

# ***Repetitive Stress Injury Thoracics***

Developed for OUCOM CORE  
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Edited by: **Wayne Feister, D.O.** and the  
CORE Osteopathic Principles and Practices Committee

***Series B - Session #5***



CC: Pain in upper-back that has progressively been getting worse.

## **Hx of CC:**

Male patient admits that the pain/soreness has been recurring over the past 4 years. He has a job in a warehouse which consists of lifting 10-20 lbs cases and rotating to the right to stack them on a pallet. He states that he lifts with his legs, but it doesn't seem to make a difference. The pain is a dull ache that seems worse when he straightens up. He has also says people have told him his shoulders aren't the same height and he has been having some pain when he takes a deep breath.



Gen: Patient is a 40 y/o male of average build appearing in mild distress.

## Musculoskeletal:

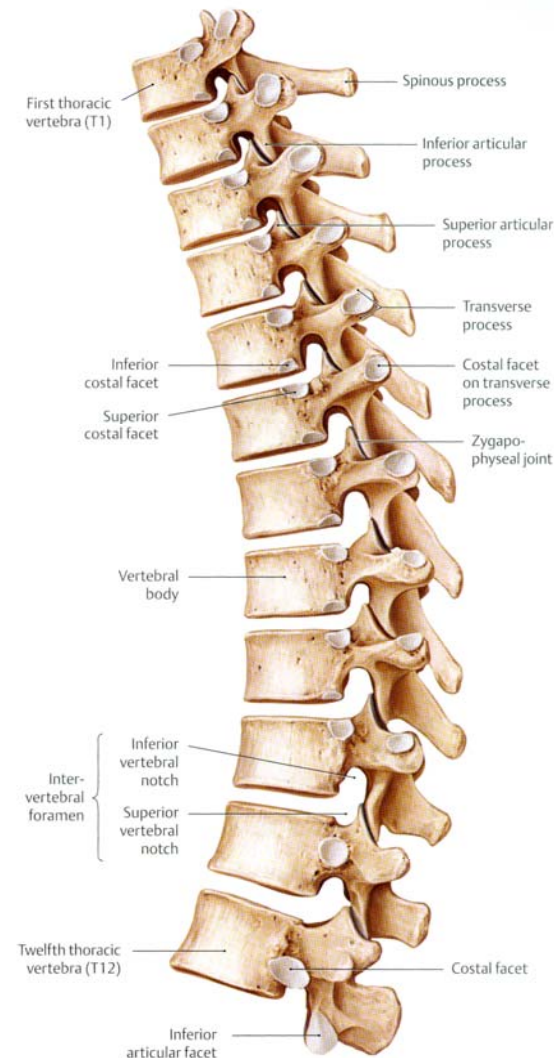
- Paravertebral and shoulder muscles feel hard and wiry. Right shoulder is anterior and inferior. T5 is FRRSR.
- T4 - T6 are noted to be FRLSR. There is tension in the suboccipital muscles. Right ribs 4 and 6 are resistant to inhalation. Rib 5 is anteriorly subluxed.

*To further understand some of these findings lets review some of the corresponding anatomical relationships.*



## Articulations:

- Each thoracic vertebra articulates with both the vertebra above and below.
- The head of the rib articulates with two vertebral bodies (vertebra 1-9). And one vertebral body (vertebra 10-12).
- Ribs 1, 11, & 12 articulate solely with the vertebrae of the same number.
- Ribs 1-10 articulate with vertebral transverse process.

