

# An Osteopathic Approach to Upper Extremity Pain Syndromes

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# Outline

- Differential diagnosis for upper extremity pain
- Clinical presentations
- Functional anatomy review
- Technique review

# Differential Diagnoses Of Cervical Radiculopathy

## Neurologic

Thoracic outlet syndrome  
Pancoast tumor  
Brachial plexopathy  
Herpes zoster  
Peripheral mononeuropathy (eg, suprascapular, long thoracic, accessory, musculocutaneous, or ulnar neuropathy, carpal tunnel syndrome, and so forth)  
Multiple sclerosis  
Syringomyelia  
Elevated intracranial pressure  
Intracranial tumor

## Shoulder abnormalities

Impingement syndrome (rotator cuff tendinitis/subacromial bursitis)  
Rotator cuff tears  
Adhesive capsulitis  
Biceps tendinitis  
Glenohumeral instability (“dead arm”)  
Glenoid cyst

## Elbow abnormalities

Medial epicondylitis  
Lateral epicondylitis

## Wrist or hand abnormalities

Wrist/finger flexor and extensor tendinitis (eg, DeQuervain’s tenosynovitis)

## Muscle or connective disease

Myofascial pain syndrome: pain-referral patterns from individual muscles  
Fibromyalgia  
Polymyalgia rheumatica

## Vascular

Thoracic outlet syndrome  
Aortic arch syndrome  
Vertebral artery dissection  
Myocardial ischemia

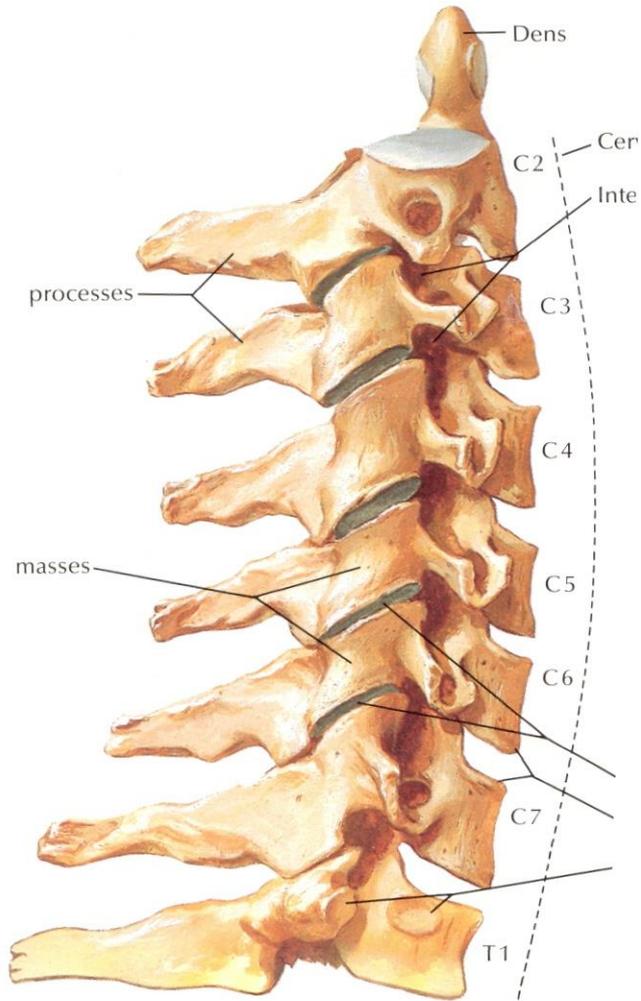
## Other

TMJD  
Neck-tongue syndrome (C2 root compression)

# Case 1: Neck pain with bilateral “electric” upper extremity pain

- A 60 yo male experience presents with neck pain and sudden onset, bilateral upper extremity pain that he describes like “electric shocks.”
- It began after he extended his neck quickly while attempting to catch some food in his mouth at the hibachi restaurant.
- He has had similar pain that was more gradual and insidious after riding his bicycle in the past.

# Cervical Spine



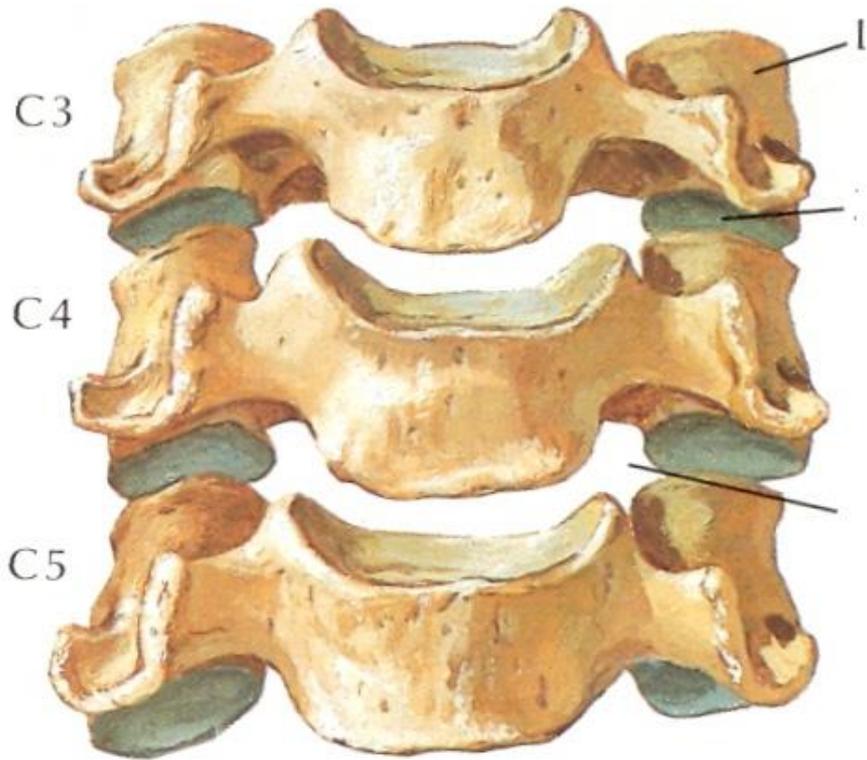
2nd cervical to 1st thoracic vertebrae:  
right lateral view

Note that C1 is missing

- Spinous process of C2 and C7 are most prominent
- Use of articular pillars for diagnosis



# Typical Cervical Vertebrae



- Saddle shaped vertebral bodies
- Uncinate processes create the uncovertebral which determine motion patterns but create osteophytes that narrow the foramina

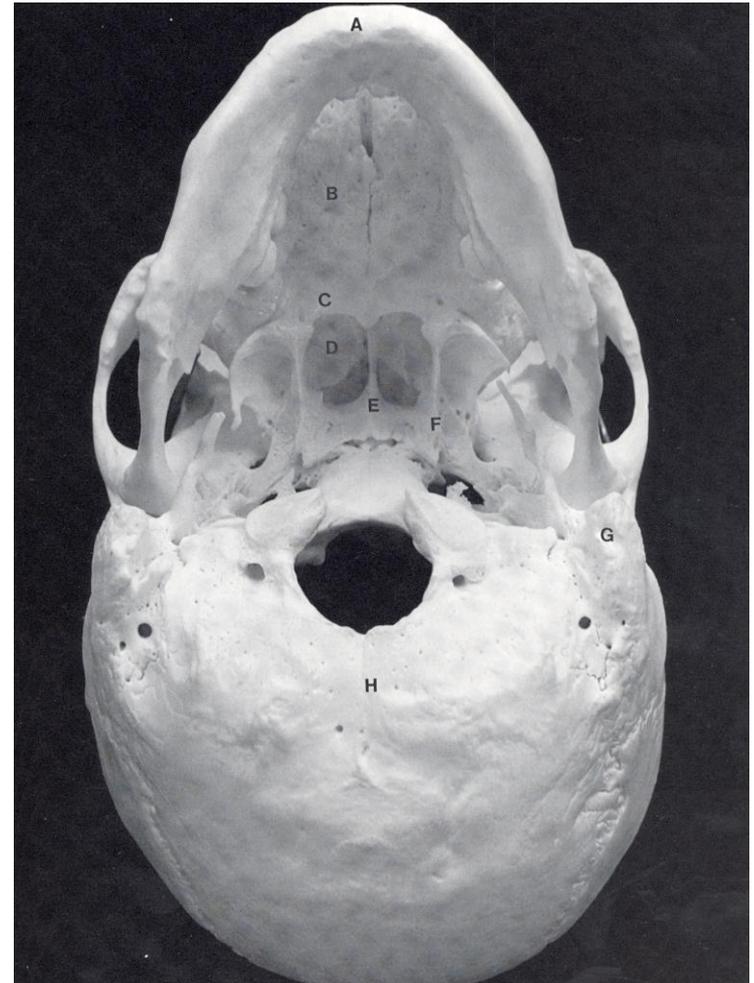


# Occipito-atlantal Joint

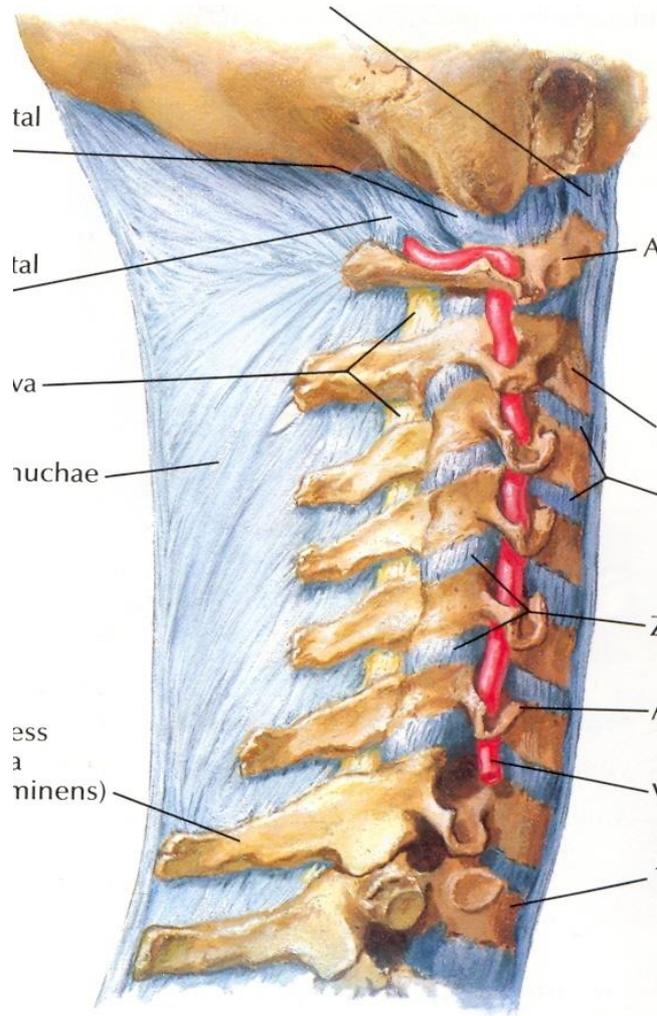
anterior



Superior view



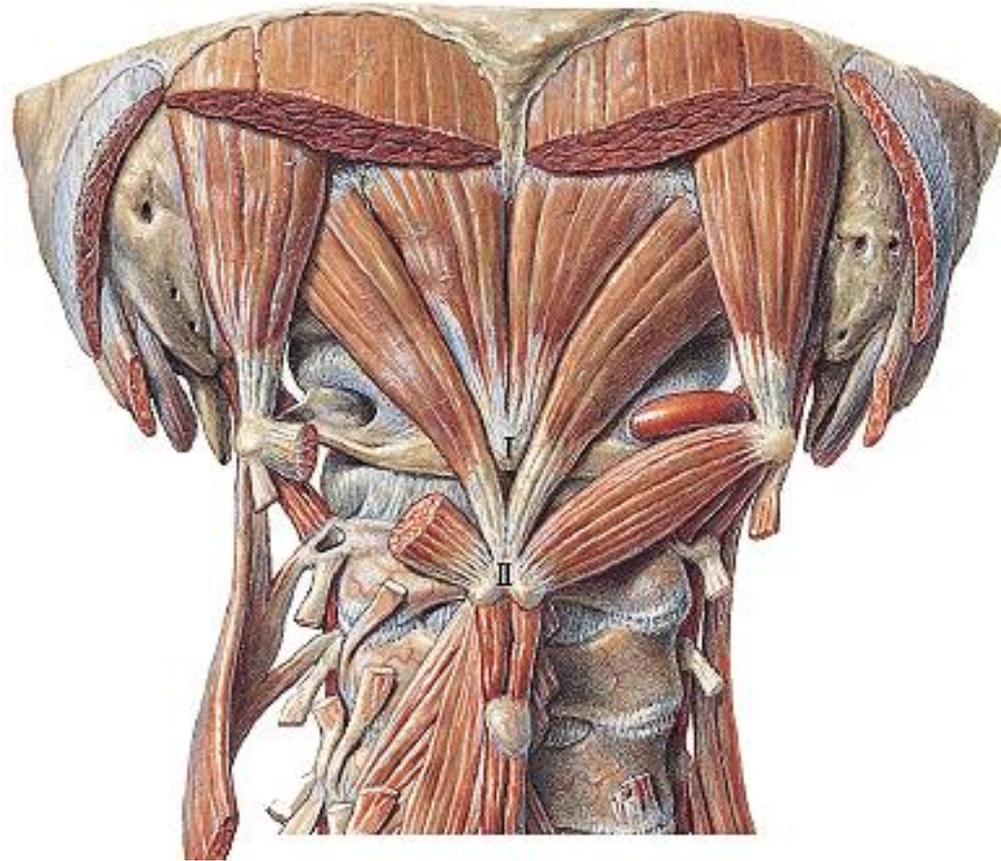
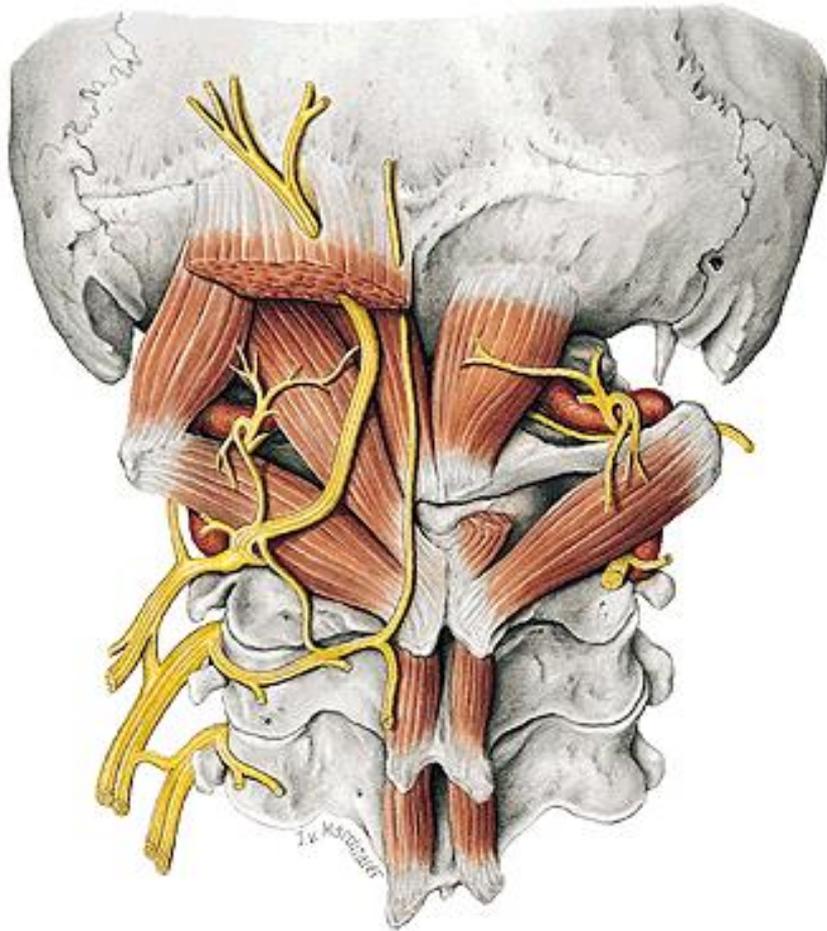
# Ligamentum Nuchae



