Thoracic Spine and Ribs

Anatomy Review

1. Thoracic vertebrae and ribs
   - Thinner disks than lumbar spine; decreased ROM
   - Primary goals of thoracic spine and ribs are to provide stability and organ protection
   - Costovertebral articulation T1-9 allows gliding and rolling
   - Costotransverse joint- Ribs 1-10 allow rotation
   - 1st rib articulated with T1 with no interarticular ligs; more moveable
   - Joint surfaces gradually flatten in the lower thorax from the 60 degree horizontal plane
   - Inspiration- upper chest wall flexes, lower ribs widen (abduct)
   - Internal and external intercostals muscles are active with inspiration and exhalation
   - Diaphragm- primary muscle of inspiration also providing “core” stability

2. Muscles
   - Trapezium attached to all t/s processes; upper, middle and lower portions
   - Serratus anterior- protracts scapula, attaches outer ribs 1-6 innervated by long thoracic n. Nerve palsy results in winging
   - Latissimus dorsi- innervated by thoracodorsal n.
   - Pectoralis Major- provides flexion and IR of shoulder
   - Intercostal mm are active during inspiration and expiration
   - Diaphragm is the primary muscle of inspiration with a broad attachment to the ribs and spine

3. Nerves
   - Dorsal scapular- rhomboid major and minor
   - Thoracodorsal- latissimus dorsi
   - Long Thoracic- serratus anterior
Biomechanics Review

- Progressive increase in flexion and extension as move from T1-12
- Primary motion is rotation
- Generally in neutral, SB and rotation will be coupled
- Ribs will elevate/ depress in the sagittal plane with respiration primarily in the upper chest wall, while in the lower frontal plane flaring will occur
- During spinal flexion the ribs will rotate anteriorly, during extension posteriorly

Pathomechanics Review

- Thoracic zygapophyseal joints can cause both local and referred pain; most commonly one segment inferior and lateral to the joint
- Segmental structures can refer to the visceral structures of the abdomen, flank and chest wall
- T4-7 frequently implicated in pseudoanginal pain
- Common Presentations of segmental dysfunction
  - Limited extension T1
  - Limited flexion T3-7 (flattened mid t/s)
  - Limited extension T8-12
  - Decrease in rib cage excursion during respiration could indicate limited flexion T3-7