Controversial Entrapment/compression Neuropathies

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Disclosures: None

Learning Objectives

- Critically evaluate the criteria for an entrapment neuropathy
- Understand the difficulties in defining specific controversial neuropathies
- Use this information to improve diagnosis and management of patients

The “controversials”

- Thoracic outlet syndrome
- Piriformis syndrome
- Radial tunnel/posterior interosseous neuropathy
- Anterior interosseous neuropathy
- Fibular tunnel peroneal/fibular nerve entrapment

Ideal criteria for the diagnosis of an entrapment/compression neuropathy

1. Clear symptoms (not just musculoskeletal pain) localizing damage to specific nerve
2. Neurological signs that localize damage to a specific nerve
3. Electrodiagnostic studies show/localize damage to a specific nerve
4. Imaging studies show compression/entrapment (in some cases)
5. Surgery confirms compression/entrapment (in some cases) and is curative (in some cases)

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- **Imaging studies often lacking or controversial**

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- **Surgical findings often unconvincing and unreliable**

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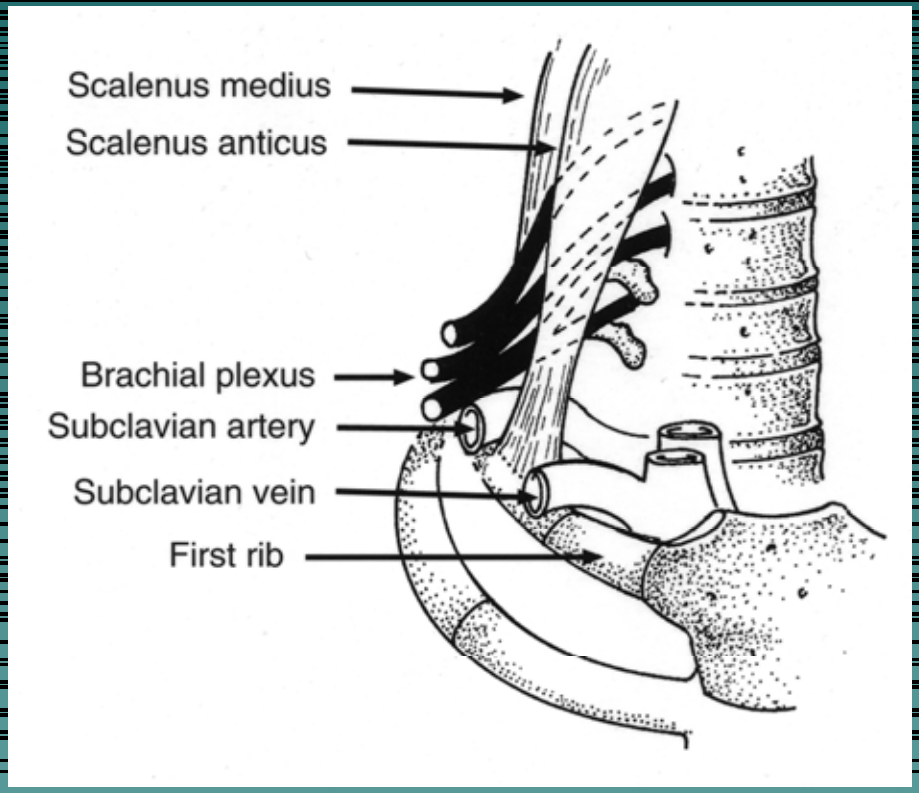
- Surgical findings often unconvincing and unreliable
- **Follow-up often inadequate, biased**

Thoracic outlet syndrome**s** (TOS's)



Thoracic outlet syndromes (TOS's)

"TOS is one of the most controversial clinical entities in medicine" Cochrane Collaboration 2010

