

THORACIC OUTLET SYNDROME WHAT CAN THE VASCULAR LAB ADD?

Kevin James, M.D., F.A.C.S

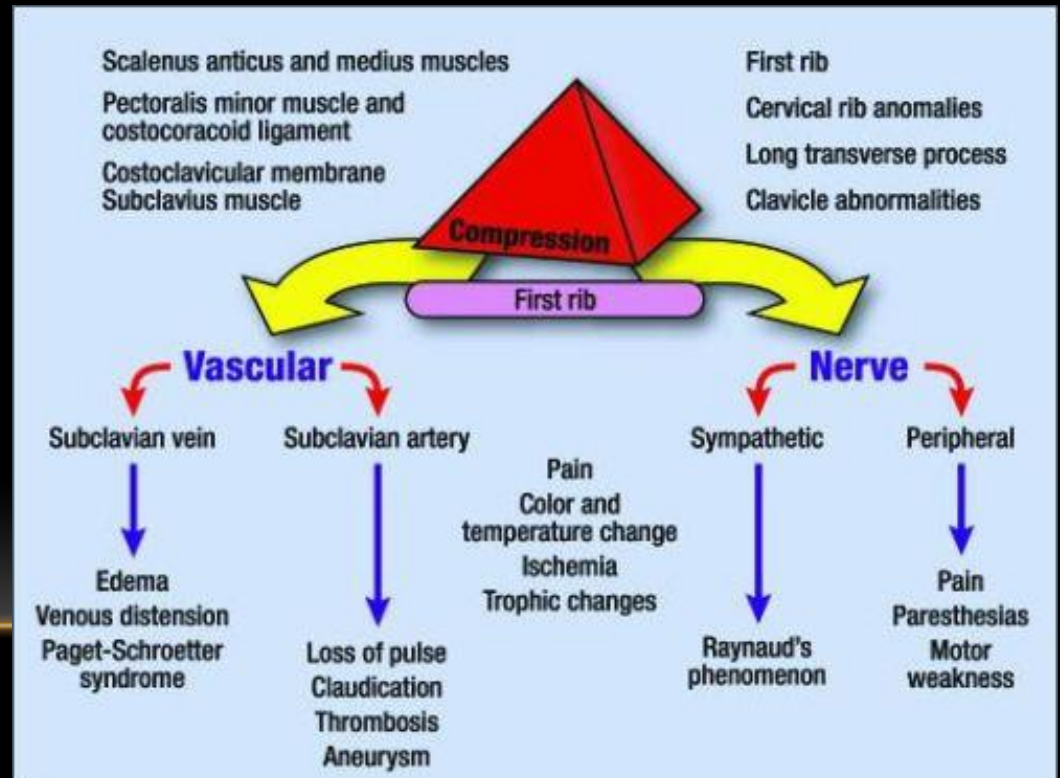
THORACIC OUTLET SYNDROME

- What is it?
- Who gets it?
- What role does the vascular lab have in the workup?

THORACIC OUTLET SYNDROME

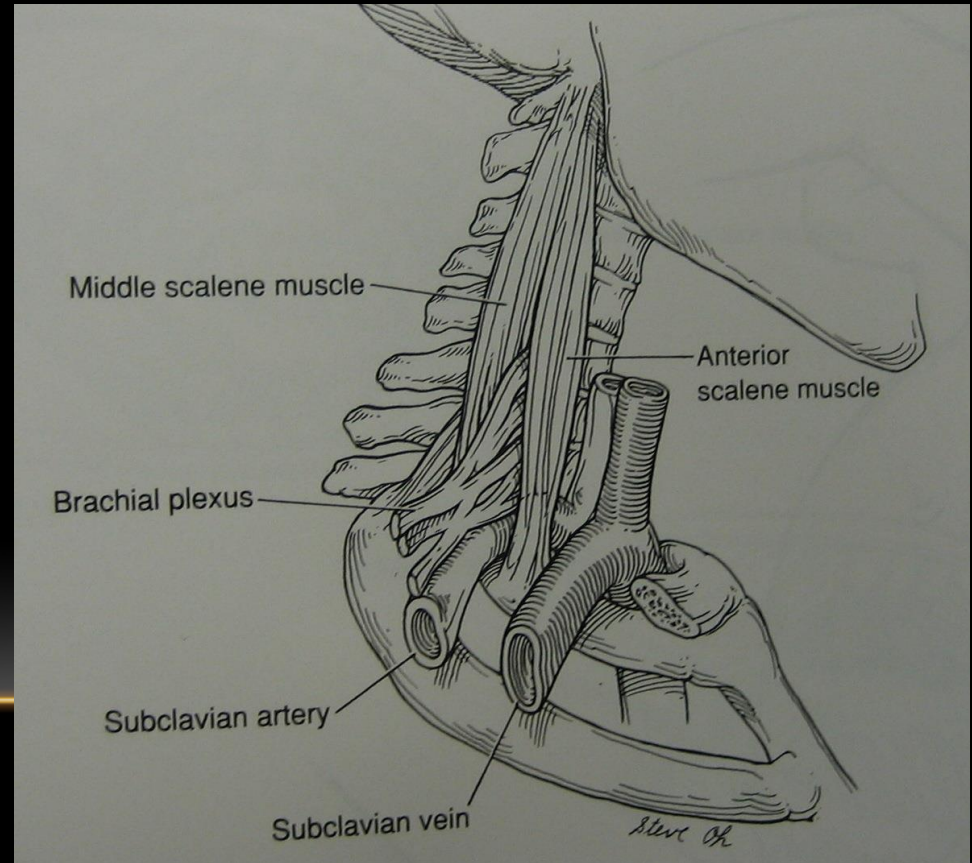
- Defined as the symptomatic compression of the neurovascular bundle at the thoracic outlet
- Venous, Arterial, and Neurogenic
- Anatomy is the key to understanding thoracic outlet syndrome

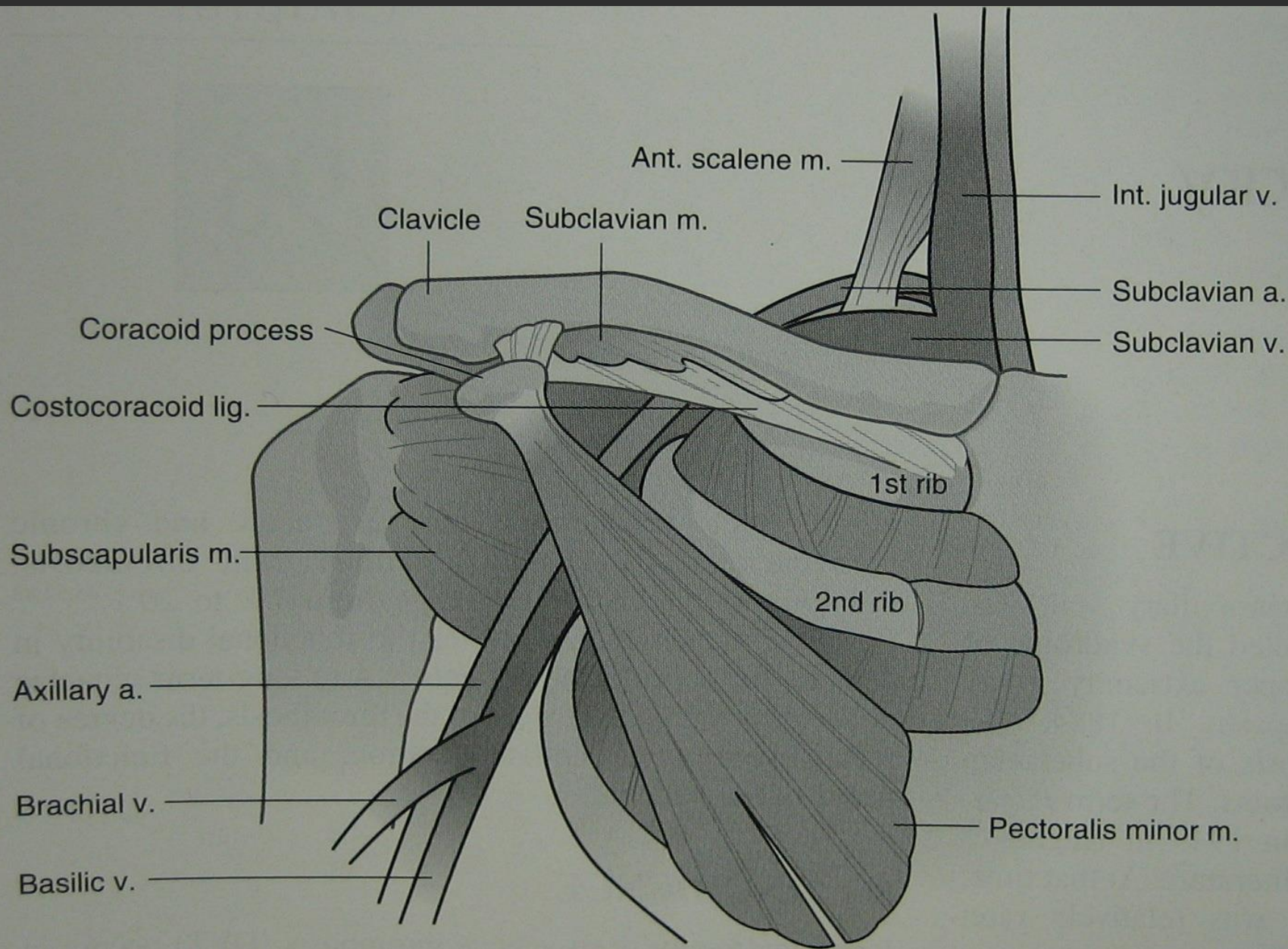
True incidence unknown
 0.2%-8% of general population
 15-40 years old
 3:1 female/male

