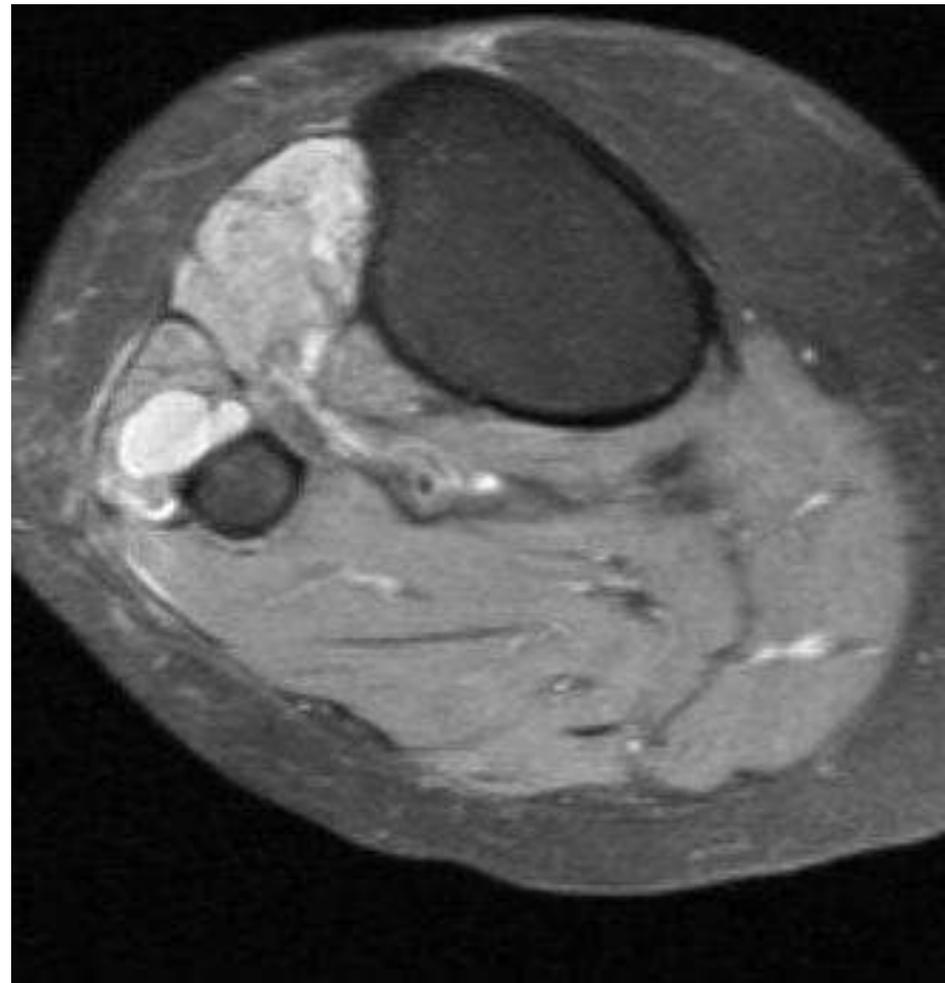


Nerve Entrapment Syndromes



Nerve entrapment syndromes

Introduction

- Chronic entrapment
- Commonly as the nerve passes through an osseoligamentous tunnel, or between aponeurotic edges
- One side fixed, one moves -> friction
- May see mass pressing on nerve
- Secondary changes in muscles of nerve distribution
- Inflamed or thickened nerve

Nerve entrapment syndromes

History

- Initially described by:
 - Astley Cooper 1820
 - James Paget 1850
- First surgical decompression
 - Learmonth 1930
- Common types
 - Carpal tunnel syndrome
 - Ulnar nerve at the elbow
 - Guyon's canal
 - Suprascapular syndrome

Nerve entrapment syndromes

Pathology

- Chronic blunt injury -> ischemic changes
 - Edema
 - Dislocation of the nodes of Ranvier
 - Structural changes to myelin sheath and axon
 - Focal segmental demyelination is constant
 - Complete recovery is due to remyelination
- Incomplete recovery due to Wallerian degeneration

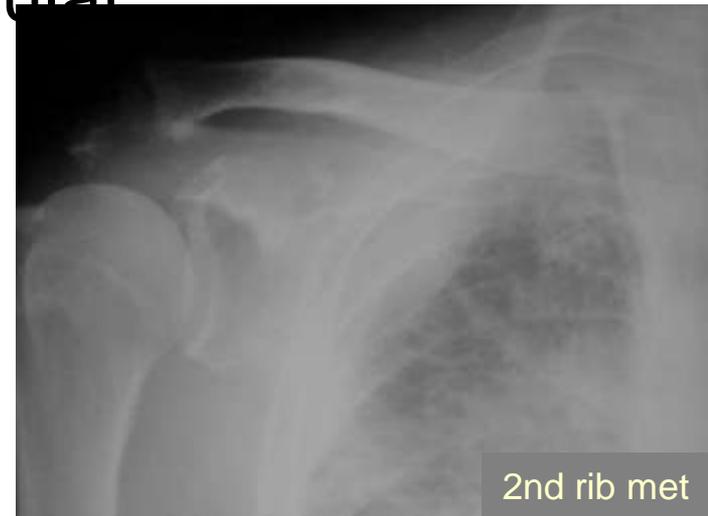
Nerve entrapment syndromes

Clinical

- Depends on nerve involved
- Irritative sensory symptoms
 - Pain and paresthesias
- Ablative sensory symptoms
 - Numbness
- Ablative motor signs
 - Weakness and atrophy
- If mixed nerve – sympathetic dystrophy
 - Dry, thin, hairless skin
- Most peripheral entrapped nerves Sens. and Motor
 - Except – deep ulnar (motor), Lateral femoral cutaneous (sensory)