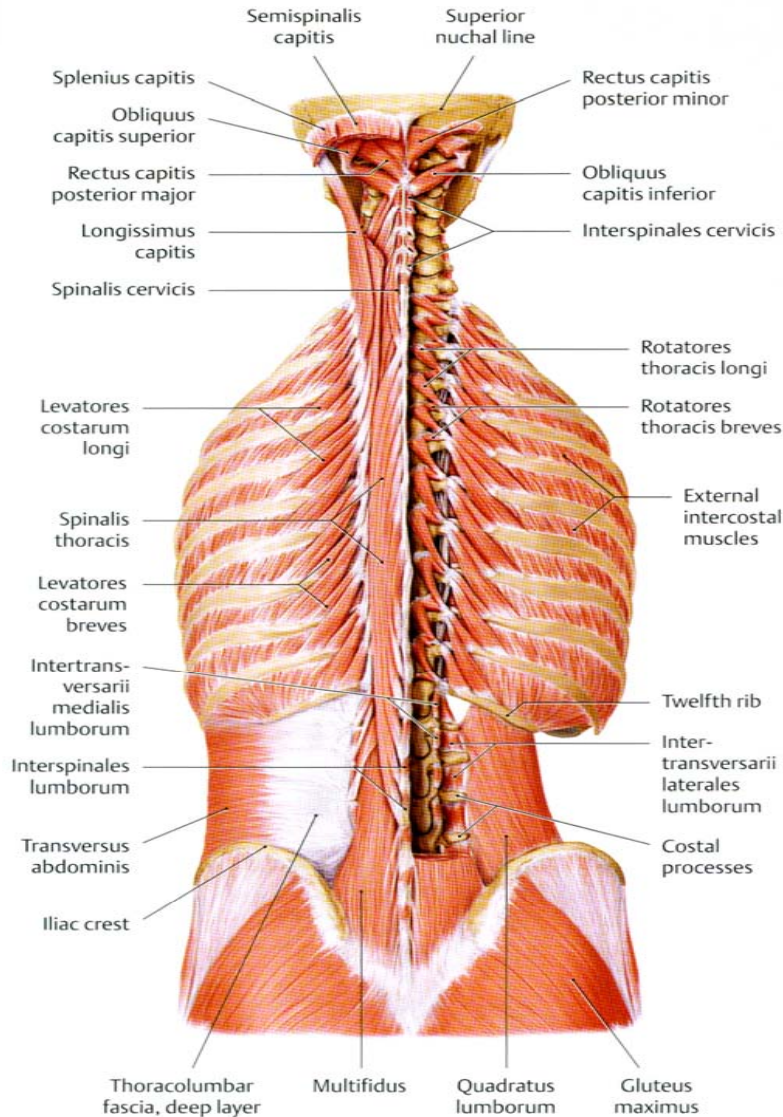


Theme: Atlas of Anatomy

**CORE OMM Curriculum**

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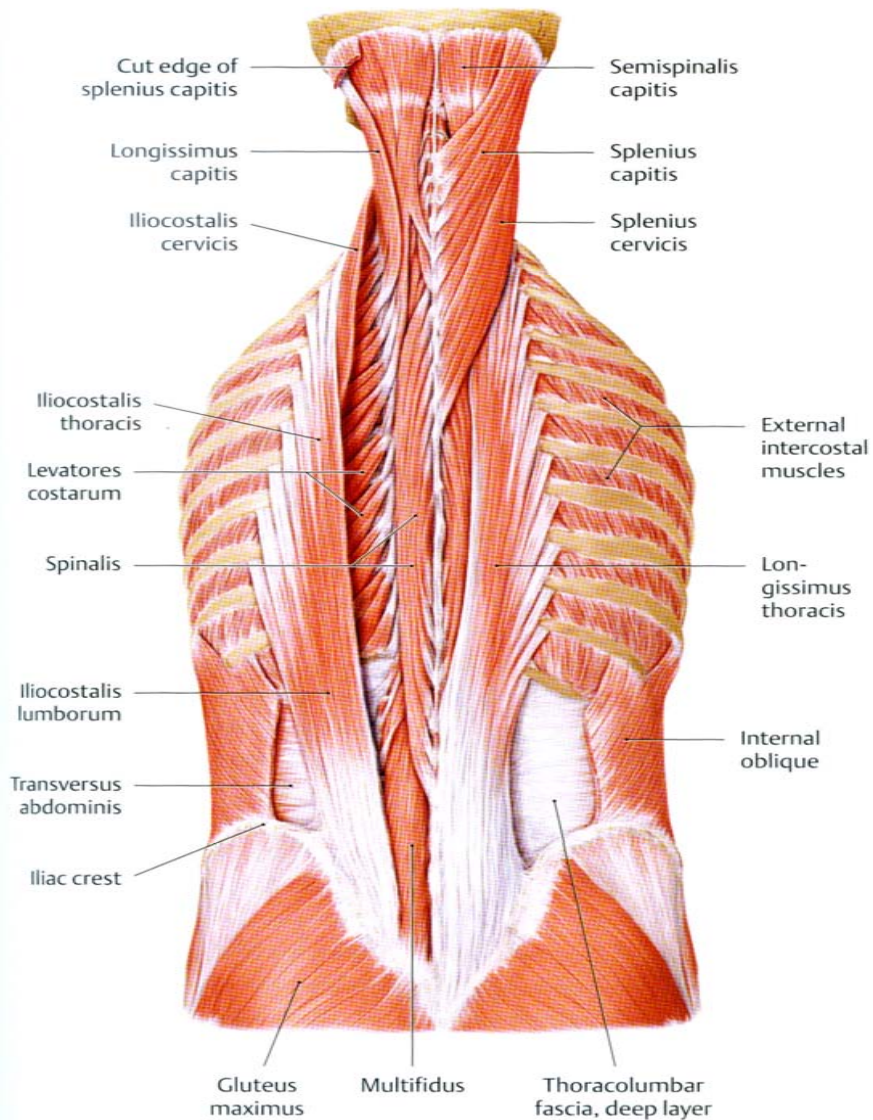


## Muscle Attachments:

- Muscles of the spine such as longus colli, serratus posterior, erector spinae, and transversospinalis *attach on the thoracic vertebrae*, as do the short, segmental muscles of the trunk, such as levator costarum, intertransversarii, and interspinalis.
- Muscles of the upper extremity such as the rhomboids, latissimus dorsi, and trapezius *also have attachment on the vertebrae in the upper thoracic levels.*