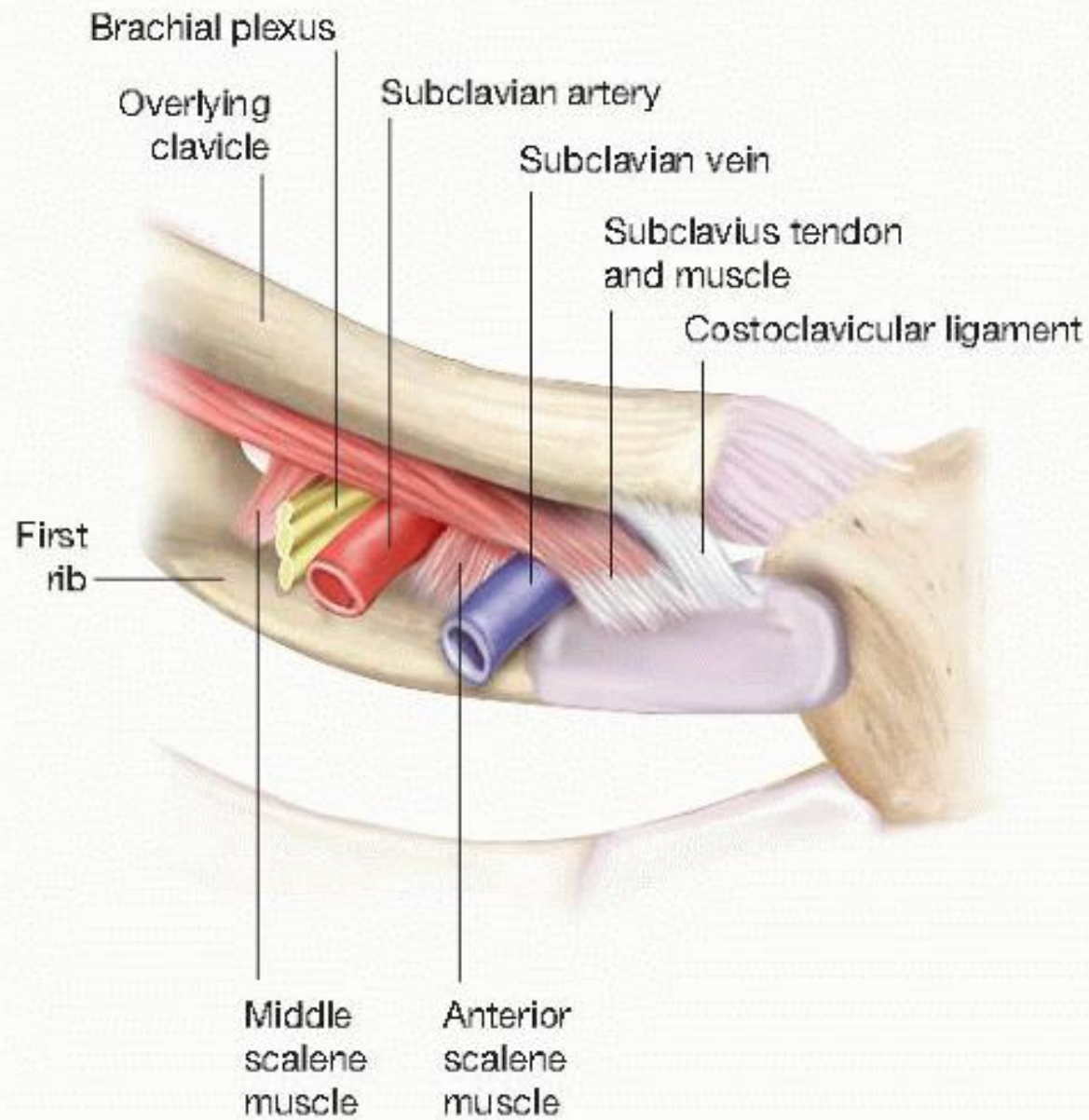


ETIOLOGY

- trauma (single event or repetitive) exerted on the neurovascular structures within the thoracic outlet.
- Subsequent inflammation
- Ant scalene, middle scalene, and first rib
- Brachial plexus (C-5/T-1), artery and vein
- Anatomic relationships key

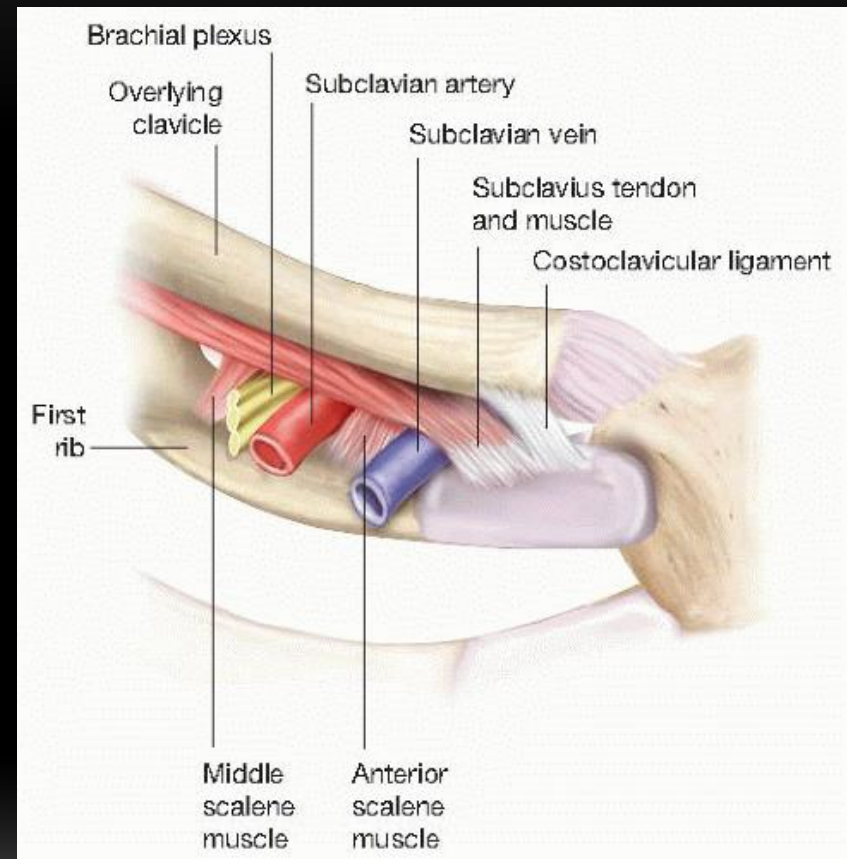






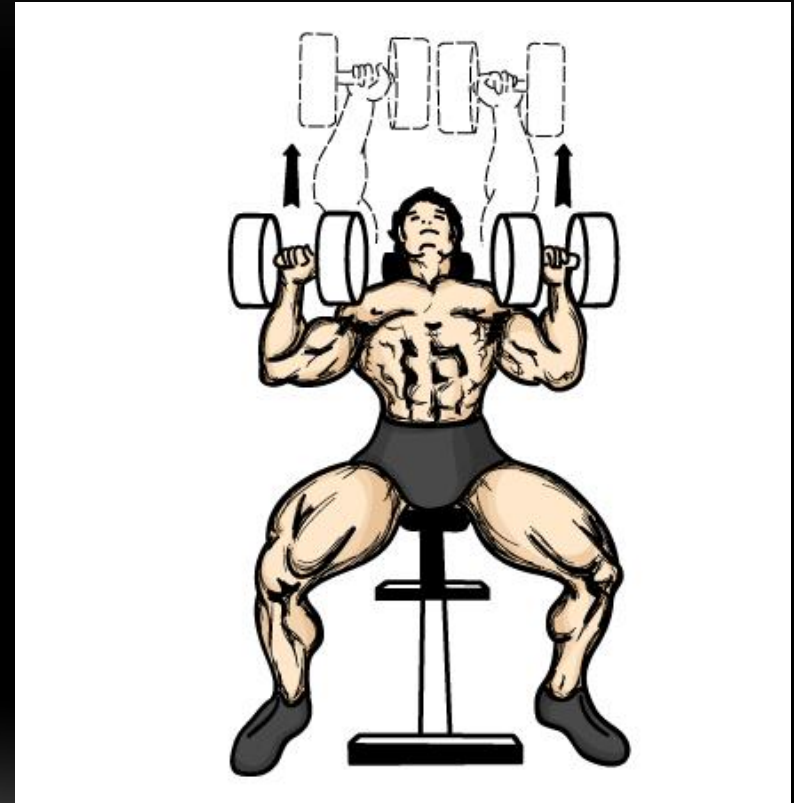
CAUSE

- Osseous changes (Cervical ribs)
- Soft tissue abnormalities (multiple subtypes)
- Trauma (Hyperextension)
- Inflammation, overuse, underuse, and postural change.



