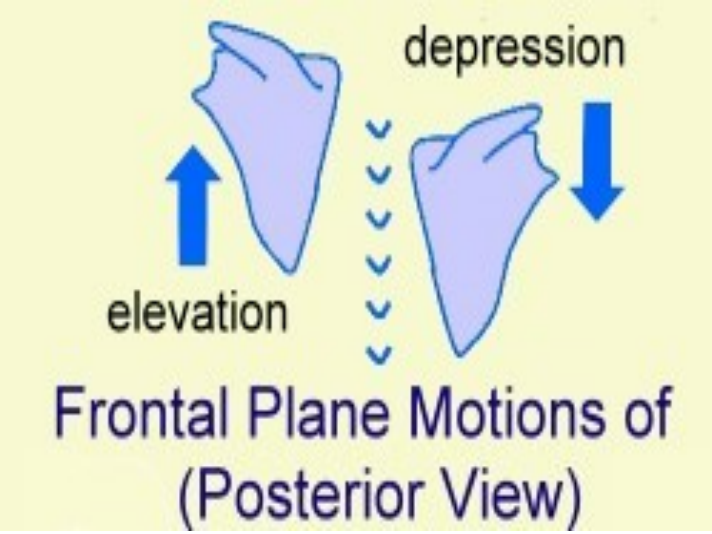
Scapulohumeral Rhythm

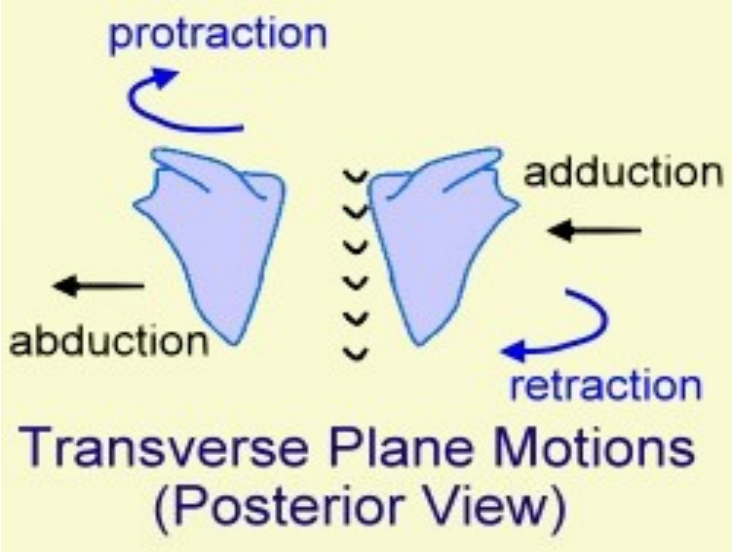
- Anticipatory bony positions are defined as pre-programmed force dependent activation patterns.

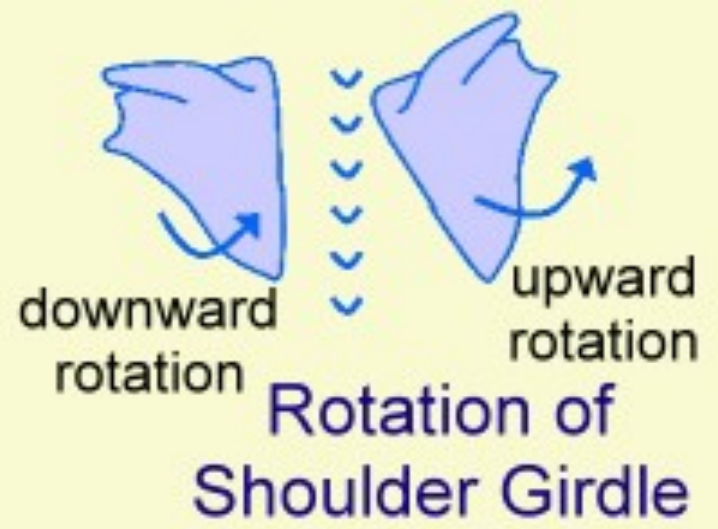
- Glenoid (nose) moves dynamically

in response to the humerus (ball)

