INTERVENTION STRATEGIES FOR THE SHOULDER

The purpose of this handout is to demonstrate how a biomechanically-based treatment approach can be implemented with commonly utilized exercises. Therefore, the handout is not intended to provide an all-inclusive list of possible shoulder exercises. When having patients perform these exercises, consider modifying biomechanical factors to target specific impairments and vary the challenge to the patient. These factors may include changing the resistance, moment arm, speed, contraction type, muscle length, etc. Consider choosing or modifying the exercise based on the principal of specificity (i.e., how the muscle is used during functional and/or athletic activities). It may be appropriate to start with an exercise that is less specific but addresses activation of the muscle and control of a movement, and then progress to a more specific exercise/activity as appropriate. Finally, consider appropriate dosing of the exercise based on the desired outcome (hypertrophy, endurance, power) and the function of the target muscle (prime mover vs. stabilizer).

Evidence for the effectiveness of strengthening exercises is generally based on EMG measurements of muscle activity. Although numerous studies have been conducted in this area, many do not appear to adequately control for important factors that can impact the comparison of EMG amplitude between exercises (e.g., muscle length, contraction type, movement speed). Therefore a concerted effort was made to reference studies that only include studies of sound scientific quality. For many exercises, evidence does not yet exist and are therefore included based on biomechanical theory.

DECREASED SCAPULAR UPWARD ROTATION

Goals:
1. Obtain lower trapezius and/or serratus activation with minimal upper trap activity
2. Maintain good position of scapula on thorax throughout motion
3. Avoid clavicle elevation (i.e. shoulder shrugging)

Wall slide
Description: Face the wall with forearms flat on the wall and thumbs pointing posterior. Push gently into the wall with forearms through slight scapular protraction (should not have much visible movement, just activating the serratus anterior). Slide forearms up the wall while maintaining pressure into the wall through scapular protraction.

Common incorrect movement patterns:
1. Excessive scapular protraction
2. Using elbow extension to push forearms into the wall
3. Clavicle elevation (i.e. shoulder shrugging) through excessive upper trap

Evidence:
- Effective exercise to activate the serratus at and above 90° of elevation (Hardwick 2006)
Progressions:
1. Performing glenohumeral ER while performing wall slide
2. Step hands up wall maintaining ER

Initial Position | Set Position with Slight GH ER | Final Position | Step up wall

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**Prone scapular setting**

Description: Lie in prone with shoulder in overhead position resting on the table. Set the scapula through retraction and depression. Lift the arm slightly off the table maintaining good scapular position.

Common incorrect movement patterns:
1. Clavicle elevation (i.e. shoulder shrugging) through excessive upper trap activity

**Initial Position**

**Scapular Setting**

**Final Position**

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**Prone I, Y, T**

Description: Lie in prone with shoulder hanging off the edge of the table. Set the scapula through retraction and depression. Maintain this position while performing the desired movement avoiding upper trap activity:
- I: extend the arm to the side
- T: horizontally abduct the humerus
- Y: elevate the humerus

Common incorrect movement patterns:
1. Performing the movement only through glenohumeral joint
2. Clavicle elevation (i.e. shoulder shrugging) through excessive upper trap activity

Evidence:
- Prone Y and T have good activation of middle and lower trapezius (but high upper trap also) (Ekstrom 2003)

**Initial Position**

**Set Position**

**Final Position**
Variations/Progressions:
1. Progress to performing scapular retraction/depression during humeral movement (vs. maintaining the scapular set position throughout)
2. If needed, consider manually assisting the scapula into appropriate position (e.g. upward rotation, posterior tilt, external rotation):

Evidence:
- Compared to no guidance, combined manual and verbal guidance significantly decreased sternoclavicular elevation and retraction, and scapulothoracic internal rotation and anterior tilt. EMG activity demonstrated increased lower trap and serratus anterior activity (Jacobs et al. 2017)
**Dynamic hug**

Description: Stand with back towards resistance bands with shoulders flexed approximately 60° and internally rotated, and elbows flexed. Horizontally abduct the humerus while protracting the scapula as though reaching out to hug.

Common incorrect movement patterns:
1. Clavicle elevation (i.e. shoulder shrugging) through excessive upper trap activity
2. Punching through elbow extension

Evidence:
- Good activation of serratus anterior (75-110% MVIC) (Decker 1999)

**Sidelying flexion**

Description: In sidelying, flex the shoulder keeping the humerus parallel to the ground.

Common incorrect movement patterns:
1. Scapular internal rotation (medial border winging) in response to the large moment arm

**Scapular Punches**
Description: This exercise can be performed in a variety of positions (e.g. seated, supine, inclined supported on table, inclined on Swiss ball, standing). Flex the shoulder is so the arm is in line with gravity. Protract the scapula by reaching towards the ceiling keeping the elbow extended. Hold at end position and slowly return to start position.

Common incorrect movement patterns:
1. Clavicle elevation (i.e. shoulder shrugging) through excessive upper trap activity
2. Punching through elbow extension

Evidence: (Ludewig, unpublished data)
- Standing punch and resisted shoulder flexion have highest serratus anterior activation (% MVIC), but these also have high activation of upper trap (high UT/SA ratio)
- Supine punch and theraband punch have lower serratus anterior activation but do not result in as much upper trap activation
Push up plus

Description: This exercise can be performed in a variety of positions (e.g. standing at wall with elbows extended, standing at wall with elbows flexed, on incline, in push up position, on Swiss ball). In a push up position, protract the scapula keeping the elbow extended. Hold at end position and slowly return to start position.

Common incorrect movement patterns:
1. Flexing the elbows to lower the chest

Evidence: (Ludewig 2004, Decker 1999)
- Plus phase of a standard push up resulted in highest serratus anterior activation (80%-100% MVIC)
- Plus phase of a knee push up and elbow push up resulted in 60-70% MVIC
- Plus phase of a wall push up had lowest serratus anterior activation (45% MVIC)
- UT/SA ratio was low across all exercises
INCREASED SCAPULAR INTERNAL ROTATION
DECREASED SCAPULAR POSTERIOR TILT

Goals:
1. Obtain middle trapezius, lower trapezius, serratus anterior, and rhomboid activation
2. Maintain good position of scapula on thorax throughout motion

Exercises from previous sections: wall slide, prone I, prone T, prone Y, prone scapular setting, dynamic hug, sidelying flexion, punch, push up plus

Sidelying ER
Description: In sidelying with a towel under the elbow, set the scapula through retraction and depression. Maintain this position while externally rotating the humerus. Hold, then slowly lower fist to stomach.

Common incorrect movement patterns:
1. Trunk rotation to increase shoulder ER
2. Not maintaining scapular retraction and depression
3. Clavicle elevation through increased upper trap activity

Initial Position | Scapular Set Position | Final Position

Progressions:
1. Perform scapular retraction/depression while externally rotating the humerus
2. Isometric holds
3. Perform in sidelying plank position

Bilateral shoulder ER
Description: In standing, hold resistance band with forearms in neutral rotation (thumbs up). Hold shoulders in slight elevation in the scapular plane and elbows flexed to 90 degrees. Set scapula through retraction and depression. Externally rotate shoulders through comfortable range of motion. Hold final position, then slowly return to initial position.

Common incorrect movement patterns:
1. Only performing glenohumeral ER (i.e. no scapular retraction and depression)
2. Not maintaining scapular retraction and depression
3. Clavicle elevation through increased upper trap activity

**Initial Position**

**Scapular Set Position**

**Final Position**

**Progressions:**
1. Perform scapular retraction/depression while externally rotating the humerus
2. Isometric holds

**Wall clocks with band**

Description: Stand facing the wall with resistance band around the wrists and palms flat on the wall at chest height. Set scapula through retraction and depression. Imagine the numbers of a clock on the wall and reach towards specified number(s).

**Common incorrect movement patterns:**
1. Only performing glenohumeral ER (i.e. no scapular retraction and depression)
2. Not maintaining scapular retraction and depression
3. Clavicle elevation through increased upper trap activity
Progressions:
1. Reach towards specific numbers, then progress to whole clock face
2. Perform scapular retraction/depression while externally rotating the humerus
3. Isometric holds at specified numbers

Rows
Description: Stand facing the wall holding resistance band. Extend humerus while retracting and depressing the scapula.

Common incorrect movement patterns:
1. Only performing shoulder extension or elbow flexion (i.e. not performing scapular retraction and depression)
2. Clavicle elevation through increased upper trap activity
**Sleeper stretch**

Description: In sidelying (avoid trunk rotation) with the shoulder flexed to 90 degrees, gently internally rotate the shoulder by pulling the forearm towards the table using the other hand.