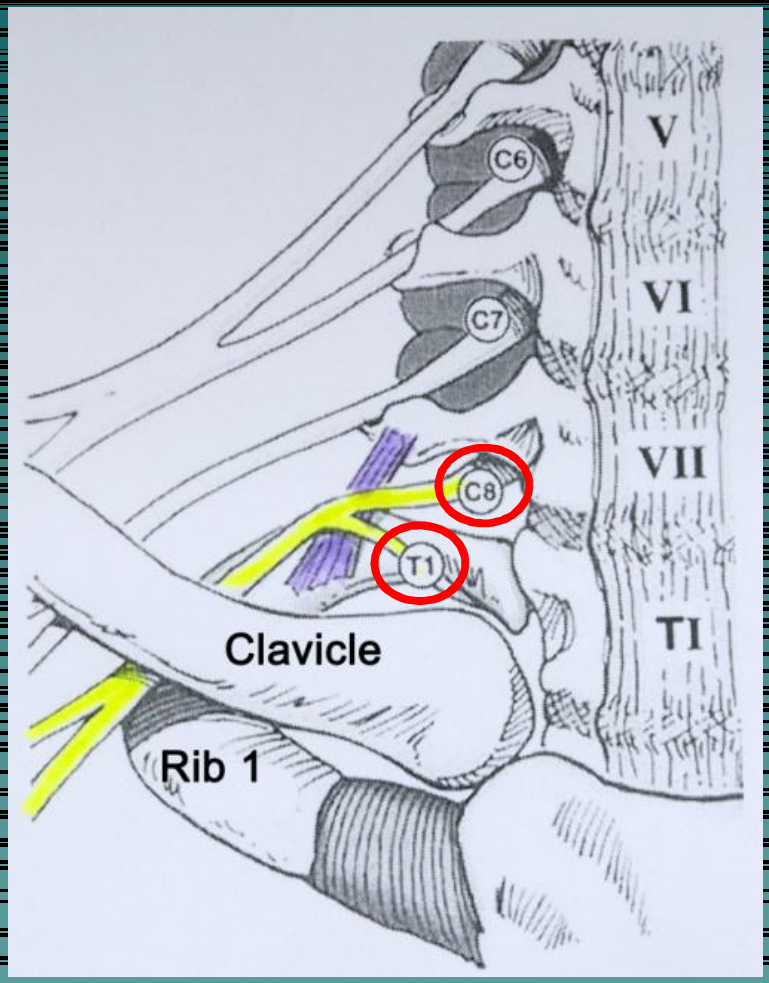
1. True neurologic TOS

2. Arterial TOS

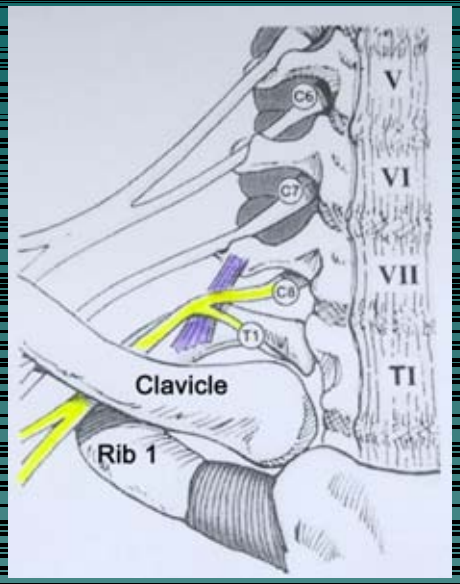
3. Venous TOS

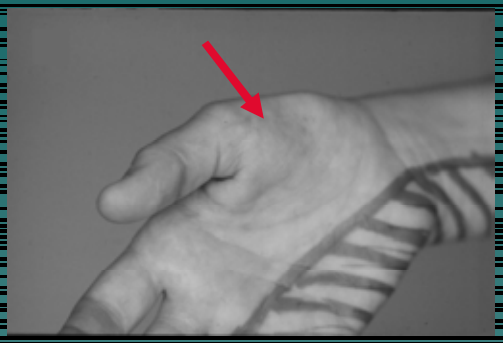
4. Nonspecific (disputed) TOS

True neurologic/neurogenic TOS



True neurologic/neurogenic TOS





- Lower trunk plexopathy
- Clear sensory symptoms & weakness
- Median >> ulnar hand muscle wasting/weakness
- C8, T1 sensory loss
- Specific electrodiagnostic criteria
- Imaging usually unhelpful
- Surgery required

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- Main symptom = aching pain in shoulder & down arm
- No agreement regarding other core symptoms
- Neurologic signs mild, uncertain or absent

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Main role of electrodiagnostics is to diagnose other common syndromes: CTS, ulnar neuropathy, cervical radiculopathy

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- Neurologic signs mild, uncertain or absent
- No substantiated electrodiagnostic abnormalities
- **Provocative tests**

Nonspecific (disputed) TOS

So-called clinical diagnostic or provocative tests

- Adson's maneuver & elevated arm stress test (EAST or Roos) ?ù pulse obliteration, blood flow changes &/or paresthesias

- All have high false positive rate in normal persons and ***are useless***

Nonspecific (disputed) TOS

- Main symptom = aching pain in shoulder & down arm
- No agreement re other core symptoms
- Neurologic signs mild, uncertain or absent
- No substantiated electrodiagnostic abnormalities
- Provocative tests – all of unproven validity
- **Vascular studies misleading; MRI studies inconclusive**
- **Diagnosis usually made by vascular surgeon, not a neurologist**

Nonspecific (disputed) TOS

Surgical results

Trans-axillary 1st rib resection

Complete relief 20-85%

Partial relief 7-60%

Complications 1-30%

Very worrying surgical outcomes!

Nonspecific (disputed) TOS

2 armies

The true believers

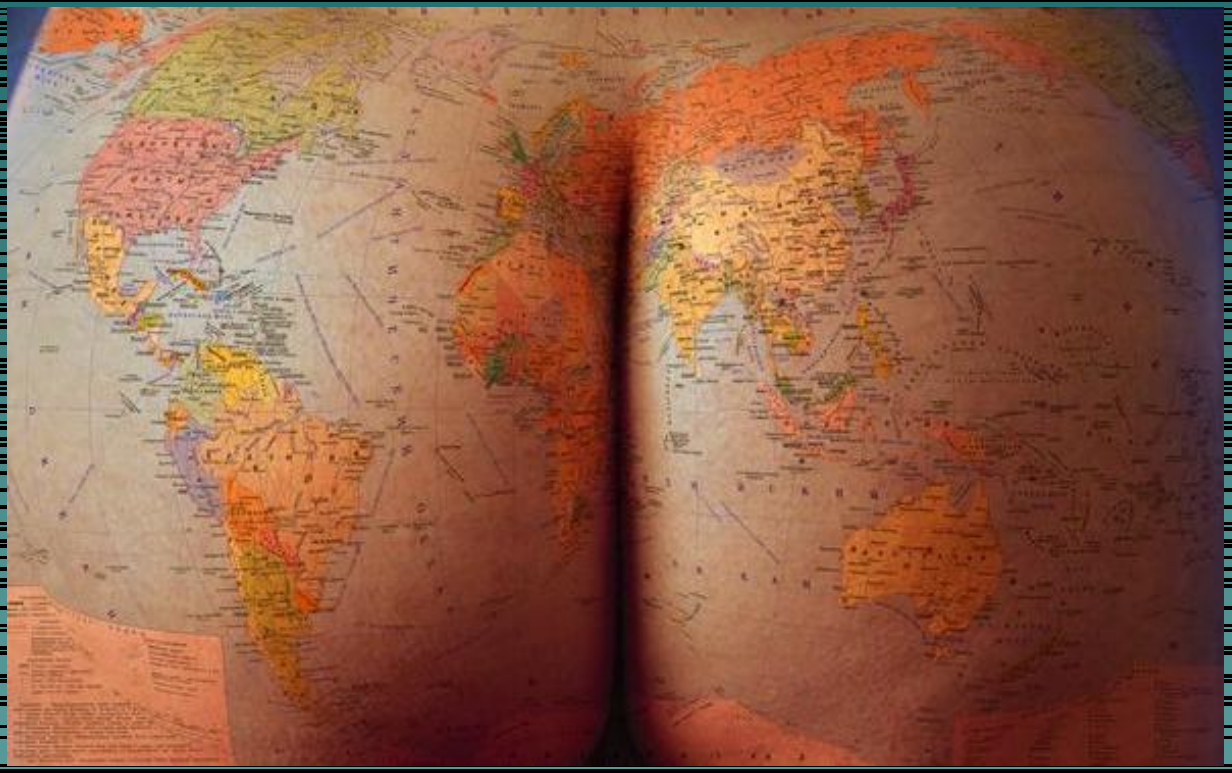
Usually surgeons (in USA) who believe the syndrome is common and responds well to surgery