Scapular Motions

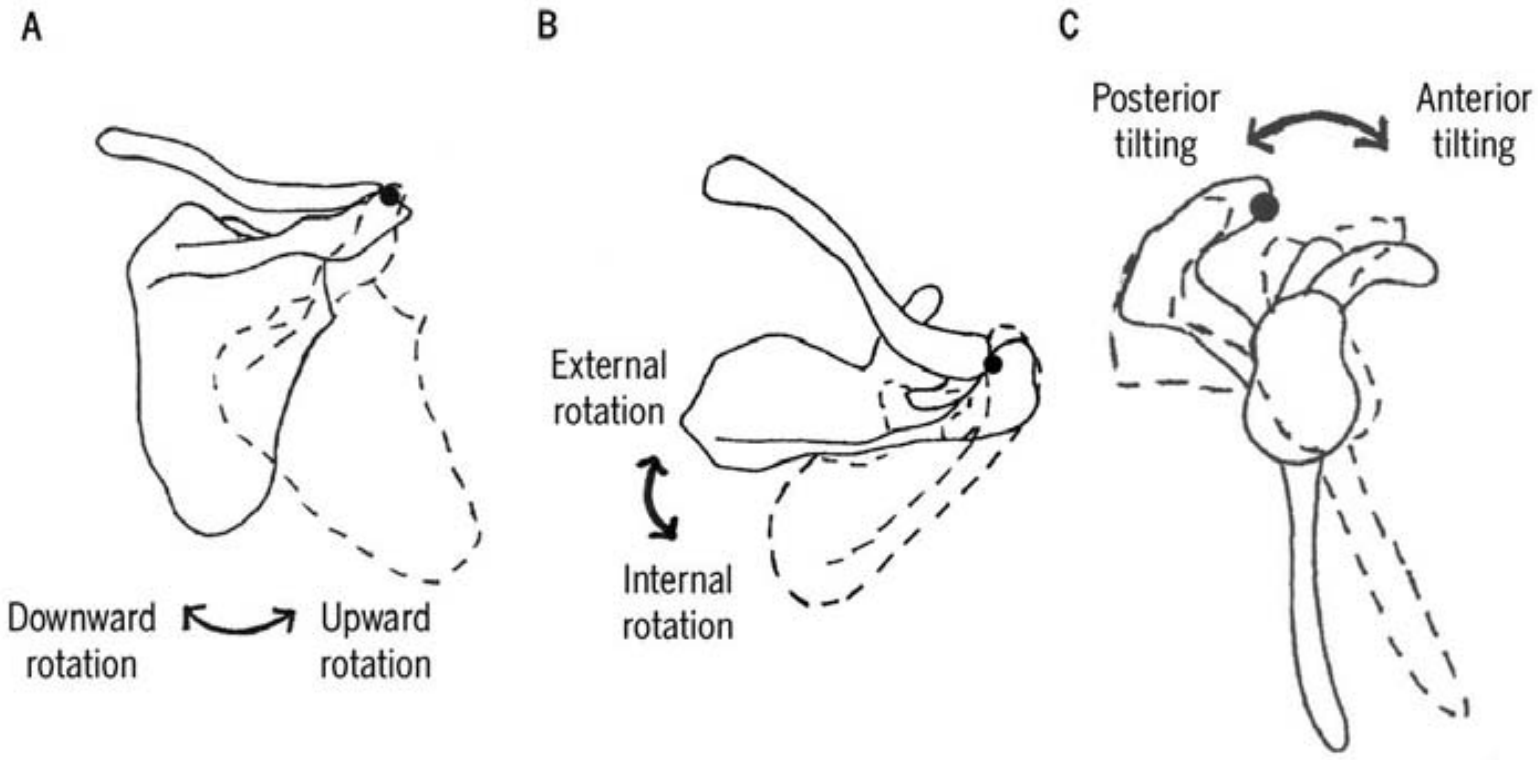






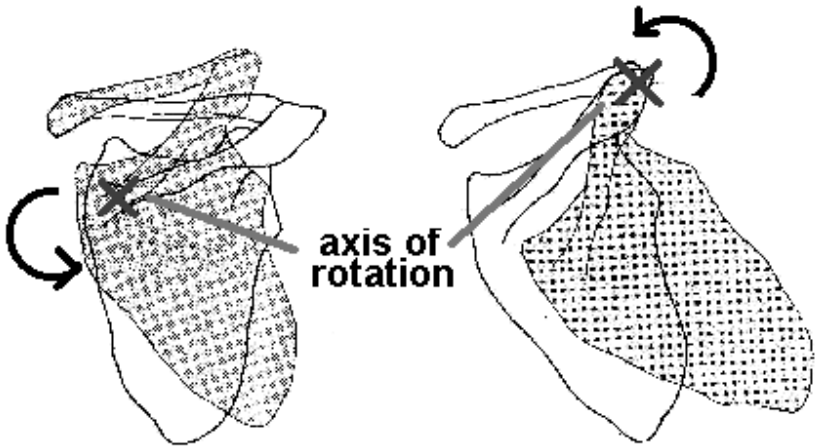
Scapular Kinematics

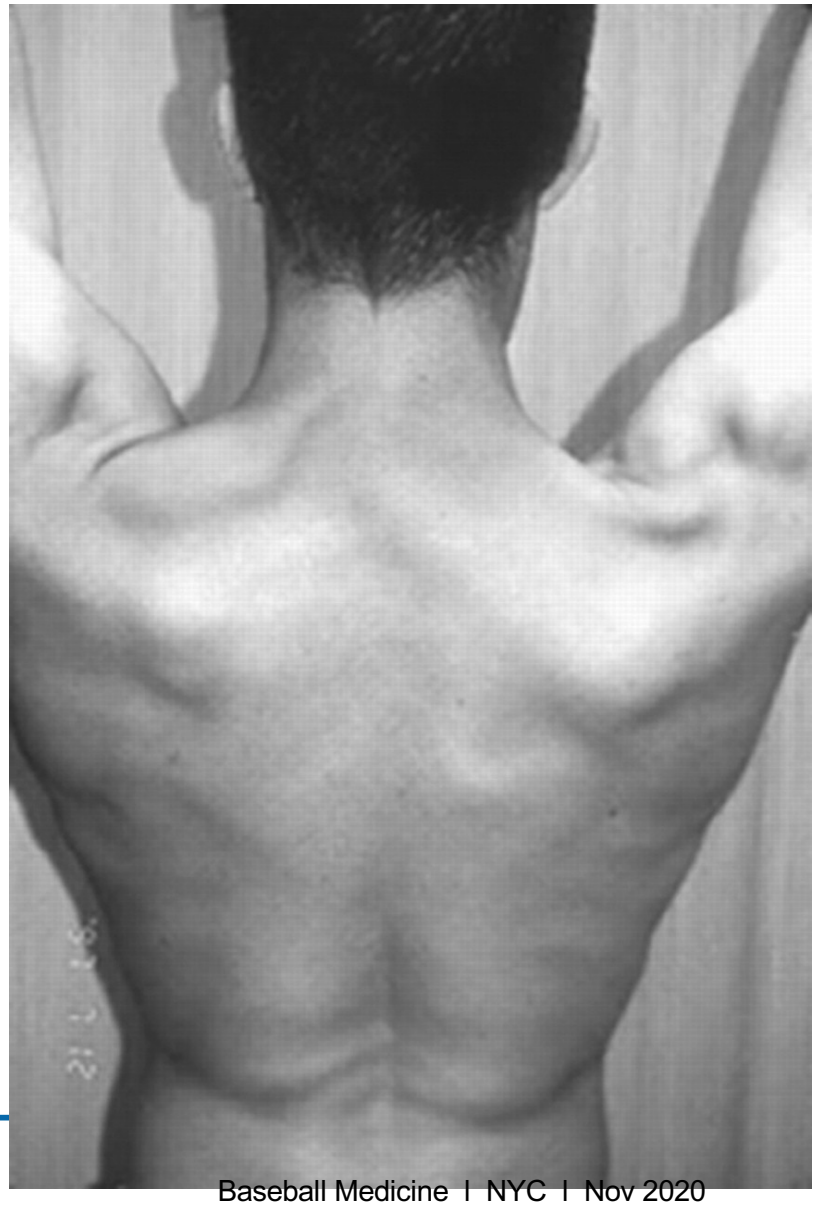
- During elevation of the arm overhead, the scapula should upwardly rotate (UR) and posteriorly tilt on the thorax.
- ***UR is the predominant scapulothoracic motion***.



Scapular Kinematics

- End range elevation in healthy subjects involves some scapulothoracic external rotation.
- Thoracic posture has also been related to alterations in scapular positioning.