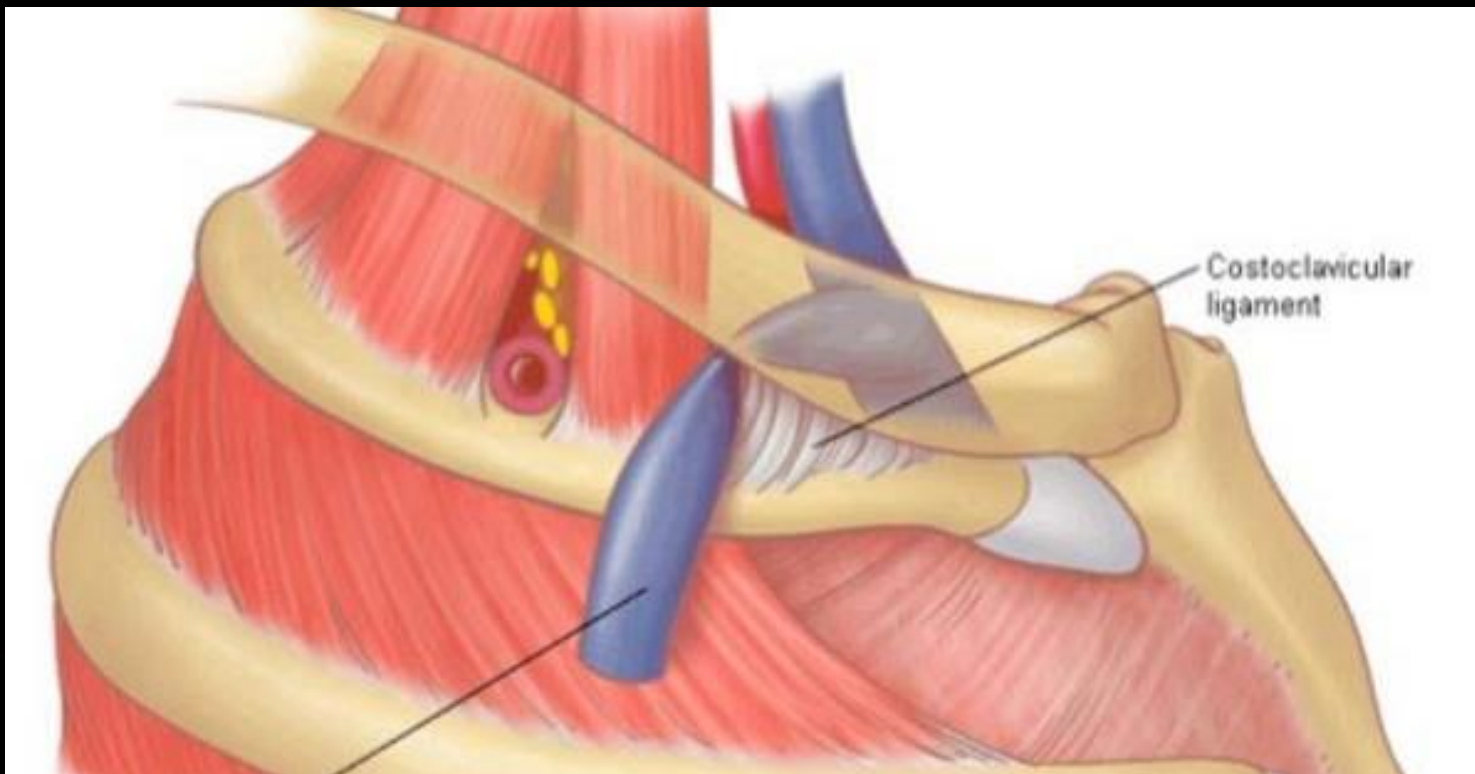
VENOUS

- Effort Vein Thrombosis
- “Paget-Schroetter” Syndrome
- Venous Claudication
- Typically affects young, muscular males
- Repetitive, upper shoulder exercise
- Can be work related
- (painter, wallpaper)



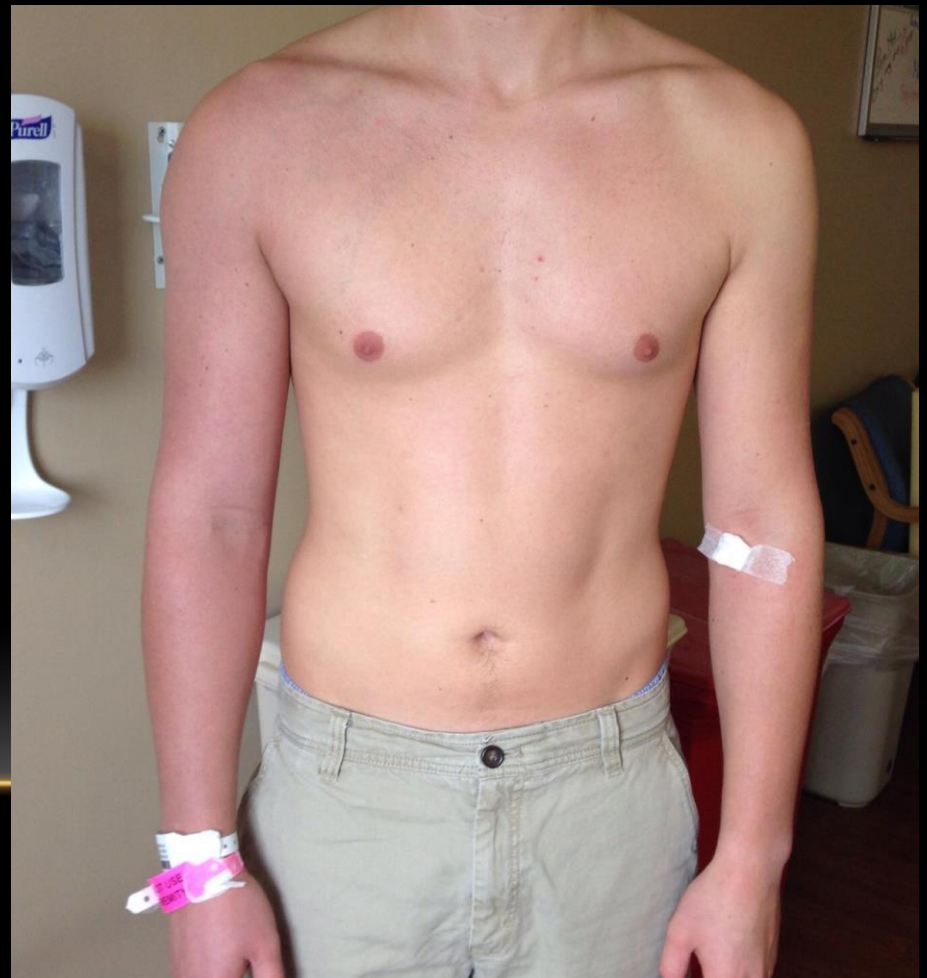
VENOUS

- MALE:FEMALE 2:1
- Usually w/o neurologic symptoms
- Arm swelling and pain with exertion



VENOUS : HISTORY AND EXAM

- Arm swelling/asymmetry
- Engorgement of surface veins and chest wall collaterals



DUPLEX ULTRASOUND

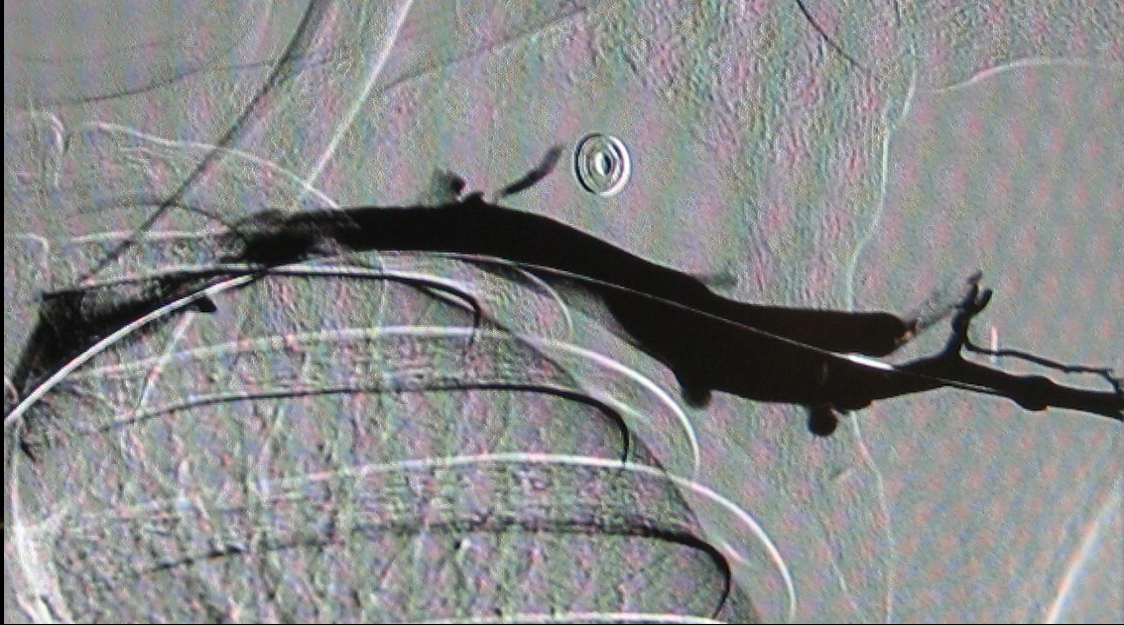
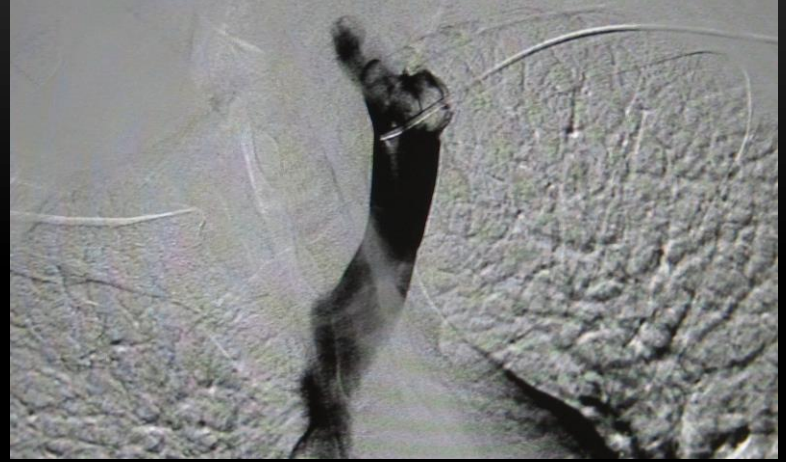
- A critical component of workup.
- Identify thrombus. (May not always be possible)
- Demonstrate venous outflow obstruction
 - Loss of phasicity and poor augmentation
 - Document presence of large collaterals
- Provocative maneuvers not usually helpful
- Venous findings usually isolated, and not paired with arterial or neurogenic