Thieme: Atlas of Anatomy





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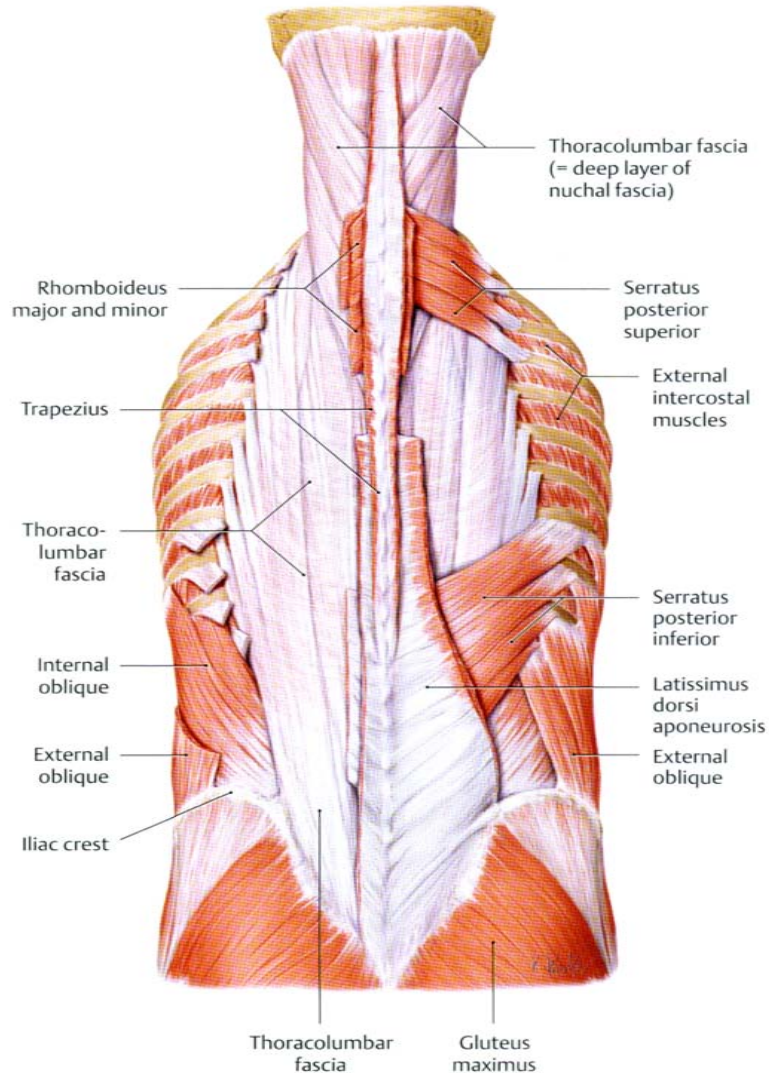
Thieme: Atlas of Anatomy



## Relatively Immobile:

1. Rotation > Sidebending > Flexion > Extension
2. Rule of 3's for spinous process
  - T1 – T3 – same level
  - T4 – T6 – ½ segment below
  - T7 – T9 – 1 segment below
  - T10 – 1 segment below
  - T11 – ½ segment below
  - T12 – same level





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## **Alterations in the thoracic spine can affect:**

- Rib cage
- Upper extremities
- Cervical spine
- Lumbar spine
- Pelvis

***The reverse is also true***



## Screen

- Tissue
  - Palpate and compare lower cervicals to upper thoracics, upper thoracics to lower thoracics, and lower thoracics to upper lumbar

## Screen

- Motion
  - Side bend thoracic region R and L to assess gross motion
  - Rotate thoracic region R and L to assess gross motion





## Scan

### – Tissue

- Palpate for areas of greatest restriction, comparing one vertebrae to another

### – Motion

- Use rotation, SB, F/E, respiration and translatory motions comparing one to vertebrae to the one above and below



## Regional Motion Diagnosis

- Use all planes of motion to define the position of the vertebrae.
- F/E, SB, rot, ceph/caud, trans, ant/post, and resp.



## Local Motion Diagnosis

- Place thumbs on transverse process and determine rotation
- Ask Pt. to flex and extend or introduce local flexion and extension to the vertebrae