Scapular Dynamic Stabilizers

Force Couples - Synergistic Muscle Actions

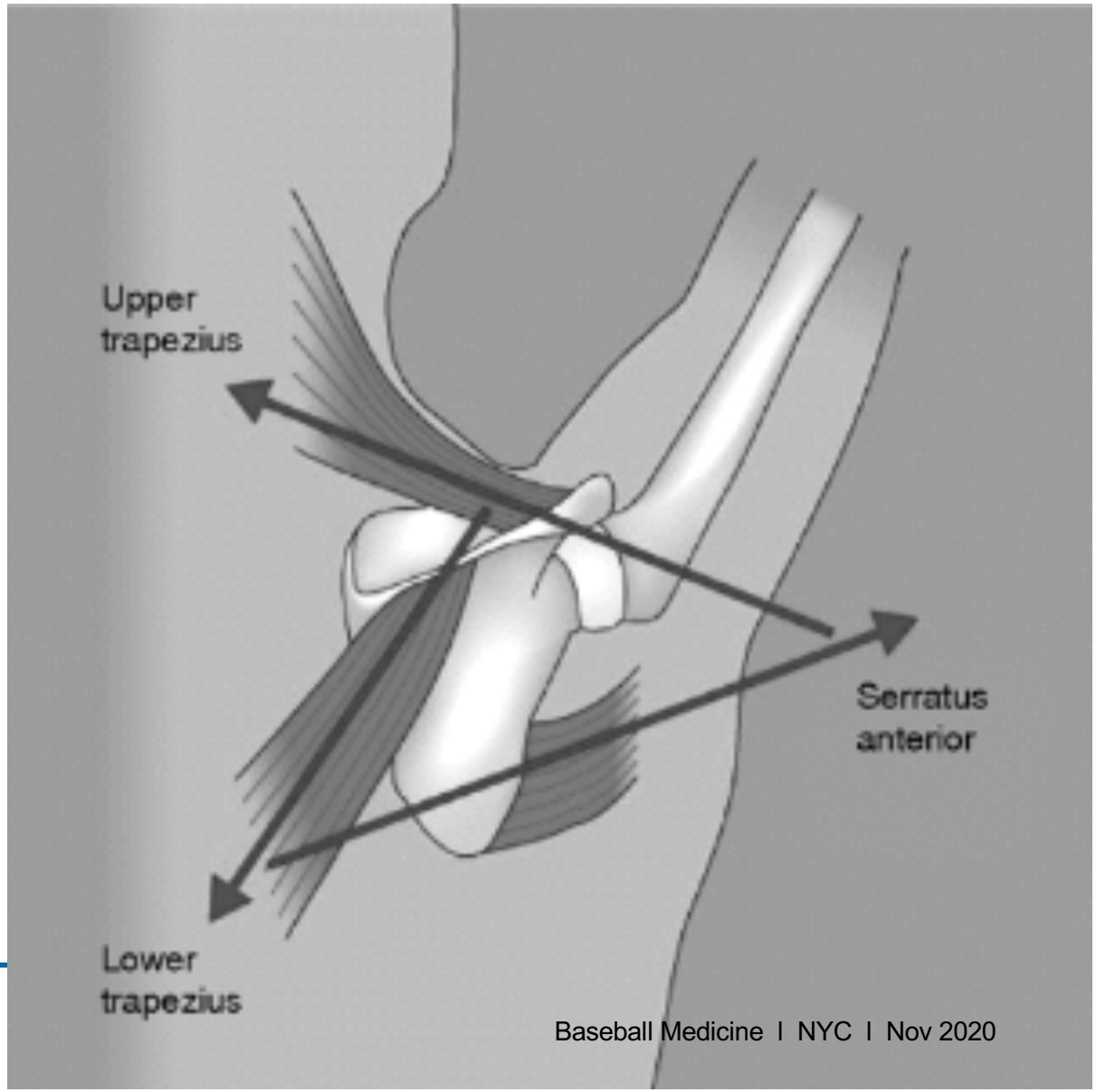
Main Stabilizers

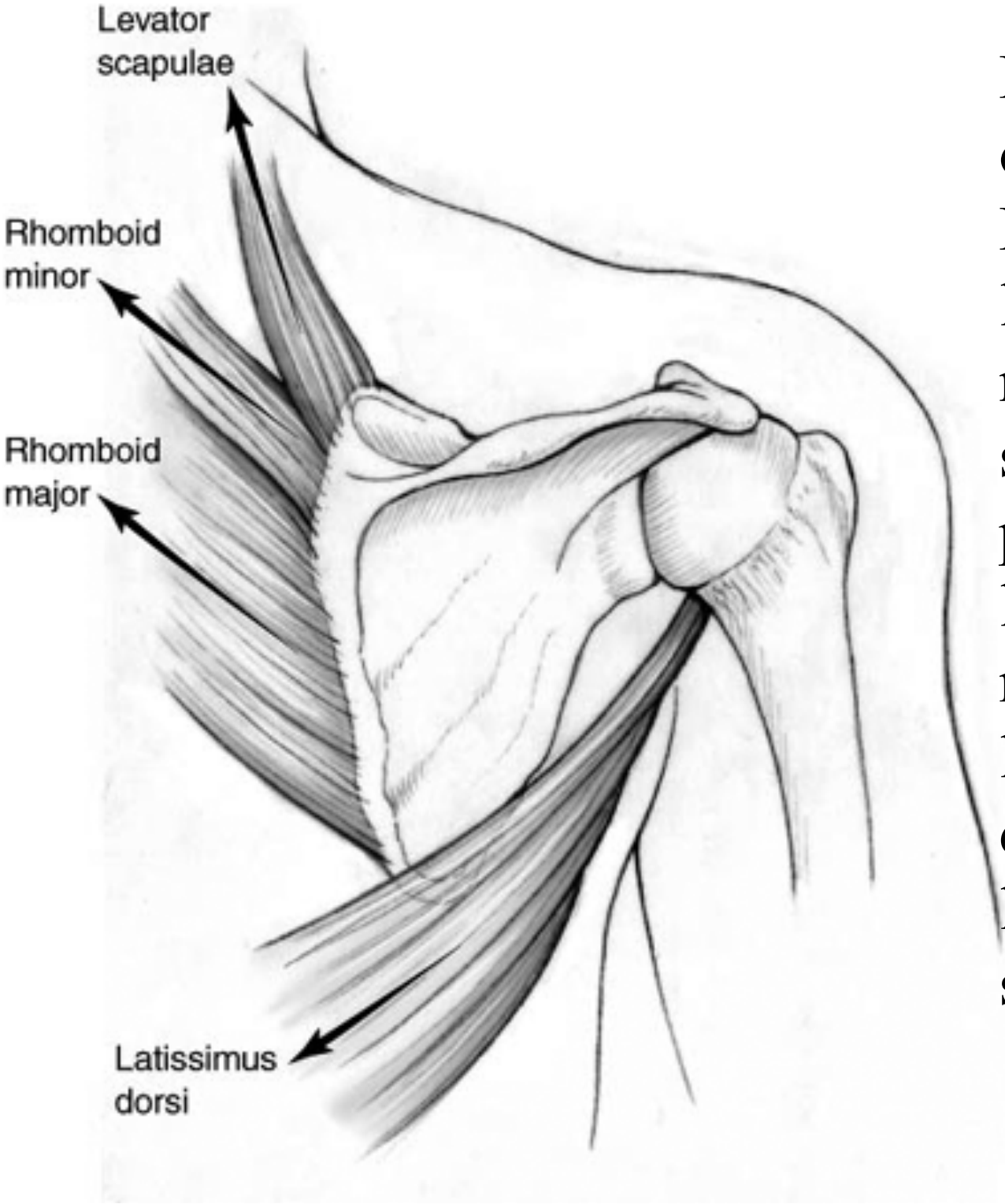
Levator Scapulae

Rhomboids

Serratus Anterior

Trapezii





Downward rotation of the scapula. The Rhomboids and levator elevate the medial border of the scapula while the pectoralis minor, lower pectoralis major, and latissimus dorsi depress the lateral portion of the scapula.