Neurologic Thoracic Outlet Syndrome

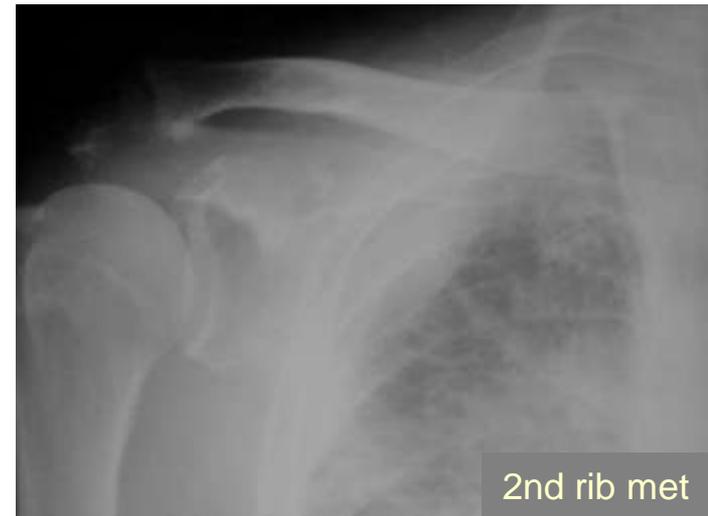
- Brachial plexus compression
 - True (Classic)
 - Congenital band or Cx rib - rare
 - Nonspecific
 - Compression or traction in cervicoaxillary canal
- Can have combined neurovascular
 - Usually traumatic



2nd rib met

Neurologic Thoracic Outlet Syndrome

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2nd rib met

Neurologic Thoracic Outlet Syndrome

- F:M 3.5:1
- Sensory symptoms > motor
 - Motor intrinsic hand muscle atrophy
- Principally arm pain, may be chest
 - Exacerbated by abduction



Neurologic Thoracic Outlet Syndrome

Radiology

- Bony abnormalities
 - Cx rib
 - Elongated C7 transverse process
 - Pancoast tumor
 - Arteriography – aneurysm
 - MRI – Cord lesion
 - Radiculopathy
 - Plexus distortion

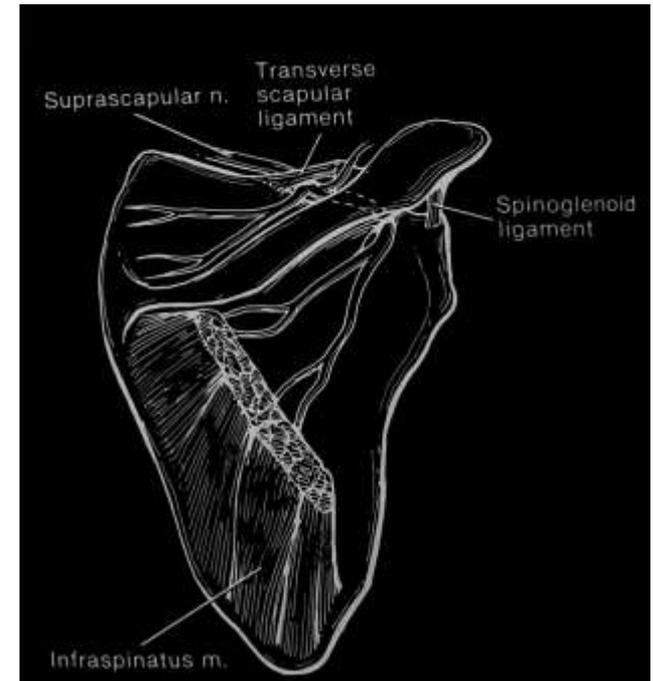
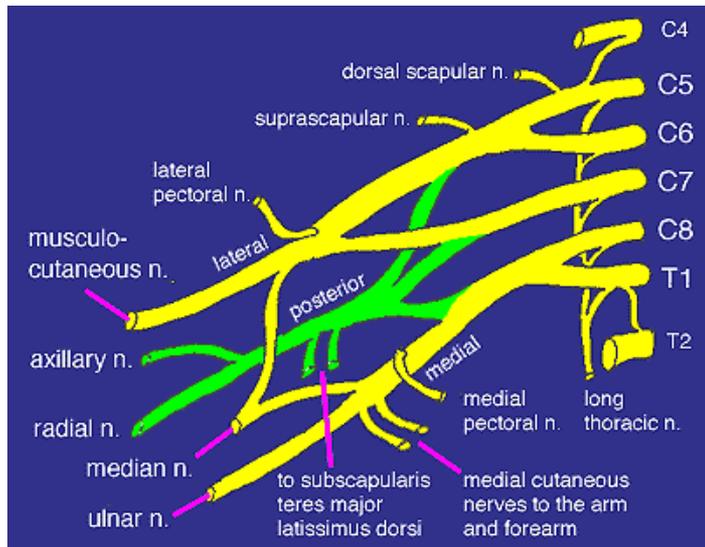


Large R C7 transverse process

Entrapment syndromes

Suprascapular nerve

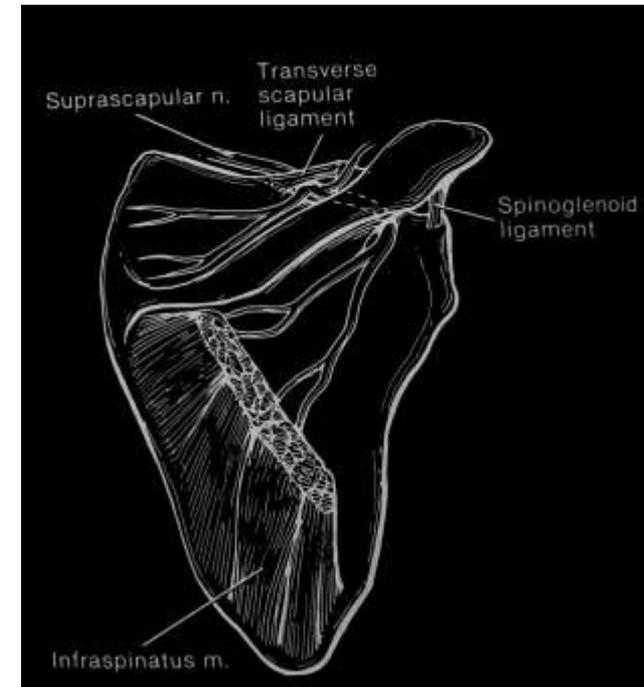
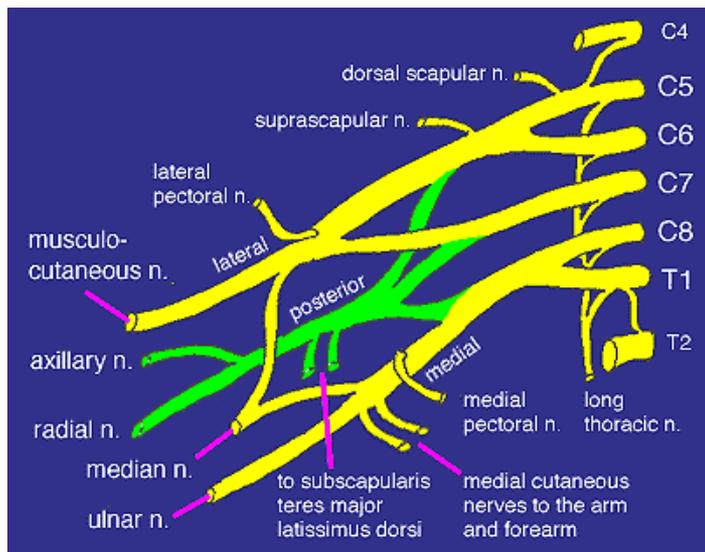
- Upper limb athletes
- Deep dull aching pain – sensory fibers to joint
- Weakness Abd and ER
- Hollow infraspinatus fossae



