

Dyskinesia &  
Associated  
Thoracic Hyper-  
Kyphosis


Leading To Altered Biomechanics Of  
The GHJ Resulting In Pain & Injury

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- Chapter 2 – Associated musculoskeletal conditions (Theory)
- Chapter 3 – Static Scapulae assessment (Theory & Practical)



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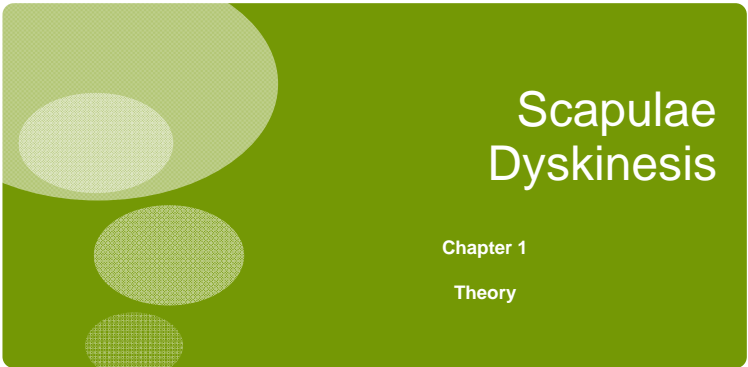
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Scapulae  
Dyskinesis

Chapter 1  
Theory

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## Scapulae Dyskinesis

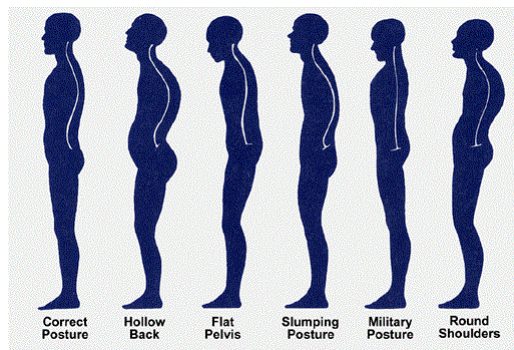
- Scapulae dyskinesia (SD) also referred to as scapulae instability plays a significant role in a number of musculoskeletal conditions (chapter 2)
- SD = abnormal positioning of the scapulae in a static position & dysfunctional movement patterns of the scapulae during motion

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## Thoracic Posture – Related to SD



- Ideal posture of the thoracic spine is important as a hyperkyphosis would lead to a scapulae protraction syndrome

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## Scapulae Dyskinesia



- Normal shoulder function also requires smooth integration of movement at the GHJ, scapulothoracic region, A/C & SC joint
- This combined movement pattern is referred to as scapulohumeral rhythm
- **SD results in poor scapulohumeral rhythm resulting in painful musculoskeletal conditions**

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## Scapulae Dyskinesia



- Scapulohumeral rhythm (SHR) should be smooth, coordinated & symmetrical (Brukner & Khan 2012).
- Disturbed SHR manifests as altered or jerky movement (Brukner & Khan 2012).
- Poor SHR may be a result of an injury associated to the shoulder region or a predisposing factor contributing towards the injury or musculoskeletal condition