Pathomechanics

Most commonly weak or inhibited muscles

- Lower scapular stabilizers
  - Serratus, rhomboids, lower trapezius
- Serratus & Lower trapezius force couple produces acromial elevation (30-35º with full elevation)
- ↓ acromial elevation = impingement

Scapular Stabilizers

- A scapular assessment must be include assessments for:
- Posture (Cervical Spine)
- Scapular Mobility
- Posterior Capsule Tightness
- Pectoralis Minor Length

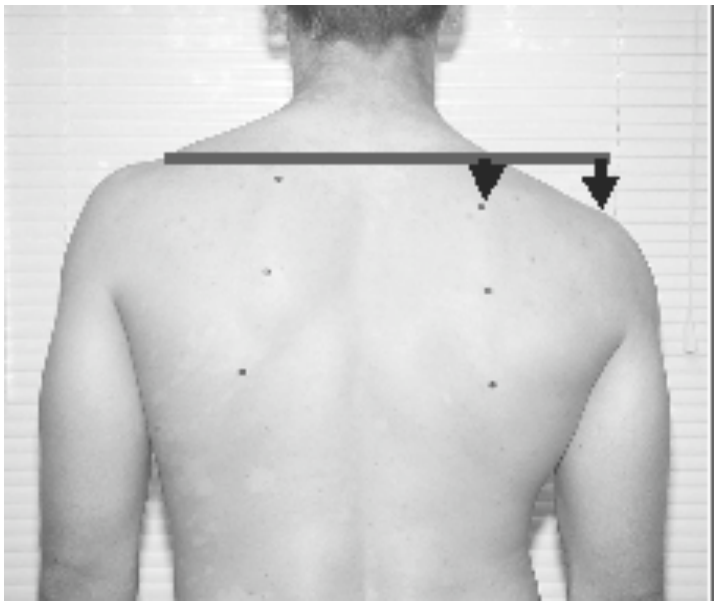
S.I.C.K. Scapula

- **S**capular malposition
- **I**nferior medial border prominence
- **C**oracoid pain and/or malposition
- dys**K**inesis of scapular movement
- Recognized as an overuse muscular fatigue syndrome in the throwing athlete

The scapula doesn't move right when the musculature fatigues.

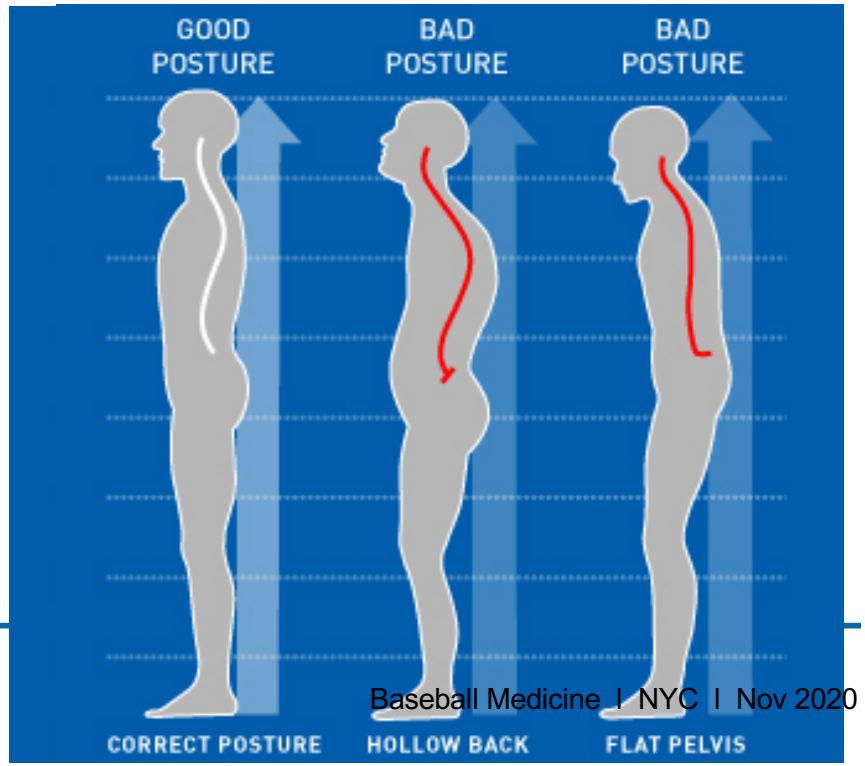
SICK Scapula

- Caused by altered kinematics of scapular muscles
- Protraction and abduction of scapula
- Leads to hyper-abduction posterior to the scapular plane (dropped elbow), bringing the posterior edge of the glenoid towards humerus



Postural Assessment

- Back View
  - Spine Alignment
  - Head Position
  - Muscle Symmetry
- Side View
  - Forward Shoulders/Head
  - Cervical Lordosis
- Front View
  - Coracoid levels
  - AC/SC joints



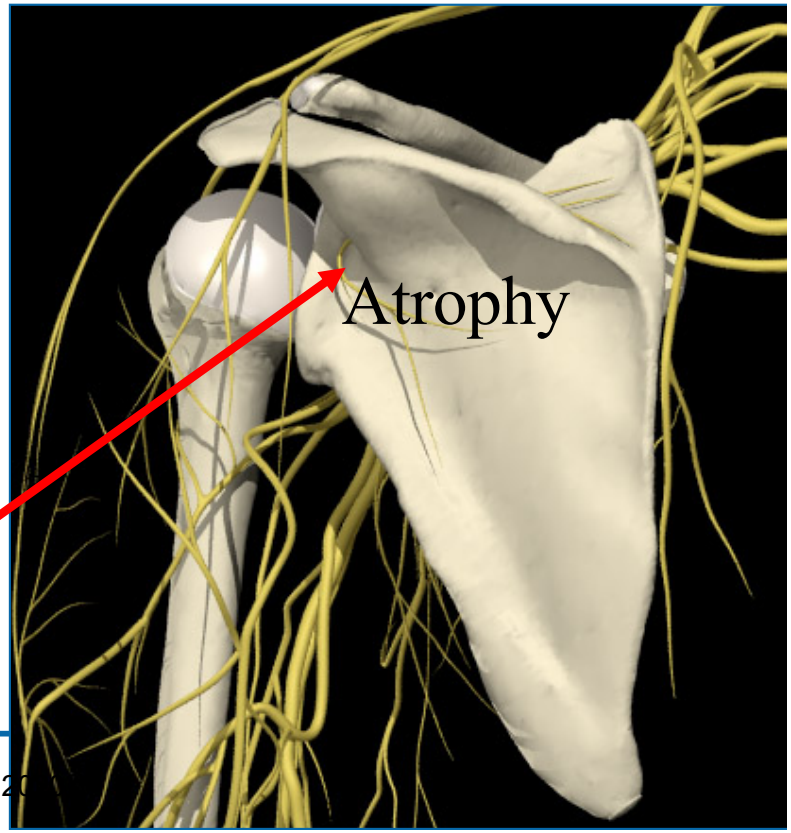
Scapular Observation

- Visual observation from the back: flexion and abduction.
- Rate as dyskinesis: present/absent
  - Winging: prominence of any portion of medial boarder
  - Dysrhythmia: premature or excessive motion
- Test without resistance and with resistance

Scapular Evaluation

- Observe the scapula both statically and dynamically
- Look for asymmetry or deformity
- Atrophy or hypertrophy
- Crepitation

Suprascapular Nerve



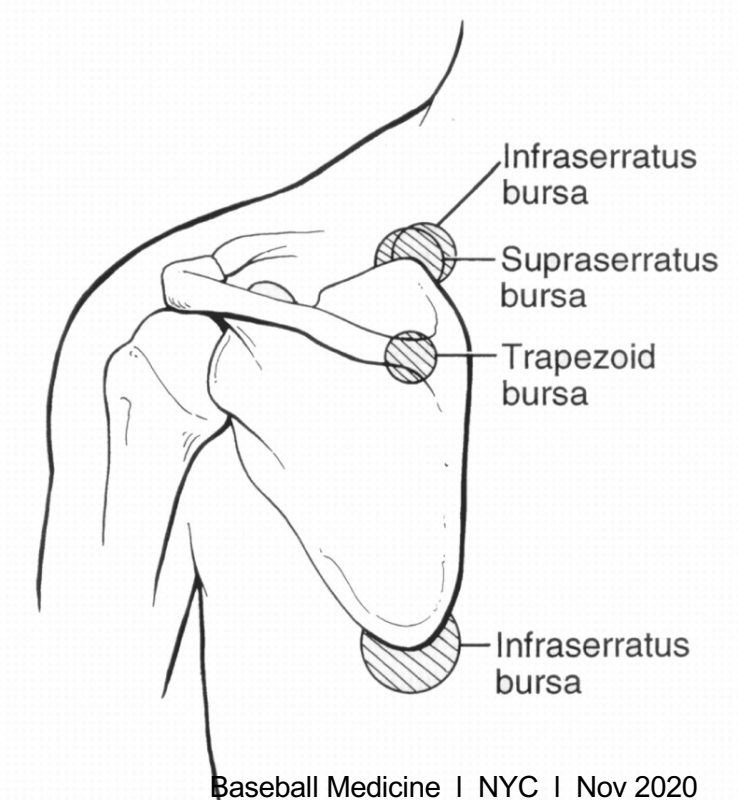
Scapular Observational/Palpation

Scapula Position

- Resting position – mark the scapular landmarks
- Palpation: UT/LT, Pectoralis Minor. Pain can cause inhibition.

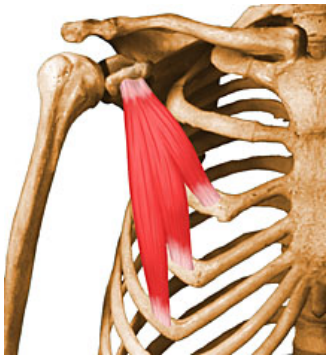
Scapular Evaluation - Palpation

- Medial border of the scapula is parallel to the spinous processes of the thoracic vertebrae.
- Distance between the medial border and the midline of the thorax is approximately 8 cm
- Resting position – mark the scapu
- Palpation: UT/LT, Pectoralis Minc inhibition.

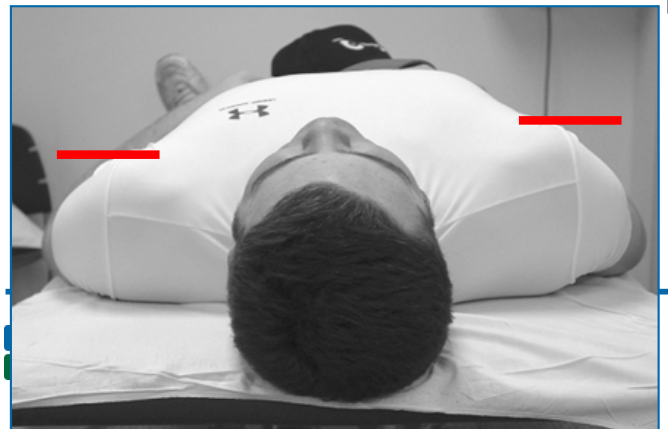


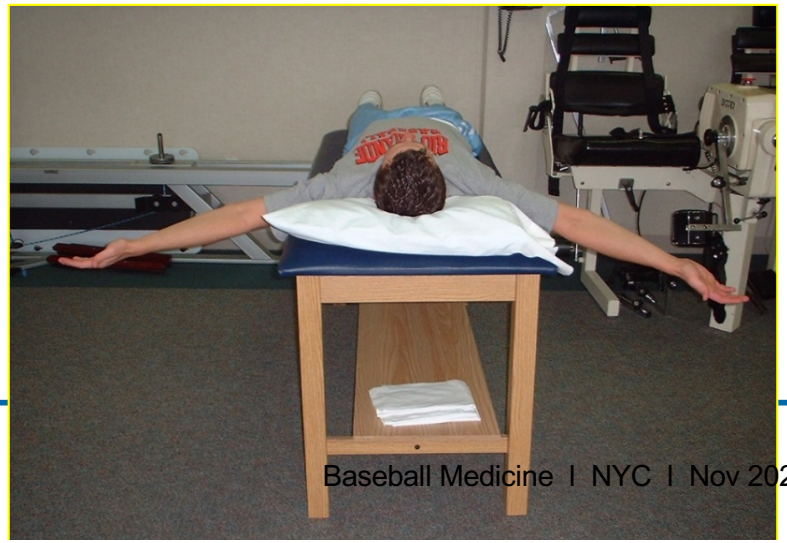
Anterior Flexibility/Pectoralis Minor

- Anterior Length/Tension Function
- Scapular retractors inhibited by tight anterior structures