The sceptics

Usually neurologists – who doubt the existence, doubt the efficacy of surgery & worry about surgical complications

"The objective diagnosis is…a challenge and generally accepted diagnostic criteria are lacking" (Cochrane Collaboration)

Piriformis syndrome (PS)



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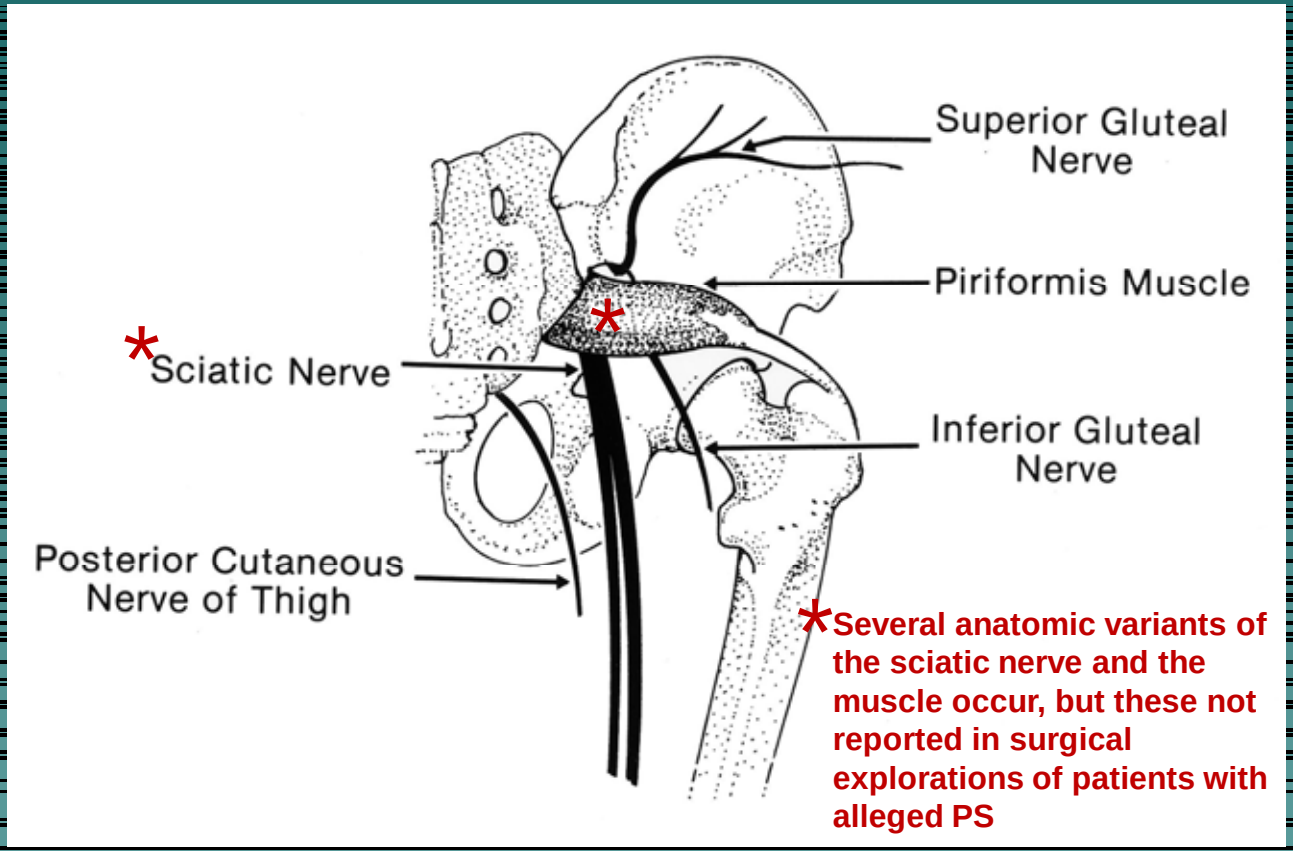

***Several anatomic variants of the sciatic nerve and the muscle occur, but these not reported in surgical explorations of patients with alleged PS**

Piriformis syndrome (PS)

4 different syndromes described in the literature
(analogous to the TOS's)

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1. **Proximal sciatic neuropathies**: Damage to the proximal sciatic nerve by various lesions in the vicinity of the piriformis muscle (PM), or by prolonged external pressure.

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3. **Posttraumatic PS**: Damage of the sciatic nerve by the PM and adjacent tissues from posttraumatic scarring.

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2. Neurogenic PS: Compression and damage of the proximal sciatic nerve by the PM.
3. Posttraumatic PS: Damage of the sciatic nerve by the PM and adjacent tissues from posttraumatic scarring.
4. **Nonspecific PS**: Cause unclear; possible compression of (but no damage to) the sciatic nerve by the PM.

1 – 3 = proximal sciatic neuropathies

4 = controversial entity

Nonspecific Piriformis syndrome (PS)

- No consensus re. defining characteristic symptoms
- More likely to be LS radiculopathies, musculoskeletal back, hip and SI joint pain
- Many early descriptions are from pre-imaging era so can be ignored
- Exam: some say neuro deficits are present (always subtle and unconvincing) others insist on NO deficits. Neuro exams often inadequate
- Heavy reliance on unvalidated provocative "signs" (Freiberg, Pace, Beatty, FAIR (leg flexed, adducted, internally rotated)
- Electrodiagnostic criteria (notably H reflex latencies during FAIR) dubious
- MR neurography – Filler et al: Needs validation; controversial
- Surgical results inconsistent - Filler et al: Need validation

....and more....

- Relief by local injections (local anesthetic + steroids): seems to work sometimes. But this may also help radiculopathies!
- Relief by botulinum toxin: Literature is moderately impressive in terms of improving symptoms in a nonspecific “pain-in-the-bum” syndrome
- This taken as support of piriformis muscle “spasm” and compression/irritation of the sciatic nerve. But how does botulinum toxin work in migraine?

My conclusions re PS

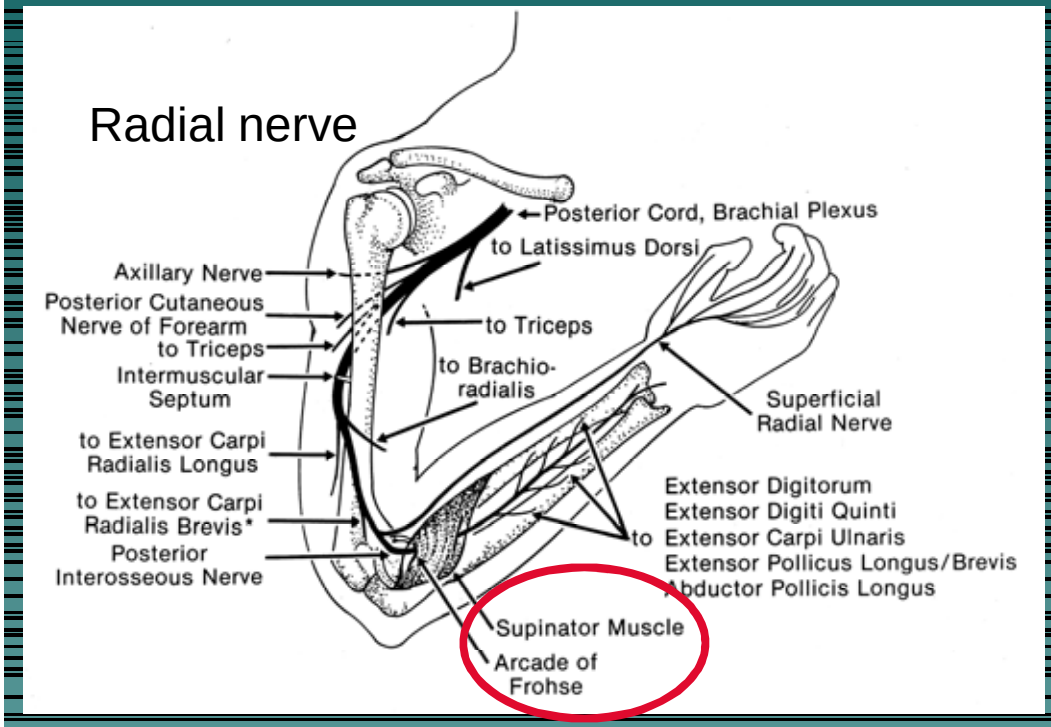
- Like you, I have these patients and have done every electrodiagnostic and imaging studies I can think of without being able to diagnose a compressive/entrapment neuropathy

- It is reasonable to try local anesthetic/steroid or botulinum toxin injections into piriformis area for symptomatic relief

- But I don't know what I'm treating! The "non-specific piriformis syndrome"?

- I've never referred for surgical exploration

Posterior interosseous neuropathy (PIN)



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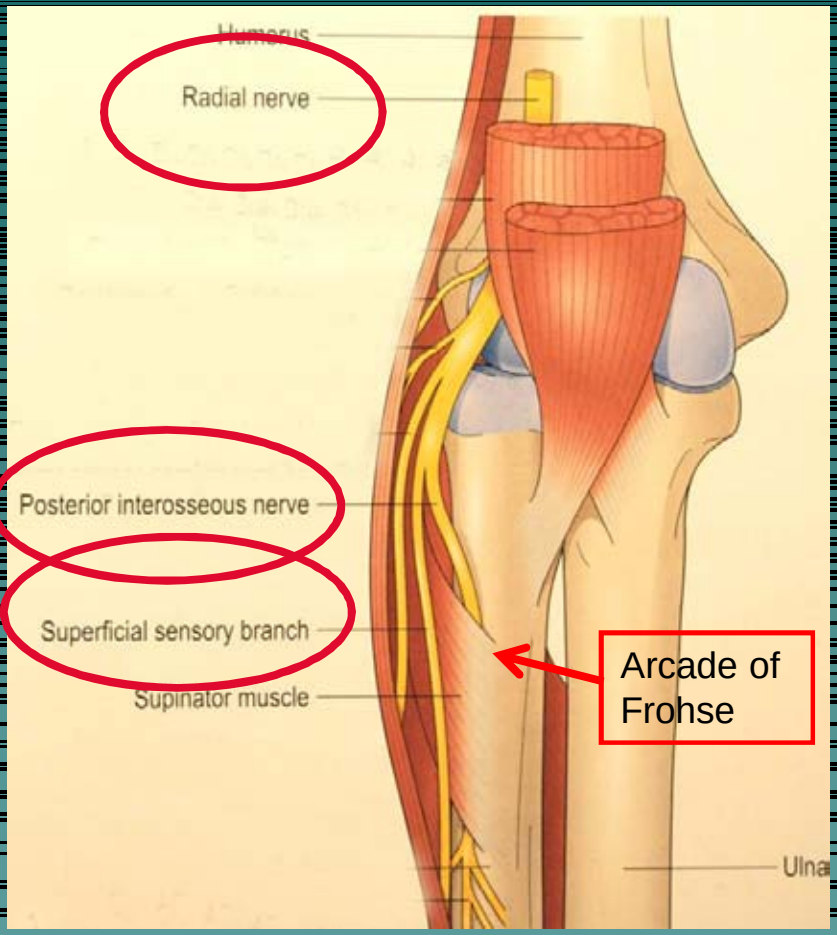
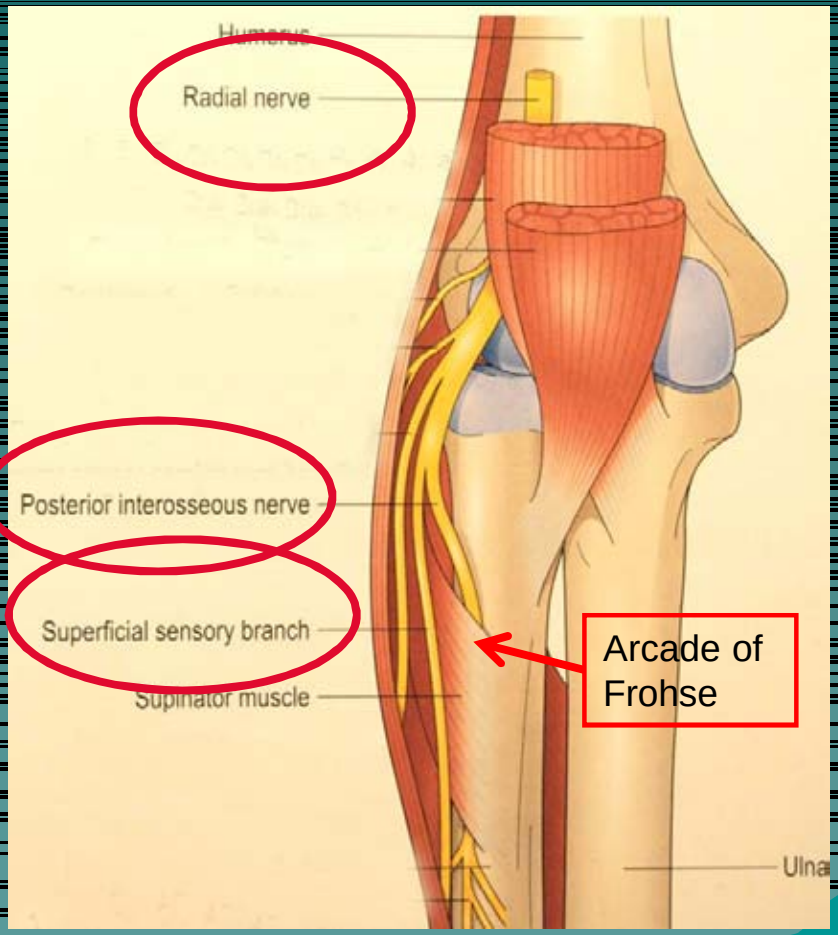