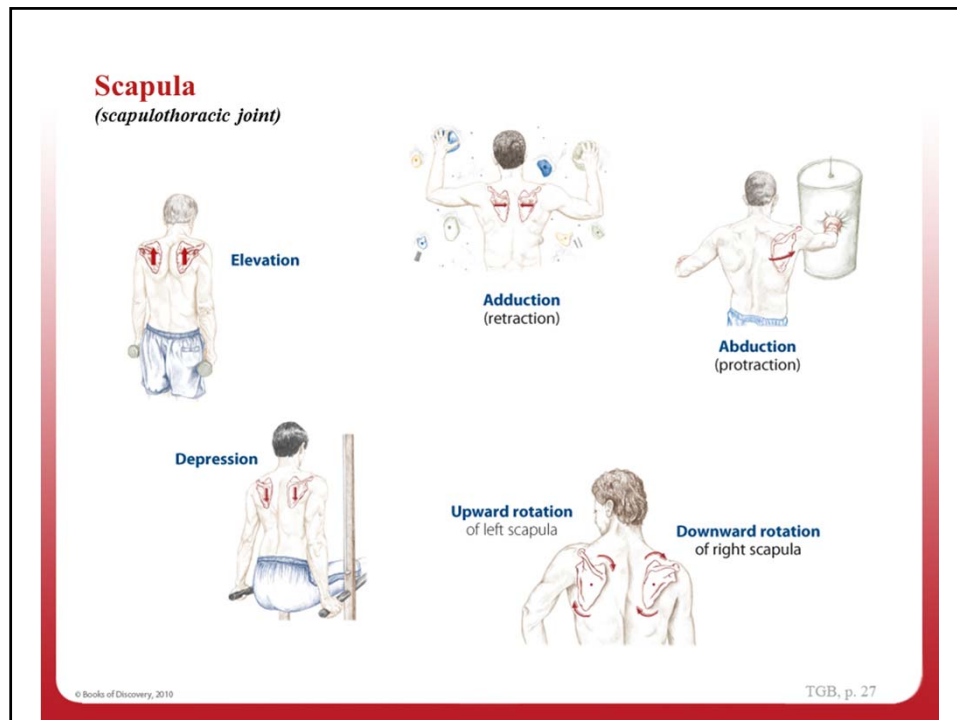
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## Scapulae Dyskinesia



- Ideal Scapulohumeral rhythm (SHR) = 3:1 ratio. Every 3 degrees the humerus abducts/flexes past a certain range the scapulae should upwardly rotate 1 degree

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## Scapulae Dyskinesia



- Abnormalities of SHR are most commonly due to weakness and /or poor motor control of the scapulae stabilising muscles (with or without weakness of the rotator cuff muscles).
- Short/tight SH muscles may also contribute to altered SHR
- Involuntary adaptive movement pattern to avoid a painful arc will also contribute to altered SHR

## Scapulae Dyskinesia



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- To achieve full range of motion pain free, & to achieve full range of motion with ideal force transfer (decrease loading on active/passive structures) to the GHJ, correct upward rotation patterns of the scapulae is essential.
- A correct upward rotation pattern of the scapulae ensures that the coracoacromial arch is removed from the pathway of the greater tuberosity during motion of the humerus avoiding potential impingement (Brukner & Khan 2012).

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## Scapulae Dyskinesia



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- Ideal scapulae positioning & movement patterns enhances GHJ stability at greater than 90 degrees of abduction by placing the glenoid fossa under the humeral head
- Ideal SHR is essential for decreasing forces & wear & tear on the associated active & passive structures of the GHJ, **this is not possible with a unstable scapulae**

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## Scapulae Dyskinesia

### Muscles controlling the scapulae



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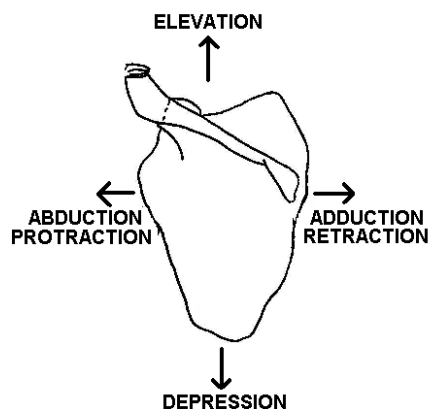
- Trapezius (all divisions)
- Serratus Anterior (upper & lower divisions)
- Rhomboids
- Levator scapulae
- Pec minor

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## Scapulae Dyskinesia



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Multiple forces occurring at the same time:

- Ant tilt vs Post tilt/depression
- Upward Rot vs Downward Rot
- Protraction vs Retraction

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## Scapulae Dyskinesia



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- These muscles work in coordinated patterns known as "force couples to control three dimensional scapular motion (Brukner & Khan 2012).
- The main upward rotation force couple involves the upper trapezius coordinating with the lower trapezius & serratus anterior (Brukner & Khan 2012).