- The pectoralis minor (attachments from the coracoid process to ribs 3,4,5) is capable of producing scapular internal rotation, downward rotation, and anterior tilt
- Tender with SICK scapula

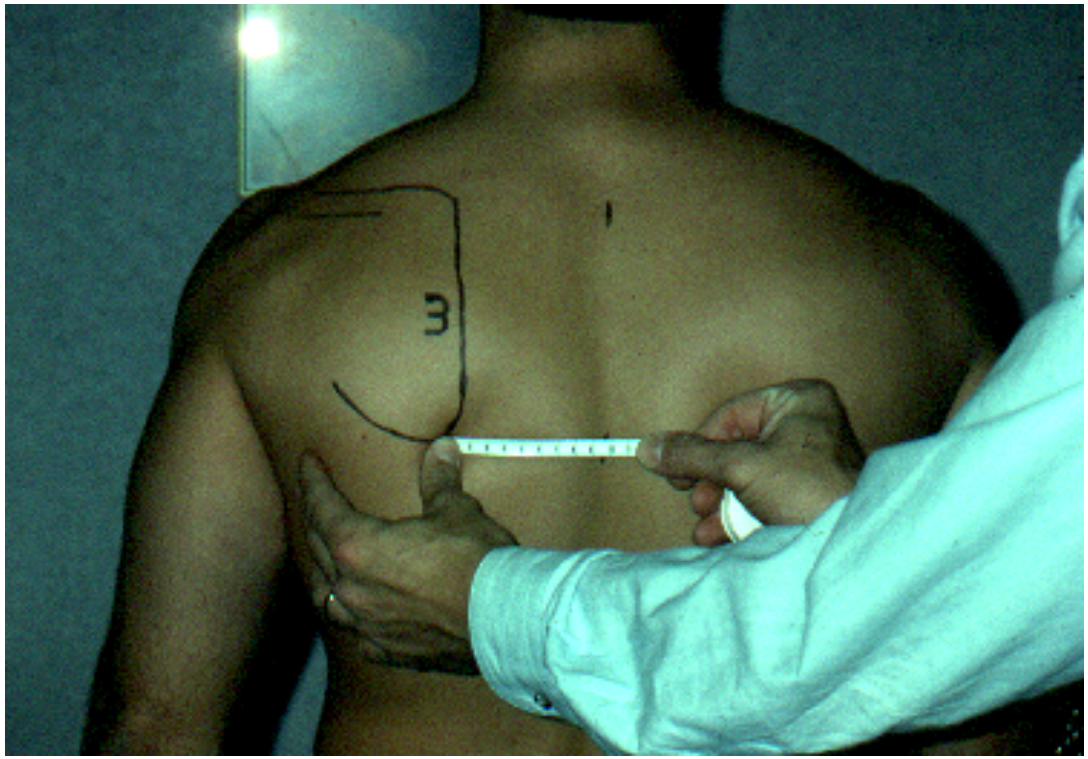




Scapular Evaluation - Static

Kibler Lateral Scapular Slide Test

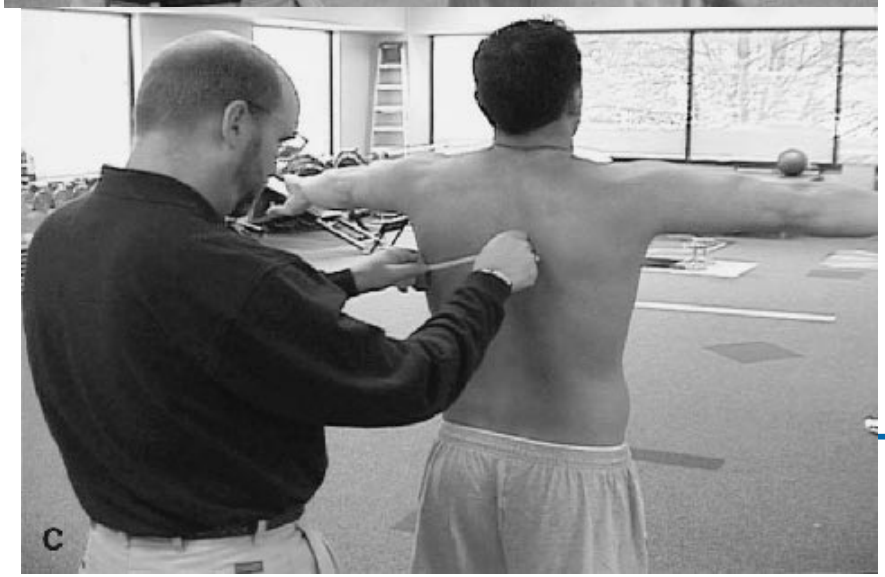
4 Arm Positions
- Resting
- 45 Degrees
- 90 Degrees
- 120 Degrees



1.5 cm in more than 2 positions is statistically significant in symptomatic patients

Scapular Evaluation - Static

Scapula Motion – Kibler Slide Measurements

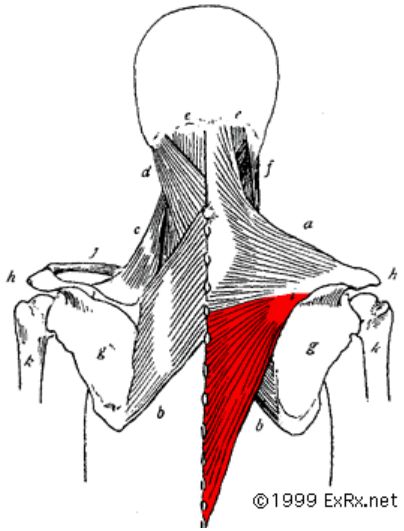


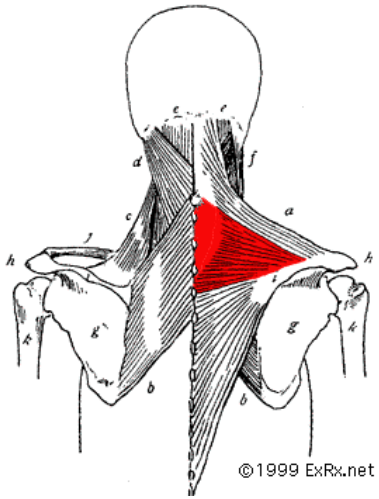
Scapular Evaluation - Static

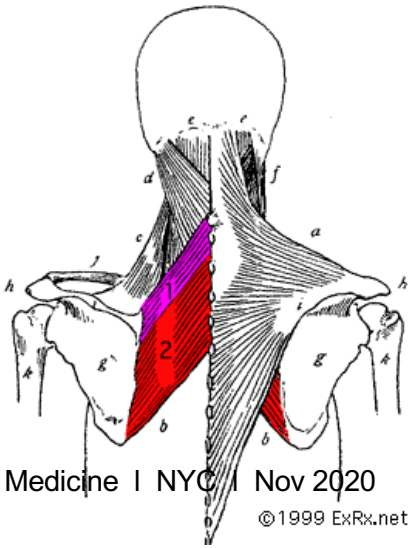
Side-to-side differences of greater than 1.5 cm have been shown to indicate lack of scapular stabilization.

