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Convocation 2020

Movement is Medicine:
Muscle Imbalance
Crossed Syndromes
Upper Crossed Syndrome

• Testing:
  • Cervical Flexion Test
  • Bilateral Shoulder Abduction Test
  • Scapular Stabilization
  • Scapular Depression
  • Supine Bilateral Shoulder Flexion

• Treatment:
  • Stretch:
    • Pectoralis Major/Minor
    • Levator Scapulae
    • Upper Trapezius
    • SCM
    • Latissimus Dorsi
  • Retrain:
    • Cervical Flexion
    • Lower trapezius and rhomboids
Cervical Flexion Test

• **Rationale:**
  • As patient tries to look at feet, all the deep cervical flexors should accomplish this motion with chin tilting toward throat first, followed by raising head off the table in a smooth curved flexion arc. Weakness of deep neck flexors lead to substitution by the sternocleidomastoid and scalenes which will carry the head forward. Facilitated/hypertonic Sternocleidomastoids and Scalenes can also inhibit the deep cervical flexors. This creates an unopposed initial anterior chin thrust with extension of OA, and upper cervical region.

• **Procedure:**
  • Patient Supine and the physician sits or stands at side of table near patient’s head
  • Ask patient to SLOWLY try to look at their feet
  • Chin should tilt toward chest and remain there as patient continues to raise head (Forehead should be more anterior than chin throughout the range of motion)

• **Fails Test If:**
  1. Chin thrusts anteriorly before neck curls
  2. No distinct chin-tilt seen as the first step in flexion

• **Failed Test Signifies:**
  • Inhibited/weak: Deep cervical flexors (longus colli, longus capitus, rectus capitus anterior)

• **Due to:**
  • Dominance of SCM and scalenes (weakness of deep flexors leads to increased activity of these synergists)
  • Hypertonicity of Cervical Erector Spinae
Bilateral Shoulder Abduction Test

**Rationale:**

- Note symmetry of the scapula with shoulder abduction, especially looking for “winging” and early scapular elevation. Weakness of the supraspinatus and deltoid will result in over-recruitment of Trapezius and Levator scapulae. Overuse of these muscles leads to loss of shoulder stabilization by lower trapezius and serratus which may lead to impingement syndromes.

**Procedure:**

- Patient Seated, with good upright posture, physician standing behind patient, hands monitoring the scapula
- Begin by looking at the scapula - is one more protracted than another
- Instruct patient to raise their arms alongside their head
- Previous labs emphasized using this test to lateralize to the most dysfunctional side by noting which scapula started moving first. Both sides may be dysfunctional so describe what you feel on BOTH sides
- Note which side protracts more
- Have the patient do it again and note if there is early scapular elevation (before 60 degrees of shoulder abduction)
- If the patient sidebends the thoracic spine and elevates the shoulder to achieve the motion - this is an indicator of significant dysfunction

**Fails Test IF:**

- Both scapulae do not move symmetrically, and smoothly. Also fails test if there is scapular elevation before 60 degrees of abduction

**Failed test signifies:**

- Alteration in shoulder stabilization and the need for further assessment to identify:
  - Hypertonic Upper Trapezius and Levator Scapulae
  - Weakness of the lower trapezius and other scapular stabilizers providing stabilization
  - Possible joint restrictions/Somatic Dysfunction (Beyond scope of lab)
Scapular Stabilization

- **Rationale:** Excessive “Winging” of the medial border of scapula occurs due to Inhibition/weakness of Lower-mid trapezius, Rhomboids, and Serratus anterior, with resultant loss of scapular stabilization. Subtle imbalance is often missed unless provoked by this maneuver.

- **Procedure:**
  1. Patient on table – on hands & knees with elbows flexed enough to keep spine parallel (avoid spinal sagging or arching) to floor and in neutral position (see above) or against wall.
  2. Notice any winging or scapular elevation
  3. Physician stands next to patient and monitors the inferomedial border of scapula being tested. (The arm that remains on the table)
  4. First look and notice if there is already a difference between scapula
  5. Instruct patient to support themselves with one arm while lifting the other off the table or wall a few inches-keeping palm parallel to the table or wall (see above pictures)
  6. Physician observes and palpates for any winging of scapula on support side arm
  7. Test other side
  (You can perform the test in the same way with the patient performing a push up position at the wall)
  - **Fails Test If:** presence of any degree of scapular winging on either side: This type of winging due to inhibition/pseudoparesis or weakness is more subtle than that due to true paralysis of **Serratus** due to injury of Long thoracic nerve
  - **Failed test signifies:**
    1. Inhibited/weak Scapular stabilizers: Rhomboids, Mid & Lower trapezius, Serratus anterior
    2. Due to: Tight/Facilitated Upper body Tonic muscles: Pec minor/major, upper trapezius, levator scapulae, scalenes

Pictures from Dr. Greenman’s “Principles of Manual Medicine” 2nd edition
Scapular Depression

- **Rationale:** This test checks for strength and stability of the scapula in scapular depression. Weakness in this motion indicates weakness in scapular stabilization muscles.

- **Procedure:**
  - Have the patient lie prone with the arm to be tested flexed.
  - Monitor at the inferior medial border of the scapula.
  - Look for contraction of the lower trapezius and instruct the patient to pull the scapula down and back against resistance. Compare sides.

- **Fails Test if:**
  - Absence or weakness of motion

- **Failed Test Indicates:**
  - Weak/inhibited lower trapezius
  - Hypertonic/Facilitated scapular elevators (upper trapezius, Levator scapulae)
  - Compensatory movements of the cervical spine or lumbar spine into extension
  - Over-activity of the thoracolumbar paraspinals or latissimus dorsi
Supine Bilateral Shoulder Flexion

- **Rationale:** This test assesses the length of the Latissimus Dorsi as it has an influence on the lumbar spine, thoracic spine and attaches to the upper extremity.

- **Procedure:**
  - Have the patient lie supine
  - Bring both of the patient’s arms overhead into shoulder flexion.
  - Assess the tension and degree of ability of shoulder flexion, and the ability to maintain a neutral lumbar spine (avoiding lumbar extension). Note any asymmetry.

- **Fails Test if:** Asymmetry in shoulder flexion from side to side, or bilaterally, or noted lumbar extension during the test

- **Failed Test Indicates:**
  - Hypertonic Latissimus Dorsi
Lower Crossed Syndrome

• Testing:
  • Pelvic Clock
  • Muscle Firing Patterns:
    • Hip Extension
    • Hip Abduction

• Treatment:
  • Stretch
    • Iliopsoas
    • Rectum Femoris
    • QL
    • Piriformis
    • Hamstring
    • Adductors
    • Gastrocnemius/Soleus
  • Retrain
    • Gluteus Minimus, Medius, Maximus
    • Abdominal muscles
Pelvic Clock

- **Rationale:** Core (primarily Abdominal) muscles should keep pelvis level while tilting anteriorly & posteriorly, and rotating side to side, as during gait. If they are inhibited/weak, then patient will be unable to perform these motions without “cheating” and will recruit other muscles to “get the job done”. Typically lumbar extensors will take over in order to create these motions but will not be able to do so and still keep ASIS’s level at same time. For example during rotation, a unilateral contraction of a facilitated/hypertonic Quadratus lumborum (QL) will create ipsilateral sidebending, elevating the ASIS on that side. Also watch that patients do not recruit leg muscles to push the pelvis up or down.

- **Procedure:**
  - Patient Supine, knees bent, feet on table
  - Physician stands on eye dominant side / Thumbs on Inferior aspect of ASIS’s- Note if they remain level
  - Have Patient imagine ‘a clock’ or ‘bowl of soup’ on their belly
  - Instruct patient to move their pelvis in the 4 directions below, Do NOT allow them to push with legs or “hip hike” on either side
  - Instruct them to contract their abs- this may take some coaching
    - **Tilt Pelvis Posterior** (Decrease lordosis -Umbilicus toward 12 O’Clock / tip bowl toward face)
    - **Tilt Pelvis Anterior** (Increase lordosis -Umbilicus toward 6 O’Clock / tip bowl toward feet)
    - **Rotate Pelvis Right** (Move Umbilicus toward 9 O’Clock about 1-2 inches / tip bowl toward right- ASIS stay level)
    - **Rotate Pelvis Left** (Move Umbilicus toward 3 O’Clock about 1-2 inches / tip bowl toward left- ASIS stay level)

- **Fails Test IF:** ASIS’s do not remain level along a transverse axis/horizontal plane during any of 4 motion tests
- **Failed test signifies:** Inhibition/weakness of the core muscles controlling spine & pelvis
- **Inhibited /weak:** Core muscles, particularly: Abdominals (Rectus abdominis, Obliques, transversus abdominus)
- **Tight/facilitated:** Lumbar extensors [Erector spinae, Quadratus lumborum]
- May also indicate somatic dysfunction of the sacrum, pelvis and lumbar spine
- **Retraining:** The patient can be taught to strengthen directly from this position. They can monitor their own ASIS, contract their abs and work to improve the directions they are weaker in. example prescription:
  - Neutral to 12 and hold for 10 seconds- repeat X10 then Neutral to 6 and hold for 10 sec- repeat X10
  - Have patients move in each direction and hold for 10 seconds and release to neutral
  - Have the patient make their way around the clock attempting fluid motion without hip hike
• **Rational:** The normal firing pattern for proper hip extension is
  • Hamstrings
  • Gluteus Maximus
  • Contralateral Lumbar Erector Spinae,
  • Ipsilateral Lumbar Erector Spinae.
  • Significant findings include delayed or absent firing of the Gluteus Maximus and substitution by hamstrings and lumbar erector spinae.

• **Procedure:**
  • Patient lies prone
  • Monitor at the hamstrings, glutes, and bilateral lumbar erector spinae
  • Instruct the patient to slowly lift their leg off the table (hip extension)
  • Observe for the firing pattern of the muscles

• **Fails Test if:** The patient does not have the normal firing pattern

• **Failed Test Signifies:**
  • Inhibited weak: gluteus maximus
  • Facilitated/hypertonic: iliopsoas/rectus femoris (hip flexors), erector spinae
• **Rational:** The normal firing pattern for proper hip abduction is
  • Gluteus medius
  • Tensor fascia lata
  • Quadratus Lumborum
  • Lumbar erector spinae
  • Significant findings include late firing of the gluteus medius and early firing of the TFL resulting in internal rotation and flexion of the hip.

• **Procedure:**
  • The patient is sidelying on the contralateral side you wish to test
  • Monitor at the TFL, Gluteus Medius, Quadratus Lumborum, and Lumbar Erector spinae
  • Instruct the patient to slowly abduct their leg off the table
  • Observe for the firing pattern of the muscles.

• **Fails Test If:** The patient does not have the normal firing pattern

• **Failed Test Signifies:**
  • Inhibited weak: Gluteus medius (either truly weak or pseudoparesis)
  • Hypertonic/facilitated: adductors,
References


• Pierce-Talsma, S. Lower Crossed Syndrome Lab Handout. 2019.