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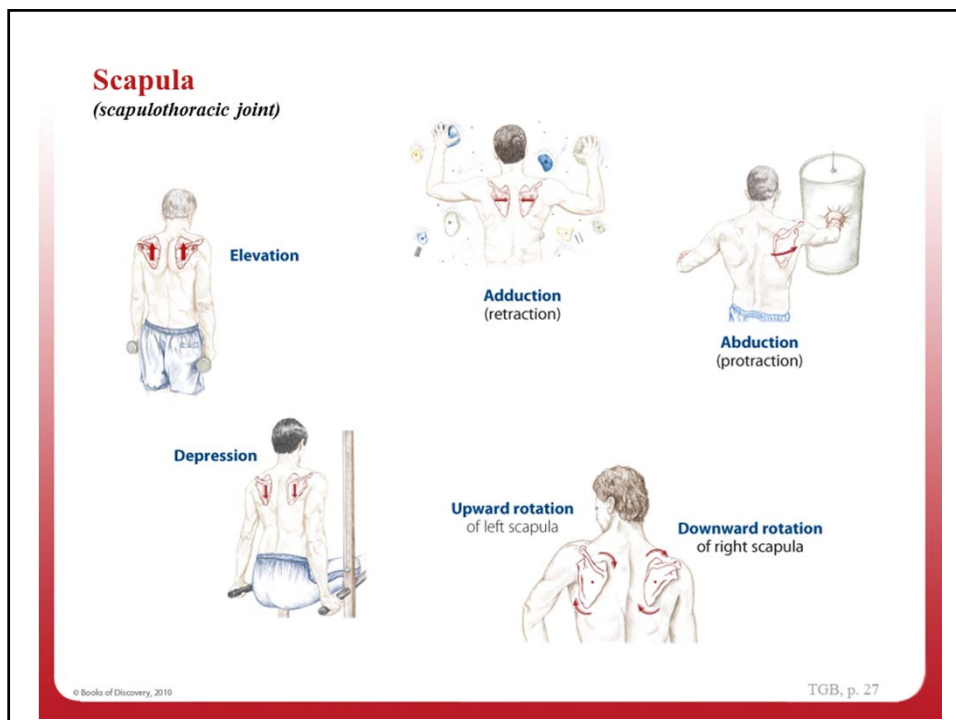
## Scapulae Dyskinesia



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- Anterior/posterior tilt & rotation involve the upper trapezius/pec minor force coupled with the serratus anterior/lower trapezius (Brukner & Khan 2012).
- A stable scapulae provides a solid base for the rotator cuff muscles to function at there ideal muscle length tension relationship resulting in correct muscle firing patterns, leading to optimal stability under load

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Scapulae Dyskinesos  
Associated  
musculoskeletal  
conditions

CHAPTER 2  
Theory

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## Scapulae Dyskinesos Associated musculoskeletal conditions



- Rotator cuff Muscles
- Tendinitis
- Tendinosis
- Strain
- Acute/Chronic Trp's

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## Scapulae Dyskinesos Associated musculoskeletal conditions



- Shoulder Impingement
- Supraspinatus (superior impingement)
- Infraspinats Impingement (superior/posterior impingement)
- Long head of bicep Impingement
- Bicepital Tendinitis

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## Scapulae Dyskinesos Associated musculoskeletal conditions



- Adverse neural tension
- Medium nerve
- Radial nerve
- Ulna nerve

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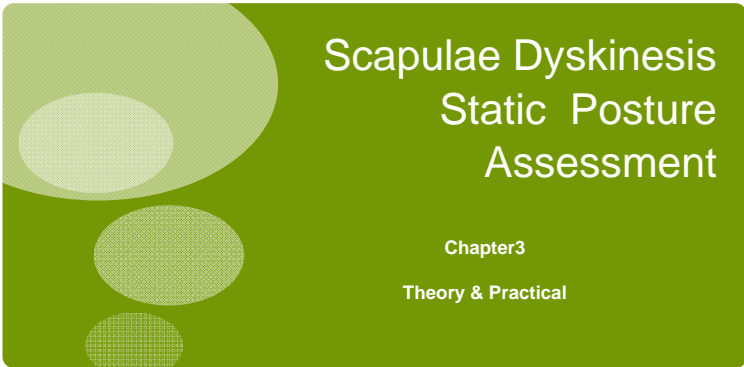
## Scapulae Dyskinesos Associated musculoskeletal conditions



Increased loading of the Cx joints & Cx  
Muscles leading to:

- Facet joint irritation
- Headaches
- Chronic Cx stiffnes
- Decreased Cx ROM

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Scapulae Dyskinesia  
Static Posture  
Assessment

Chapter3  
Theory & Practical

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Scapulae Dyskinesia  
Static Posture Assessment

Scapulae Assessment-Posterior View

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- Scapulae winging syndrome
- Scapulae downward rotation syndrome

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## Scapulae Dyskinesia Static Posture Assessment

### Scapulae Assessment-Posterior View



- Scapulae protraction syndrome
  
- Scapulae tilting syndrome

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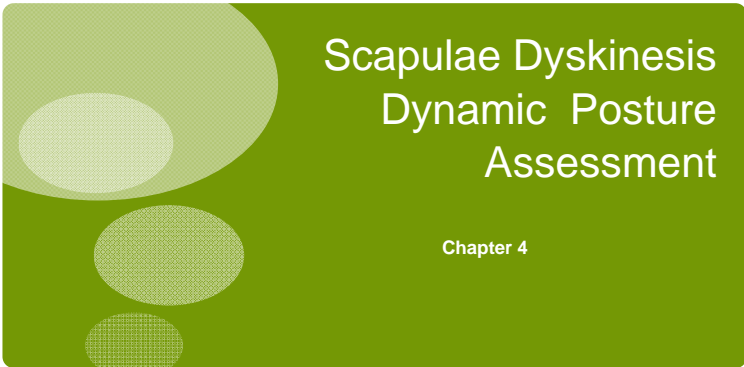
## Scapulae Dyskinesia Static Posture Assessment

### Scapulae Assessment- Supine/superior View



- Scapulae tilting syndrome

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Scapulae Dyskinesia  
Dynamic Posture  
Assessment

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Scapulae Dyskinesia  
Dynamic Posture Assessment

Stage 1

- Ask client to shoulder flex/abd to 180 degrees, therapist palpates the inferior angle of the scapulae & compares bilat.
- The inferior angle should be palpated at the mid axillary region, this is ideal
- Then ask the client to slowly return their arm back to neutral

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## Scapulae Dyskinesis Dynamic Posture Assessment



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- Therapist observes the quality of the scapulae movement during the downward rotation phase (returning to neutral)
- The movement of the scapulae should be smooth & symmetrical as this is ideal
- Any jerky or asymmetrical motion of the scapulae indicates SD/scapulae instability!