Entrapment syndromes

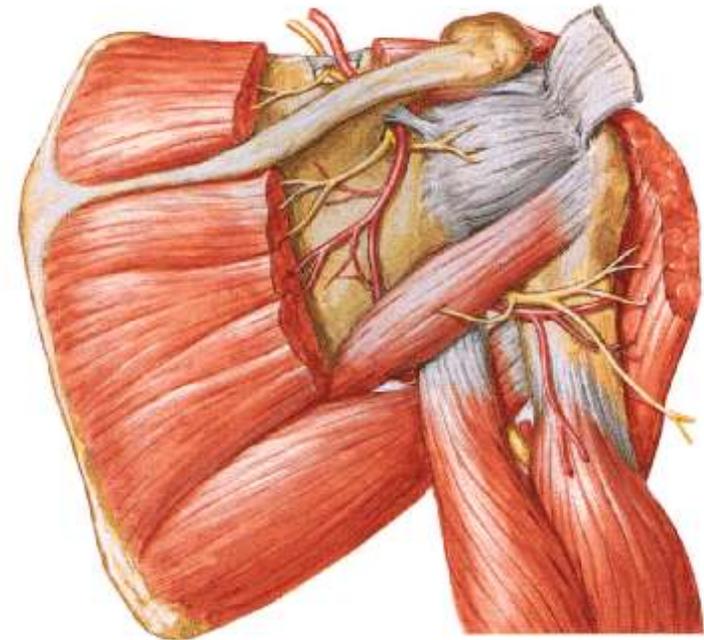
Suprascapular nerve

- C5-6 roots, arises off superior trunk
- Supplies supra and infraspinatus
- Compressed in
 - Suprascapular notch - Supra and Infra
 - Spinoglenoid notch – Infra only



Suprascapular notch ganglion

- Suprascapular nerve entrapment relating to a ganglion cyst
- Commonly superior labral tear
- Affects supra and infraspinatus



Entrapment neuropathy

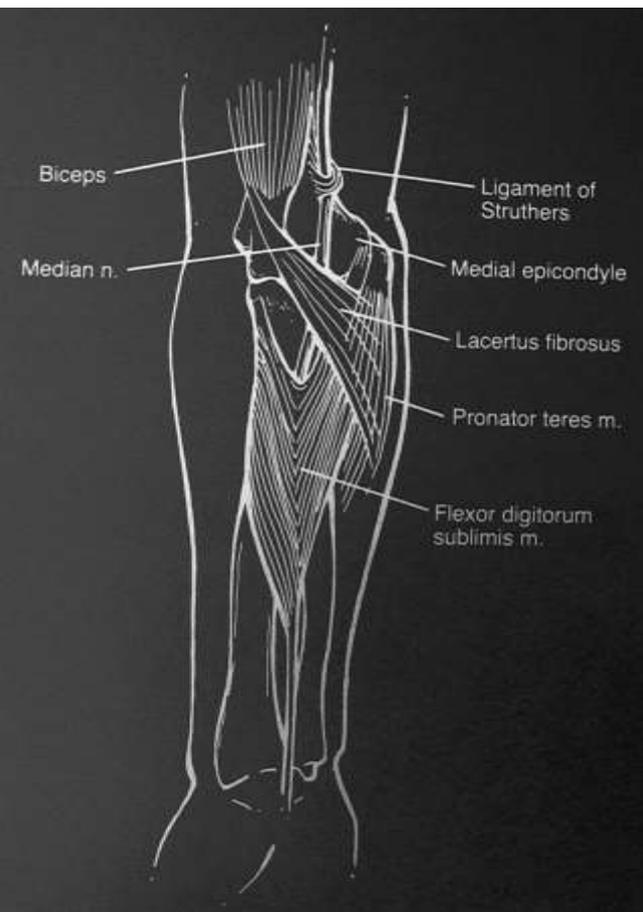
Median Nerve

- C5-T1
 - Ligament of Struthers
 - Lacertus fibrosus
 - Pronator Syndrome
 - Between heads of pronator teres
 - Anterior Interosseous Syndrome
 - Within forearm
 - Carpal Tunnel Syndrome