From….

Posterior interosseous neuropathy (PIN)

PIN ?x finger drop without wrist drop, no sensory loss



PINs

- Chronic
- Old thinking: Caused by compression & entrapment in Arcade of Frohse area by several different abnormal structures - so surgical
- New thinking: Look carefully (image) for mass lesions (eg ganglia)

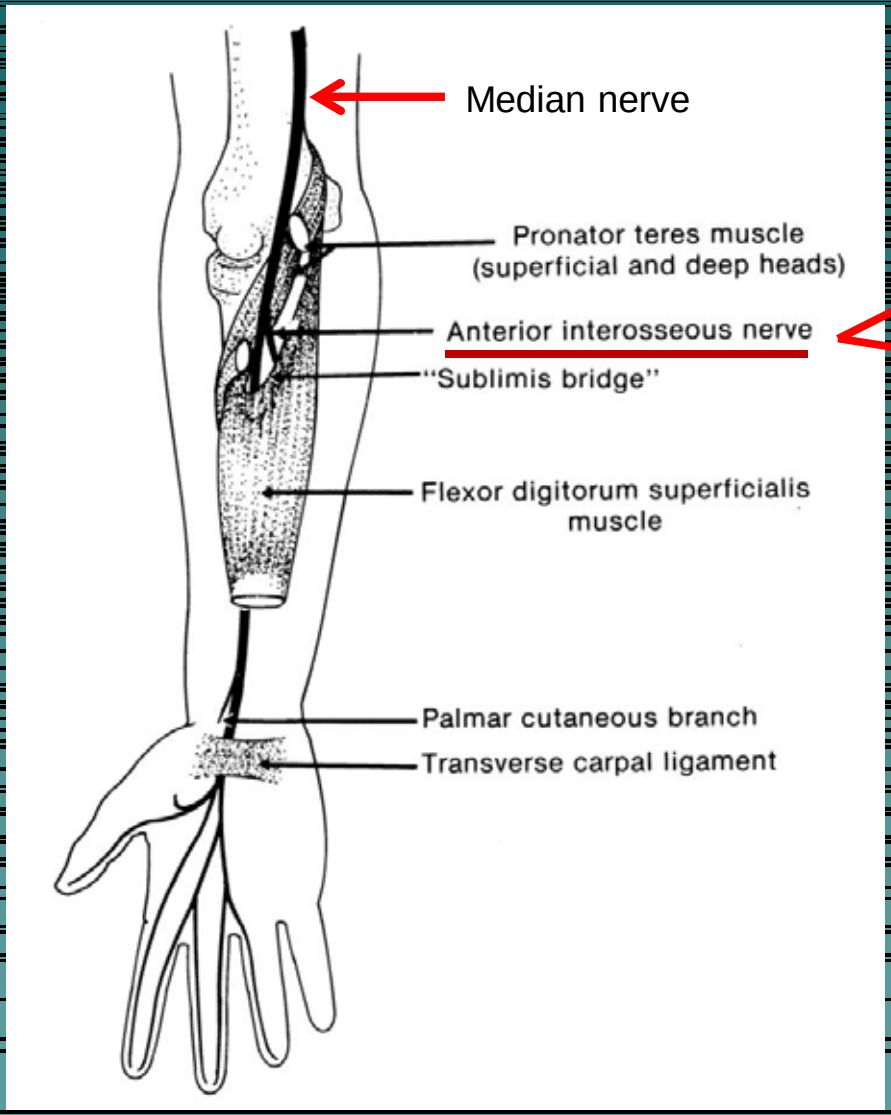
  If none - Multifocal motor conduction block neuropathy*