## INTEGRATE:

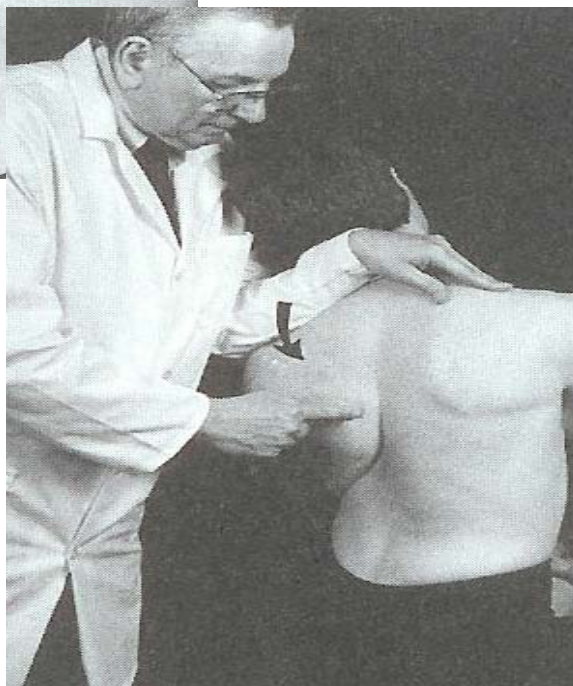
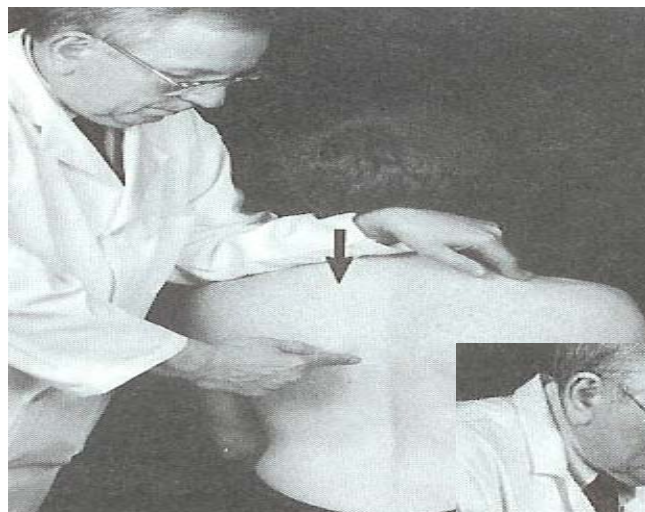
Orthopedic  
Neurologic  
&  
Structural

**EXAMS**



- Treatment should be aimed at correcting poor posture and improving ergonomics at work environment.
- Home stretches and posture corrections are integral in long term treatment.
- Treatment with manipulation can provide relief.





## FPR for superficial muscle hyper tonicity:

- Stand behind patient on ipsilateral side you're treating
- Place index finger on site of dysfunction and the other arm is placed on the patient's shoulder with the elbow at the lateral aspect to allow direction and control of the patient's motion
- Instruct patient to sit up straight until thoracic kyphosis is straightened
- Apply compression with forearm near the patient's neck. The vector is aimed straight down the parallel to the spine
- Maintain compression, create sidebending down to the monitoring finger by pressing down with elbow on same side as the dysfunction
- Hold for 3 seconds and recheck

DiGiovanna E. An Osteopathic Approach to Diagnosis and Treatment; Second edition. Pg 155-157

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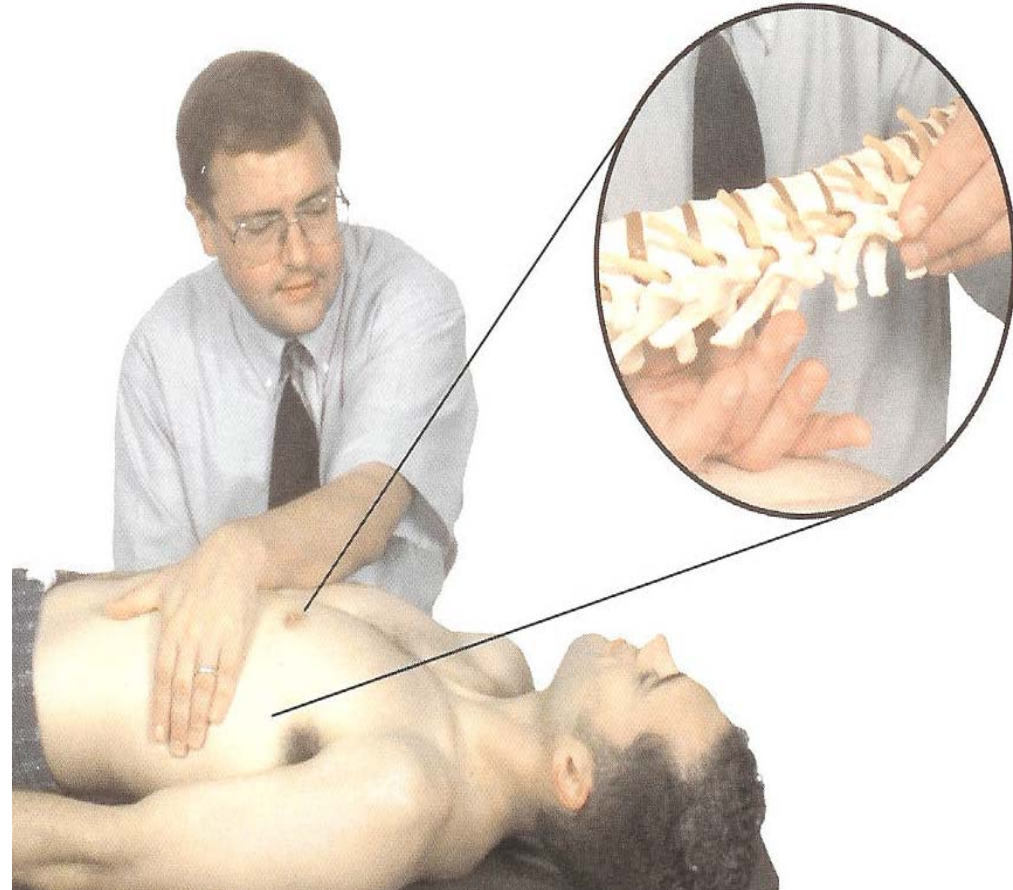


- Place a pillow under the patient in order to decrease the thoracic curve
- Monitor at the posterior transverse process
- Grasp the patient's shoulder at the acromial process and pull the shoulder parallel to the table and toward the patient's feet, until force is felt at the monitoring finger
- Maintain the force and straighten up, thereby pulling the patient's arm off the table
- Hold for 3 seconds and then repeat as necessary



# Treatment using LAR Non-neutral Dysfunction

- Sit on the opposite side of the dysfunction. Place pad of index finger on the spinous process on the same side of the rotation. Place cephalad hand across the patient's chest
- Pull the spinous process towards you, while adding a slight anterior lift to increase rotation into ease.
- Pull chest towards you with cephalad hand to induce sidebending into ease.
- Have the patient hold their breath in respiratory ease as long as possible.
- Adjust motions to balance ligamentous tension.
- Repeat as needed



Kimberly P. The Kimberly Manual: Outline of Osteopathic Manipulative Procedures; Millenium Edition. Pg 105

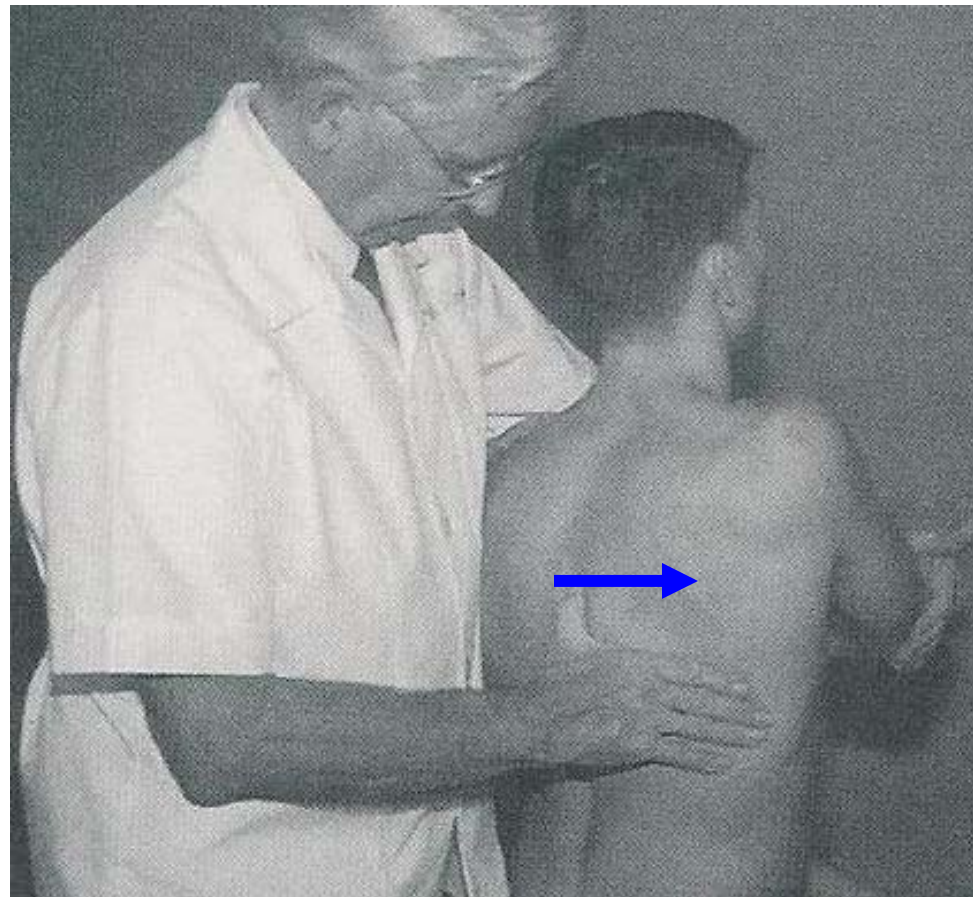


# *Treatment of Rib Cage Dysfunction*

- In general, treat the thoracic spine *before* the ribs



1. Pt sits with ipsilateral hand holding contralateral shoulder.
2. Operator stands behind the patient with the ipsilateral thumb on the shaft of the rib medial to the rib angle and with the contralateral hand controlling the patient's elbow. Pt's contralateral hand may be placed over anterior portion of rib to add compression posterior.
3. Operator applies and maintains a posterolateral "pull" force on the rib shaft.
4. Patient is instructed to pull the elbow laterally or caudally. Use 3-5 repetitions holding for 3-5 seconds.