Entrapment neuropathy - Median Nerve

Ligament of Struthers

- Supracondyloid foramen present in 1%



Entrapment neuropathy - Median Nerve

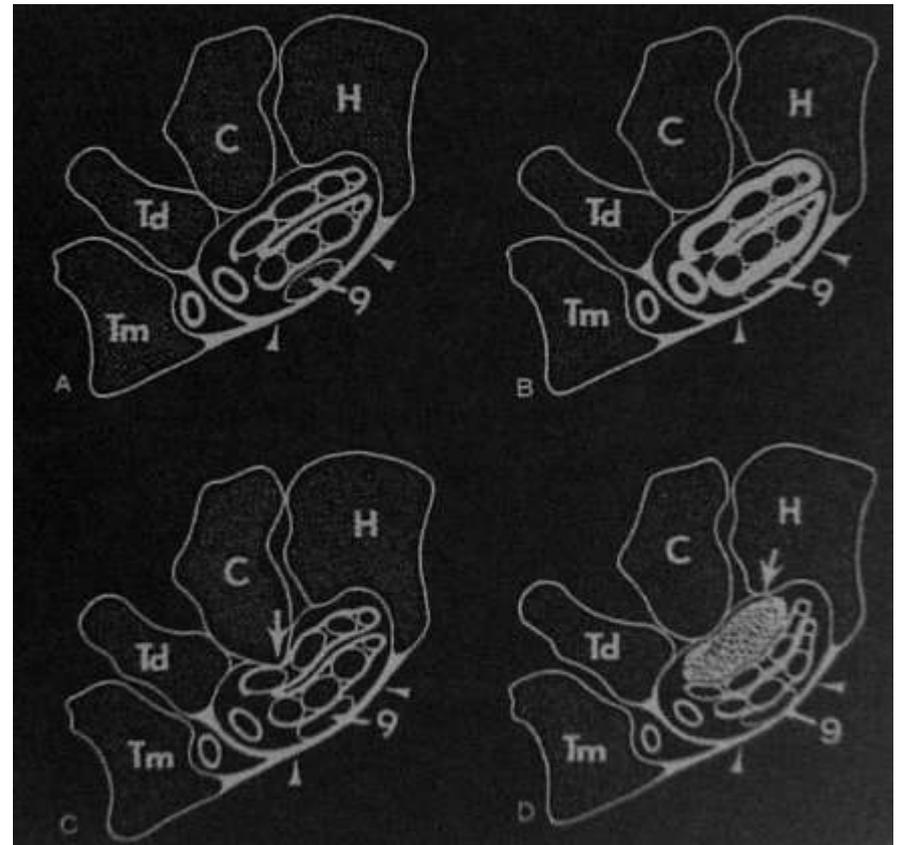
Carpal Tunnel Syndrome

- Dull ache at wrist extending up to elbow
- Worse at night
- Paresthesia median finger and thumb
- AbPB weak, OPB later, FPB spared
- Phalen sign – Worse on forced flexion
- Tinel sign – Paresthesia on tapping



Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

- Tenosynovitis
- Osseous spur
- Mass



Entrapment neuropathy - Median Nerve

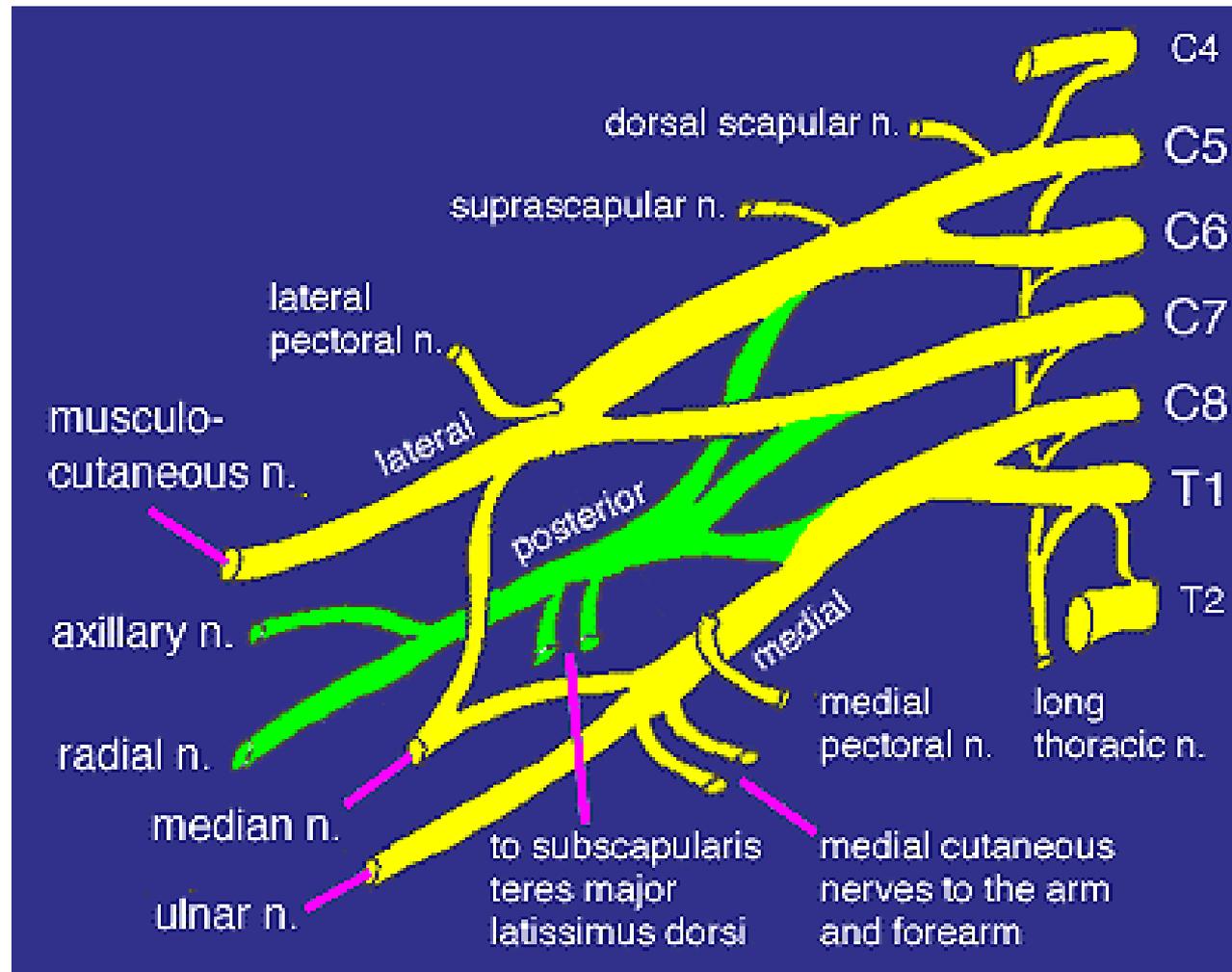
Carpal Tunnel Syndrome - MRI

- Increased signal intensity of median nerve
- Swelling of median nerve proximally
- Flattening of median nerve distally
- Bowing of flexor retinaculum