- Acute/subacute

  Variant of acute brachial plexus neuropathy?*

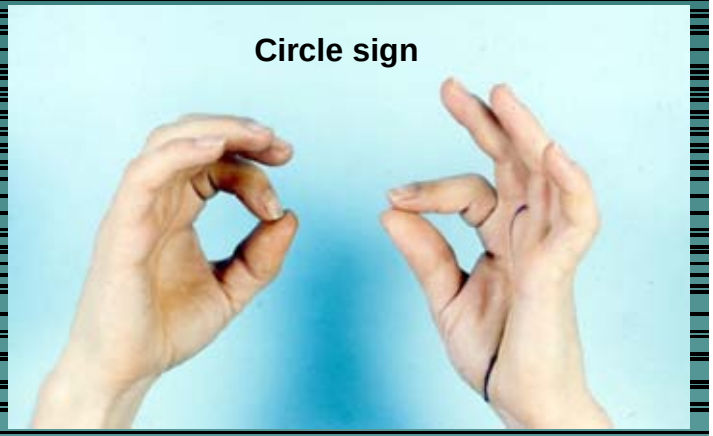
* So no surgery

Anterior interosseous nerve syndrome



Flexor pollicis longus

Flexor dig profundus digit 2



Anterior interosseous nerve syndrome

Compression/entrapment

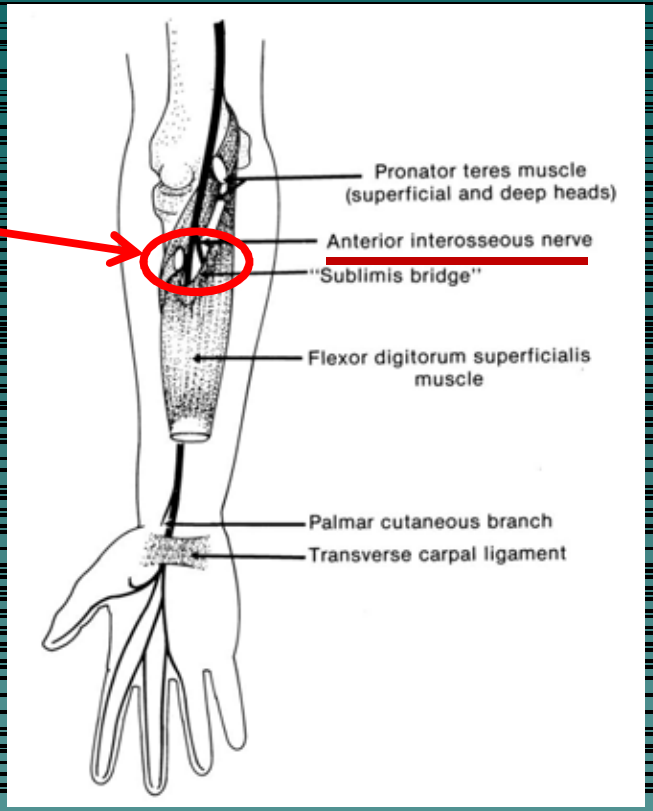
Chronic - occurs rarely.

Surgical decompression has been advocated

Often subacute and painful

Acute entrapment?

Surgical decompression has been advocated.



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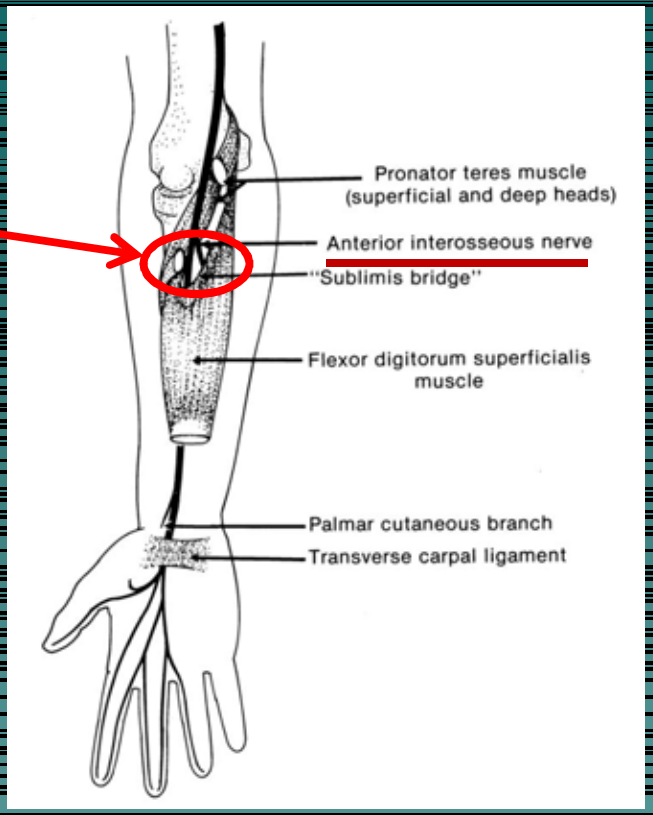
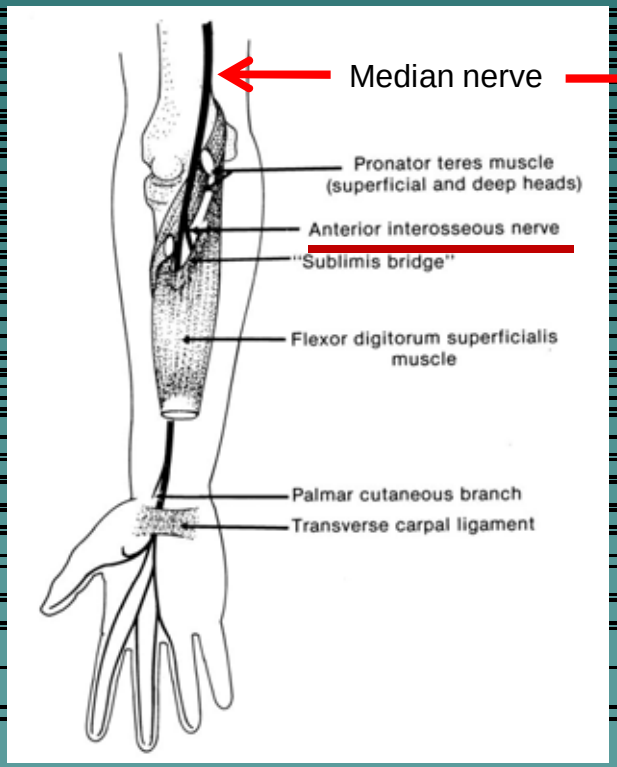
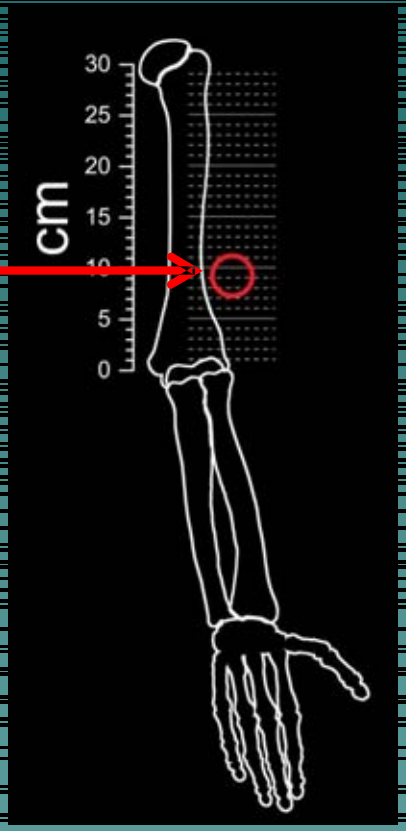


