

Thoracic Spine Hypo-mobility and Shoulder Pathology: A Missing Link?

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Objectives

Review anatomy and biomechanics of the shoulder and thoracic spine.

Understand how the decreased thoracic spine motion can play a role in shoulder pathology.

Understand how to assess thoracic spine mobility for impairments.

Understand how to utilize the manual techniques and a foam roller to remedy thoracic hypomobility.

He who treats the site of pain is often lost.
-Karl Levitt

Shoulder Anatomy Review

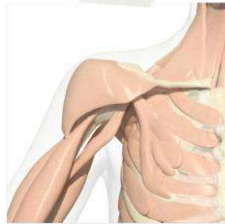
Very Mobile
Very Unstable
Cup and Saucer
Scapula: The forgotten bone



Shoulder Anatomy Review

Muscles:

Rotator Cuff (SITS)
Pec Minor
Biceps Brachii
Tricep
Trapezius (Upper/Mid/Lower)
Deltoid (Ant/Post/Mid)



Shoulder Anatomy Review

Active Ranges of Motion
(Magee)
Flexion/Extension (170/60)
Abduction/Adduction
(170/50)
Internal/External Rotation
(60/80)



Shoulder Anatomy Review

Clinical Question:

Have you treated a patient who has had near normal ROM via goniometric measurements and normal strength via manual muscle tests yet still has symptoms?

What was your reaction?

Was it this?



Thoracic Spine

12 vertebrae

Serves as an attachment site for ribs in order to protect internal organs.

Transfers energy generated from lower extremity to upper extremity as part of the kinetic chain.



Thoracic Spine Review

Range of Motion
Rotation
Flexion/Extension
Lateral Flexion
Musculature



Thoracic Spine Anatomy Review

Pec Minor
Anterior Muscles:
Serratus Anterior



Thoracic Spine Anatomy Review

Posterior Muscles:
Rhomboids
Lower Trapizeus
Mid Trapizeus
Spine extensors
Erector Spinae
Latissimus Dorsi
Teres Major



Normal Mobility

Active Movements of the Thoracic Spine (Magee)

Forward Flexion (20-45°)

Extension (25-45°)

Side Flexion (20-40°)

Rotation (35-50°)

Costovertebral expansion (3-7.5cm)

Rib motion- Pump handle, bucket handle, caliper

Hypo-mobility

Decreased energy transfer in the throwing athlete.

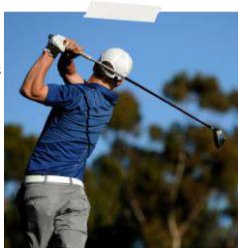
Can effect rotation and tilt of trunk

Lateral side bending occurring during acceleration and deceleration phase



Hypo-mobility (Can it effect the shoulder?)

Limited literature regarding how thoracic spine mobility may effect shoulder pathology, however it is growing.



Hypo-mobility (Can it effect the shoulder?)

'Regional Interdependence'- the concept that seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the patient's primary complaint'.
(Wainner 2007)



Hypo-mobility (Can it effect the shoulder?)

If the thoracic spine is able to achieve its correct range of movement, the body has more lumbar and scapular stability. But if the thoracic spine is not able to move freely, the body will compensate elsewhere--usually finding that lost movement in the low back and scapula-thoracic regions. In some cases, the glenohumeral joint can be impacted and contribute to a rotator cuff or labral injury.
(Marcello 2011)



Hypo-mobility Theisen 2010

2 sex & age matched groups (n=39)

The clinical question was do those with shoulder outlet impingement syndrome have a difference in Thoracic ROM in the sagittal plane.

A significant difference was reported in regards to thoracic spine mobility. Those with shoulder impingement had decreased ROM.

Concluded the mobility of the thoracic spine should receive more attention in the diagnosis and therapy of patients with shoulder outlet impingement syndrome.

Hypo-mobility

Fruth 2006

Case report

Patient with a 4 month history of upper back pain and limited Cervical, Trunk and Shoulder AROM.

Decreased mobility and pain was noted on examination at Costovertebral (CV) & Costotransverse (CT) joints of ribs 3-6 along with trigger points in the peri-scapular musculature.

Treatment consisted of mobilizations to the ribs and trigger point therapy to the peri-scapular musculature. In addition to exercises emphasizing posture and flexibility.

Symptoms decreased enough to return to normal activities after 7 physical therapy sessions.

Hypo-mobility

Katzman 2010

Review of literature and evidence based treatment options regarding age-related hyperkyphosis.

Overall prevalence 20-40% above the age of 40 years old

Biomechanical alterations may cause pain and risk dysfunction in the shoulder, pelvic girdle, Cervical, Thoracic and lumbar spine.

'Therapeutic exercise, such as self mobilization lying supine on a foam roller has been used successfully in a multidimensional exercise program that educed kyphosis among hyperkyphotic women.'- (Katzman 2007)

Hypo-mobility

Vismara 2010

Effect of obesity & low back pain (LBP) on spinal mobility: a cross sectional study in women.

Compared 3 groups

13 Obese with no LBP

13 Obese with chronic LBP

11 healthy subjects.

Compared forward flexion and lateral bending of the spine.

Generally reduced ROM, due to a decrease pelvic girdle & T/S mobility.

Lateral bending:

Obese with chronic LBP had decreased Lumbar and Thoracic ROM.