Entrapment neuropathy

Ulnar Nerve – Sites of Compression

- C7-T1



Entrapment neuropathy

Ulnar Nerve – Sites of Compression

- 1st rib
 - Klumpke
- Axilla
 - Crutches
- Humerus
 - Arcade of Struthers, 70% of pop.
 - Medial triceps to medial intermuscular septum
 - Medial intermuscular septum – following anterior transposition
- Elbow
 - Cubital tunnel syndrome
 - FCU aponeurosis of Osborne
- Forearm
 - Aponeurosis between FDS and FDP
- Hand
 - Guyons canal
 - Ulnar tunnel syndrome

Entrapment neuropathy

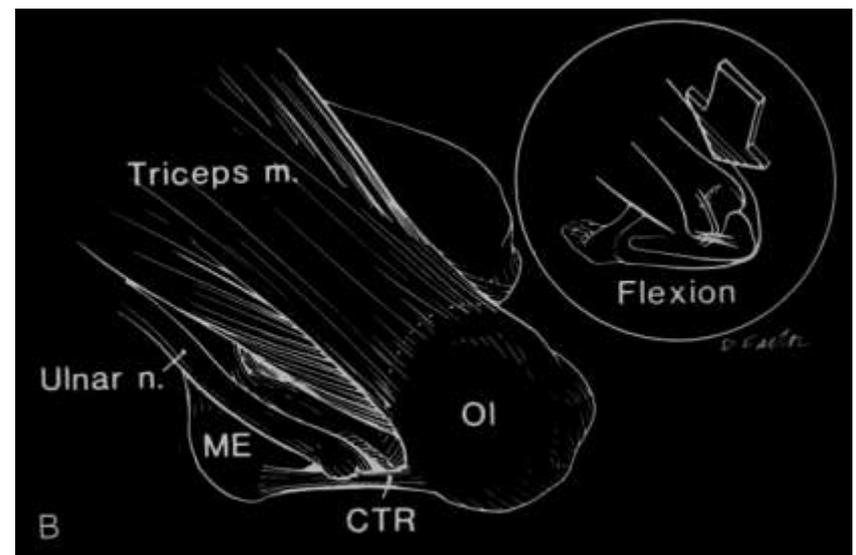
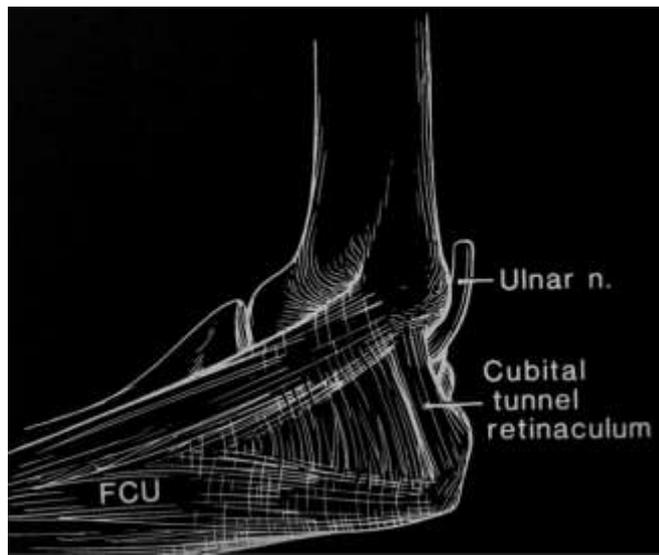
Ulnar Nerve - Anatomy

- Upper arm, Medial side of brachial artery
- Pierces intermuscular septum mid arm
- Lies on distal medial head of Triceps
- Passes through Cubital Tunnel
- Passes under the strong aponeurotic arcade between the humeral and ulna heads of FCU
- Along forearm between superficial and deep finger flexors

Entrapment neuropathy - Ulnar Nerve

Cubital tunnel syndrome - Anatomy

- Ulnar nerve compressed in cubital tunnel
 - Anterior – medial epicondyle
 - Lateral – Olecranon
 - Posteromedial –
 - Cubital tunnel retinaculum
 - AKA - Osbornes ligament or fascia



Entrapment neuropathy - Ulnar Nerve

Cubital tunnel syndrome

- Traumatic
 - Single event or chronic repetition
- Nontraumatic
 - Work related
 - Rest on elbows
 - Elbow flexion/extension
 - Concert pianists Slammed by aponeurotic arch of FCU
- Scarring and adhesion
 - Cubital tunnel
 - Under Flexor carpi ulnaris aponeurosis

Entrapment neuropathy - Ulnar Nerve

Cubital tunnel syndrome

- Spontaneous subluxation of ulnar nerve from the cubital tunnel (15% of population) may exaggerate symptoms

Entrapment neuropathy - Ulnar Nerve

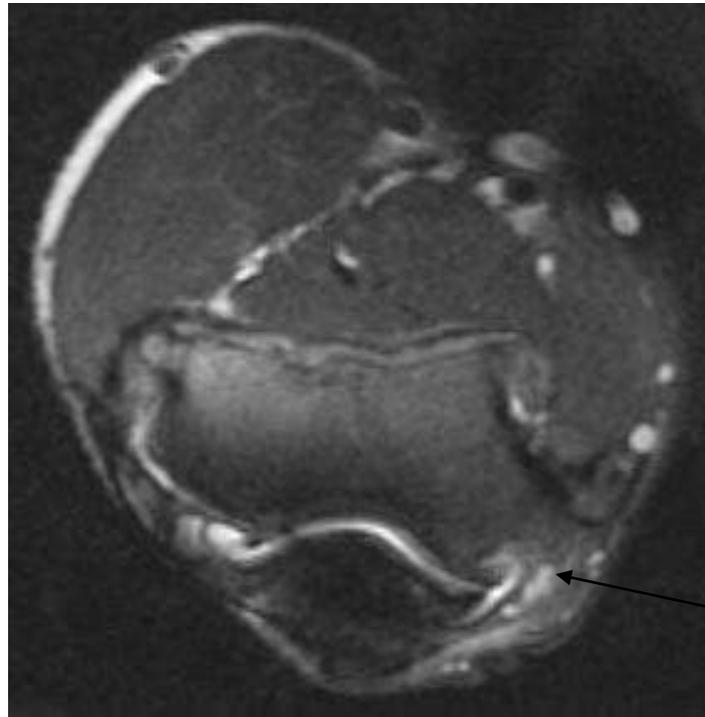
Cubital tunnel syndrome

- Ring and little finger paresthesia
- Discomfort medial forearm
- Pain medial elbow
- Tapping nerve causes distress
- Occ. Weak finger add/abd
- Ulnar claw hand