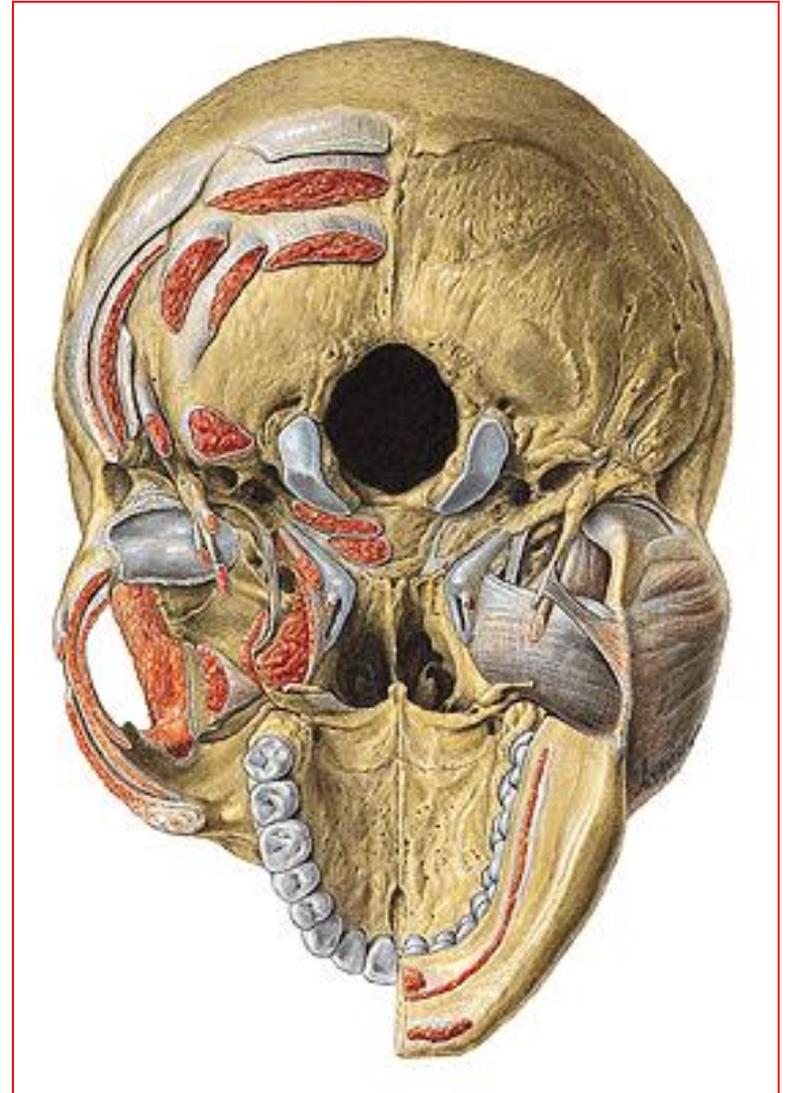
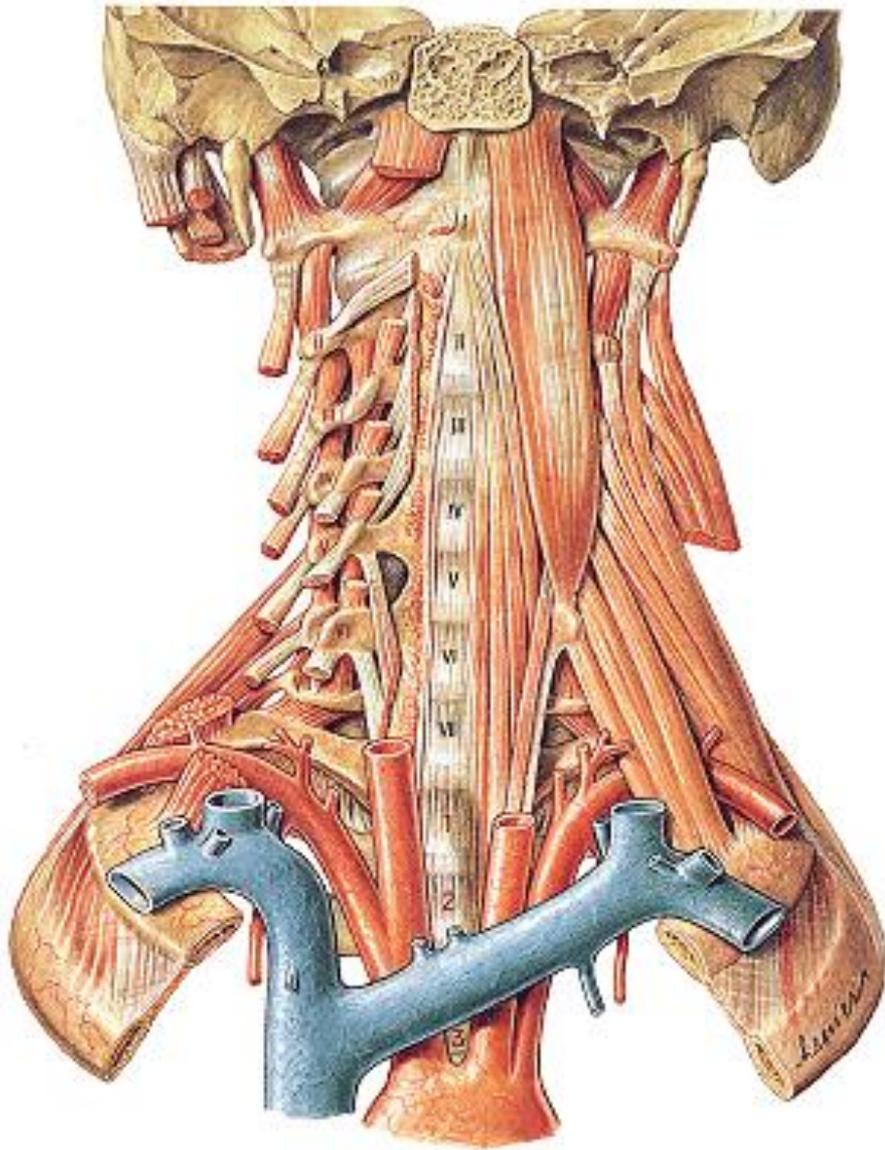
Right lateral view

- Extension of interspinous ligament
- Thick and broad
- Limits flexion

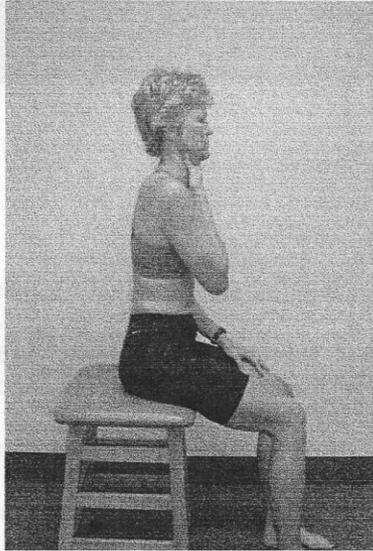
# Suboccipital Musculature



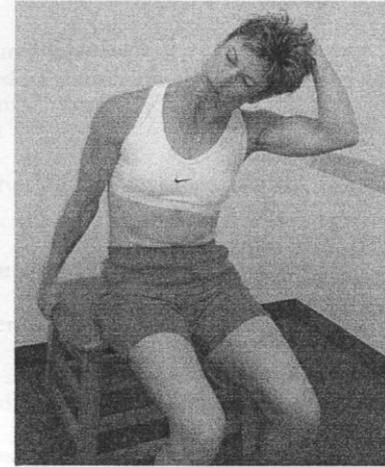
# Neck Flexors



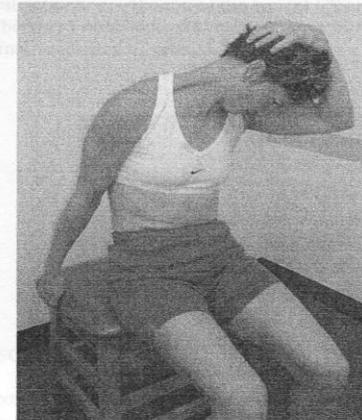
## Chin Nodding



## Upper Trapezius and Sternocleidomastoid Self Stretch



## Levator Scapulae Self Stretch



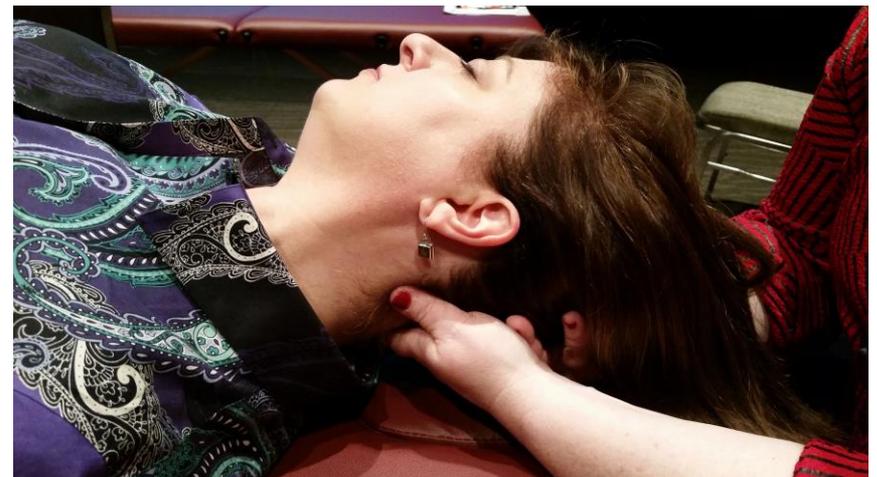
# FPR/Still Modification

1. Place dysfunctional segment in position of ease
2. Add gentle compression down to level of dysfunction until release is palpated
3. Using finger as fulcrum, reverse position to engage the barrier



# OA Release

1. Stabilize C1 posteriorly with 1<sup>st</sup> and 3rd fingers
2. Cup occiput with palm of other hand
3. Disengage slightly with cephalad traction
4. Balance occiput relative to C1 until release is palpated



# Cervical Soft Tissue

1. Stand at the patient's side.
2. Place one hand lightly on the forehead.
3. Put the pads of the fingers of the other hand on the posterolateral part of the neck.
4. Stretch the soft tissues of the neck in a perpendicular direction while GENTLY sidebending and extending the cervical area. The hand on the forehead offers gentle resistance to these motions. Treat both sides.

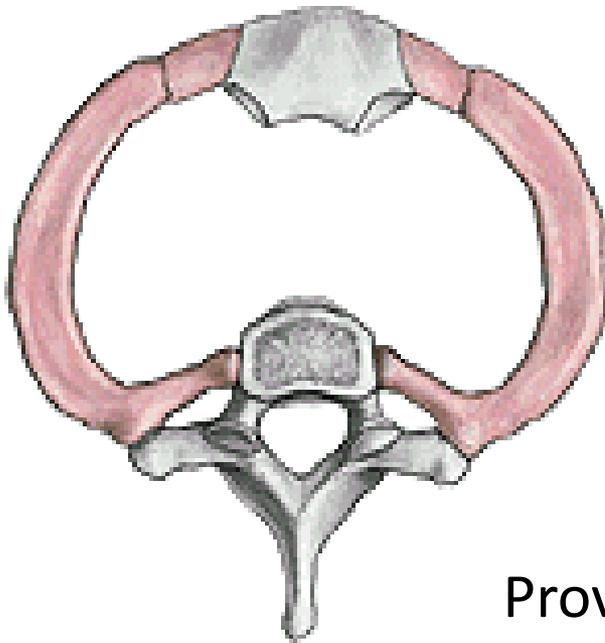


## Case 2: Unilateral upper extremity aching and edema

- A 49 yo female administrative assistant presents with upper back pain and right upper extremity aching and heaviness, worse as her work day goes on and by the end of the week. She denies numbness but says her skin feels less sensitive at times. Her rings also occasionally feel tight on that hand.
- It is improved temporarily by heat and rest but always returns.

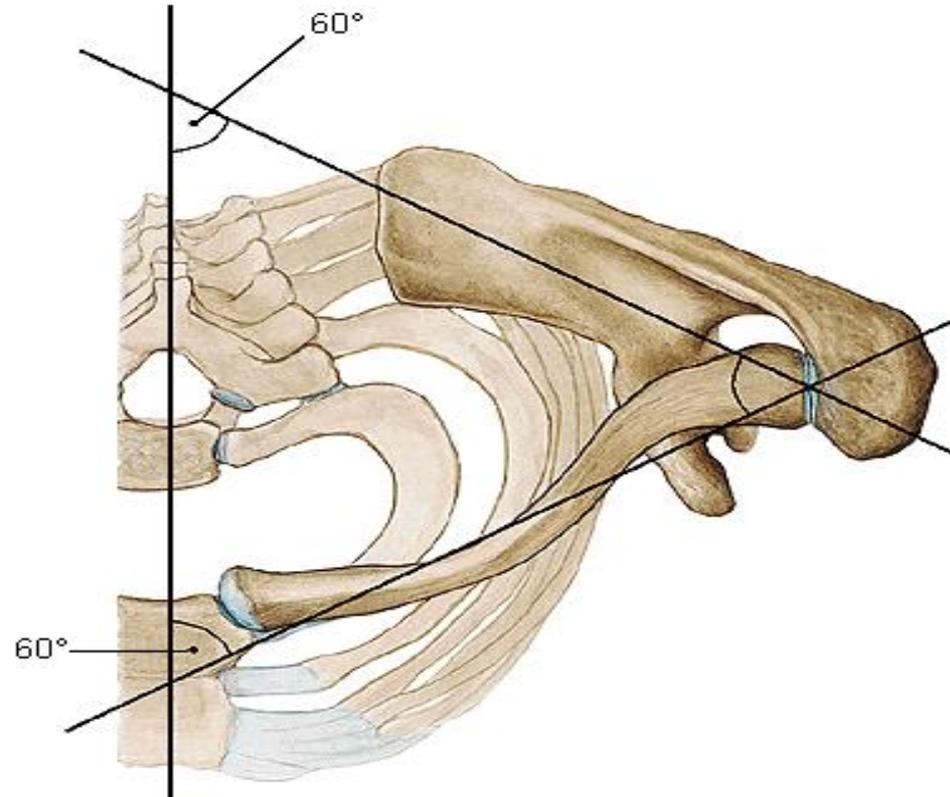
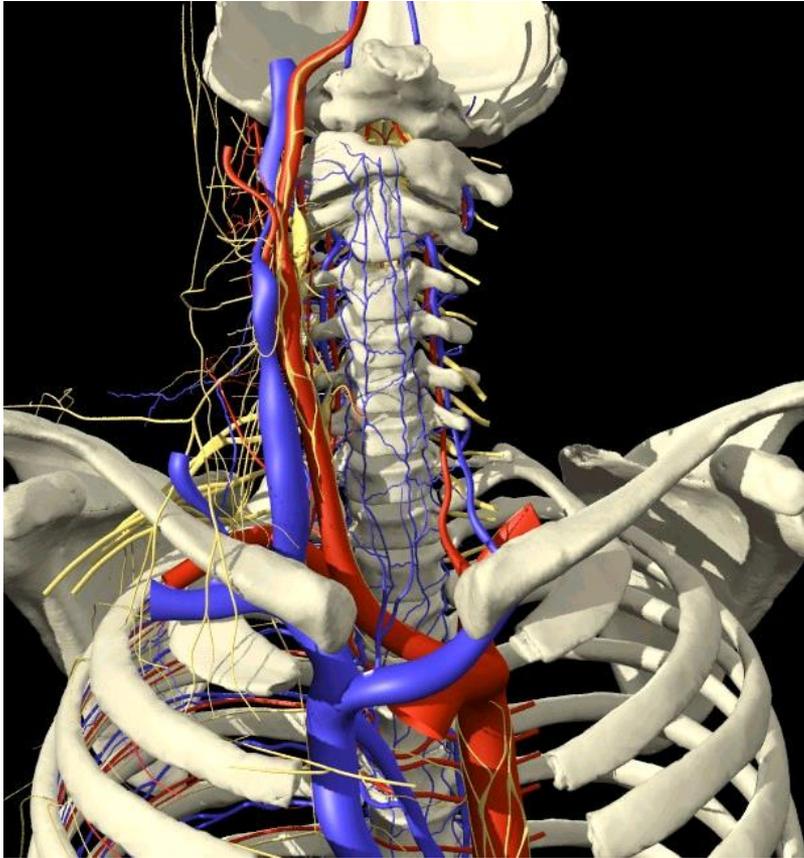
# Thoracic Inlet

T1, first rib, and manubrium form a “stable bony ring”

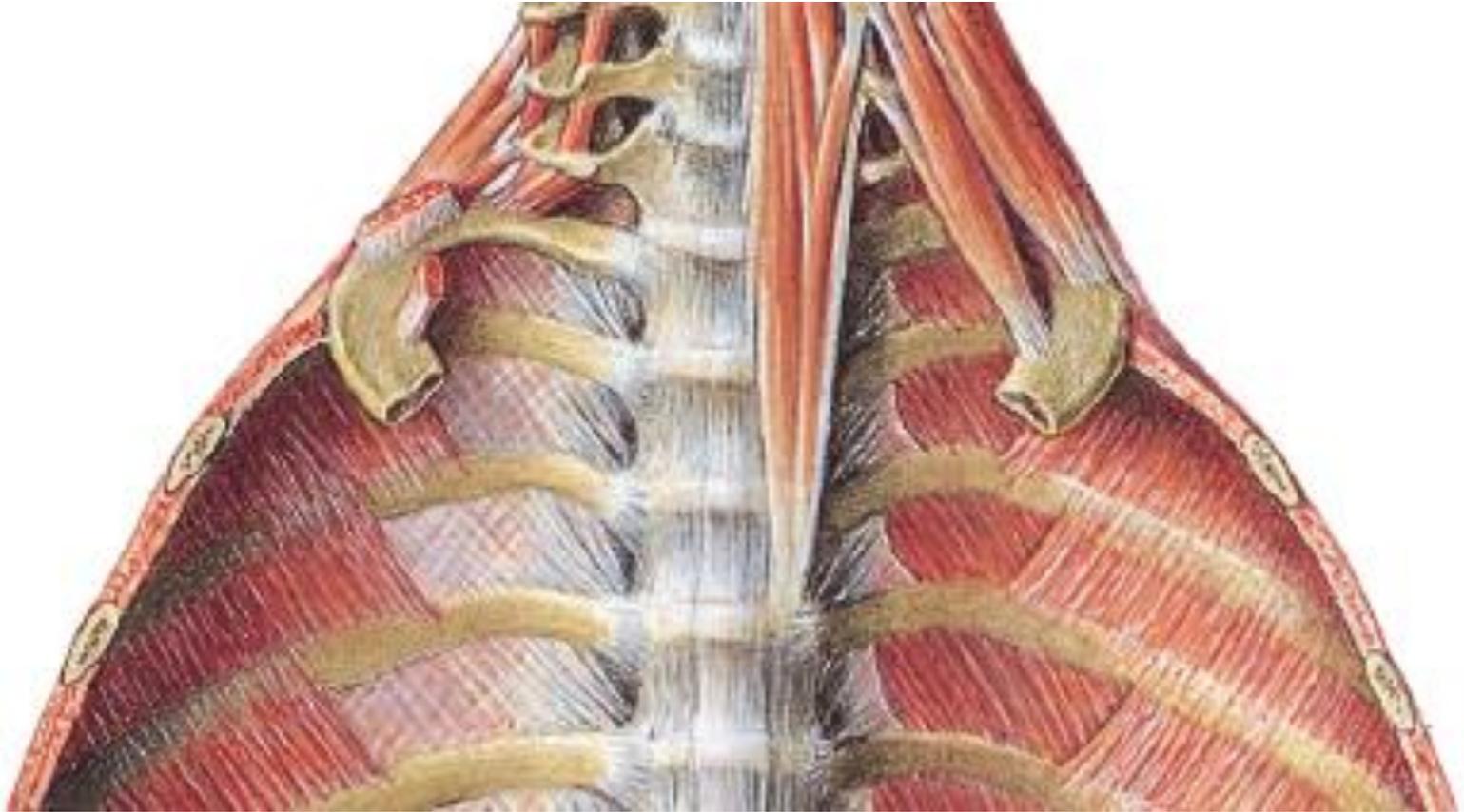


Provides “anchor” for upper extremity, as the sternoclavicular joint is the only bony attachment of the upper extremity to the axial skeleton

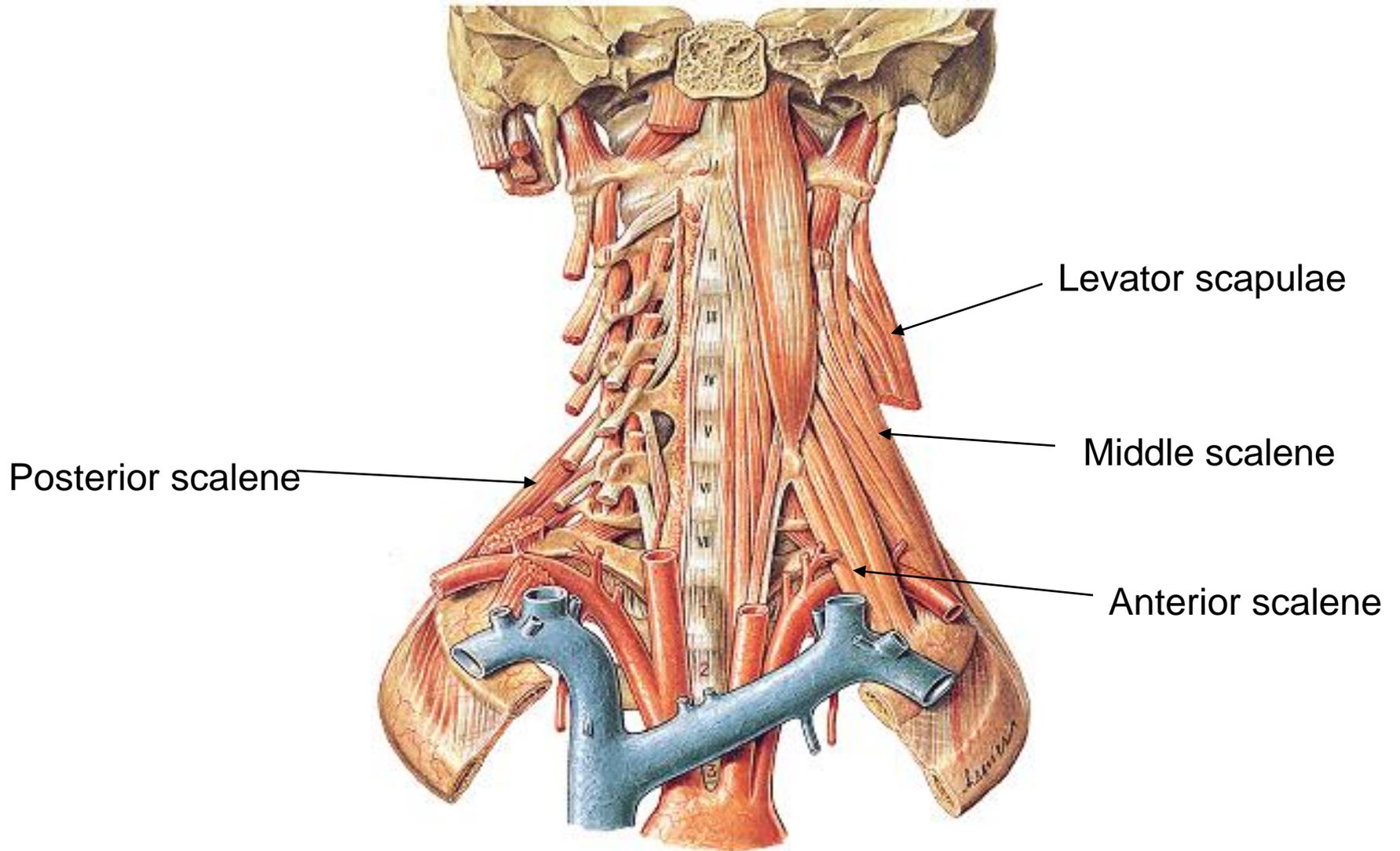
# Thoracic Inlet



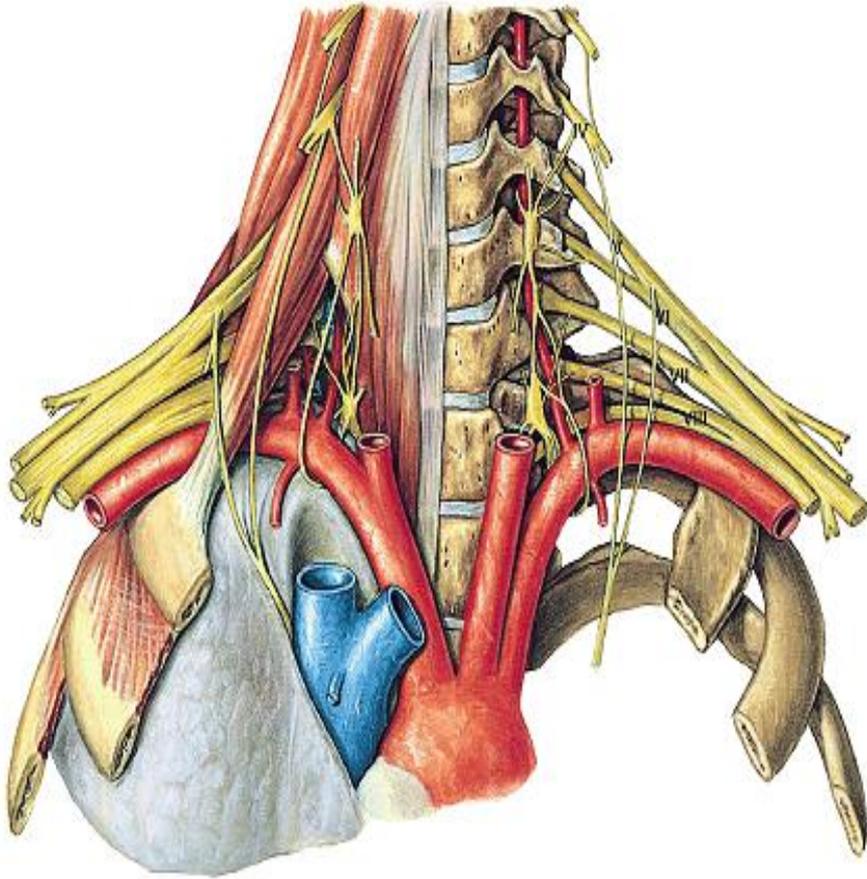
# Scalenes



# Lateral Group



# Scalenes

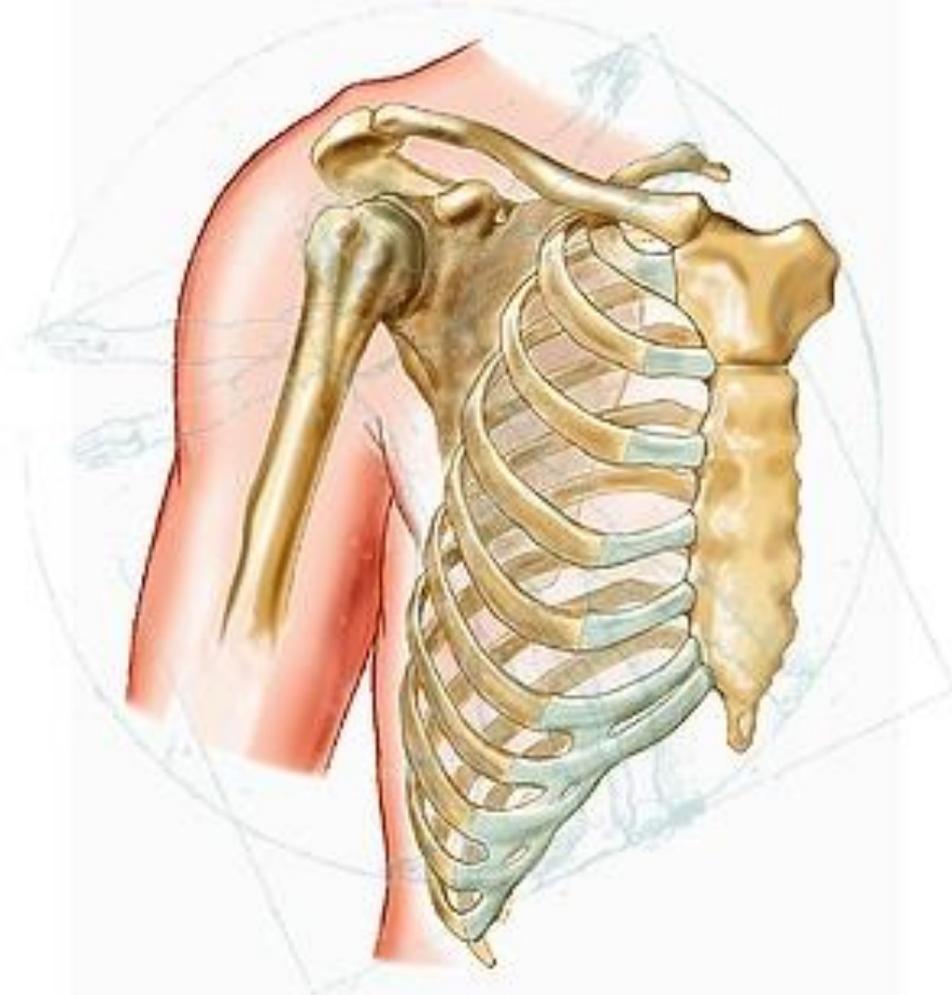


- Anterior and middle: from C4-6 transverse processes to first rib
- Posterior to second rib

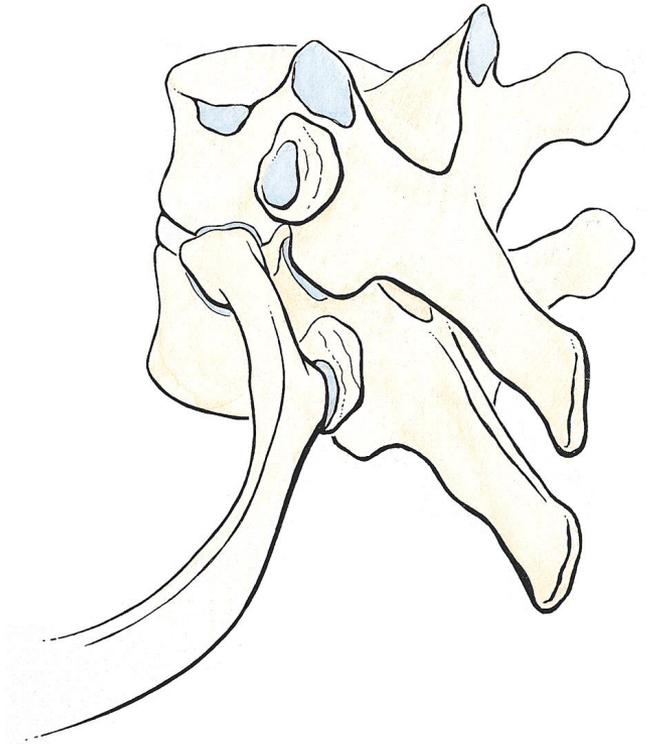
# Shoulder Girdle

comprised of several joints

- Scapulohumeral (glenohumeral)
- Subdeltoid (suprahumeral)
- Acromioclavicular
- Sternoclavicular
- Scapulothoracic
- Costosternal
- Costovertebral

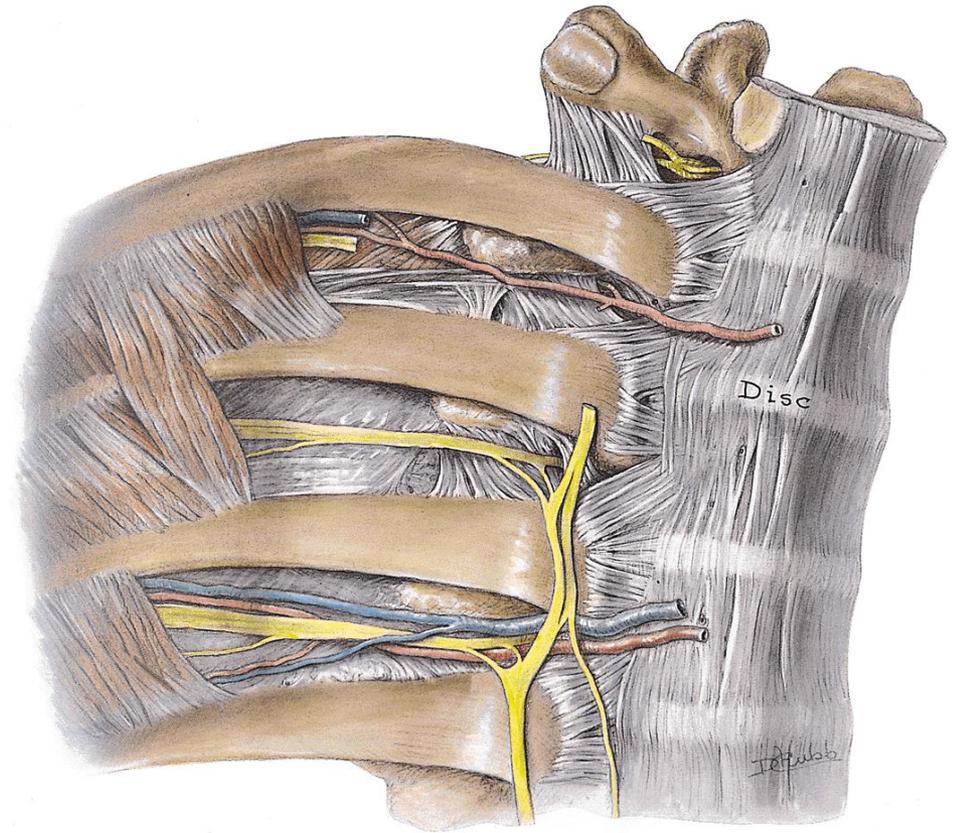
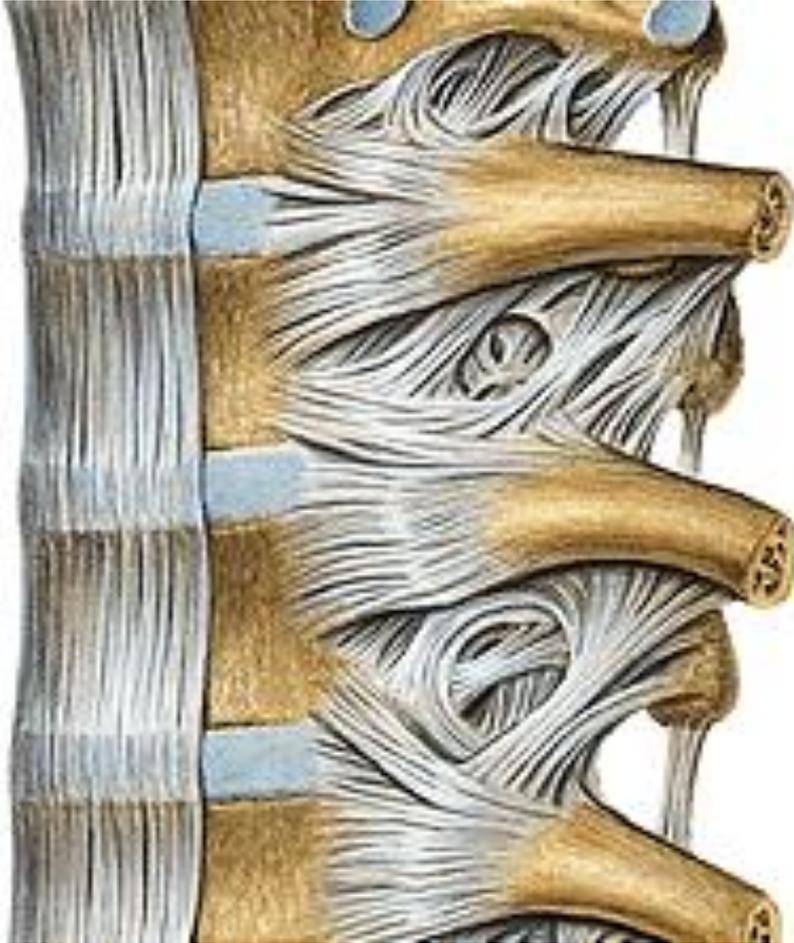


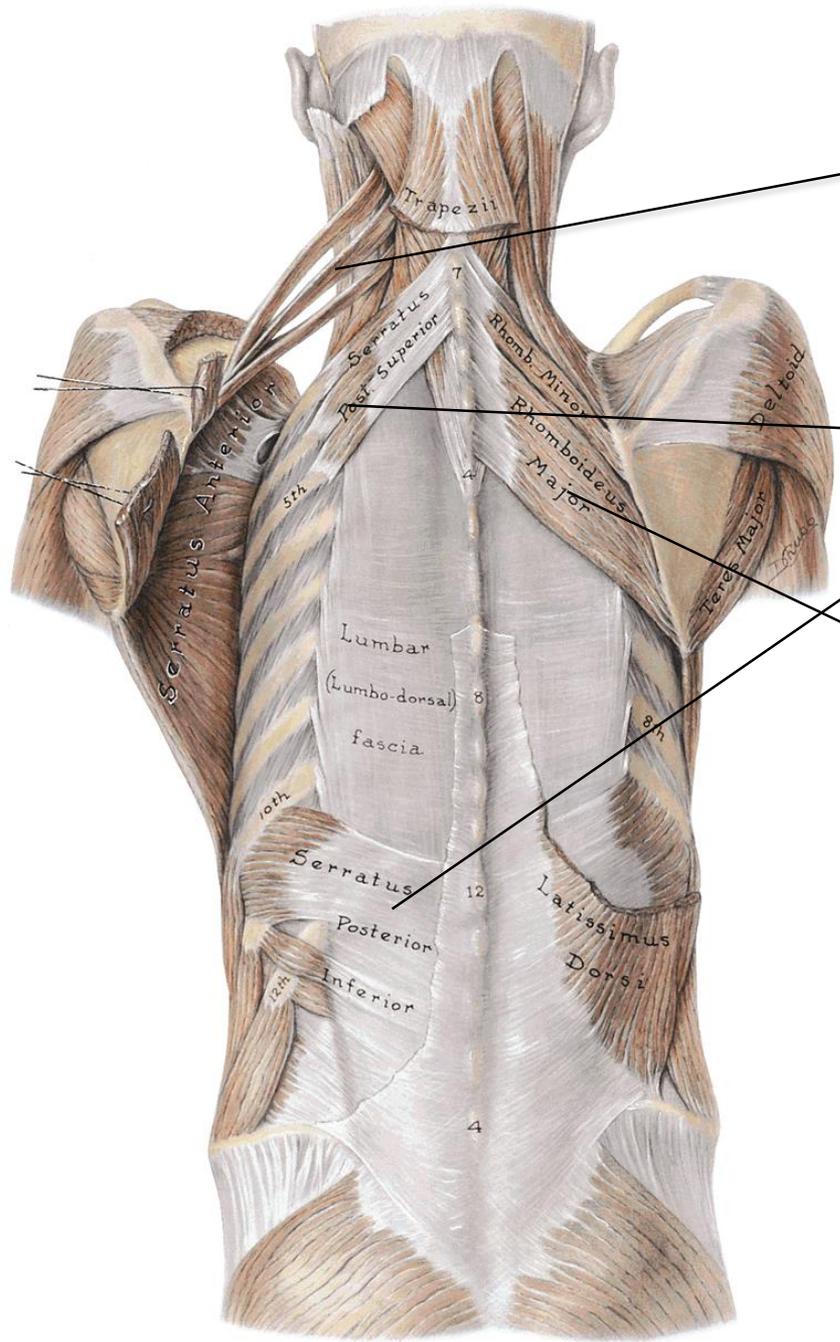
# Thoracic-Rib Relationships



Rib articulates with transverse process and body of same-numbered vertebra and with the body of the vertebra above

# Thoracic Ligaments



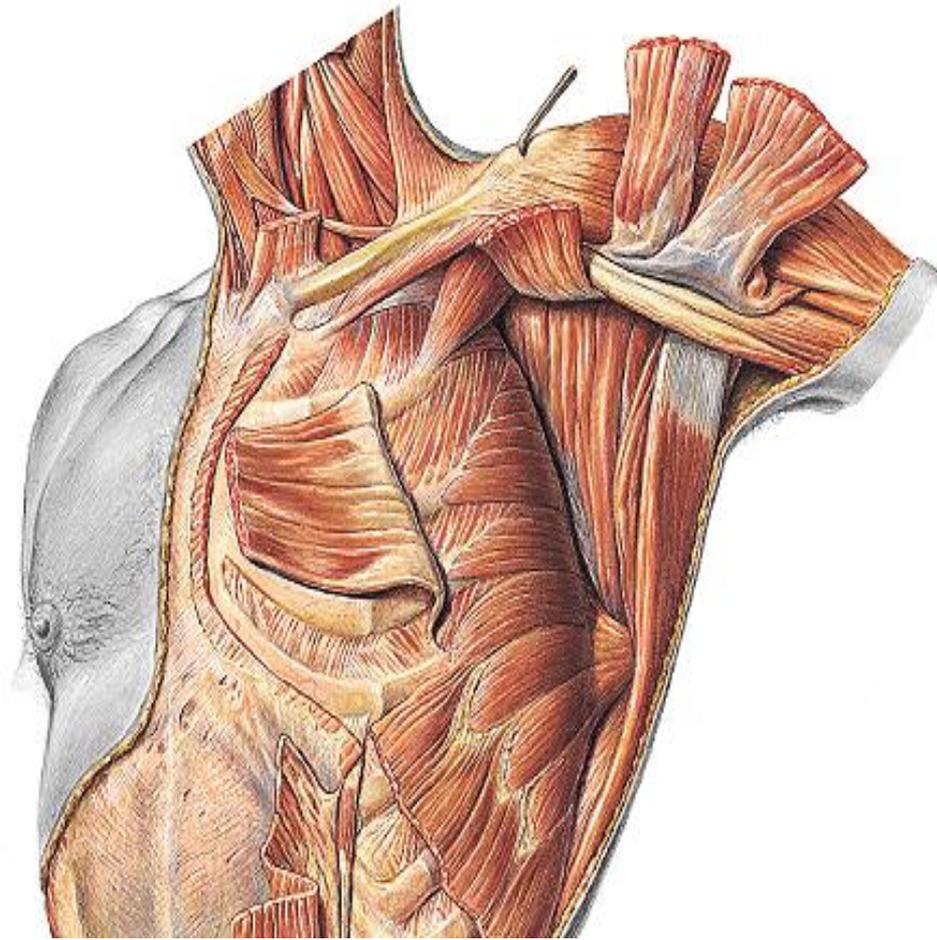


**Levator Scapulae**

**Serratus posterior superior and inferior**

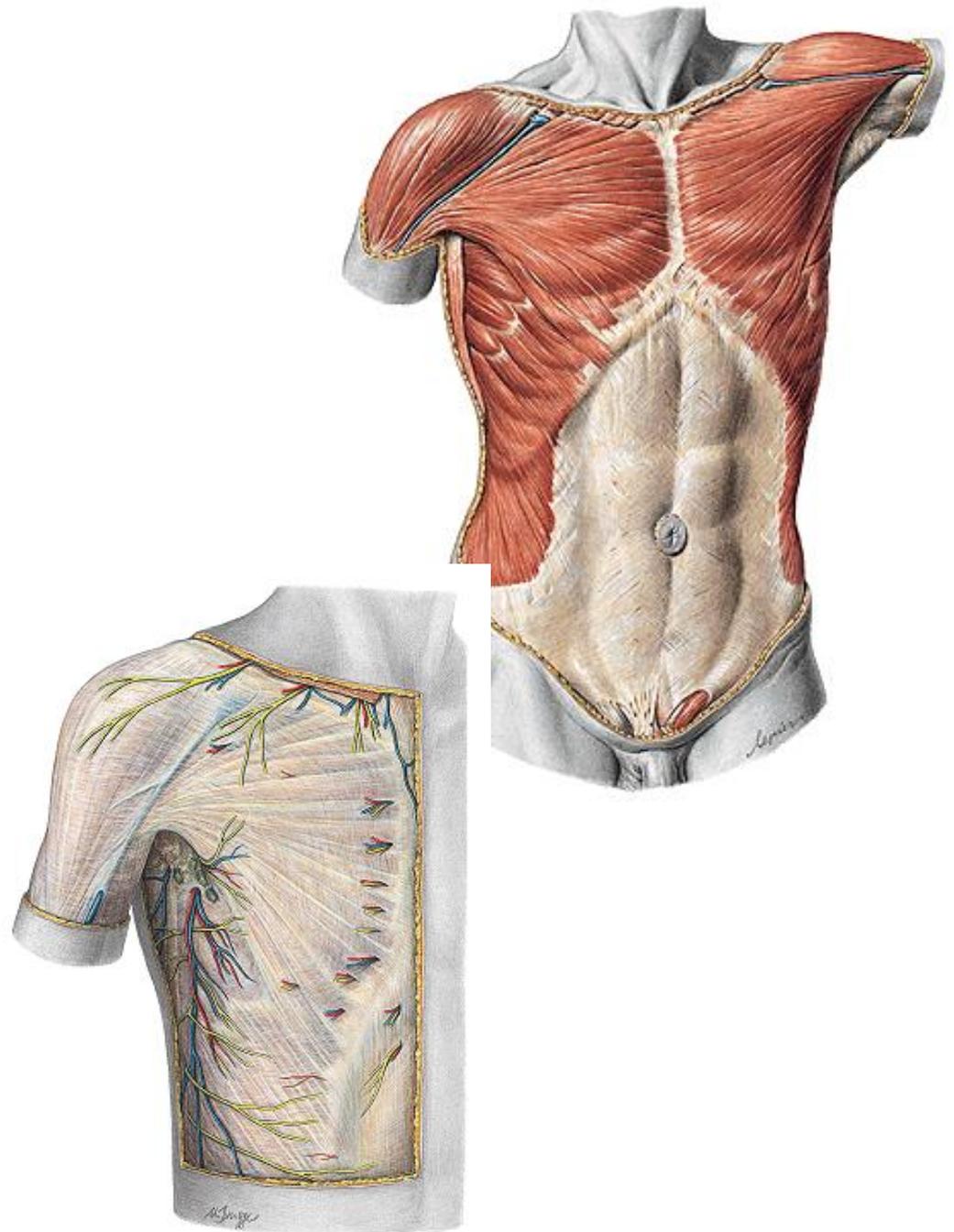
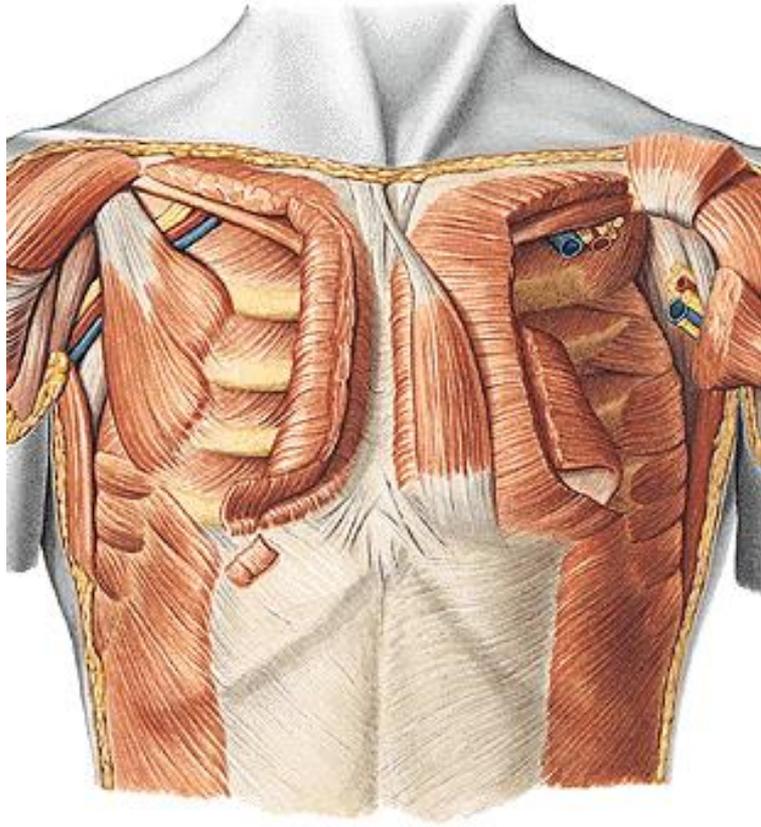
**Rhomboids**

# Serratus Anterior



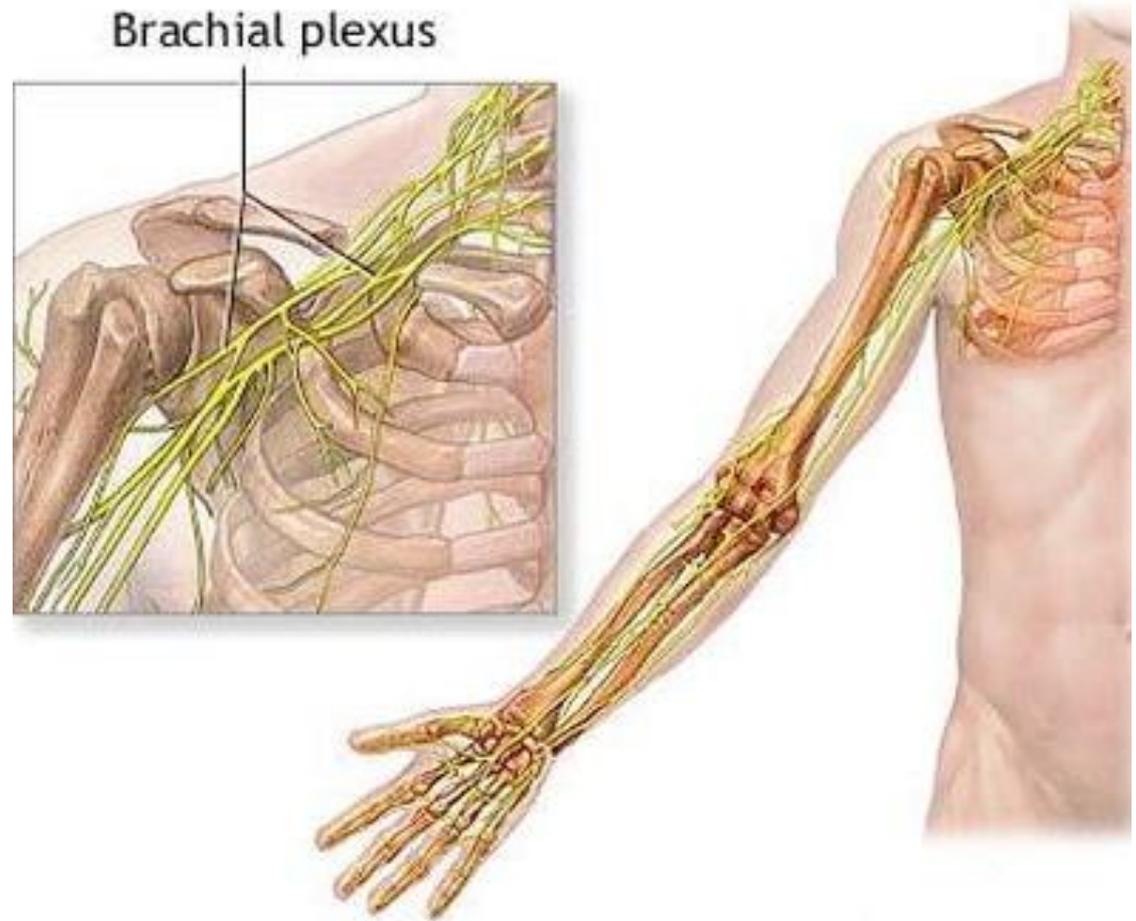
- Anterior aspect of medial border of scapula to ribs 1-9

# Pectorals



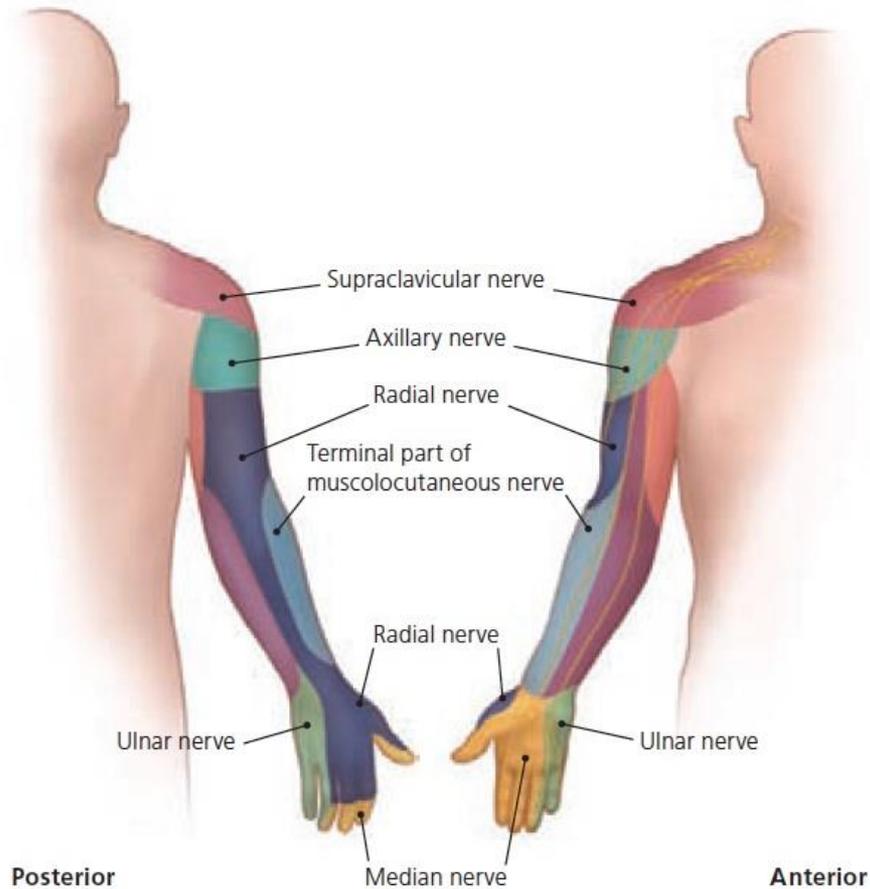
# Places nerves can be affected

- Cervical foramen
- Scalenes
- Clavicle
- Pectoralis minor
- Distal branches in their respective “tunnels”

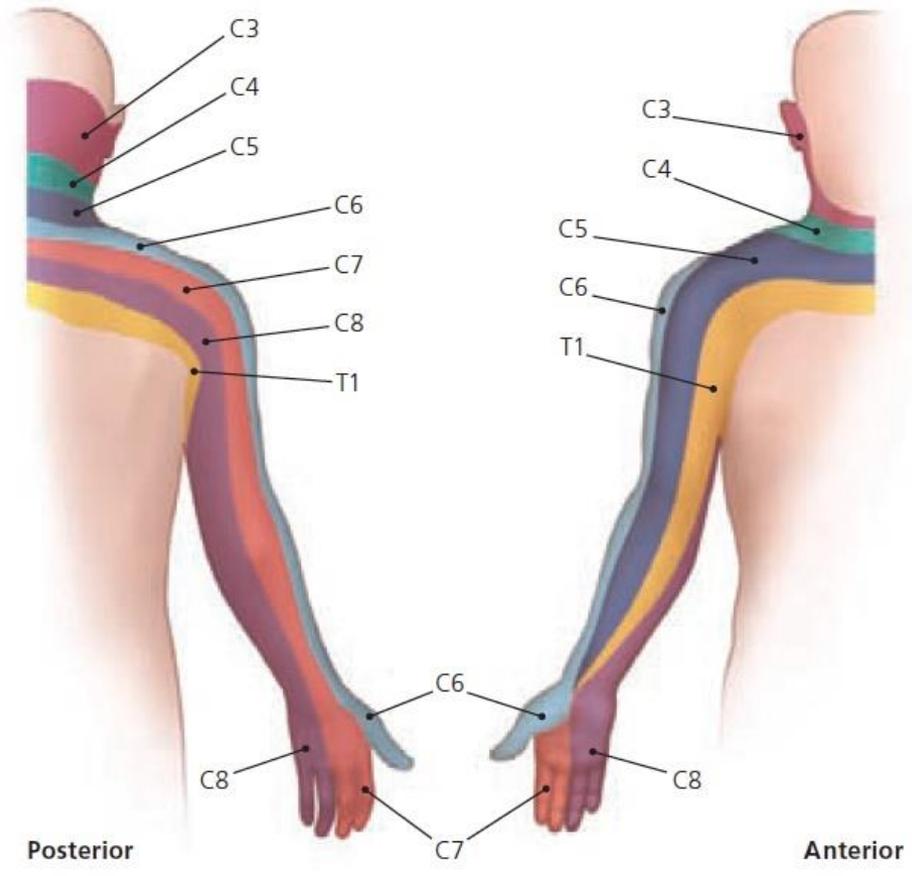


# Patterns of Radiation and/or Paresthesia

## Upper Limb Cutaneous Innervation



## Upper Limb Dermatomes

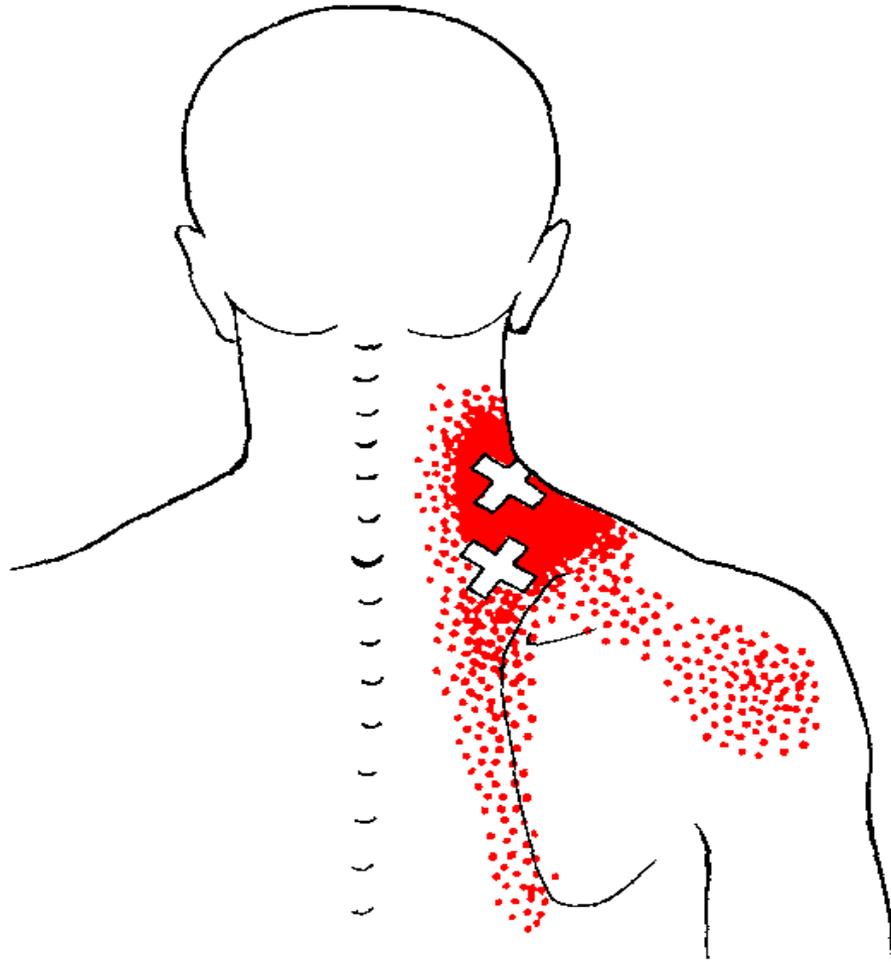


# Scalenes

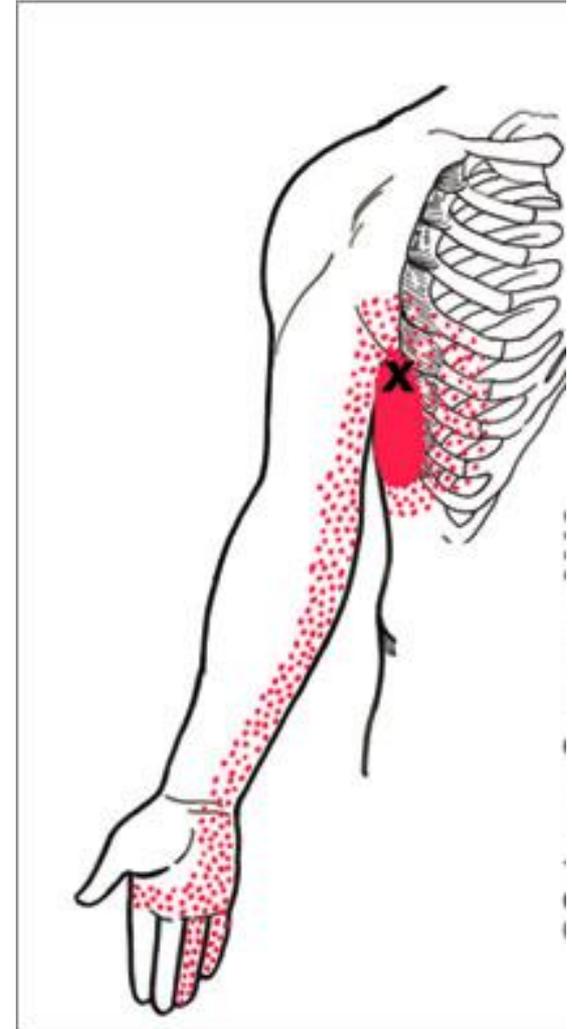
## Scalene Trigger Points and Referred Pain Patterns



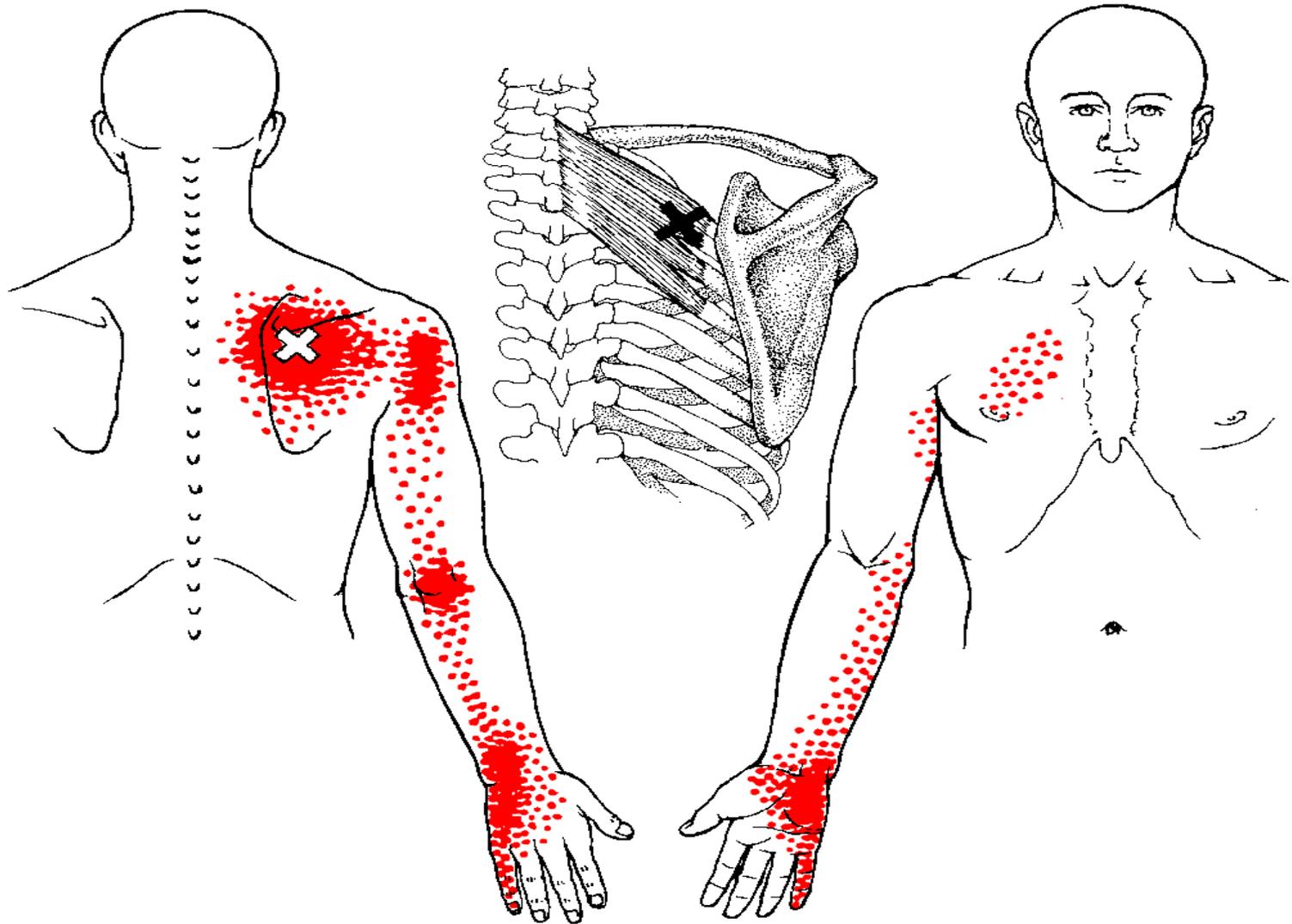
# Levator Scapulae



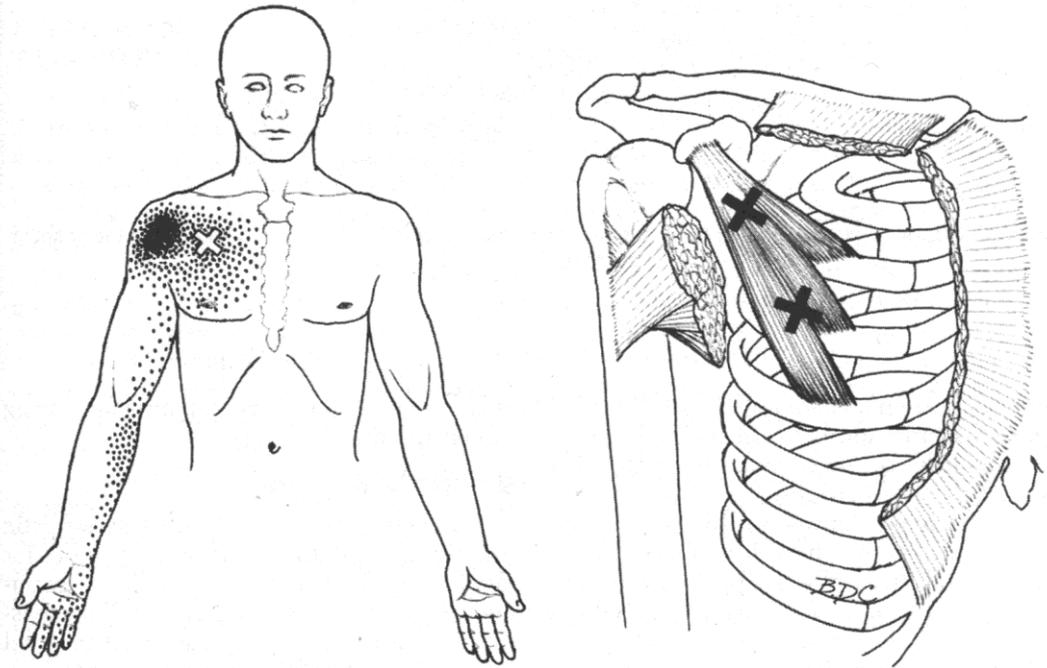
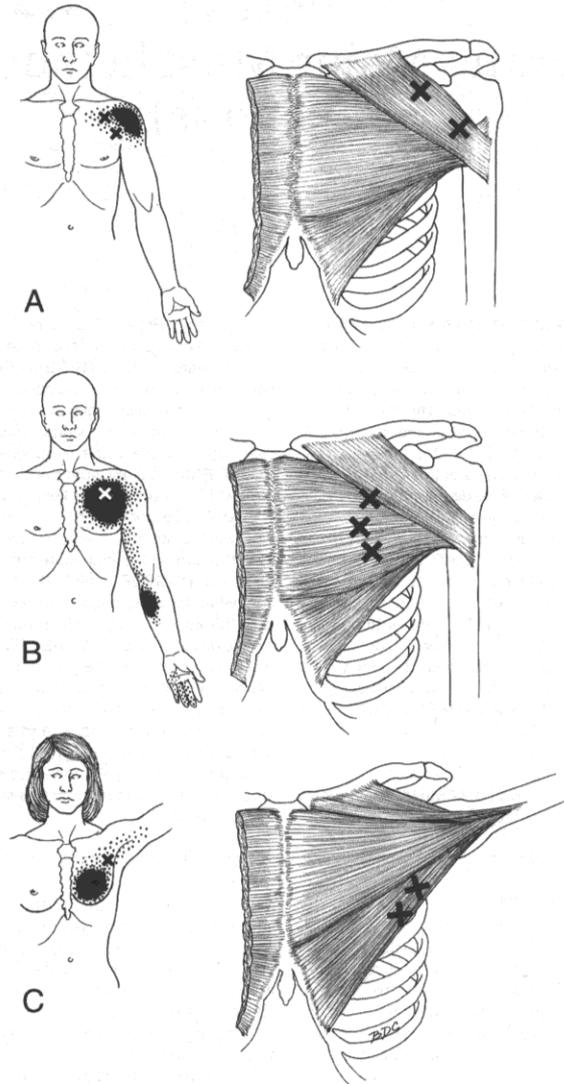
# Serratus Anterior



# Serratus Posterior Superior



# Pectoralis Major and Minor

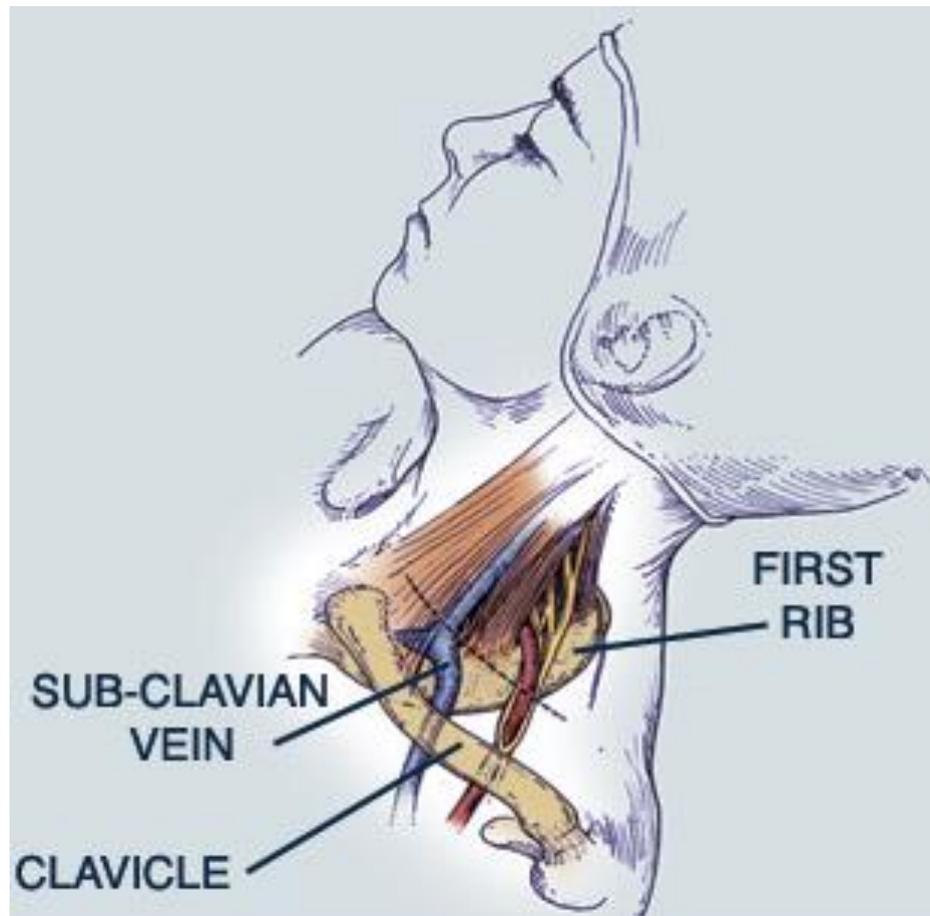


**Figure 43.1.** Referred pain pattern (*solid red* is the essential portion, *stippled red* shows the spillover portion), and trigger point locations (Xs) in the right pectoralis minor muscle. The upper X identifies the location of an attachment trigger point and the lower X a central trigger point location in this muscle.

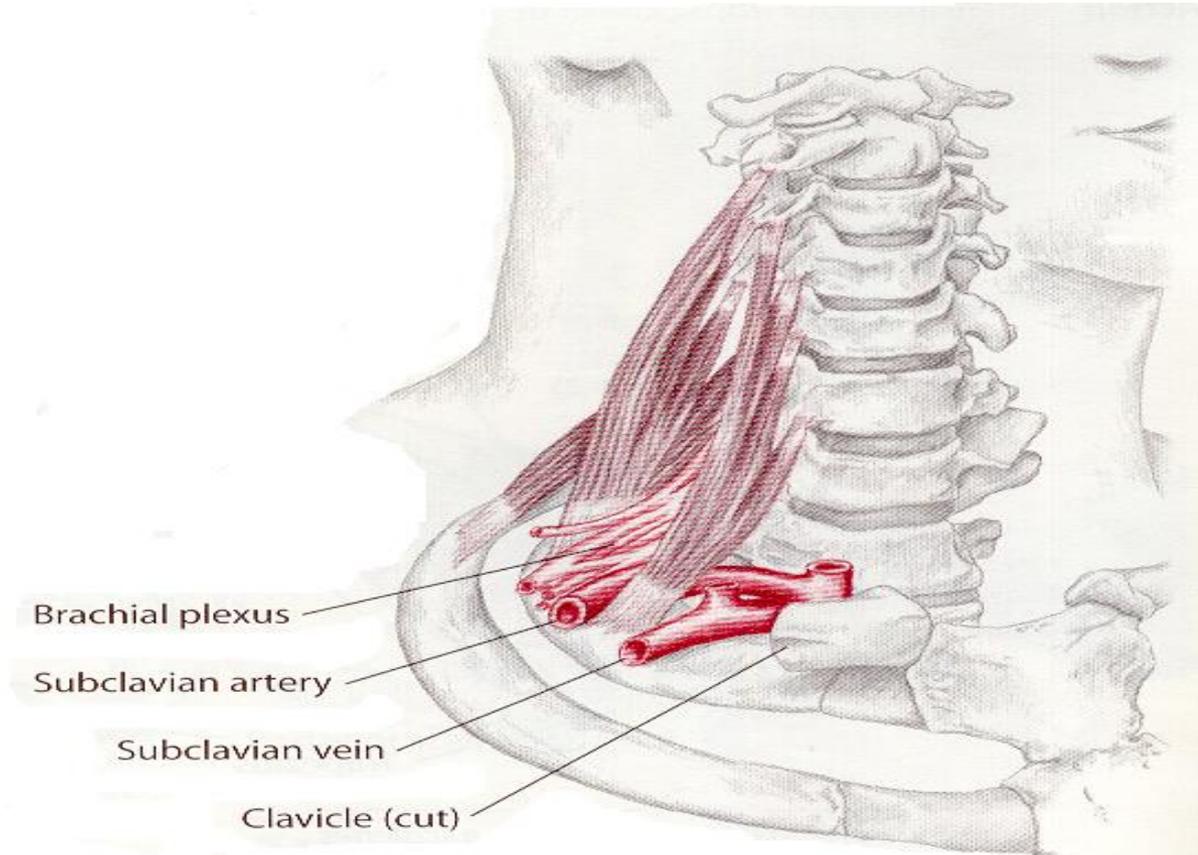
# Thoracic Outlet Syndrome

- Neurogenic
  - Compression of the brachial plexus
  - Wasting of some hand muscles, numbness and tingling
- Vascular
  - Compression of subclavian artery or vein
  - Pallor, edema, diminished pulses, + Adson's maneuver
- “Non-specific”

There can be several sites where compression of the brachial plexus occurs that can create a condition called Thoracic outlet syndrome (Commonly known as TOS)