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## Scapulae Dyskinesis Dynamic Posture Assessment

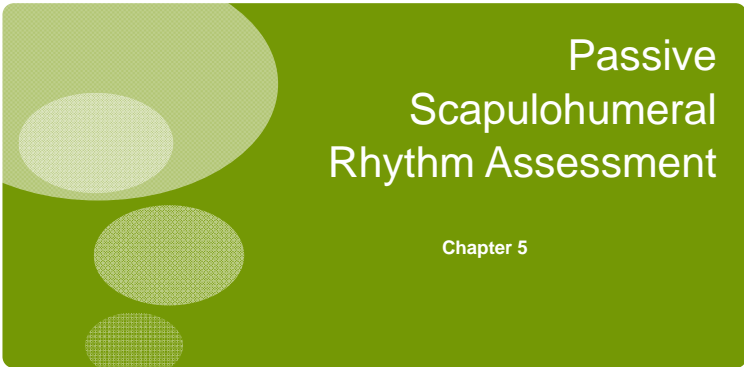


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- Stage 2
- At 90 degrees of GHJ abduction the scapulae should upwardly rotate 30 degrees, this is ideal
- At 180 degrees of GHJ abduction the scapulae should upwardly rotate 60 degrees, this is ideal
- Always compare bilat!

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# Passive Scapulohumeral Rhythm Assessment

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## Passive Scapulohumeral Rhythm Assessment

- Ideal scapulae motion regarding upward rotation during GHJ abduction will differ depending which text book you read or which researchers you follow
- Some texts recommend 1<sup>st</sup> onset of scapulae motion should be between 40-60 degrees of humeral abd/flex. Others below 40 degrees & above 60 degrees

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## Passive Scapulohumeral Rhythm Assessment



- Client sitting or standing
- Therapist supports clients test arm at the elbow joint maintaining 90 degrees while palpating the inferior medial angle of the scapulae using a pincer grip
- Therapist passively abducts the humerus while palpating the scapulae for early onset of movement . Repeat in flexion

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## Passive Scapulohumeral Rhythm Assessment



- Early onset of scapulae movement indicates poor muscle firing patterns = altered biomechanics

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## Passive Scapulohumeral Rhythm Assessment



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- Client sitting or standing
- Therapist supports clients test arm at the elbow joint maintaining 90 degrees while palpating the inferior medial angle of the scapulae using a pincer grip
- Therapist passively externally rotates the humerus while palpating the scapulae for movement

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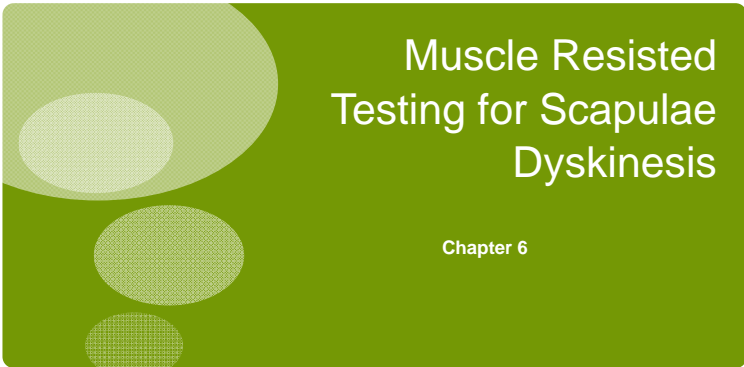
## Passive Scapulohumeral Rhythm Assessment



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- No scapulae motion should be detected during passive external rotation of the humerus
- If scapulae motion is detected this (most likely into a downward rotation pattern) indicates incorrect muscle firing patterns = altered biomechanics
- Over a period of time this would result in a musculoskeletal condition

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# Muscle Resisted Testing for Scapulae Dyskinesis

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## Muscle Resisted Testing for Scapulae Dyskinesis

- Resisted shoulder flexion in neutral
- Resisted shoulder flexion at 90 degrees
- Resisted shoulder abduction in neutral
- Resisted shoulder abduction at 90 degrees

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## Muscle Resisted Testing for Scapulae Dyskinesia



- Resisted external rotation at 90 degrees of elbow flexion
- Resisted internal rotation at 90 degrees of elbow flexion