Cubital tunnel syndrome - Causes

- Masses in cubital tunnel
 - Muscles
 - Anconeus epitrochlearis
 - Prominent medial head of triceps
 - Ganglion
 - Osteophytes

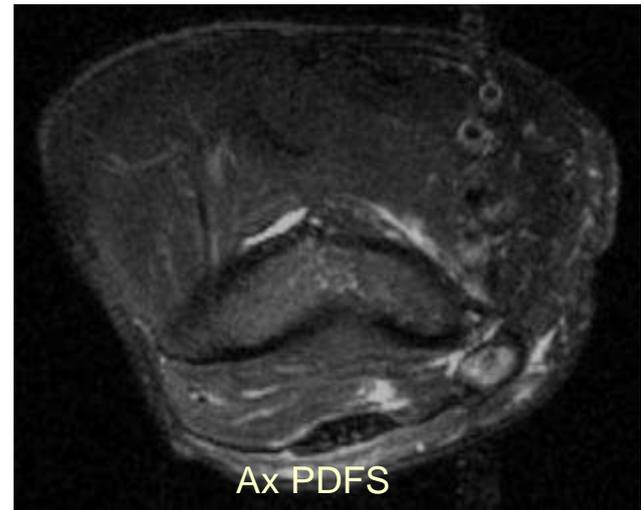
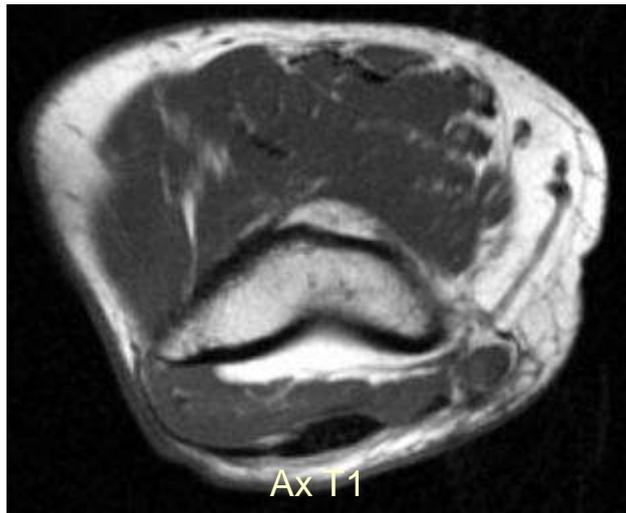


Anconeus epitrochlearis

- Cubital tunnel retinaculum - 27 cadavers
 - Absent (1)
 - Allows subluxation
 - Type 1a (17)
 - Taut in full flexion
 - Normal
 - Type 1b (6)
 - Taut in partial flexion
 - Causes dynamic nerve compression
 - Type 2 (3)
 - Replaced by Anconeus epitrochlearis
 - Static compression
- Cubital tunnel retinaculum probably a remnant of the anconeus epitrochlearis

Cubital tunnel syndrome - MRI

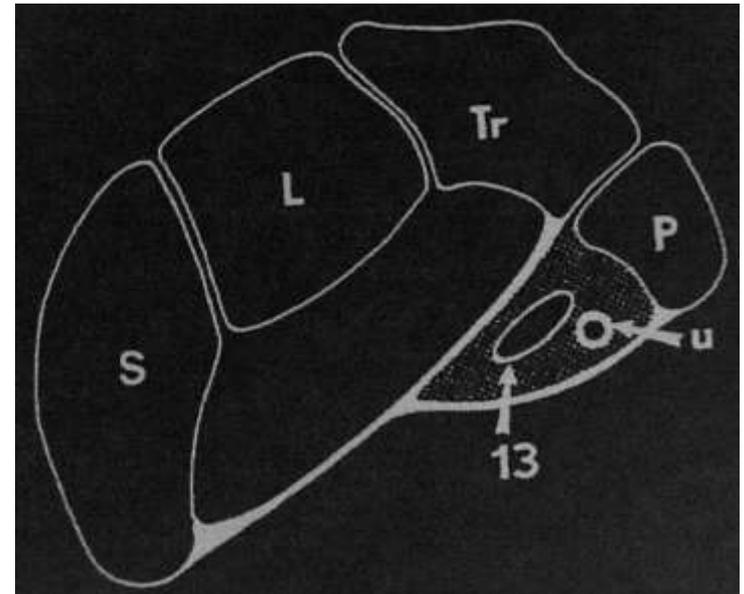
- Nerve
 - Compressed, Thickened, Displaced
 - Inflamed and enhancing
- Cause
 - OA, Ganglion, Synovitis, Muscle



Entrapment neuropathy - Ulna Nerve

Ulnar Tunnel Syndrome

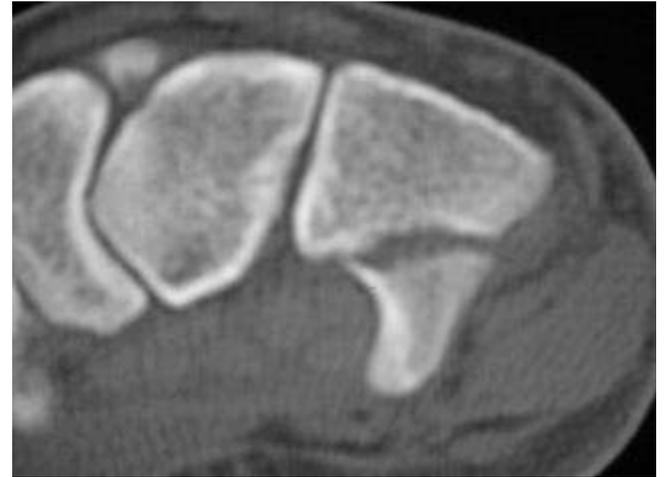
- AKA - Guyon's canal syndrome
 - Superficial to flexor retinaculum
 - Lateral to flexor carpi ulnaris
 - Medial to ulnar artery
 - Roofed by transverse carpal lig
-
- Superficial hypothenar branch
 - Proximal to canal 65% - silent paralysis
 - In canal 35% - additional pain and numbness
 - Deep motor branch
 - Paralysis – AddPol, Interossei, ulnar lumbricals
 - ODM > FDM > AbDM