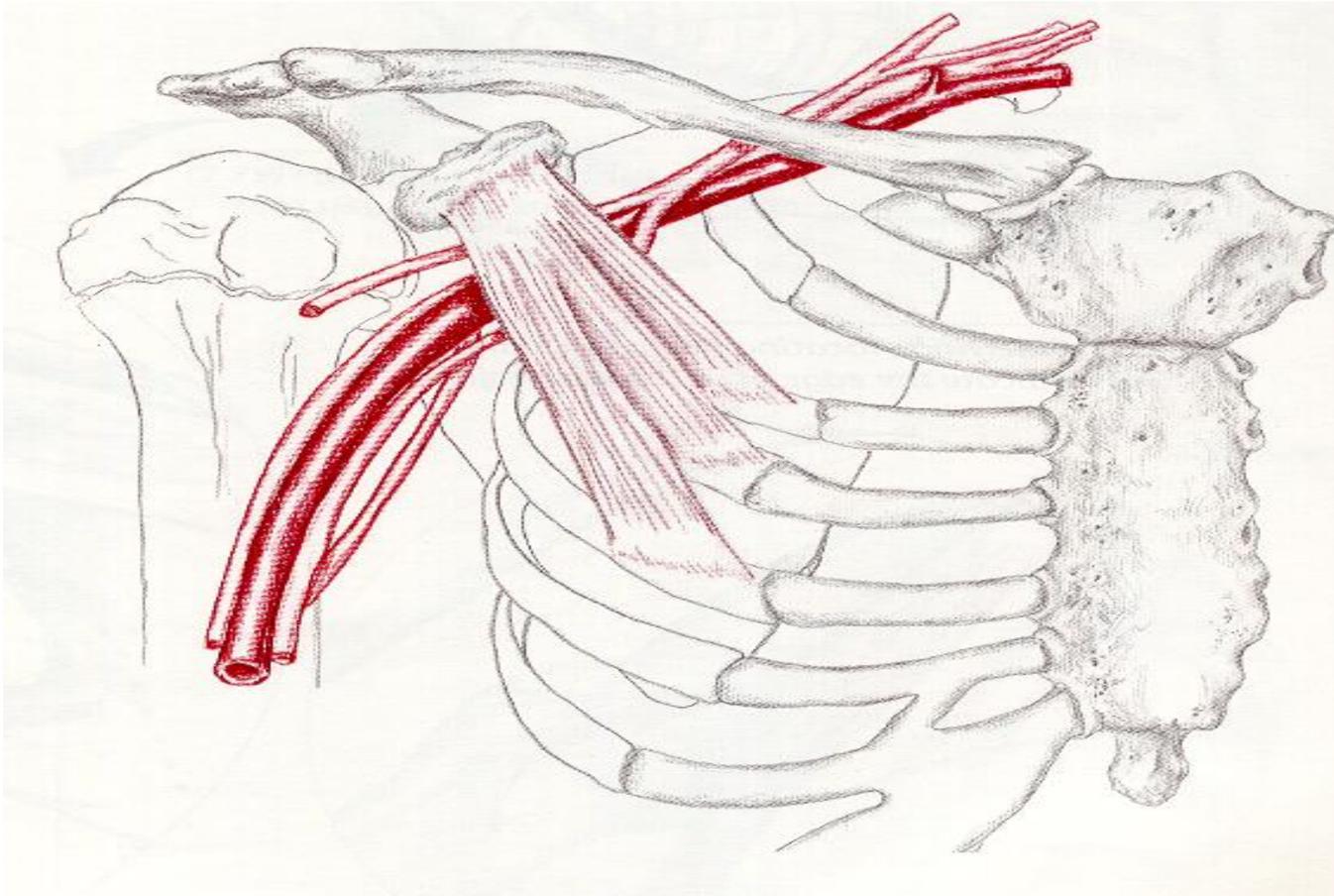
Brachial plexus entrapment between the anterior and medial scalene/or cervical rib



**Anterior Scalene Syndrome (Scalenis anticus syndrome)**

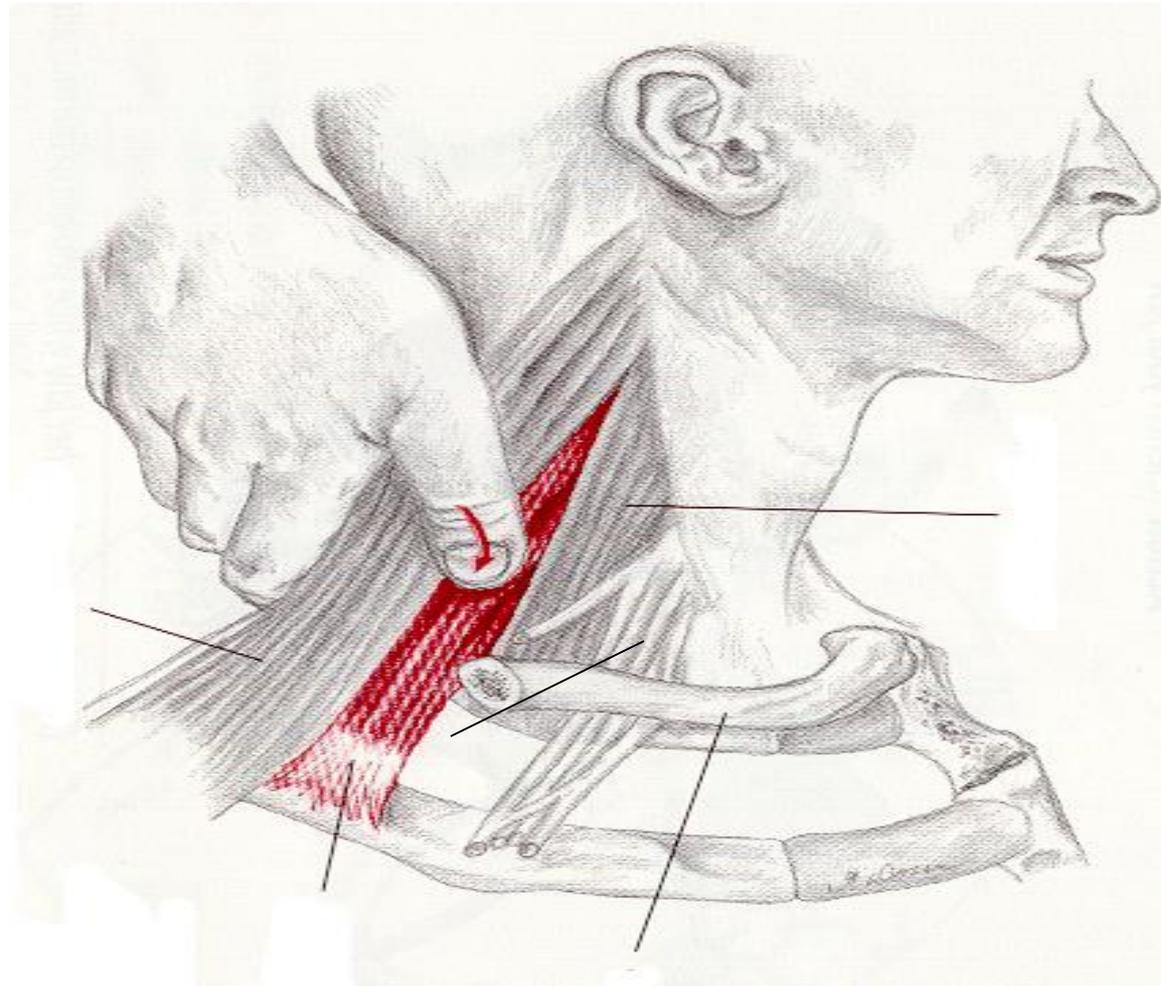
**Cervical Rib Syndrome**

## Brachial plexus entrapment under the Pectoralis Minor



**Hyperabduction Syndrome**  
(aka Pec Minor Syndrome)

# Brachial plexus entrapment between the clavicle and 1st rib



**Costoclavicular Syndrome**

# Diagnosis

- Very rarely due to a cervical rib
- EMG/NCT
- MRA or Doppler
- Needs to be directed by severity and nature of symptoms

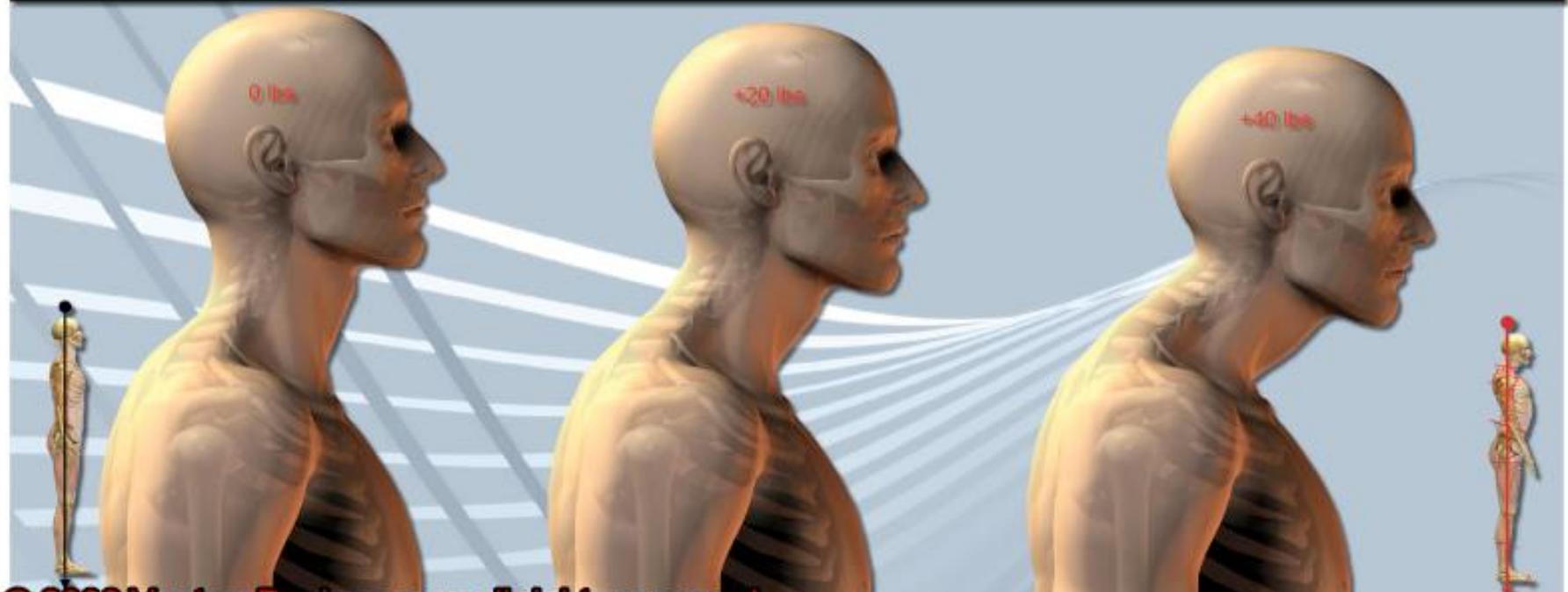
# Treatment

- First rib or clavicle resection (!)
- Evaluate each of the possible sites of compression
  - Somatic dysfunction
  - Muscle spasm or hypertrophy

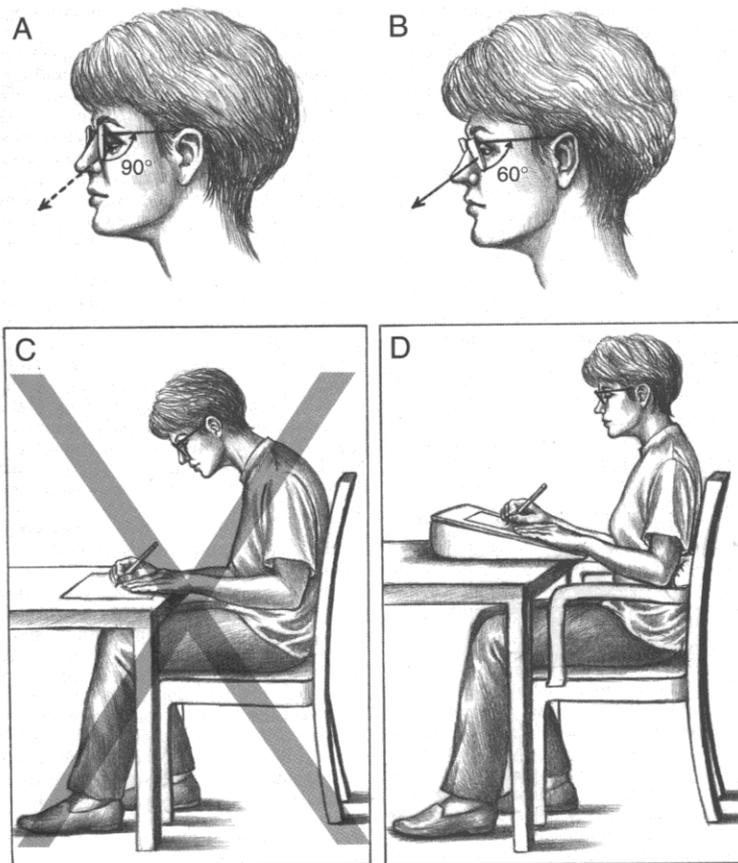
# Poor Posture and the Weight of Your Head

The human head weighs between 8 and 10 pounds and represents 8% of the total body mass. In a neutral posture position the head feels as if it weighs nothing because the body is perfectly balanced. But for every one inch the head moves forward, away from a neutral balanced posture, the head feels as if it's weight has doubled. This is due to the effects of Gravity and the tension stress placed on the neck muscles and cervical spine.

If treatment is started before spine decay begins, a person's posture can be corrected and the additional stresses on the body removed. If you know anyone that looks like the pictures below, please refer them to our office.

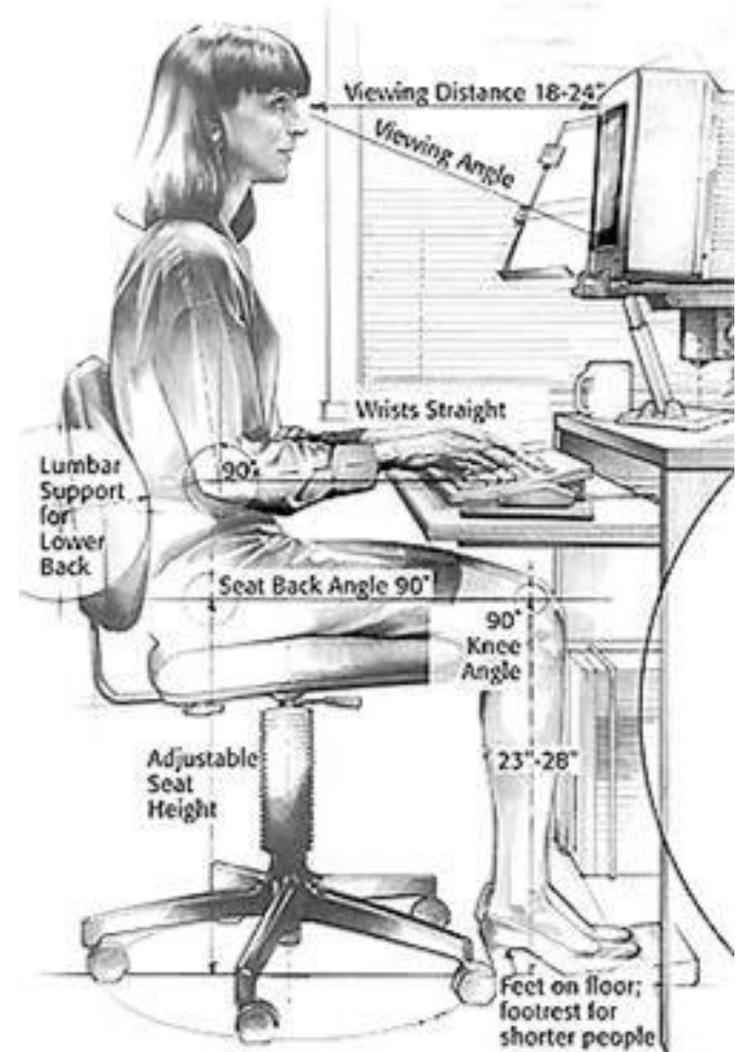


# Posture

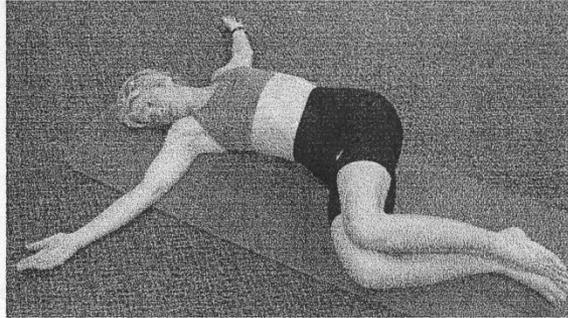
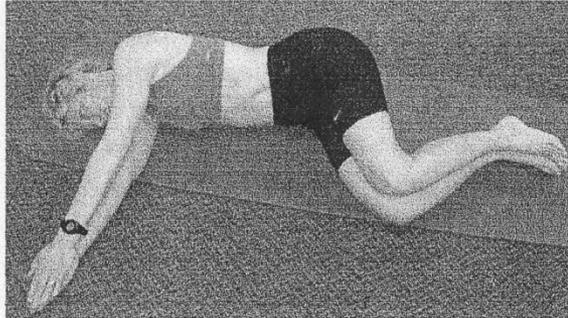


**Figure 16.4.** Causes and corrections of unnecessary load on the posterior cervical muscles. **A**, view obstructed by the lower rim of the eyeglasses, which must be compensated by a forward tilt of the head in order to read. **B**, unobstructed view for reading with the head in an erect, balanced position, after the axis of the lens has been tilted 30° or more, to bring the lower rim against the cheek. **C**, the red X indicates undesirable posture. The sustained spinal flexion with work placed flat on a low desk causes checkrein overload of the posterior cervical muscles. The poor posture is aggravated by having lenses with too short a focal length and rims that obstruct the line of vision.