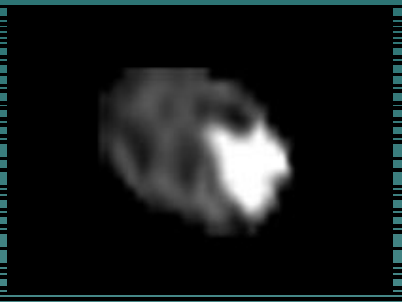
Pham, M et al. University of Heidelberg –in press

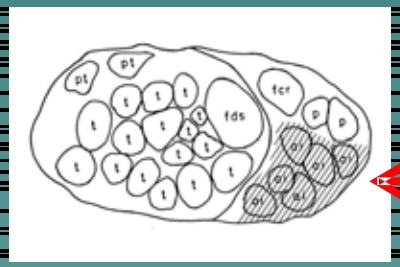
High resolution MR neurography:

Patients with acute AINs



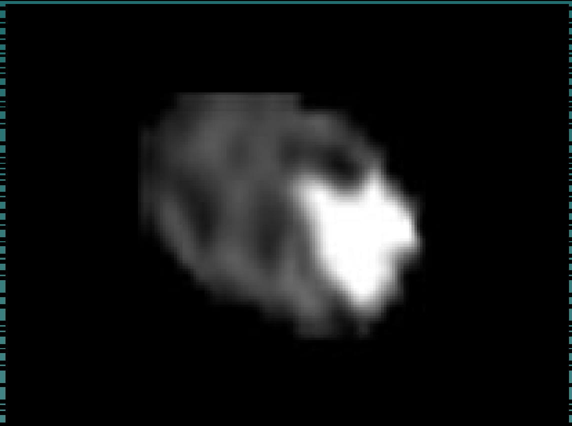


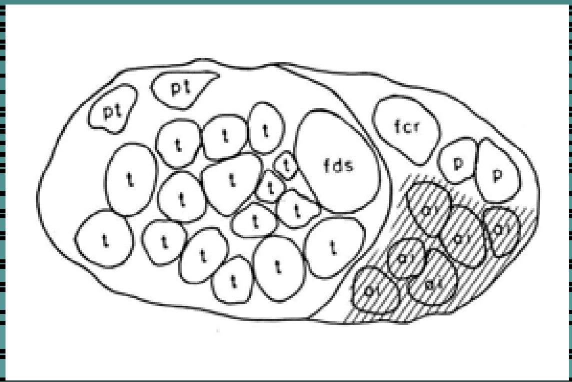




Fascicles to AIN

Anterior interosseous nerve syndrome



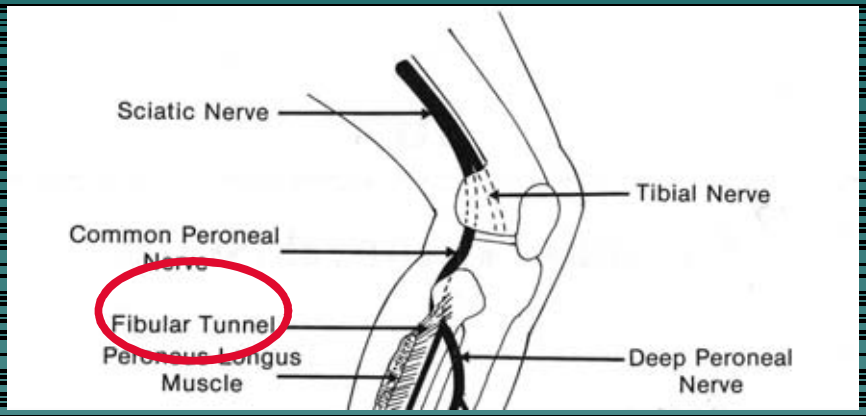


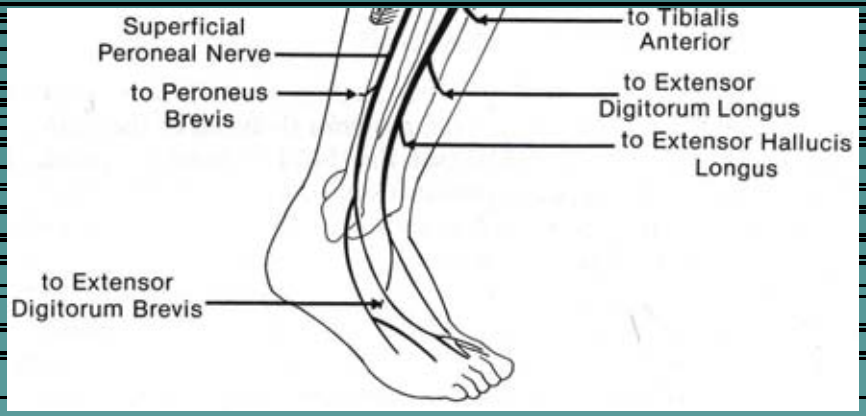
Ains are often subacute and painful

These are presumed inflammatory lesions of the **fascicles** of the AIN in the main trunk of the median nerve as seen on MRI – so likely a variant of acute brachial plexus neuropathy (Parsonage Turner syndrome) (Pham et al 2013)