# Muscle Energy for Posterior Subluxation

1. Pt sits with ipsilateral hand holding contralateral shoulder.
2. Operator stands behind the patient with the ipsilateral thumb on the shaft of the rib lateral to the rib angle and with the contralateral hand controlling the patient's elbow.
3. Operator applies and maintains an anteromedial "push" force on the rib shaft.
4. Patient is instructed to push the ipsilateral elbow to the contralateral side or towards the ceiling. Use 3-5 repetitions holding for 3-5 seconds.



Greenman P. Principles of Annual Medicine; 2<sup>nd</sup> edition. Pg 251



- A common repetitive stress injury that can be associated with the thoracics.
- Compression of nerves or vasculature as they pass through the thoracic inlet, transverse the shoulder girdle and axilla, and begin their descent into the arm.

## **Areas Affected**

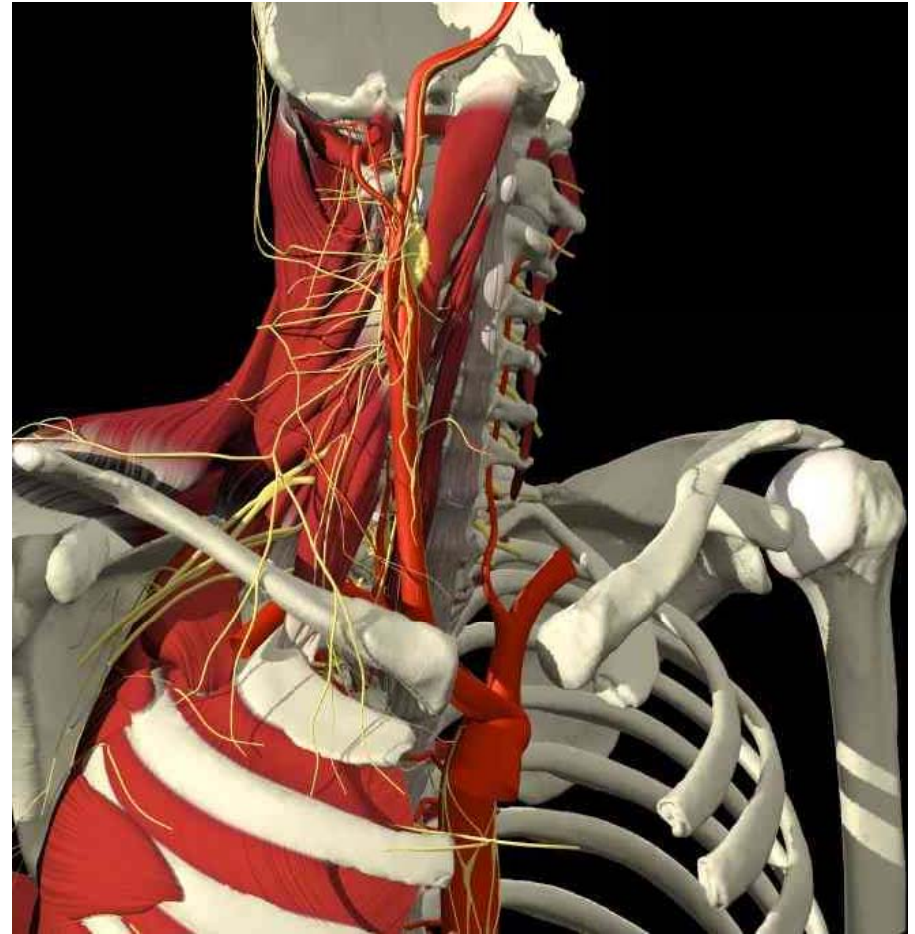
- Thoracic inlet
- Vasculature- subclavian artery and vein
- Nerves- brachial plexus
- Lymphatics



The Cephalic end of the thoracic cage is bound to the body by:

- T1, the medial margins of the right and left first ribs, the posterior aspect of the manubrium, and the medial end of the right and left clavicles.