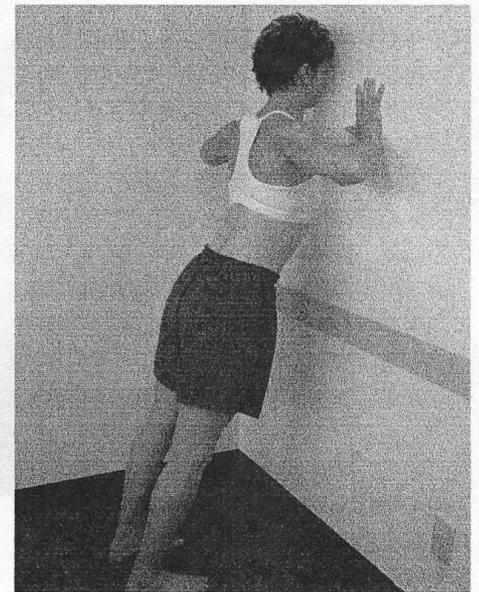
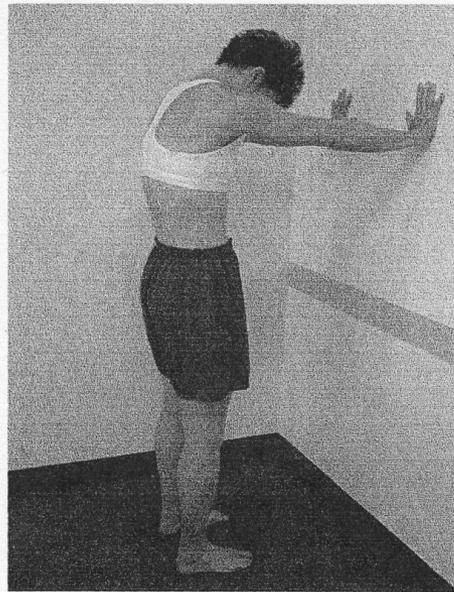
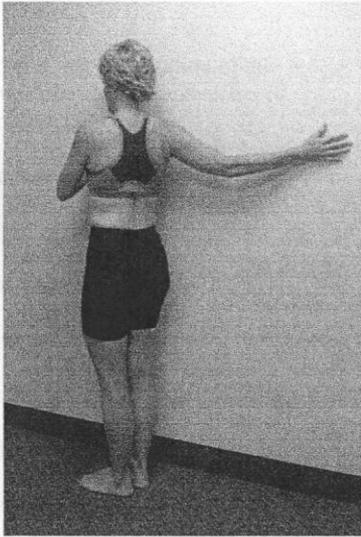
Additionally, the lack of an armrest for adequate elbow support creates a drag on the upper trapezius muscle. Lack of lumbar support in the backrest favors reversal of the normal lordotic curve and the low table top increases flexion of the spine. **D**, good posture of subject writing at a higher table with a tilted work surface, and sitting in a chair with armrests and added thoracolumbar junction support to lift the sternum. The higher table provides more adequate knee room, and the tilted board can be pulled even closer to the body for forearm support in the absence of adequate armrest support. All of these contribute to a stress-free, balanced head position.



# Shoulder Circles



## Self Stretching of the Pectorals



# Pectoral Traction

1. The patient is supine, knees raised, **fingers laced** and feet flat on the table.
2. The physician is seated at the head of the table, grasps the patient's anterior axillary folds, initially with gentle pressure on the pec major and then ultimately with deeper pressure to reach the pectoralis minor. Start with fingers flatter and curl around the pec major as the tissue releases so that you can reach the pec minor.
3. Traction is applied superiorly to stretch the muscles and the deep underlying fascia in the axillary spaces.



# Upper Rib “Bucket Handle” Dysfunction

1. Diagnosis is made by palpating ribs in mid-axillary line, applying a gentle inferior springing motion
2. Caudad traction is applied with postural augmentation and respiration until movement is improved



# Serratus Anterior

1. Diagnosis is made by assessment of muscle tone and inability to retract scapula or move fingers into superficial aspect of scapulothoracic joint
2. Treatment is done as any myofascial release



# Balanced Ligamentous Tension for the Ribs Supine

1. Patient supine
2. The same rib is palpated from both anterior and posterior and put in position of ease in all planes until release is palpated and motion is restored



# Balanced Ligamentous Tension for the Ribs Seated

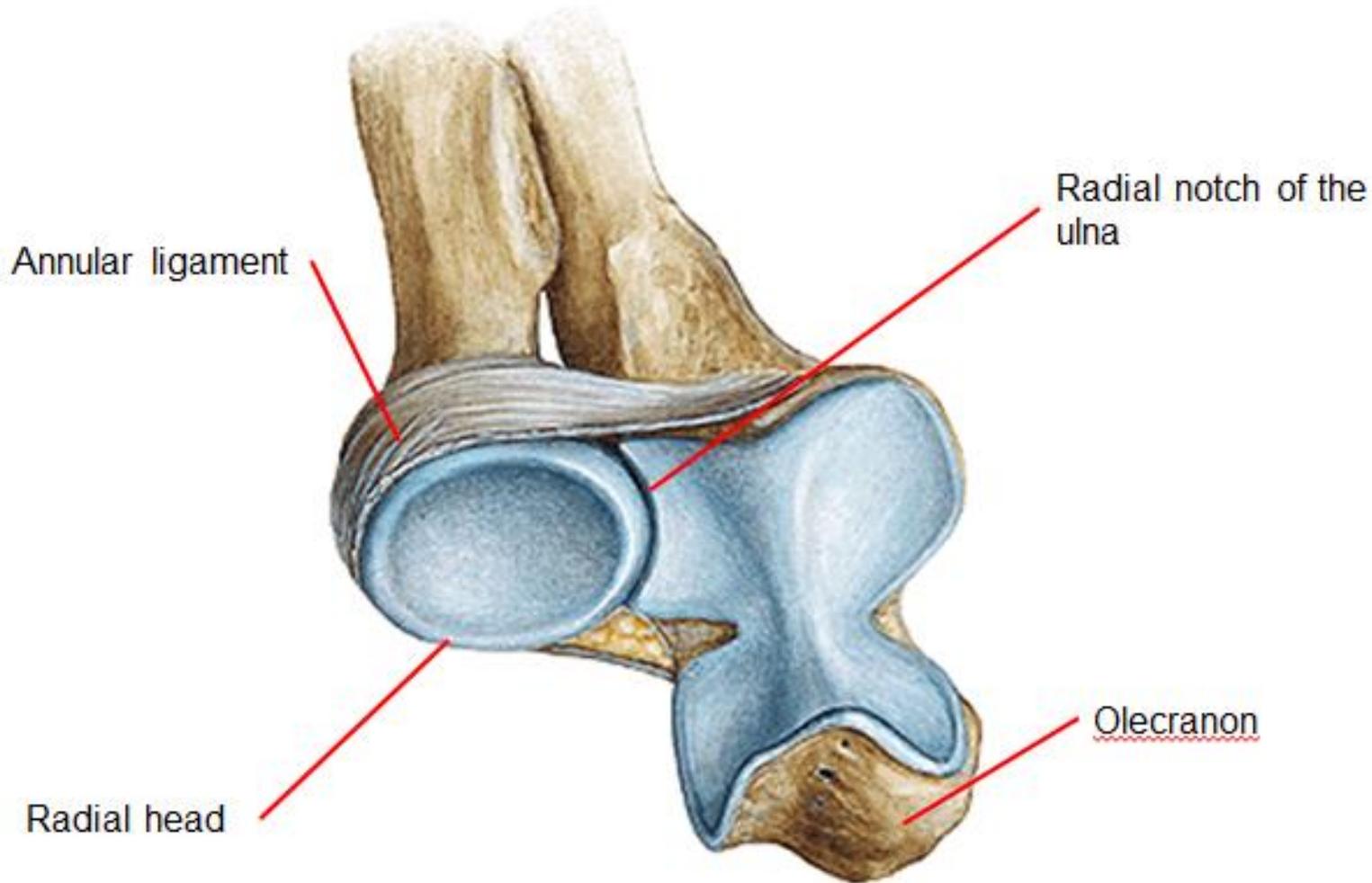
1. Patient supine, physician seated at the affected side
2. The angle of the rib is contacted with one hand while the other hand stabilizes the 2 attached vertebrae at the transverse or spinous process
3. The ribs are balanced relative to the vertebrae until release is palpated and motion is restored



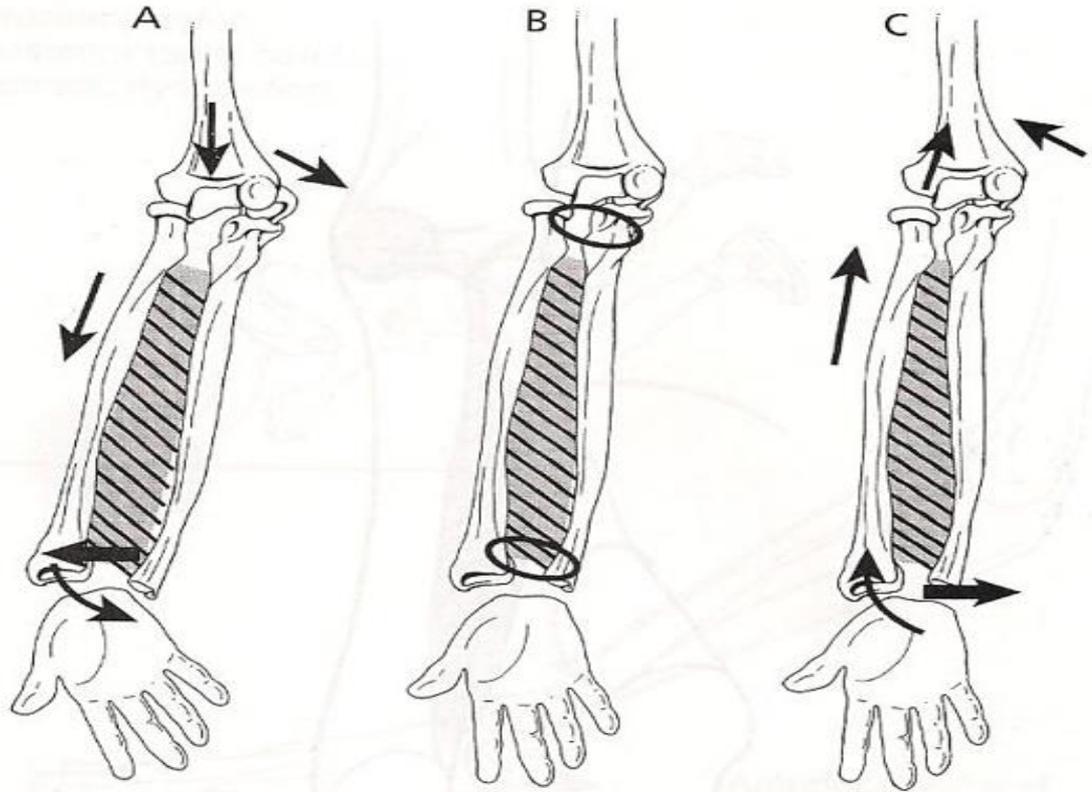
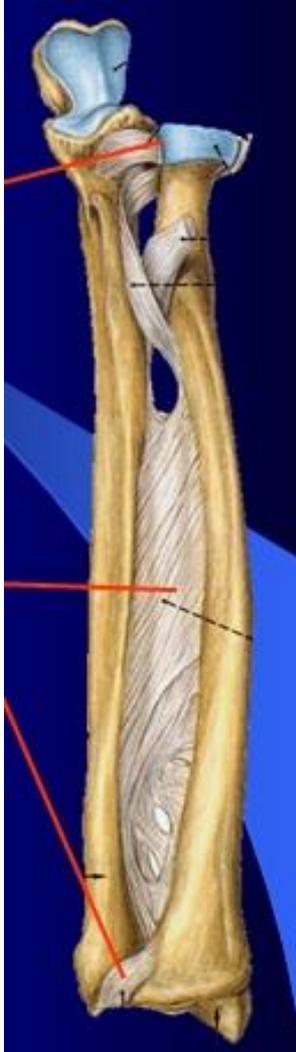
# Case 3: Wrist and forearm pain

- An 18 year old male college freshman presents with bilateral wrist and forearm aching, with perceived weakness and numbness and tingling. His symptoms are worse when working on his computer and playing video games, both of which he admits to doing with much greater frequency since starting college

# Left Elbow: Radius and Ulna



# Interosseus Membrane



Parallelogram  
mechanics:

Ulnar abduction

Parallelogram  
mechanics:

Ulnar adduction

**FIGURE 47.3.** (A) Ulnar abduction, (B) ulnar neutral, (C) ulnar adduction. (Illustration by W. A. Kuchera.)

# Carpal Separation and Retinaculum Release

1. Grasp patient's hand with both hands, using a spreading motion between the thenar and hypothenar eminences while applying traction
2. Look for areas of restricted movement in carpals which can be mobilized with a gentle thrust or articulatory movement



# Indirect Release of the Elbow, Wrist and Forearm

1. Patient seated, the physician grasps the elbow with one hand and the wrist and hand with the other
2. First the elbow and the then wrist are balanced in a “stacking” fashion and compression or traction is added



# Posterior Radial Head

Place thumb on posterior aspect of radial head.

With elbow flexed, bring forearm to barrier in supination

Ask patient to pronate against resistance for 3-5 seconds while exerting an anterior force on the radial head with the thumb.

After allowing tissues to relax for 1-2 seconds, bring to new barrier in supination.

Repeat 3-5 times or until no further gains in motion restriction are achieved

Recheck.



# Treatment of Radius and Interosseus Membrane

1. Grasp the proximal and distal radius with the thumb and forefinger of each hand, suspending the ulna via the interosseus membrane
2. Place in position of ease and follow the tissue movement as it releases



# Long Axis Fascial Unwinding of the Upper Extremity

1. Patient is supine, the arm is grasped at the hand/wrist
2. Slack is taken up in internal rotation and traction is applied
3. The arm is slowly brought through flexion, constantly apply traction and taking up slack with a change to external rotation at about 90°, finishing with the arm fully abducted and externally rotated



# Treatment Pearls

- If you can't fix the C-spine, check the upper thorax and ribs
- Vice versa
- If you can't fix any of them, look every where else!
- Posture