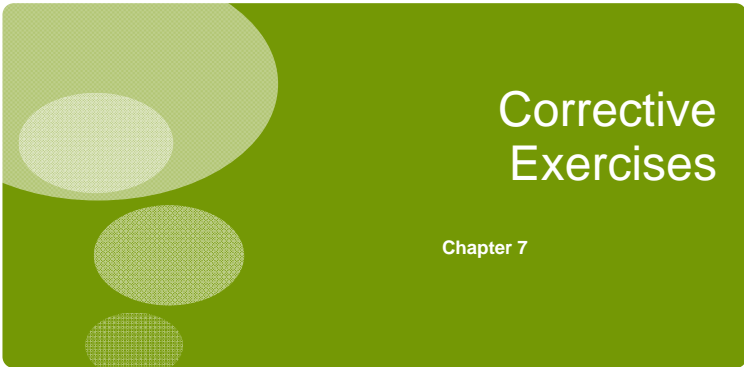
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## Muscle Resisted Testing for Scapulae Dyskinesia



- During these tests observe for scapulae elevation or any other movement pattern.
- During the last test involving resisted external rotation palpate/observe for scapulae downward rotation or any other movement pattern
- The scapulae should be stable while under load, movement indicates instability = altered biomechanics

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**Corrective Exercises**  
Chapter 7


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### Corrective Exercises Serratus Anterior

**Stage 1**

Supine Passive Protraction

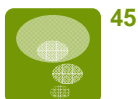


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- Client lying supine while the therapist supports the clients wrist & palpates the clients inferior medial border of the scapulae with the other hand
- The therapist then places the clients arm into 90 degrees of flexion

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## Corrective Exercises Serratus Anterior

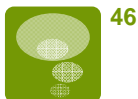


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- The therapist passively protracts the arm at the wrist while palpating the inferior medial border of the scapulae
- It is important that the inferior medial border of the scapulae protracts against the rib cage
- If no scapulae protraction is detected repeat this procedure for 3 sets/ 12 reps, this indicates altered biomechanics

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## Corrective Exercises Serratus Anterior



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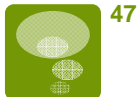
### Stage 2

#### Supine Active Protraction

- Client lying supine while the therapist palpates the clients inferior medial border of the scapulae with the one hand
- Therapist instructs the client to place their shoulder into 90 degrees of flexion

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## Corrective Exercises Serratus Anterior



- Therapist instructs client to fully protract the scapulae by slowly moving the hand (closed fist) towards the ceiling while the therapist palpates the inferior medial border of the scapulae
- At the end range of protraction the inferior medial border of the scapulae should be hard against the rib cage, **this indicates correct muscle firing patterns for the serratus anterior**

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## Corrective Exercises Serratus Anterior



- I recommend 3 sets of 12-15 reps each day or until the serratus anterior fires correctly

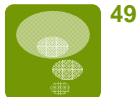
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## Corrective Exercises Serratus Anterior

### Stage 3

#### Supine Resisted Protraction



- Client lying supine while the therapist palpates the clients inferior medial border of the scapulae with the one hand
- Therapist instructs the client to place their shoulder into 90 degrees of flexion

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## Corrective Exercises Serratus Anterior



- Therapist instructs client to fully protract the scapulae by slowly moving the hand (closed fist) towards the ceiling while the therapist palpates the inferior medial border of the scapulae
- The therapist then applies a gentle downward force on the client fist while the client resists.
- This will lead to an increase in muscle firing patterns resulting in an increase in muscle fiber activation

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## Corrective Exercises Serratus Anterior

- At all times the therapist should palpate the inferior medial border of the scapulae for protraction
- 3-4 sets, 12 – 15 reps



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### Stage 4

#### Supine Resisted Protraction (cont)

- Repeat using a thera band or a light dumbbell
- 3-4 sets daily, 12-15 reps

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## Corrective Exercises Serratus Anterior

### D/B Pull Over – **Functional**

- Client supine supporting a weight with both hands above their chest at 90 degrees of shoulder flexion
- Client then adducts & depresses their scapulae's (hold)
- Client then slowly flexes & extends the shoulder, this motion must be comfortable at all times