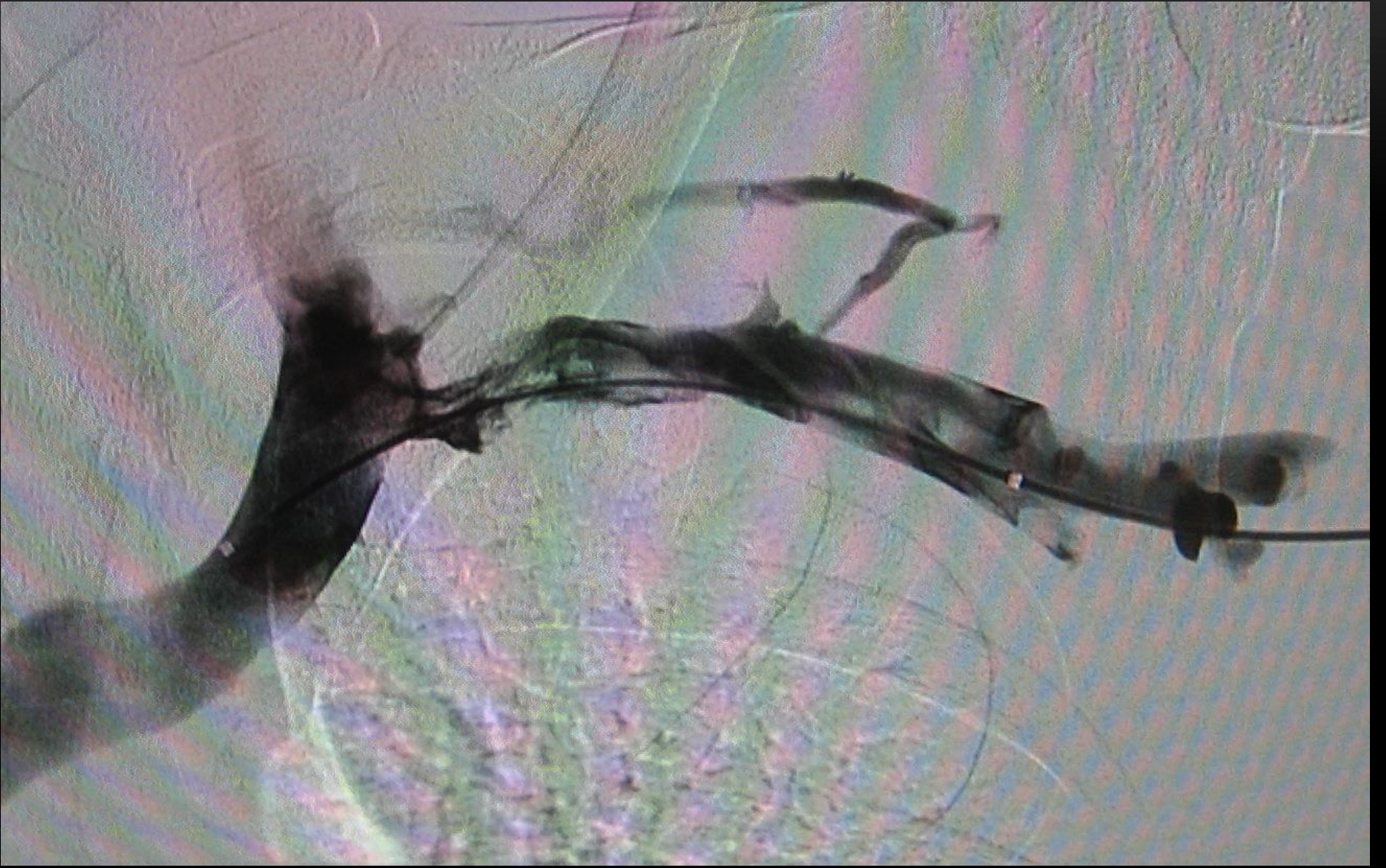


VENOUS THORACIC OUTLET

- Venography still the gold standard





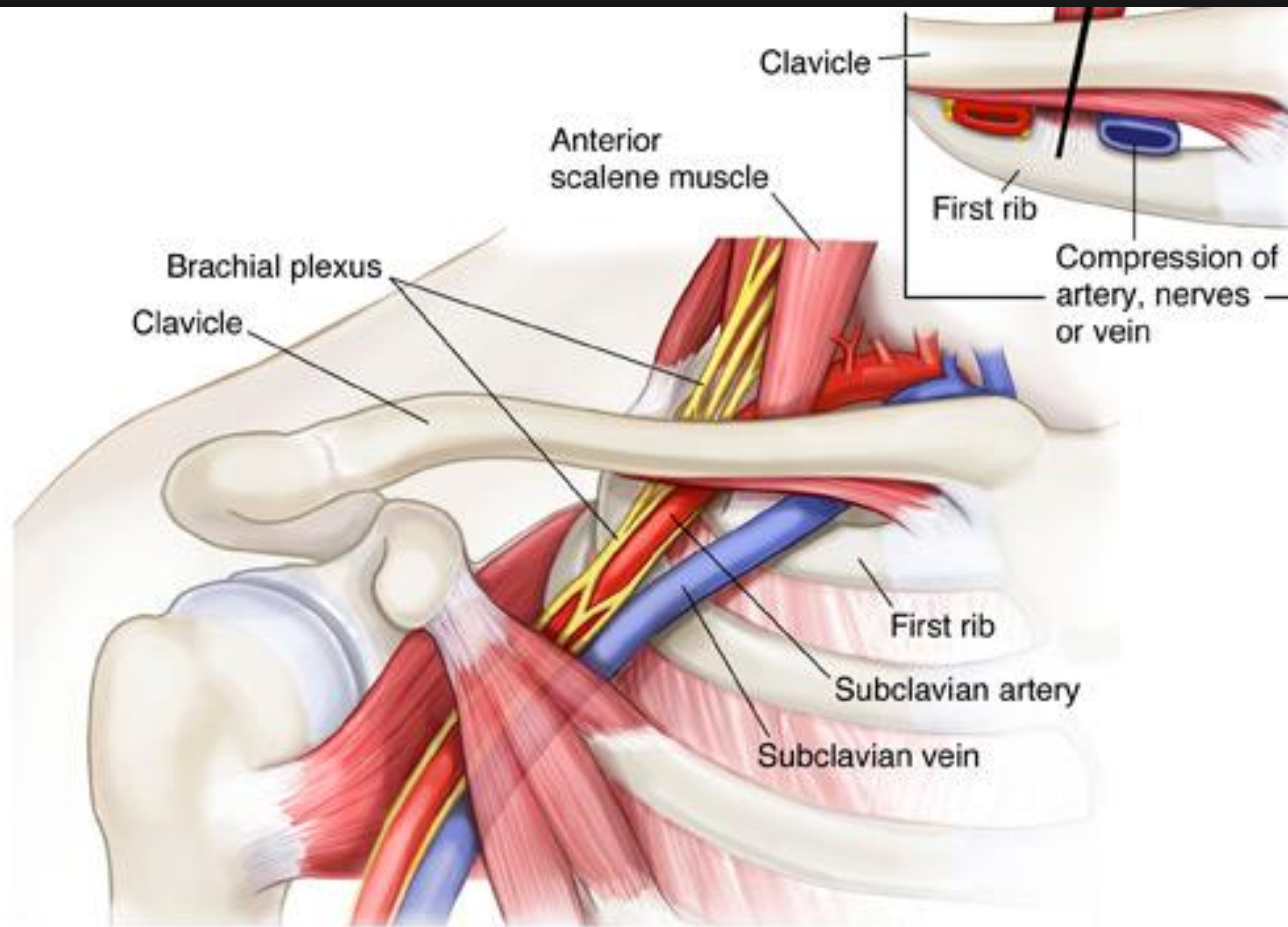


ARTERIAL

- Rarest cause of TOS
- Arterial compression can result in aneurysm, thrombosis, or emboli
- Arterial and neurogenic symptoms often combined