Entrapment neuropathy - Ulna Nerve

Ulnar Tunnel Syndrome

- Masses
 - Ganglion
 - Lipoma
- Synovitis
- Fractures
 - Hook of hamate
- Accessory muscle
- Aneurysm
 - Hypothenar hammer syndrome



Entrapment neuropathy

Radial Nerve

- Axilla
 - Crutches, Saturday night palsy
- Passes laterally under long head of triceps
 - Fibrous arch
- Lies on humerus between medial and lateral heads of triceps
 - Fibrous arch of lateral head
 - Fractures Holstein-Lewis
 - Tourniquet
- Passes into anterior compartment through lateral intermuscular septum
 - Compression
- Lies between brachialis/biceps and ECRB/L, brachioradialis at cubital fossa
 - Body builders
- Intimate to anterior radiocapitellar joint
 - Synovial lesions
- Divides
 - Motor – PIN
 - Sensory – Superficial radial nerve
- PIN enters radial tunnel under arcade of Frohse
 - Leash of Henry (← recurrent radial artery) cross over just proximal to arcade
- Lies between deep and superficial heads
 - Supinator syndrome

Entrapment Syndromes - Radial Nerve

Posterior Interosseous Syndrome

- Motor nerve
- Occ. Dull ache front elbow
 - Nervi nervorum
- Fatigue of forearm extensors
- Weak forearm extensors
 - Weak MCPJ extension esp. 3-4
 - Preserved IPJ extension from lumbricals
- Radial wrist extensors preserved
 - Origin proximal to radial tunnel

Entrapment Syndromes - Radial Nerve - PIN

Resistant Tennis Elbow

- Radial collateral ligament rupture.
- Radial tunnel syndrome
 - Posterior interosseous branch of radial n.
 - Fibrous arch of supinator (Arcade of Frohse)
 - Distally through supinator



Radial neuritis

Entrapment Neuropathy - Radial Nerve

Posterior Interosseous Nerve Syndrome

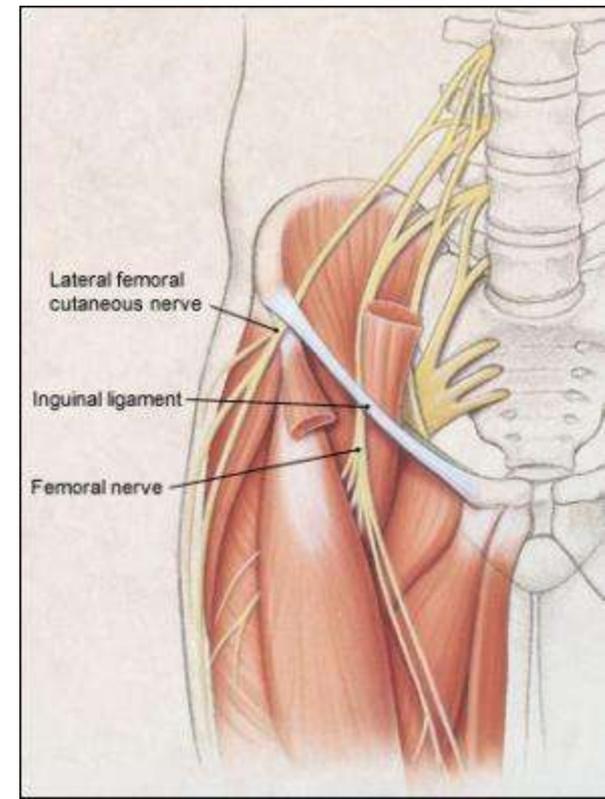
- 51 y.o. female with weakness of hand extensors and radial deviated wrist



Entrapment neuropathy

Lateral Femoral Cutaneous Nerve

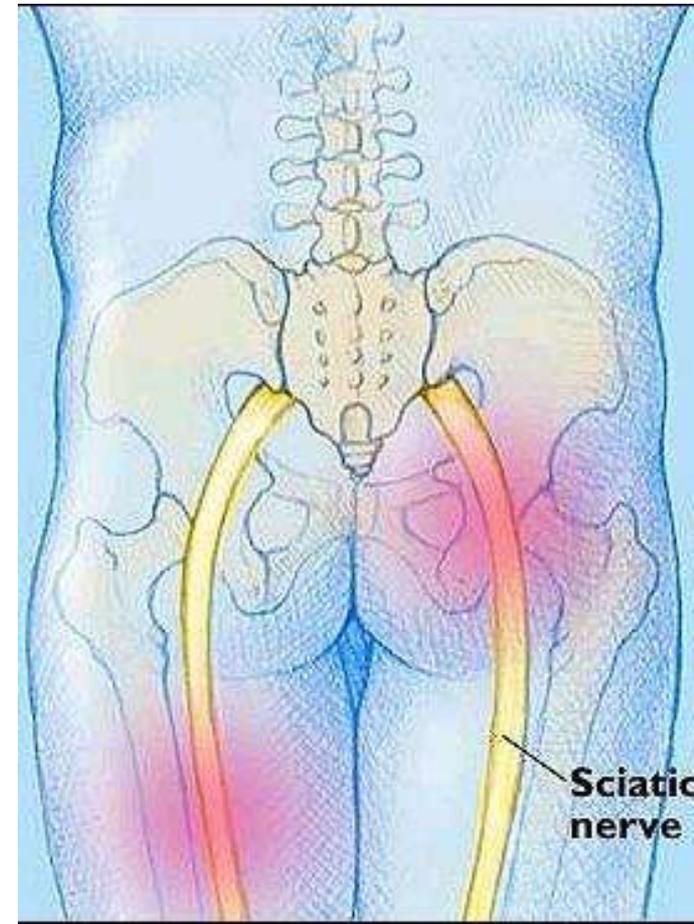
- Meralgia paresthetica L1-2
- Obesity, Pregnancy, Hyperextension
- Sensory changes lateral thigh
- Kinked under inguinal ligament



Entrapment neuropathy

Sciatic nerve

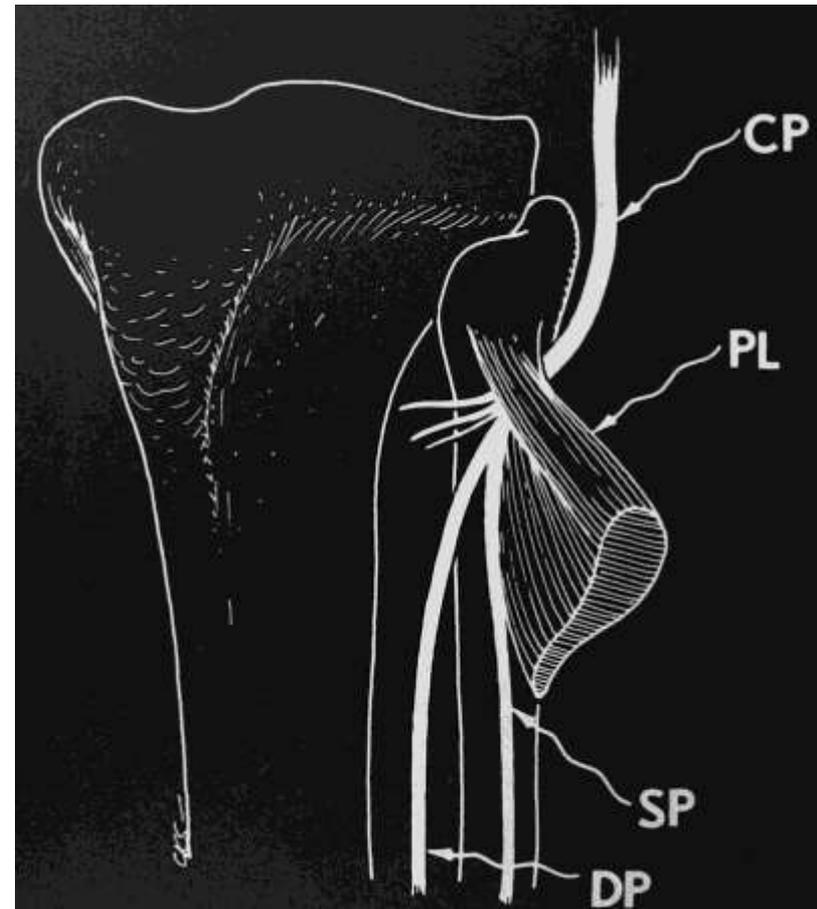
- Sciatic Nerve L4-S3
 - Piriformis Syndrome
 - Tumor
- Tibial nerve
- Common peroneal nerve



Entrapment syndromes

Common Peroneal Nerve

- L4-S2
 - Popliteal fossa
 - Fibular tunnel



Entrapment syndromes

Tibial Nerve

- L4-S1
 - Popliteal fossa
 - Tarsal tunnel syndrome
 - Plantar nerves
 - Digital nerves
 - Sural nerves

Entrapment Syndromes - Tibial nerve

Tarsal Tunnel Syndrome

- Roof – Flexor retinaculum
- Floor – Tarsal bones and muscles
- Contains
 - Flexor tendons
 - Artery and vein
 - Tibial nerve

Entrapment Syndromes - Tibial nerve

Tarsal Tunnel Syndrome

Tibial nerve

- Medial calcaneal branches
 - Perforate laciniated ligament
 - Sensory medial skin
- Medial plantar nerve
 - Muscles – AbH, FHB, FDB, 1st lumbrical
- Lateral plantar nerve
 - Muscles – QP, AbDquinti

Entrapment Syndromes - Tibial nerve

Tarsal Tunnel Syndrome

- AKA - Posterior or Medial TTS, Tibial neuropathy
- Commonest nerve compression syndrome in foot
- Pain and parasthesia plantar foot and toes
- Tibial nerve or branch
- In fibroosseous tunnel
- Deep to flexor retinaculum –laciniated ligament

Tarsal Tunnel Syndrome - Anatomy

- Floor - Talus, Calcaneus, QPM
- Roof - Flexor retinaculum, AbHM
- Anterior - FDL,
- Posterior FHL

- Divided into channels by septae
- 2 cm long, narrowest distally
- Contents - PTT, FDL, FHL, PTNVB
- TN => MCN, LPN, MPN*



Tarsal Tunnel Syndrome - Aetiology

- Compression of nerve
- Intrinsic
 - Ganglions, Varicosities, Lipomas
 - Neurilemmomas, Neurofibromas
 - Synovial sarcoma, Tenosynovitis
 - Fibrosis from trauma, Rheumatoid arthritis
- Extrinsic
 - Trauma, Biomechanical - Jogger's foot

Peripheral Neuritis

- Mechanical
- Radiation
- Post viral
 - Parsonage Turner Syndrome
 - Polio
- Ischemic neuropathy
 - Diabetic
- Polyneuropathy

Peripheral Neuritis

Parsonage Turner Syndrome

– AKA

- Neuralgic amyotrophy
- Acute brachial neuritis / radiculitis
- Nontraumatic neuropathy
- Shoulder girdle syndrome

– Idiopathic denervation syndrome of shoulder muscles

Peripheral Neuritis

Parsonage Turner Syndrome

– Pathology

- Neuritis of lower motor neurons of brachial plexus
- Probably post viral
- Also follows trauma, surgery and immunization

Peripheral Neuritis

Parsonage Turner Syndrome

– Acute findings (after 2w symptoms)

- Swollen muscles
- ↓T1, ↑T2 / STIR, Enhance
- No focal lesion on nerve

– Chronic findings

- Fatty atrophy
- ↑ T1, ↑T2, ↓STIR
- No focal tear