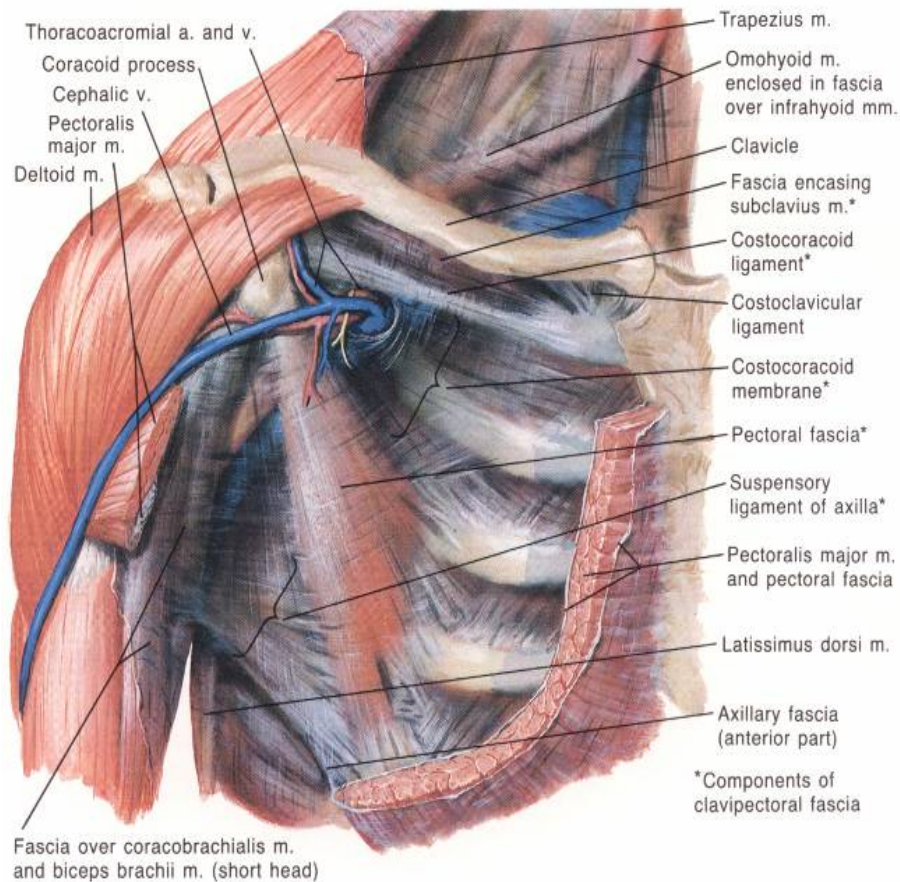
The esophagus, trachea, and major vessels of the neck and UE pass thorough the thoracic inlet.



Primal Pictures, Complete Human Anatomy,  
2004



## Pectoral, Clavipectoral, and Axillary Fasciae



## Subclavian artery is compressed in 5% of all cases.

- Leaves the thorax by arching over the first rib and between the scalene muscles
- Sx can include ischemia, decreased peripheral pulses, coolness, pallor and possible cyanosis of the UE.

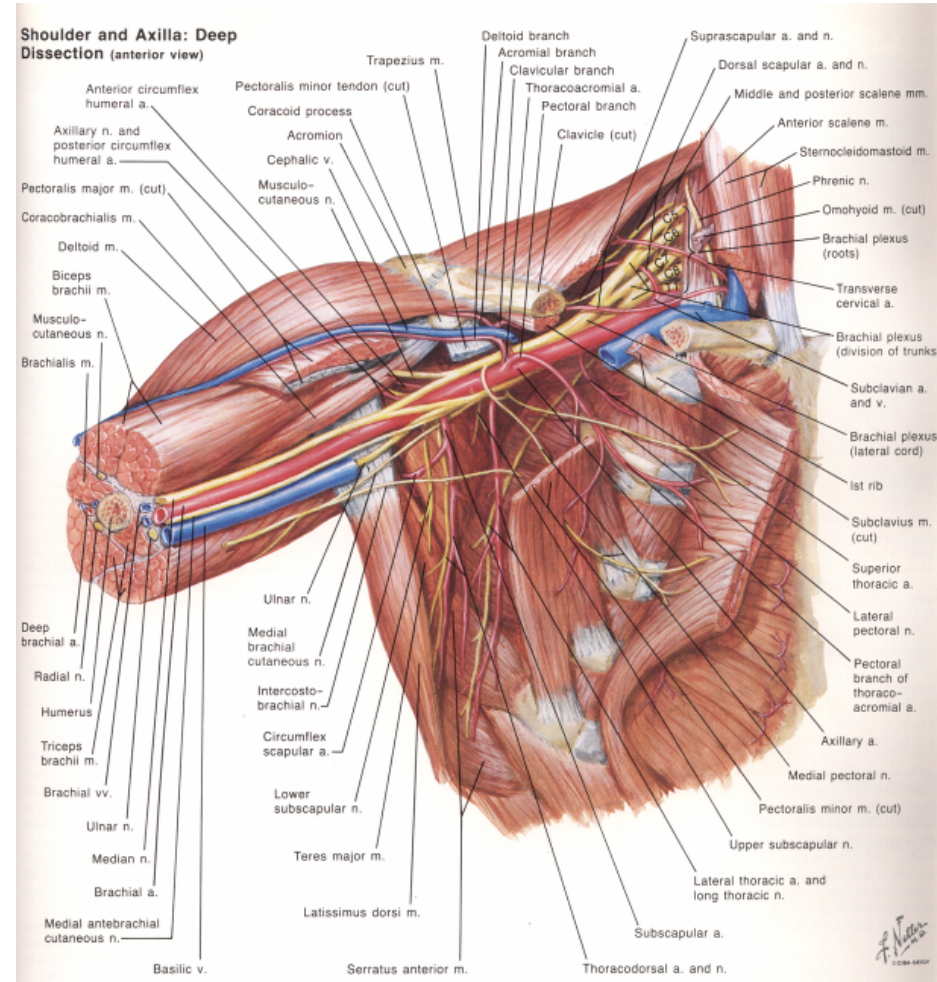
## Subclavian vein is compressed 1% of the time.