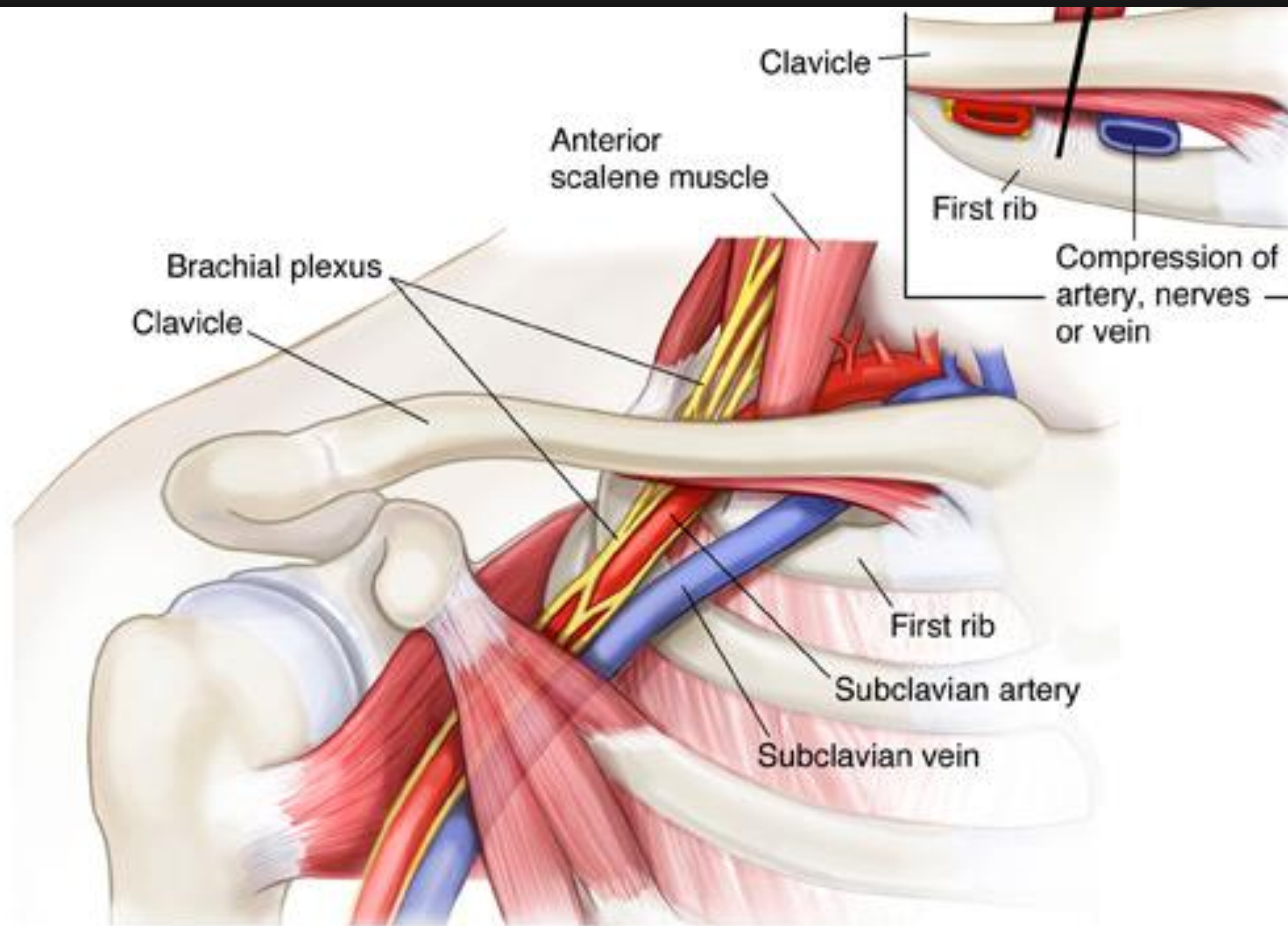


ARTERIAL THORACIC OUTLET



Thoracic Outlet Syndrome

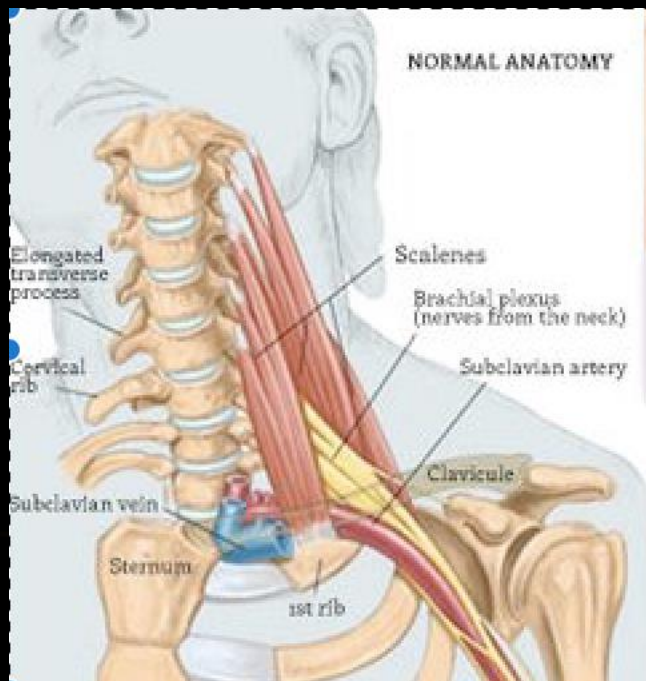
ARTERIAL = NEUROGENIC



Thoracic Outlet Syndrome

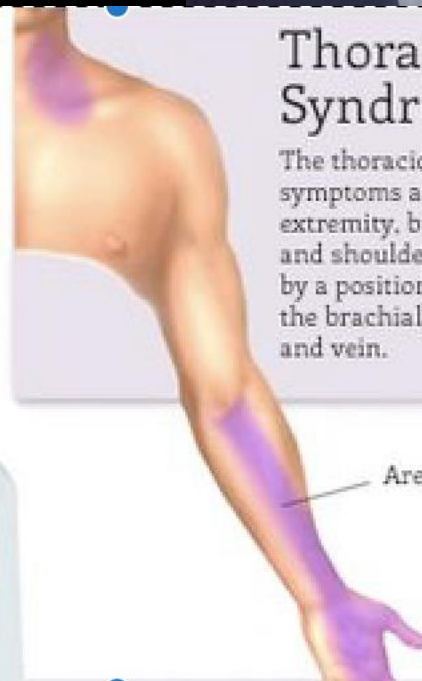
NEUROGENIC

- Most common
- Most controversial
- Difficult to diagnose definitively



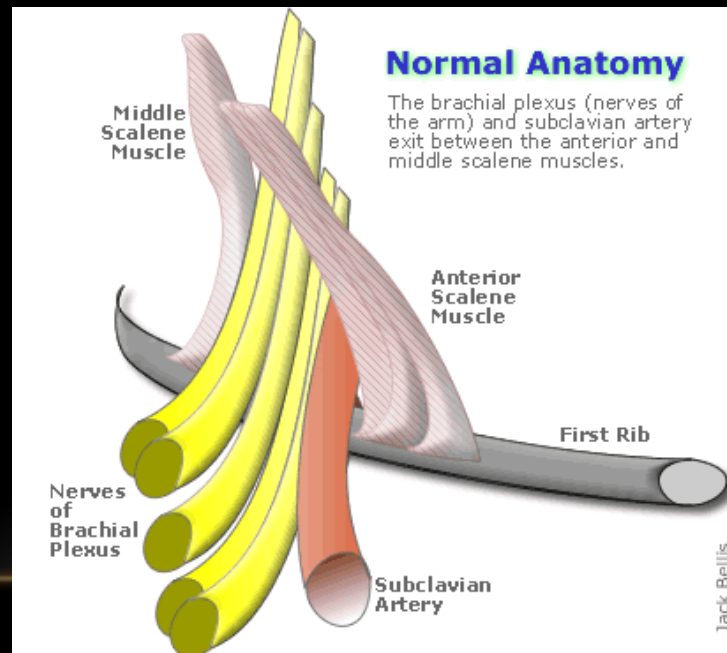
Thoracic Outlet Syndrome (TOS)

The thoracic outlet syndrome is a group of symptoms arising not only from the upper extremity, but also from the chest, neck, and shoulders. The symptoms are produced by a positional, intermittent compression of the brachial plexus and/or subclavian artery and vein.



NEUROGENIC

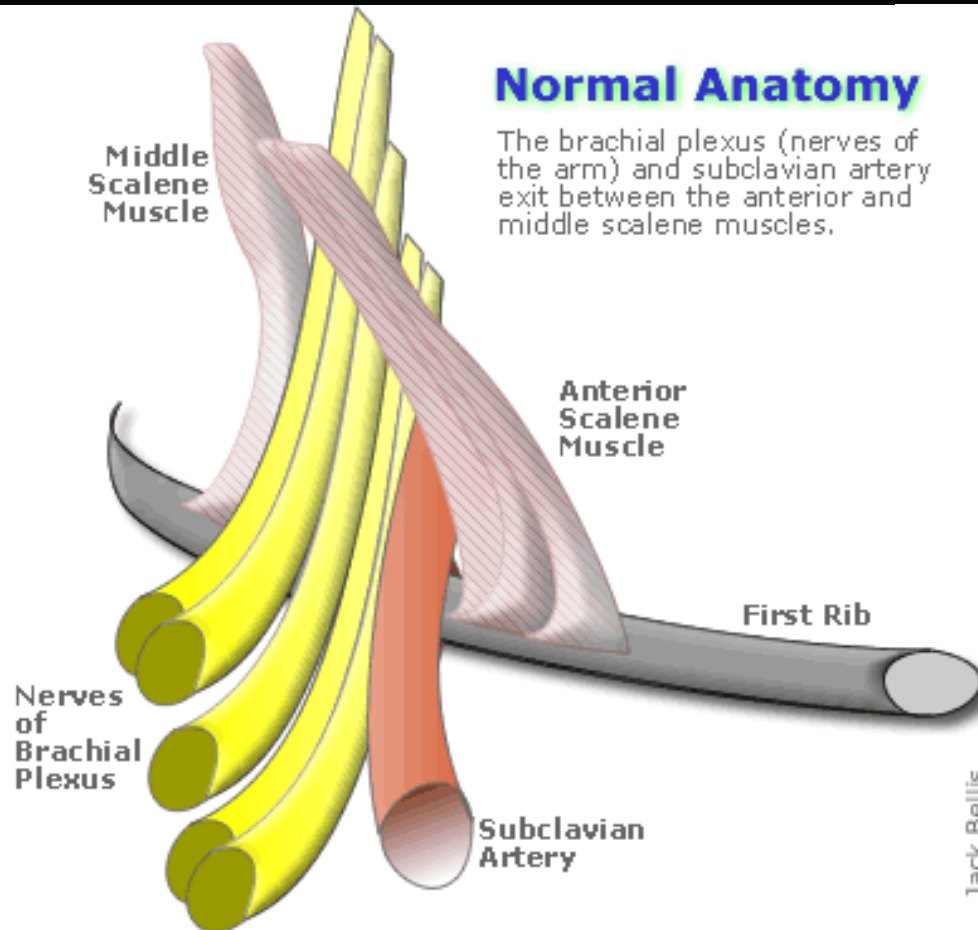
- Anatomic abnormality (band, rib, fracture, etc.), not typically seen
- EMG, SEP usually negative
- Other etiologies must be excluded
- Cervical radiculopathy and shoulder injury common competing dx