Scapular Evaluation – Manual Muscle

- Scapula Muscle Strength
- MMT
- Scapular Pinch – Perform an isometric scapular pinch retraction and hold for 20 seconds. Fatigue or burning pain under 15 seconds may indicate early scapular retractor fatigue

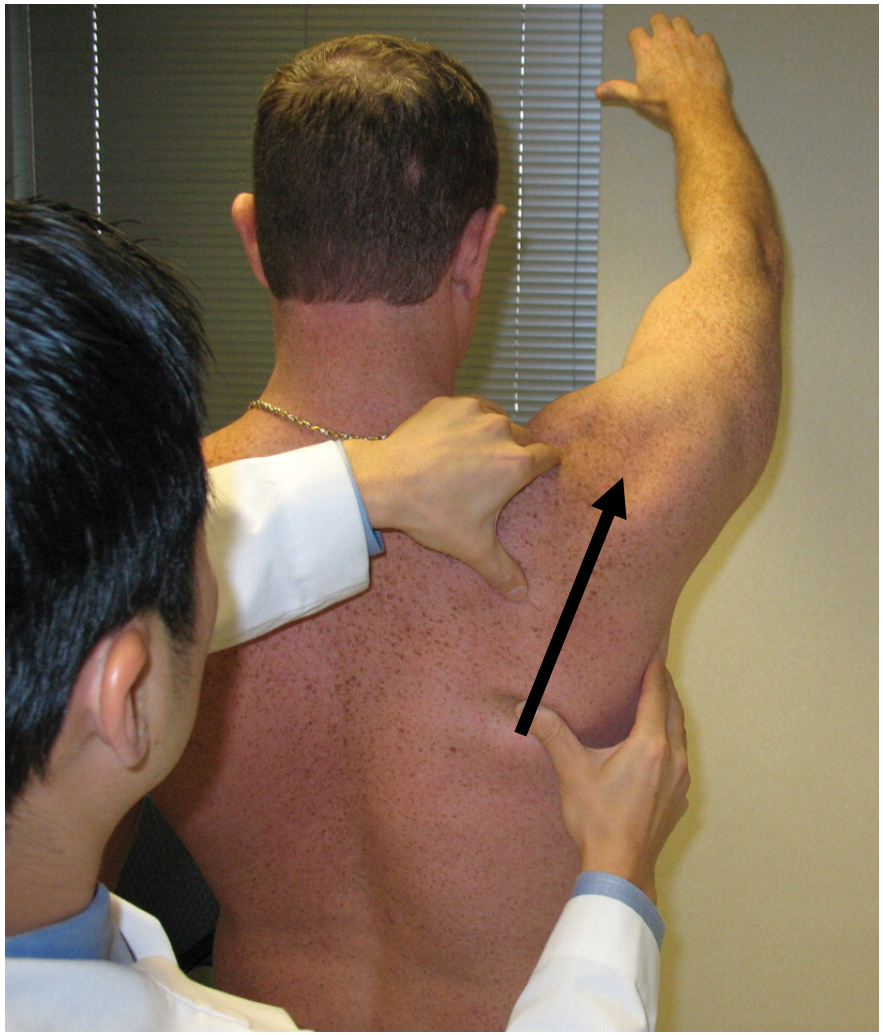






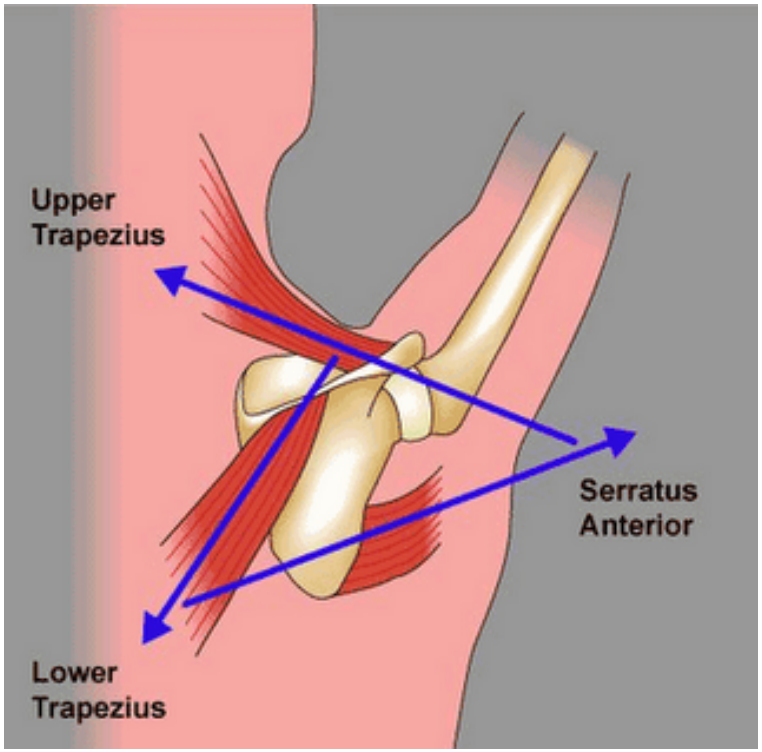
Scapular Assistance Test

- Abnormal scapular motions are attempted to be improved through manual assistance provided by the examiner.
- Symptom reduction during manual scapular repositioning may help to confirm a scapular contribution to pathology.



Scapular Rehabilitation Principles

- Reestablishing coupled scapulohumeral movements to maximize concavity/compression of the glenohumeral joint thus maximizing the glenohumeral kinematics.