- Follows the same path
- Major sx is swelling of the hands



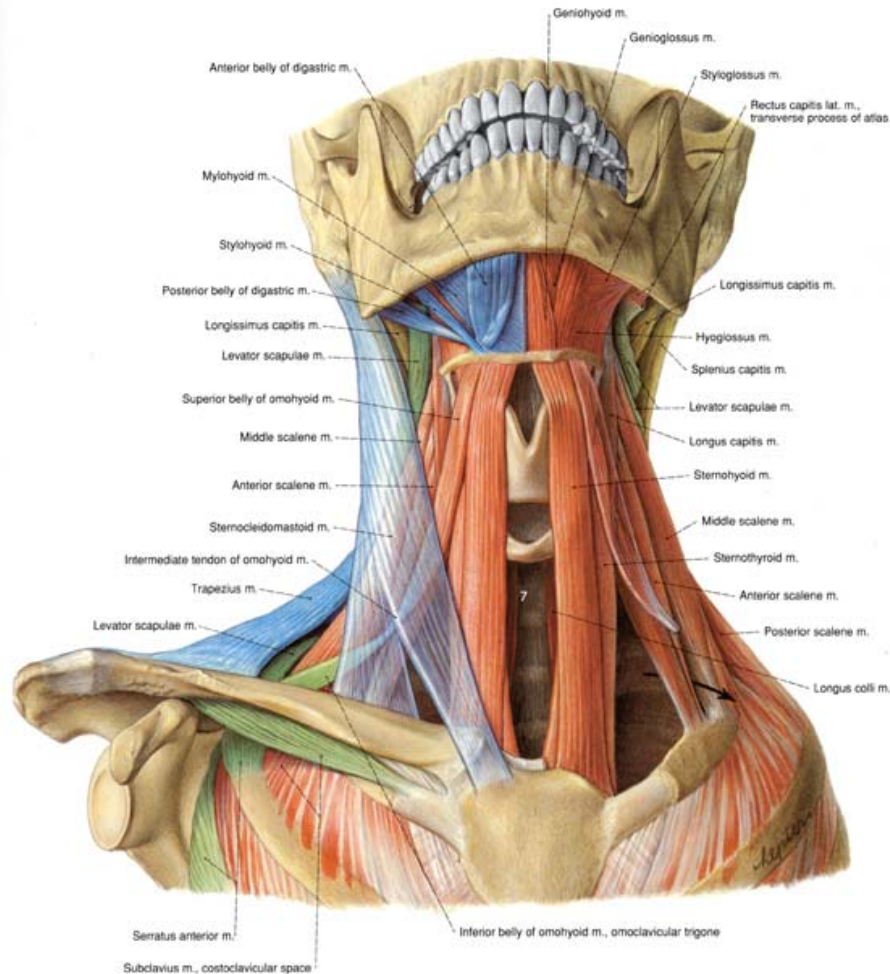
*Brachial plexus compressed  
in 95% of cases*

- Sx can include paresthesias, anesthetics, pain, weakness, and atrophy in the UE
- It follows the great vessels



Netter, Atlas of Human Anatomy, 2nd ed. Novartis.1997





- Rarely compressed
- Also pass through Sibson's fascia, (membrana suprapericardialis) following the neurovascular bundle

Netter, Atlas of Human Anatomy, 2nd ed.  
Novartis.1997



## Directed at:

- Thoracic region
- Upper ribs
- Clavicles
- Scalene muscles
- Muscles of the shoulder and pectoral girdle
- Fascial tension



1. Anterior Cervical Fascia Release
2. HVLA, & ME, for C7, T1, and T2 dysfunction
3. Soft tissue stretching, of anterior and middle scalene muscles
4. Correction of clavicular dysfunctions
5. Correction of 1st and 2nd rib dysfunction
6. ME for pectoralis minor



- Primal Pictures, Complete Human Anatomy, 2004
- DiGiovanna E. An Osteopathic Approach to Diagnosis and Treatment; 2nd edition
- Netter, Atlas of Human Anatomy, 2nd edition. Novartis.1997
- Greenman P. Principles of Annual Medicine; 2<sup>nd</sup> edition
- Kimberly P. The Kimberly Manual:Outline of Osteopathic Manipulative Procedures; Millenium edition
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