NEUROGENIC

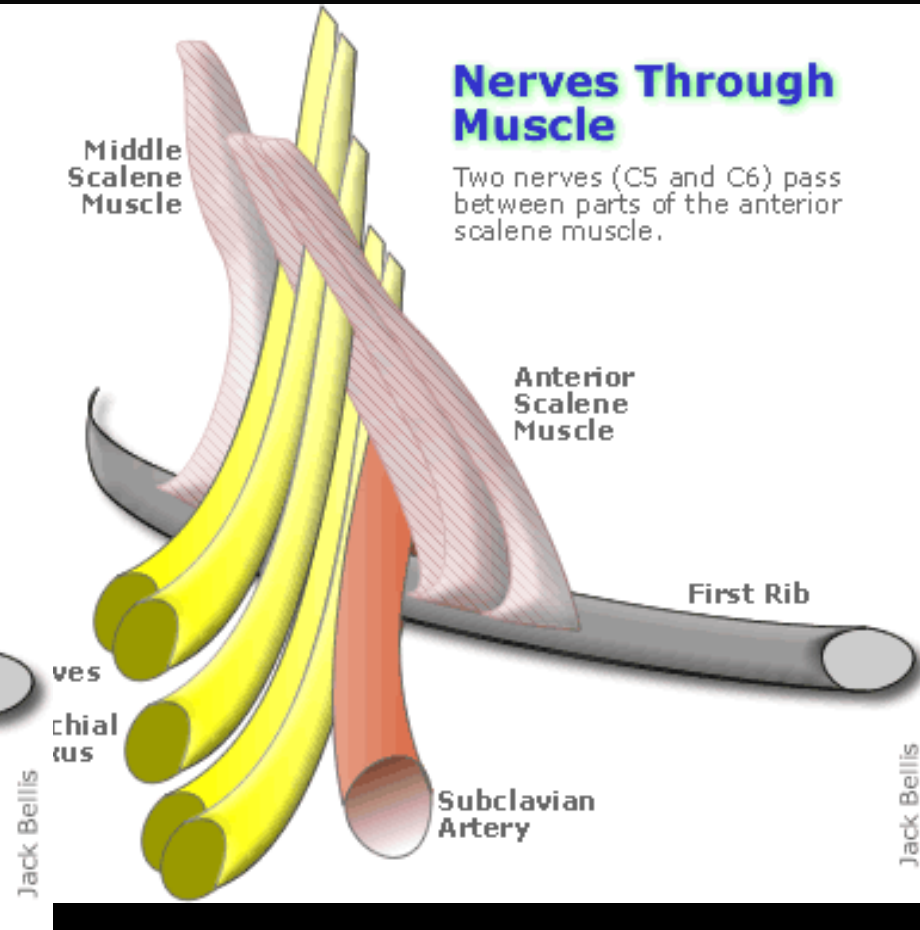
Normal Anatomy

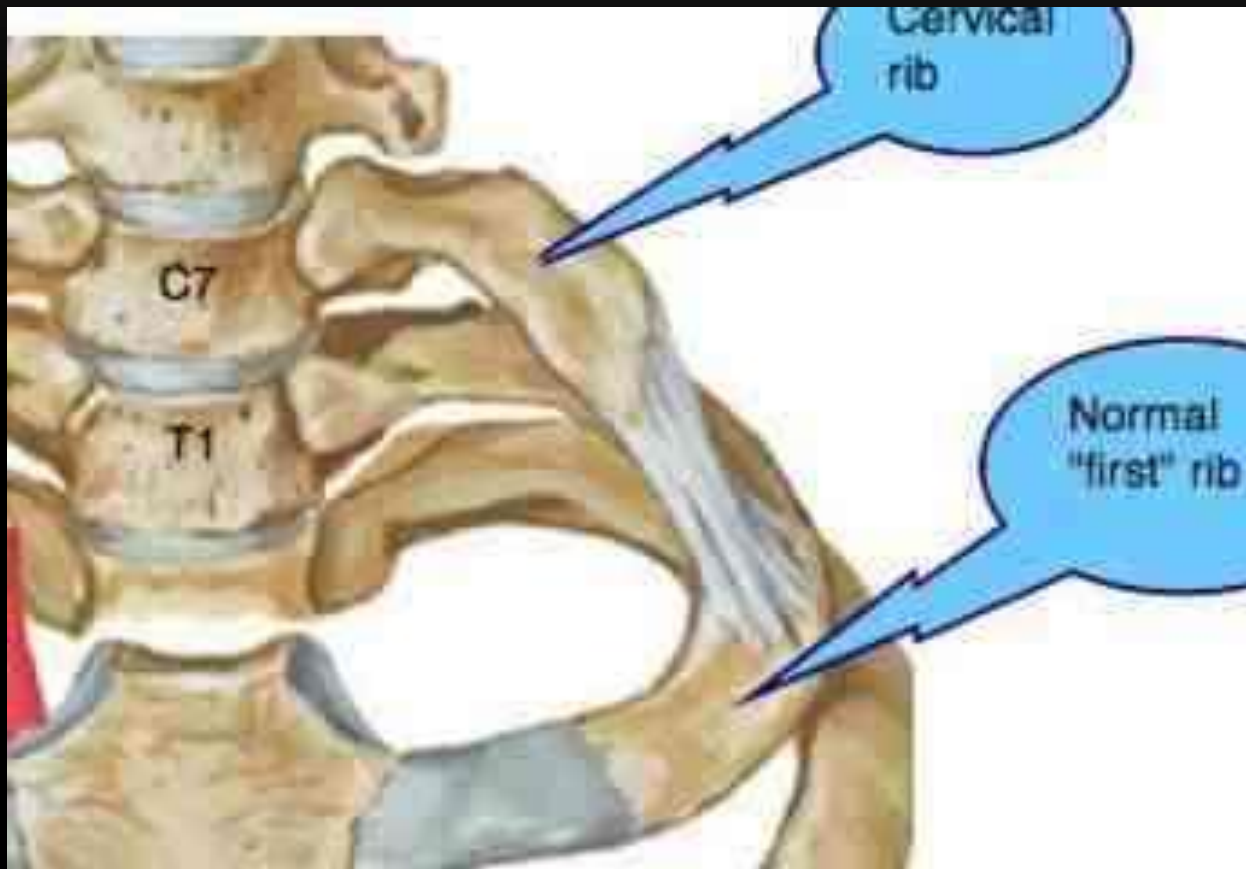
The brachial plexus (nerves of the arm) and subclavian artery exit between the anterior and middle scalene muscles.

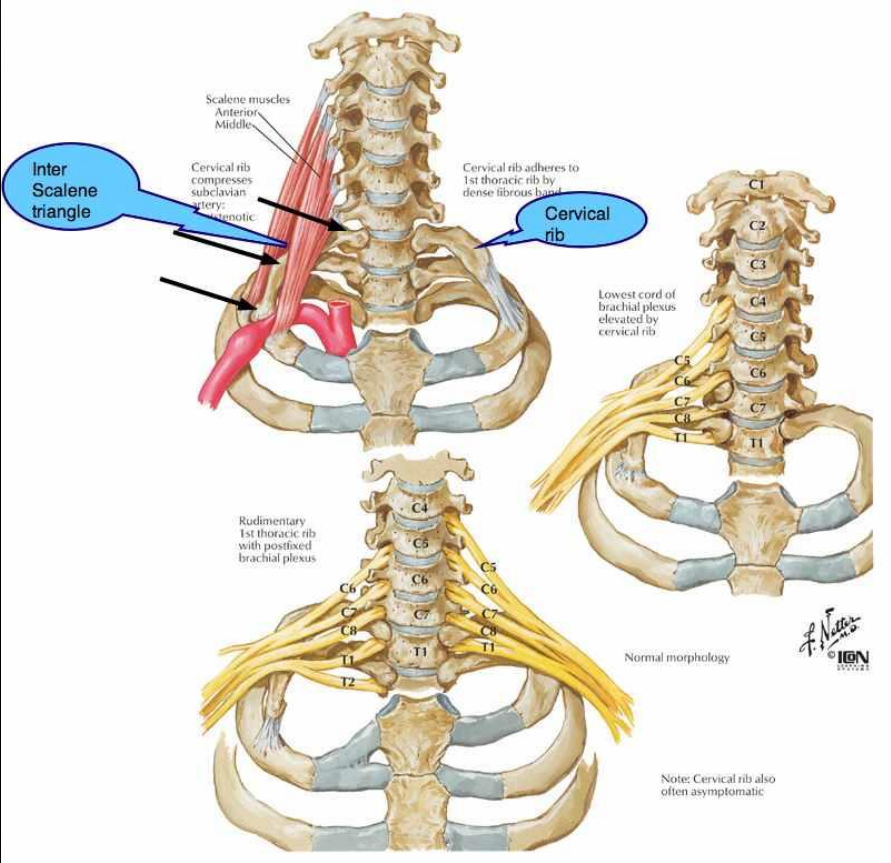


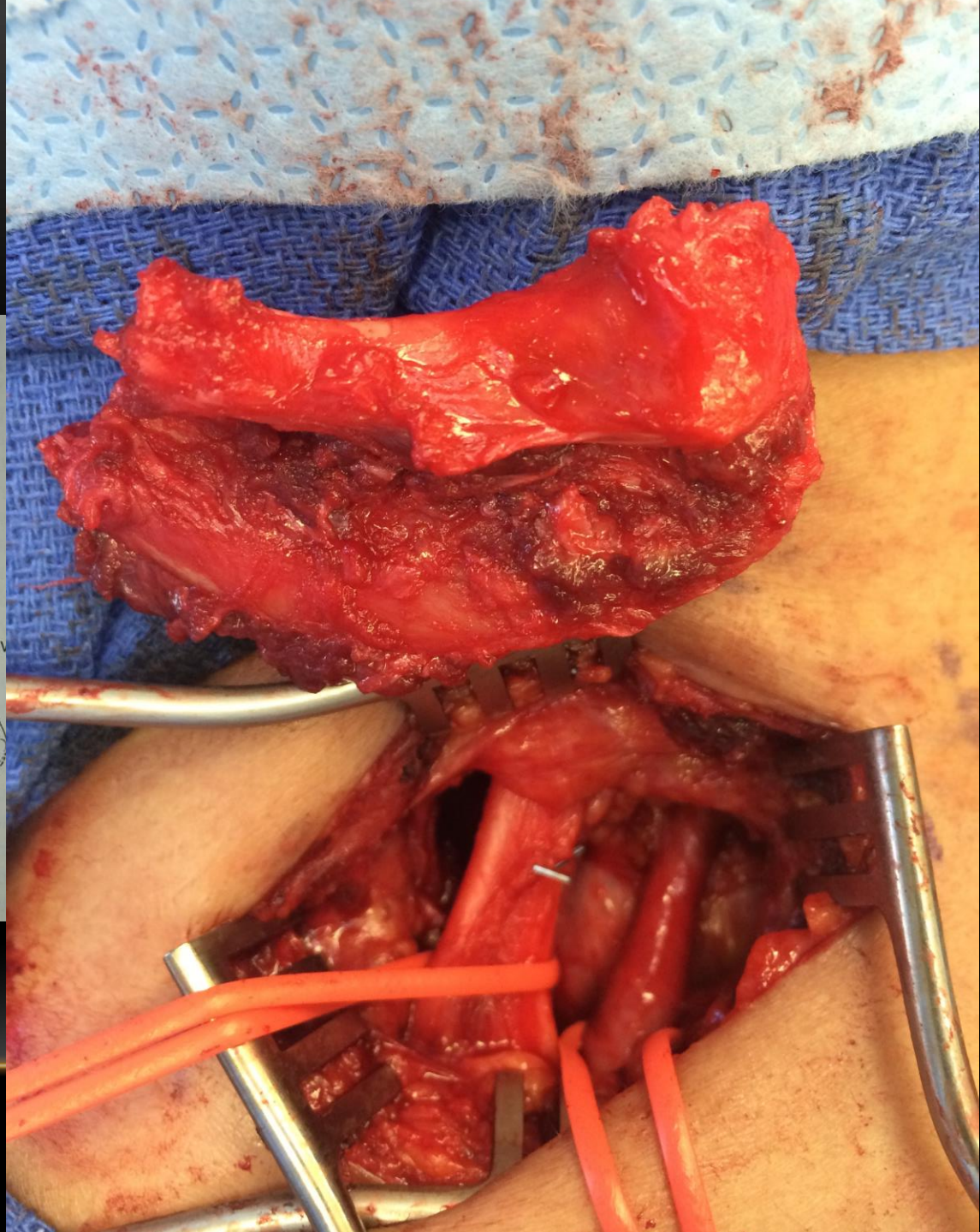
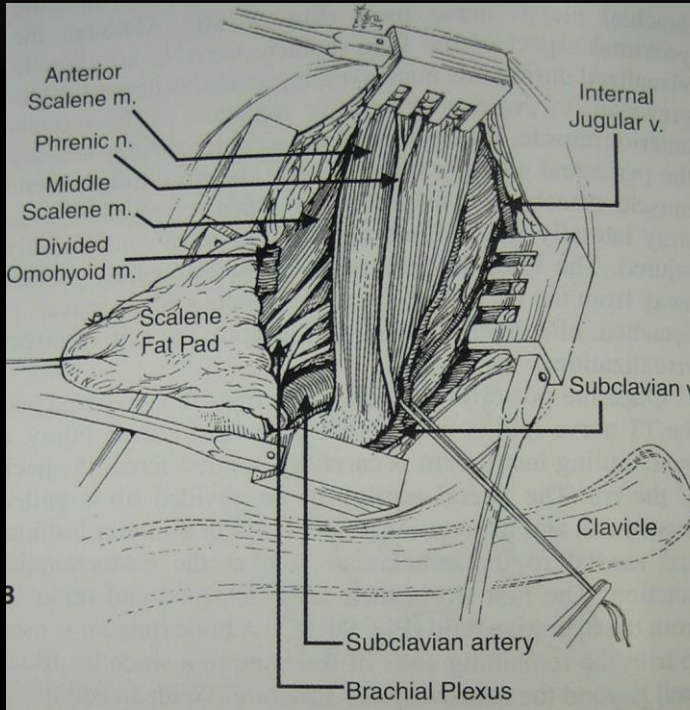
Nerves Through Muscle

Two nerves (C5 and C6) pass between parts of the anterior scalene muscle.



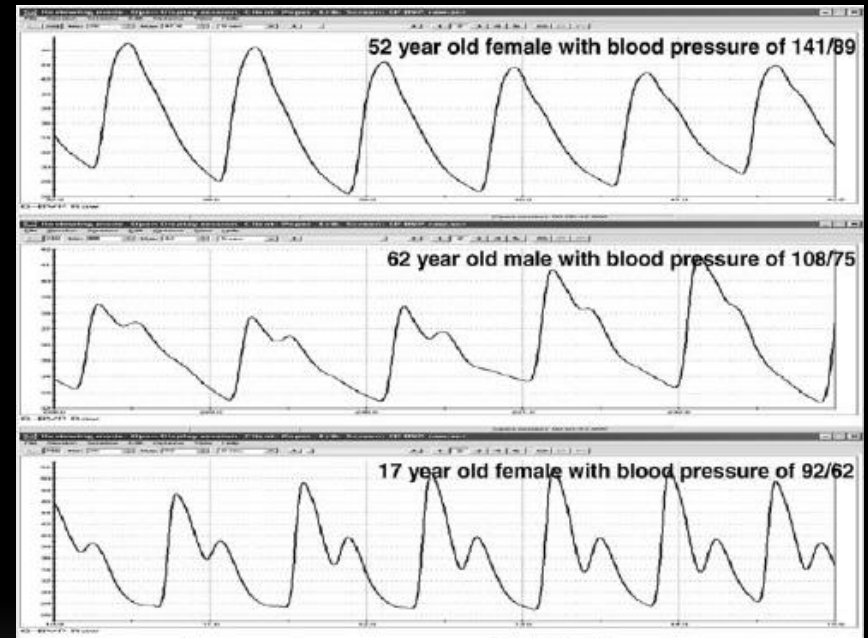






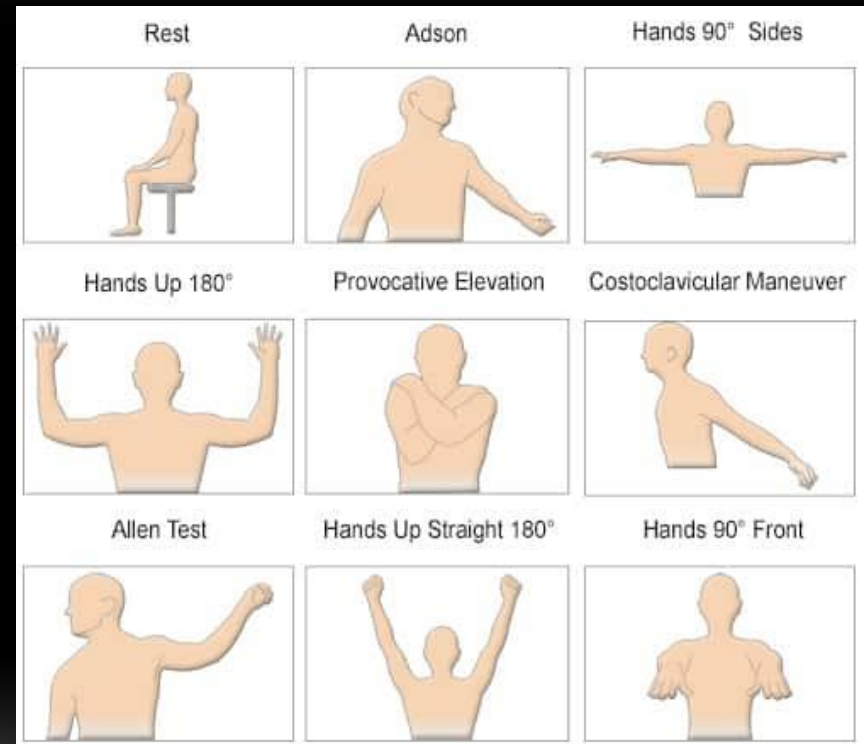
VASCULAR LAB DIAGNOSIS

- Notoriously difficult
- Physical exam helpful if reproduces symptom
- Begin with the “static” exam
- Duplex and/or PVR at rest
- Compare symptomatic to asymptomatic side