Common incorrect movement patterns:
1. Shoulder protraction (i.e. not lying directly on the side)

Evidence:
- Found to significantly increase both horizontal adduction and internal rotation ROM (Laudner 2008)

![Initial Position](image1.png) ![Final Position](image2.png)

**Horizontal adduction stretch**

Description: Stand with the scapula against the wall. Lean into the wall to prevent scapular internal rotation and sternoclavicular protraction. Pull arm across the body.

Common incorrect movement patterns:
1. Allowing scapular internal rotation and sternoclavicular protraction.

Evidence:
- May be more effective to increase glenohumeral ROM than sleeper stretch (McClure 2007)

![Initial Position](image3.png) ![Final Position](image4.png)
**Pectoralis minor stretch**

*Description:* Stand facing the wall with shoulder elevated and a towel between the anterior shoulder and the wall for padding. Bend elbow to reduce neurodynamic tension. Set scapula through retraction and depression. Gently rotate trunk contralaterally.

Common incorrect movement patterns:
1. Inadequate scapular set

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**EXCESSIVE GLENOHUMERAL TRANSLATIONS**

**Goals:**
1. Increase rotator cuff activation to improve glenohumeral joint stability
2. Maintain good position of scapula on thorax throughout motion

**Resisted glenohumeral IR**

*Description:* Stand sideways to a door with a resistance band anchored above the shoulder. Elevate the shoulder approximately 60 degrees and bend the elbow to 90 degrees. Rotate the shoulder into internal rotation without letting the elbow drop. Hold and slowly return to initial position.

Common incorrect movement patterns:
1. Scapular internal rotation or anterior tilt
2. Extending or adducting the shoulder while internally rotating
**Planks on ball**

**Description:** Lie on Swiss ball supporting the upper body weight through the forearms with the humerus near vertical. Hold the position.

**Common incorrect movement patterns:**
1. Not maintaining good scapular position
2. Allowing trunk to drop towards the floor
3. Not keeping shoulders directly over elbows

**Progressions:**
1. Manual perturbations performed by therapist on the ball or on patient’s body
2. Slowly roll ball forward, backwards, and to the side while maintaining plank position
**Figure 8 or alphabets**

**Description:** This exercise can be performed in a variety of positions (e.g. seated, supine, inclined supported on table, inclined on Swiss ball, standing). Flex the shoulder so that the arm is in line with gravity.

**Common incorrect movement patterns:**
1. Not maintaining good scapular position

**Progressions:**
1. Change the patient’s body and shoulder position (inclined on table, inclined on ball, etc.)
2. Increase the speed and/or amplitude of the movements
3. Require the patient to respond to verbal commands on speed, direction, amplitude, etc.
**Ball on wall**

Description: Stand facing the wall with shoulder flexed to 90 degrees and a ball between the fist and the wall. Perform rapid alternating movements of the shoulder maintaining the ball on the wall.

Common incorrect movement patterns:
1. Not maintaining good scapular position
2. Clavicle elevation through excessive upper trap activity (usually with fatigue)

**Quadruped ball catch**

Description: In quadruped, start with the shoulder elevated approximately to prone Y position. Allow the ball to drop towards the ground but quickly catch it before it makes contact. Return to initial position and repeat.

Common incorrect movement patterns:
1. Clavicle elevation through excessive upper trap activity (usually with fatigue)

![Initial Position](image1)

![Mid Position](image2)

![Final Position](image3)

Progressions:
1. Start in 90 degrees abduction and external rotation. Drop ball towards the ground and catch by internally rotating the shoulder.
**Supine ball catch**

*Description:* The patient lies supine with their arm supported on a towel in 90 degrees abduction. Stand at their feet and toss a ball or light hand weight to them. The patient catches the ball making sure to control eccentric shoulder external rotation. The patient throws the ball back and the exercise is repeated.

**Common incorrect movement patterns:**

1. Inability to control the humerus or scapula.
2. Excessive scapula tilting/trunk movement to compensate for decreased glenohumeral motion

**Progressions:**

1. Change speeds
2. Patient lies on table near edge so shoulder is no longer supported
3. Perform with patient maintaining bridge position on Swiss ball (ball under shoulders)

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**EXCESSIVE CLAVICLE ELEVATION**

**Goals:**

1. Decrease upper trapezius activity
2. Increase lower trapezius and serratus anterior activation
3. Maintain good position of scapula on thorax throughout motion

**Exercises from previous sections:** wall slide, prone I, prone T, prone Y, prone scapular setting, dynamic hug, sidelying flexion, punch, push up plus

**Biofeedback (clinical EMG, mirror, manual guidance)**
References