Almost never an entrapment that requires surgery

Fibular tunnel syndrome



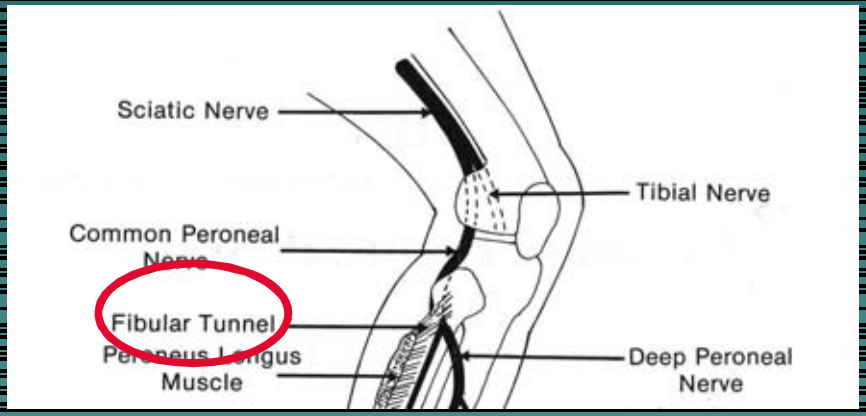


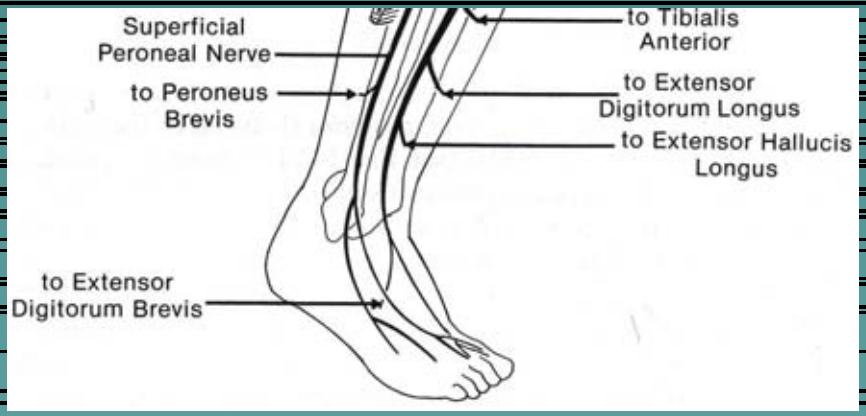
- Many causes peroneal/fibular neuropathy including external compression
- Is there true entrapment within fibular tunnel?

- Slowly progressive peroneal neuropathy
- No cause: no trauma, no leg crossing
- MRI normal
- Surgery: “Tight fibular tunnel – nerve constricted”

- Slowly progressive peroneal neuropathy
- No cause: no trauma, no leg crossing
- MRI normal
- Surgery: “Tight fibular tunnel – nerve constricted”
- Slow but definite improvement ?:

Fibular tunnel syndrome: Conclusion





- A few convincing case reports
- My strategy: If no compressive cause found, if imaging studies are normal, and neuropathy progressive ?Ê surgical decompression at the tunnel

Summary

The important question: Are these entrapments/compressions and should surgery be done?

Common features of “controversials”:

- Pain >> true sensory aberrations >> motor deficits
- Rigorous neuro history/exam often lacking in descriptions
- Diagnosis often based on unvalidated signs
- Electrodiagnostic studies often lacking, inadequate, controversial
- Surgical findings often unconvincing
- Follow-up often inadequate, biased

Be sceptical!

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References

email for a comprehensive list

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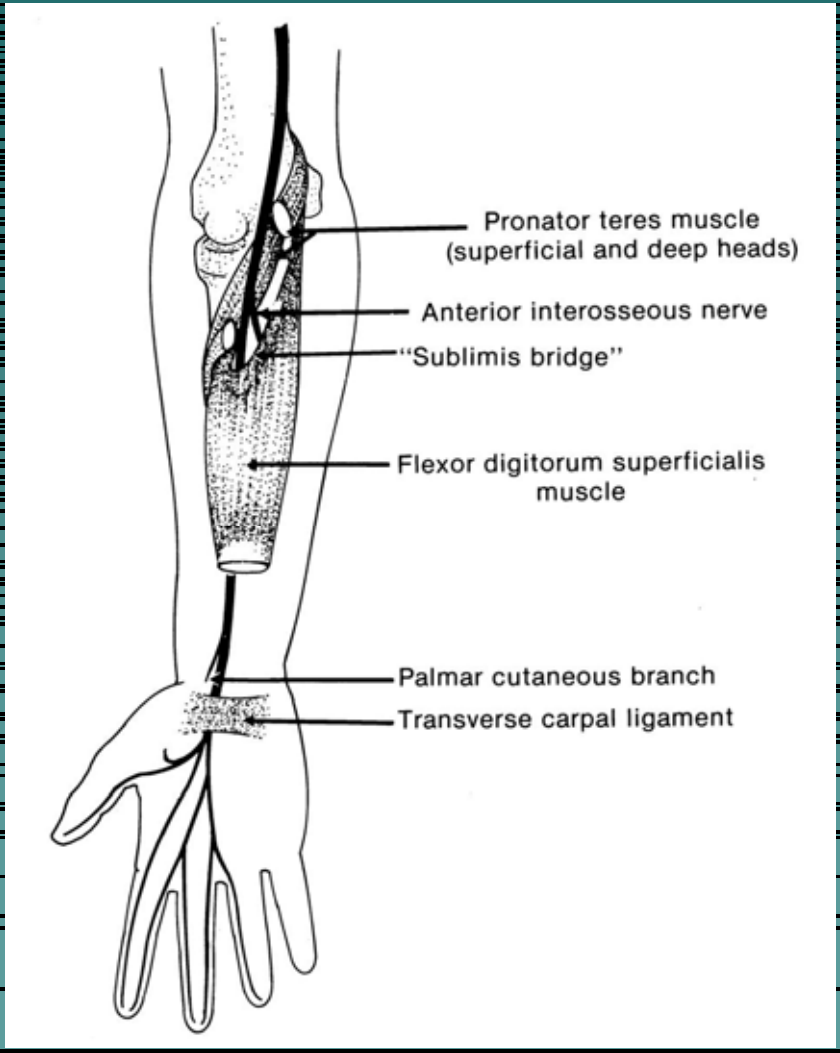
Pronator teres syndrome



3 definitions:

1. Any median neuropathy in region of elbow
2. "True neurogenic" pronator teres syndrome
3. "Nonspecific" pronator teres syndrome

True neurogenic pronator teres syndrome

- Very few descriptions of true entrapment in pronator muscle
- Is this a real entity?

"Nonspecific" pronator teres syndrome

- Many reports. Pain, cramping in forearm, no neuro symptoms & signs
- Electrodiagnostic studies: Unconvincing
- Operative findings – many abnormalities in PT muscle area, but all found in cadaver studies. Surgery ? unconvincing results
- Conservative measures: rest seems effective
- Not an entrapment neuropathy: Is this a *forearm compartment syndrome*?