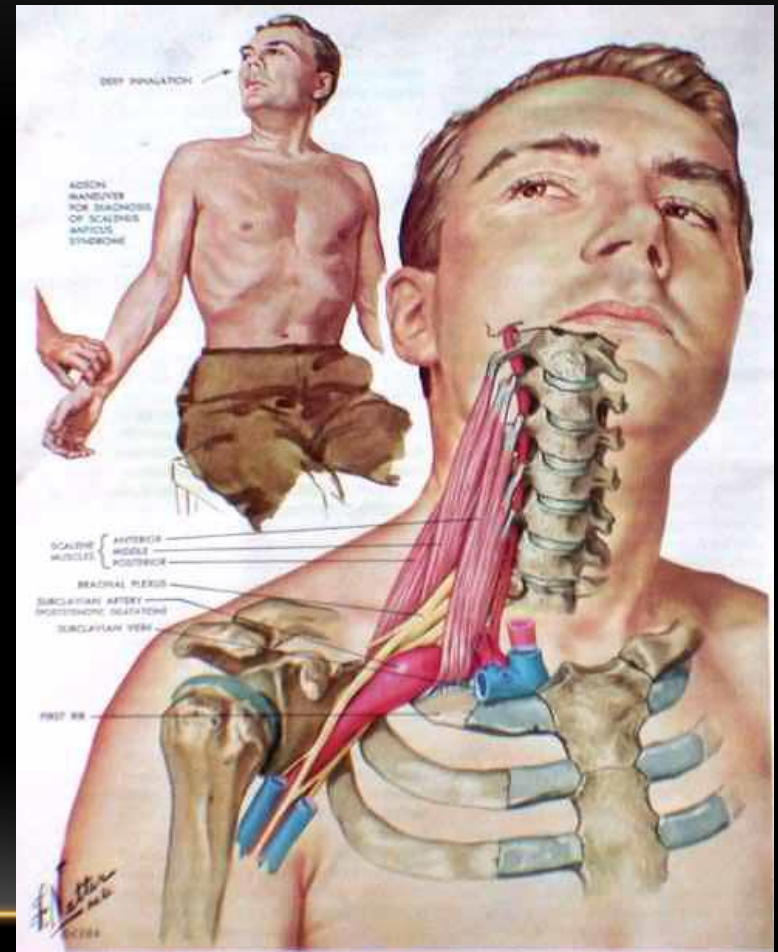
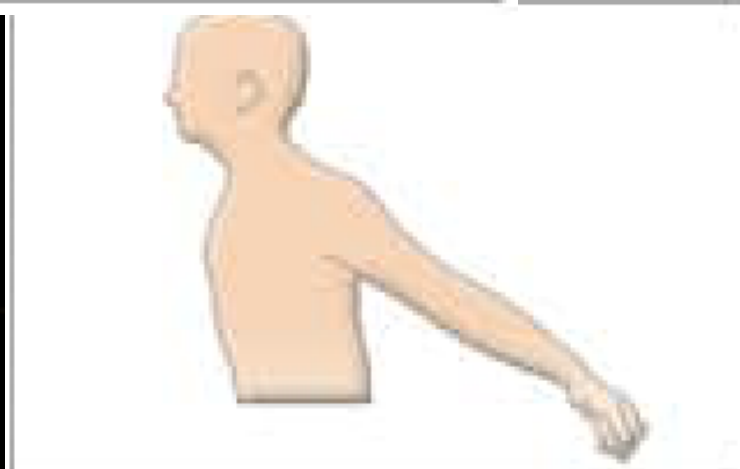
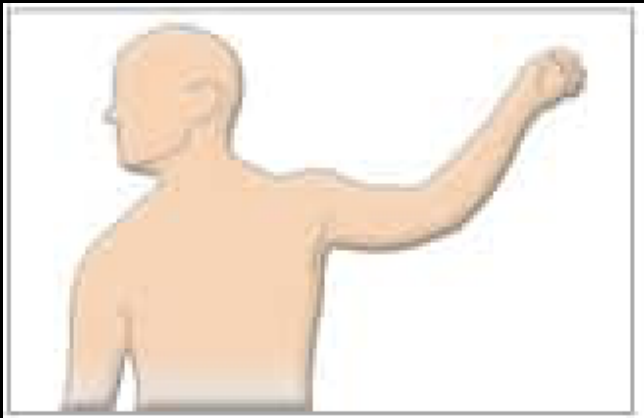
VASCULAR LAB DIAGNOSIS: DYNAMIC EXAM

- Provocative maneuvers
- Compare both sides with baseline (resting)
- Document correlation of subjective symptoms and arterial findings
 - Radial doppler (pencil easier than gated probe)
 - Digital waveforms



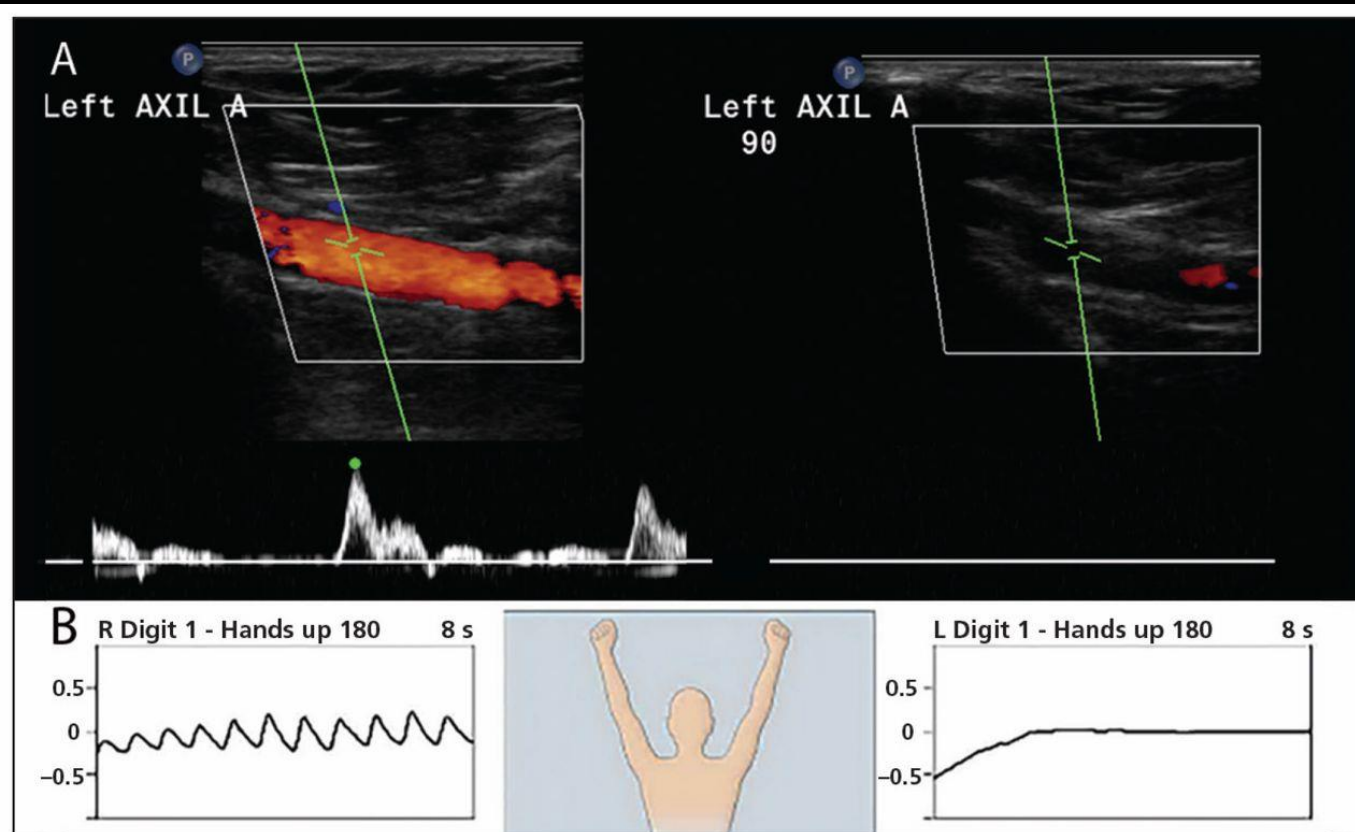
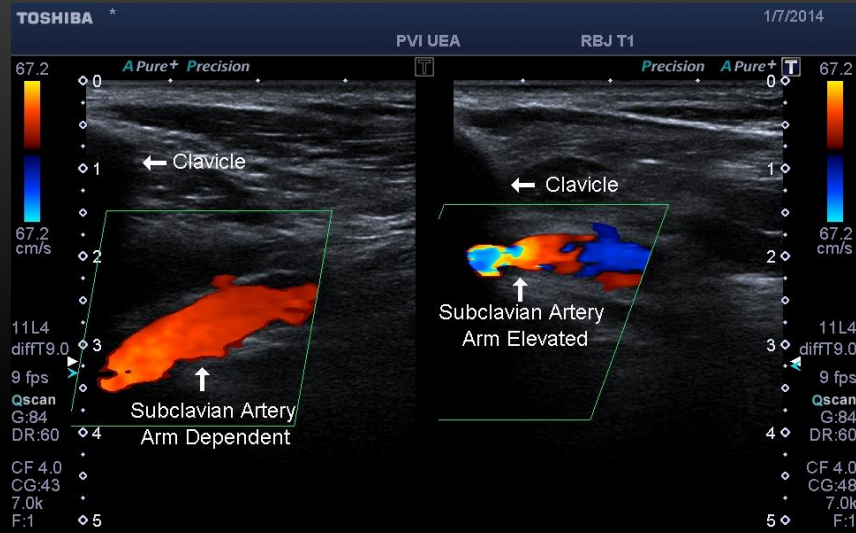
PROVOCATIVE MANEUVERS

- Adsons test
- Allens test



PROVOCATIVE MANEUVERS

- Don't forget to ask what position reproduces symptoms



Artery Compression



SUMMARY

- Understand the anatomy
- Venous
 - Document abnormal venous outflow
 - +/- Thrombus
- Arterial and Neurogenic
 - Group together
 - Compare both arms
 - Utilize provocative maneuvers
 - Try to reproduce symptoms