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## Corrective Exercises Serratus Anterior

### Stage 1

#### Functional Wall Exercise



- Client stands facing the wall with their arm positioned at 90 degrees of shoulder flexion
- A ball is placed between the clients open palm & the wall
- The client then protracts their scapulae by pressing their palm into the ball multiple times

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## Corrective Exercises Serratus Anterior

### Stage 2

#### Functional Wall Exercise



- The client then repeats the exercise but varies the angle of shoulder flexion multiple times

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## Corrective Exercises Serratus Anterior

### Stage 3

#### Functional Wall Exercise



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- Client stands facing the wall with their arm positioned at 90 degrees of shoulder flexion
  
- A ball is placed between the clients open palm & the wall
  
- The client then protracts their scapulae by pressing their palm into the ball, then performs a circular motion in both directions

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## Corrective Exercises Serratus Anterior

### Stage 4

#### Functional Wall Exercise



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- The client protracts their scapulae by pressing their palm into the ball, then performs a circular motion in both directions
  
- The client repeats this exercise multiple times varying the angle of shoulder flexion

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## Corrective Exercises Lower & Middle Trapezius

### Stage 1

#### Arrow Head Exercise -Passive



- Client prone with arms by their sides
  
- Therapist stands to the side of the client & places their hands on the top of the clients shoulders with their thumbs placed on the spine of the scapulae

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## Corrective Exercises Lower & Middle Trapezius



- Therapist passively adducts the scapulae then depresses the scapulae & holds for 10 seconds
  
- This will help the client understand the movement pattern & may assist in motor unit re-learning
  
- 1 set, 10 reps, hold each rep for up to 10 seconds

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## Corrective Exercises Lower & Middle Trapezius

### Stage 2

#### Arrow Head Exercise –Passive + Active



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- Therapist passively adducts the scapulae then depresses the scapulae
- The client then holds the scapulae in that position for 5-10 seconds
- Therapist palpates middle & lower traps for co-activation
- 1 set, 5 reps, hold each rep for up to 10 seconds

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## Corrective Exercises Lower & Middle Trapezius

### Stage 3

#### Arrow Head Exercise – Active



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- The client now performs the exercises actively under your guidance
- Therapist palpates middle & lower traps for co-activation
- 1 set, 10 reps, hold each rep for up to 10 seconds

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## Corrective Exercises Lower & Middle Trapezius

### Stage 4

#### Arrow Head Exercise – Active



- Repeat the exercise with the arms abducted at 90 degrees
  
- 1 set, 5-10 reps, hold each rep for up to 10 seconds
  
- Therapist palpates middle & lower traps for co-activation

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## Corrective Exercises Active Wall Angles



- Therapist instructs the client to lean against the wall in a partial squat position, hips flexed approx 45 degrees
  
- Therapist instructs client on how to find their neutral position for their lumbar spine & maintain it
  
- Client abducts their shoulders to 90 degrees then externally rotates 90 degrees so their hands are touching the wall (if possible).

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## Corrective Exercises Active Wall Angles



- Client then adducts their shoulders full range slowly while maintaining their elbows against the wall & holds for 5-10 seconds
- 2-3 sets, 10 reps, hold each rep for 5-10 seconds

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## Summary

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## Summary Scapulae Dyskinesia



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- SD refers to poor scapulae positioning & altered movement patterns during motion
- SD also refers to incorrect muscle firing patterns
- SD can also be related to pain inhibition of a associated active or passive structure
- SD over a period of time will lead to some form of musculoskeletal condition

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## Summary Scapulae Dyskinesia



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- Corrective exercises play an important role for correcting altered biomechanics due to incorrect muscle firing patterns
- Corrective exercises is important to restore stability back to the scapulohumeral & scapulothoracic regions for ideal shoulder function/loading

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