Obese without LBP had only decrease Thoracic ROM.

Hypo-mobility Mintken 2010 Physical Therapy

N=80 (Age 18-65)

Successful outcome= 49 (61%)

6 different manual techniques done to each patient. 1 nonthrust mobilization to lower cervical spine and 5 different thrust manipulations focused on the thoracic spine

Every patient performed 2 general spine mobility exercises, 1 for cervical spine and 1 for thoracic spine.

Clinical Prediction Rule: If 3 of 5 variables were present the chance of a successful outcome improved from 61% to 89%.

Variables included: Pain-free Shoulder flexion <127°, Shoulder IR <53° @ 90° of shoulder abduction, negative Neer test, not taking medications for shoulder pain, symptoms <90 days.

Hypo-mobility Strunce

21 subjects (18-65 yo) with shoulder pain as their primary complaint.

Presented with:

decreased shoulder ROM

pain reproduction with Neer or Hawkins-Kennedy tests

Excluded those with pain that could attributed to other pathologies occurring within the body and those with confirmed RTC tear, adhesive capsulitis, cervical nerve root compression.

Performed thoracic and rib manual mobilization/manipulation techniques based on physical examination and measured the immediate effects.

Statistically significant reduction of pain and increase in AROM for all subjects tested.



Thoracic Spine Assessment methods

History

Observation

Palpation

Segment movement- Individual vs. Group

Joint play

Posterior/ Anterior

Rotational

Thoracic Spine Mobility



Thoracic Spine Mobility





Stand and with your feet firmly planted on the ground (feet shoulder width apart). Cross your arms over you chest and rotate your torso as far to the left as you can and then as far to the right as you can.



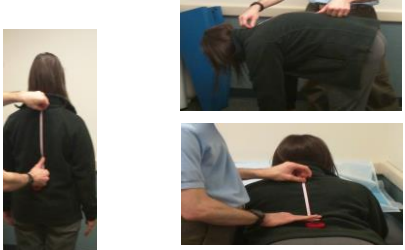
Sit down and with your feet firmly planted on the ground (feet shoulder width apart). Cross your arms over your chest then rotate your torso as far to the left as you can and then as far to the right as you can.

Thoracic Spine Assessment methods

Forward flexion & Side flexion-
Tape measure method - Ott's Sign
Movement cannot be isolated
Rotation- Compare one side to the other with client/athlete in a seated position to limit rotation from hips.

Objective Measurements

Ott's Sign



Objective Measurements
(cont.)

Rotational Assessment



Left rotation

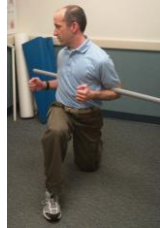


Objective Measurements
(cont.)

Rotational Assessment

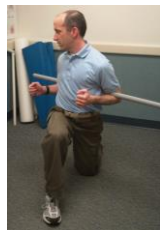


Right rotation



Objective Measurements
(cont.)

Rotational Comparison



Objective Measurements
(cont.)

Squat assessment



Manual Techniques

- Anterior/Posterior mobilizations
- Rotational mobilizations
- Clinician
- Self
- Lateral flexion stretching
- Rotation stretching



Manual Techniques

- Anterior/Posterior Mobilizations



Manual Techniques

Rotational



Manual Techniques

Rib mobilization



Manual Techniques

Quadruped

Rotational



Manual Techniques

Quad Post-
Rotation



Manual Techniques

Quad Post-
Rotation



Foam Roller- Precautions/ Contraindications

- Suspected fracture/ stress fracture
- Spinal Cord involvement
- Structural damage that makes positioning difficult or painful
- Movement impairments that make it difficult to get onto or up from the roller.
- Hyper-mobile segments
- Low back contusions/ SI dysfunction
- Lack of sensation

Foam Roller Assessment

Foam Roller

Floor contact (Before & After)
Assessing the symmetry of movement



VIDEOS



Lateral Rolling



Forward Reaching



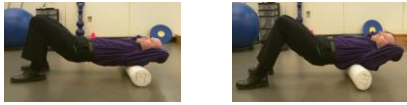
Overhead Reaching



Perpendicular Rolling





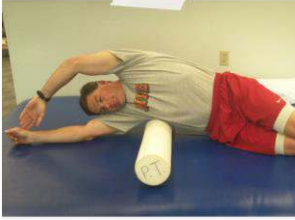


Foam Roller Techniques



Foam Roller Techniques

Lateral Flexion



Foam Roller Techniques

Lateral Flexion
(Physioball progression)



3A FLETTES



Elbow Flares



'No Money'
Muscle Facilitation



Horizontal Abduction
Muscle Facilitation



Foam Roller

Other Benefits
Muscle facilitation
Self soft tissue release
Ex. Latissimus Insertion



Foam Roller

Self soft tissue release
Latissimus Insertion



Foam Roller

Self soft tissue release
Latissimus Insertion



Summary:

Consider the anatomy and biomechanics of the shoulder and thoracic spine when a patient presents with shoulder pain.

Assess thoracic spine mobility for impairments.

'Regional interdependence' means decreased thoracic spine motion can play a role in shoulder pathology.

Incorporate manual techniques and exercises to remedy thoracic hypomobility.

Empower the patient.

Thank you!

Allied Health Education
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Questions?

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