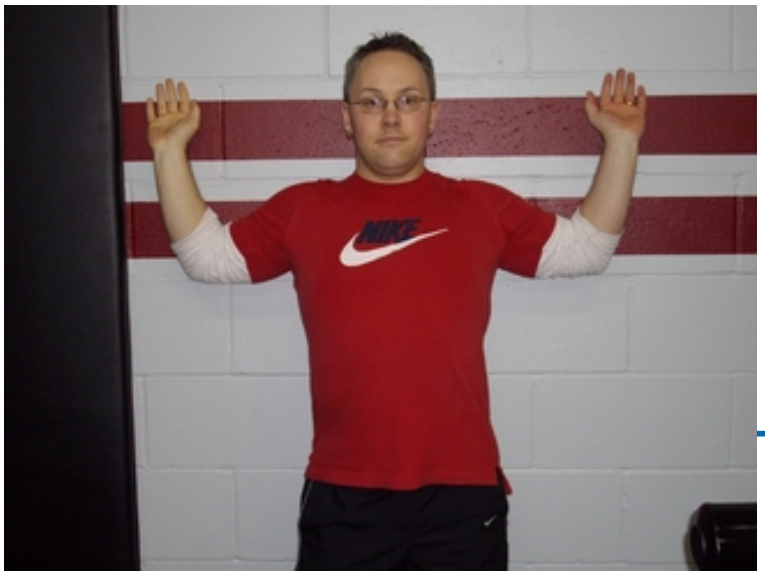


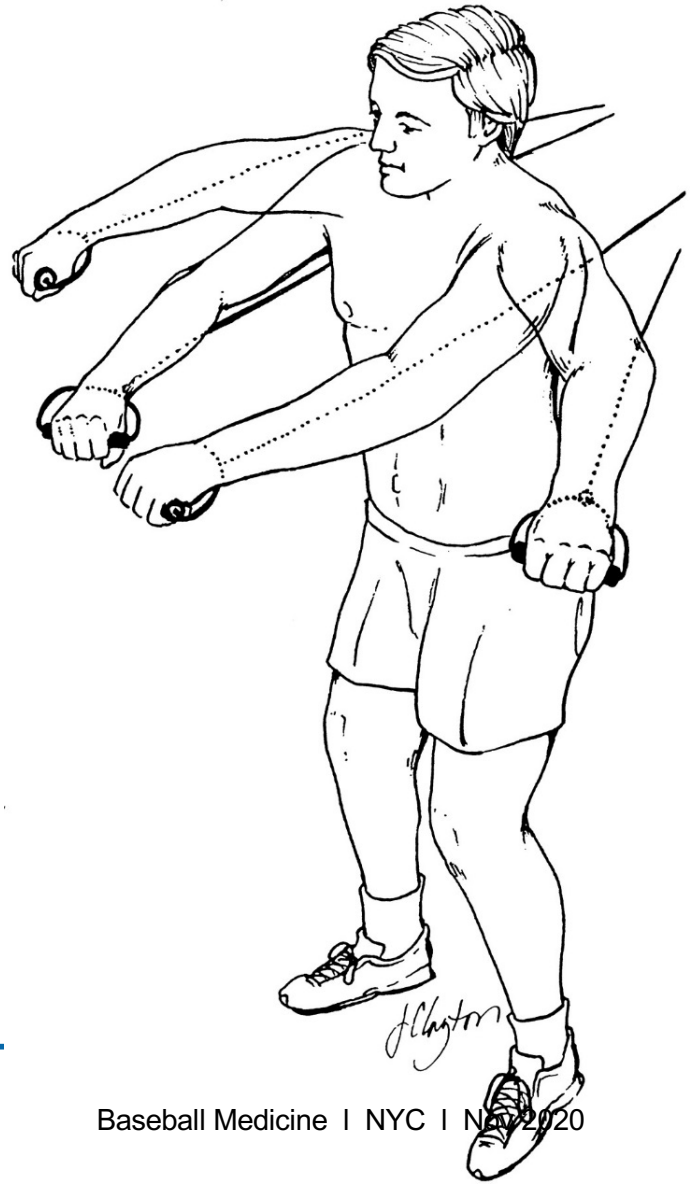
Common Scapular Interventions

- Serratus anterior strengthening or retraining
- Upper trapezius activation reduction
- Posterior shoulder stretching
- Pectoralis minor stretching
- Thoracic extension posture and ex

Serratus Exercises

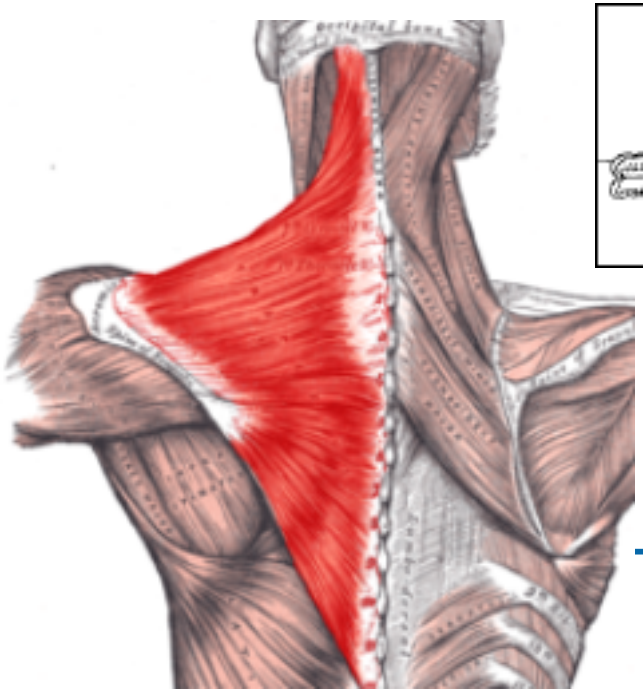
- Push-up plus
- Push-up progression exercises
- Modified “dynamic hug,” with ER
- Supine “punch,”
- Wall slide exercises

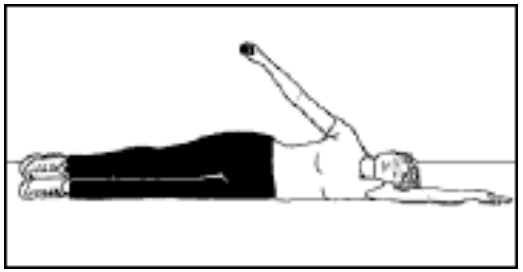




Lower Trapezius Exercises

- Exercises that lessen upper trapezius activity and increase lower trapezius activity:
  - Shoulder flexion in the side-lying position up to 135°
  - Prone horizontal abduction with external rotation
  - Shoulder external rotation in side lying.





Scapular Stabilization Exercises

UT	LT	Rhomb.	Serratus	Levator
Rowing	Rowing	Rowing	Push-up+	Rowing
Military Press			Military Press	Shrug
Horiz. Abd.	Horiz. Abd.	Horiz. Abd.	Flexion	Horiz. Abd.
Scaption	Scaption 90-120	Scaption	Scaption	Scaption
Abd.	Abd.	Abd.	Abd.	

Scapular Taping

- Using thoracic and scapular taping intended to change posture in both subjects with shoulder impingement and healthy subjects, significant changes in posture and increases in arm elevation pain-free range of motion were noted with taping in both groups

- Lewis JS, Wright C, Green A. Subacromial impingement syndrome: the effect of changing posture on shoulder range of movement. *JOrthop Sports Phys Ther.* 2005;35:72-87.

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Thank You!

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