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

1. Very Mobile
2. Very Unstable
3. Cup and Saucer

Scapula: The forgotten bone

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

Active Ranges of Motion

- 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?

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

**Anterior Muscles:**
- Pec Minor
- Pec Major
- Serratus Anterior

Thoracic Spine Anatomy Review

**Posterior Muscles:**
- Rhomboids
- Lower Trapezius
- Mid Trapezius
- Spine extensors
- Erector Spinae
- Latisimus 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.
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)

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)

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 sagital 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 reduced 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 be 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 your 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

Rotational Assessment

Right rotation

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

Quadraped Rotational
Manual Techniques

- Quadraped 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/Sl dysfunction
- Lack of sensation
Foam Roller Assessment

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

VIDEOS

Lateral Rolling  Forward Rolling

Overhead Rolling  Perpendicular Rolling
Foam Roller Techniques
Foam Roller Techniques

Lateral Flexion

(Supine Progression)

SA Presses
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!
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Questions?
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References: