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#NSCAPT21

Building a Movement Foundation: Functional Exercise for the Cervical, Thoracic, and Lumbar Spine

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CONFLICT OF INTEREST STATEMENT

I have no actual or potential conflict of interest in relation to this presentation.

Objectives

- Discuss Differential Diagnoses
- Review relevant anatomy
- Present cervical, thoracic, and lumbar joint kinematics
- Describe common spine dysfunctions
- Discuss and demonstrate treatment principles, exercise

Cervical Spine- Differential Diagnosis

Mechanical Neck Pain

- Cervicalgia
- Osteoarthritis
- Cervical disc disorder
- Spondylosis
- Sprain and strain of the cervical spine
- Headache
- Cervico-cranial syndrome
- Radiculopathy

Cervical Spine- Differential Diagnosis

Red Flag Conditions

- Cancer
- Cervical Myelopathy
- Upper Cervical Ligamentous Instability
- Vertebral Artery Insufficiency
- Inflammatory or Systemic Disease
- Cervical Fracture

- Is severe
- Persists for several days without relief
- Spreads down arms or legs
- Is accompanied by headache, numbness, weakness or tingling
- Severely limits cervical ROM
- Seek immediate care if severe neck pain results from an injury, such as a motor vehicle accident, diving accident or fall.

Superficial Cervical Flexors

Sternocleidomastoid (SCM)

Anterior scalenes

Deep Cervical Flexors

Longus Colli

Longus Capitus

Superficial Cervical Extensors

Upper Trapezius

Levator Scapulae

Mid layer Cervical Extensors

Splenius capitus

Splenius cervicis

Deep Cervical Extensors

Semispinalis cervicis

Multifidus

Suboccipitals

Suboccipitals

Rectus Capitis Posterior Major
Rectus Capitis Posterior Minor
Superior Obliquus Capitis (SOC)
Inferior Obliquus Capitis (IOC)

SUBOCCIPITAL MUSCLES	MUSCLE SPINDLES PER GRAM OF MUSCLE TISSUE
Inferior Oblique	242
Superior Oblique	190
Rectus Capitis Posterior Major	98
Rectus Capitis Posterior Minor	98

Cervical active ROM Screening:

- Flexion (chin to chest) 40-60 degrees
- Extension (looking up) 70-80 degrees
- Rotation (turning left and right) 60-80 degrees
- Lateral Bending (tilting to side) 45 degrees
- Multisegmental Cervical Flexion
  - Chin to middle of clavicle (mouth closed, shoulders relaxed)

Deep Neck Flexor Test

- Test Position: Supine, hook lying.

  Performing the Test: Tuck patients chin in and lift off table 1 inch. The examiner looks for substitution of the platysma or SCM muscle.

  Normal Values: **Men: 38.9 seconds, Women: 29.4 seconds** ("The Deep Neck Flexor Endurance Test: normative data scores in healthy adults").

Deep neck flexor activation

- Use first knuckles or pad of thumb as target
- Use pad of thumb as manual feedback, 10-20% contraction force

Long Neck Flexion exercises for Deep neck flexor activation

- Supine
- Seated or Standing with feedback
- Ball roll up
- Sphinx position
- Quadruped

Cervical Spine Summary

- Cervical Spine needs stability, but upper cervical may need mobility
- Deep neck flexion strength and endurance important for posture
- Suboccipitals tied to visual system and dense with muscles spindles

Thoracic Spine/Breathing

Differential Diagnoses

- Cardiac ischemia
- Thoracic Aneurysm
- Peptic Ulcer
- Inflammatory Disorders (ankylosing spondylitis)
- Inflammatory or Systemic disease (epidural infection, osteomyelitis)
- Pneumothorax
- Neoplastic Conditions (cancer)

Differential Diagnoses

Rib fracture
Rib Sprain/strain
Thoracic Spondylosis
Stenosis
Disc Herniation
Osteoporosis
Fracture
T4 Syndrome
Spinal Deformity (kyphosis, scoliosis)

Anatomy

- 12 Thoracic vertebra
- Junction Zones:
  - Cervical/Thoracic (CT)
  - Thoracic/Lumbar (TL)
- Ribs

Neurology/Function

- Sympathetic postganglionic neurons
- Hypothesized that manual stimulation may encourage homeostasis through an analgesic effect

Anatomy

- Diaphragm
- Abdominals
- Erector Spinae

Normal Thoracic AROM

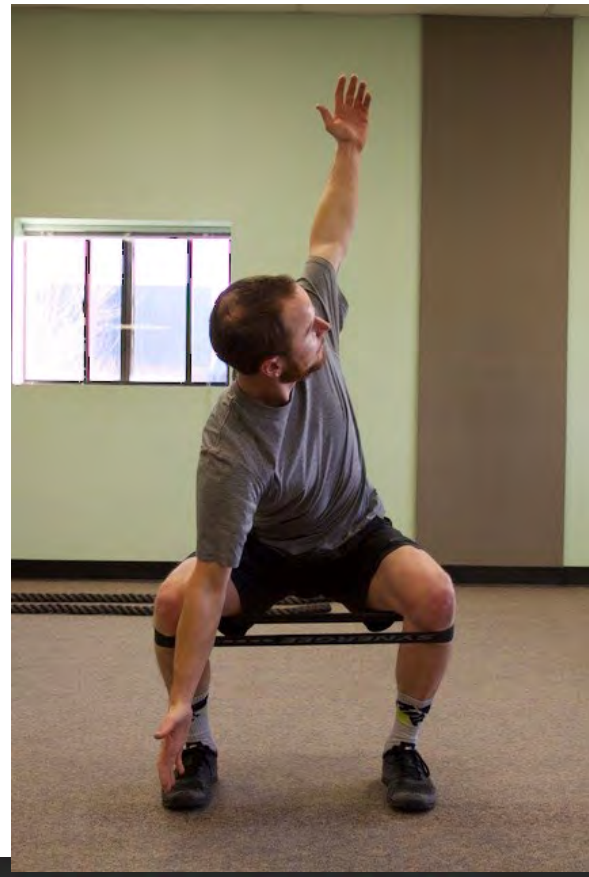
- Thoracic Flexion: 20-45 degrees
- Thoracic Extension: 25-45 degrees
- Thoracic Rotation: 40-50 degrees
- Thoracic Sidebend: 20-40 degrees

Thoracic Spine

- Take your pick!
  - Foam roll
  - Bench Extension
  - Cat/camel
  - Childs pose with rotation
  - OMG
  - Bretzel
  - Thread the needle
  - Merrin Rotation
  - Half Kneeling rotation at wall

Thoracic Spine Exercise- “Merrin’ Rotation

- Athletic stance
- Press back of hand or elbow on inside of knee
- Rotate to resistance
- Take breath, follow resistance on exhale
- Repeat 3-5 times, then reverse



Summary

- Main idea: Thoracic spine is the foundation of good posture
- Principles: Use breathing to self mobilize and improve motion
- Improved rotation = improved ability to extend

Lumbar Spine/Core

Differential Diagnosis

Serious Conditions

- Cancer
- Fracture, including compression fractures
- Infection
- Ankylosing Spondylitis
- Radiculopathy
- Cauda Equina Syndrome
- Aneurysm

Differential Diagnosis

Red Flag Symptoms

- Constant Pain not affected by position or activity
- Unexplained weight loss/gain
- Bowel or Bladder Incontinence
- Saddle anesthesia
- Numbness/Tingling (especially of lower limbs)
- Motor Deficits (Drop Foot)
- Fever
- Recent Trauma
- Severe Pain

Lumbar Pathologies

Complex, but..

- Most MRIs of healthy, pain free individuals show pathologies
- One of the best treatments for non specific low back pain = regular exercise
- If direction specific, avoid 'stretching' or going into the pain.
- Partner with a PT or health professional
- Neutral based exercise, lower impact best

Muscular Anatomy

- Rectus Abdominus
- External/Internal Obliques
- Transversus Abdominus
- Multifidus
- Pelvic Floor
- Quadratus Lumborum
- Psoas

Strength vs Stability

- ‘Movers’
- Job is moving the spine out of neutral (i.e. crunching)
- Exerting force
- Rectus Abdominus, Erector Spinae

- ‘Holders’
- Maintaining neutral spinal position despite a challenge
- Resisting change/absorbing force
- Balance
- Transverse Abdominus, Multifidus, etc.

Everything is Core!

- Sahrmanns
- Dead Bug
- Quadruped Variations
- Crawling
- Perturbation Training
- Squats/Deadlifts

Exercises

Evaluate, can they do exercise:

- Slow, controlled
- Without:
  - **breath holding**
  - Abs ‘doming’
  - Pelvic floor compromise (leaking?)
  - Pain!

Lumbar Spine Summary

- Lumbar pathologies are common on MRI but don’t always cause dysfunction/pain
- Core as a canister
- Are we targeting movers or holders?
- Need stable lumbar spine/pelvis for appropriate extremity control