

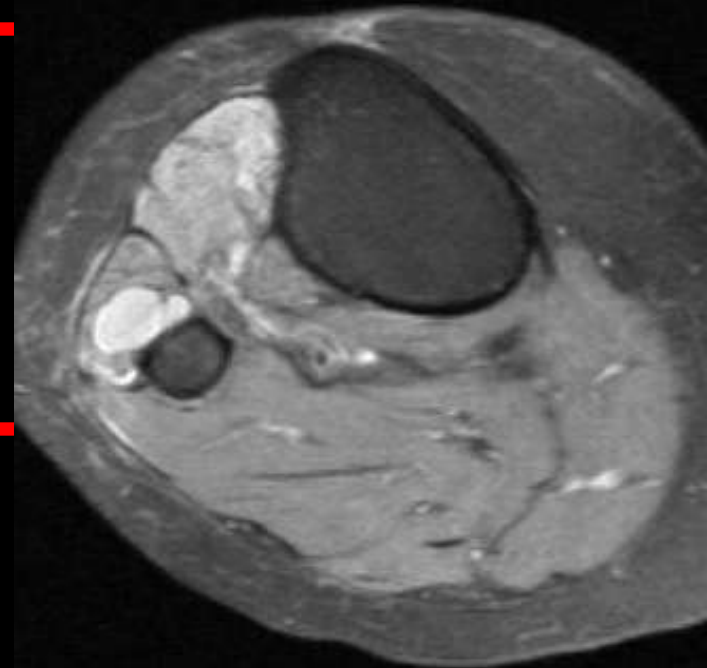


# Nerve Entrapment Syndromes

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Department of Radiology  
University of California School of Medicine  
San Diego, California

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# Nerve entrapment syndromes

## Introduction

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- Chronic entrapment
- Commonly as the nerve passes through an osseoligamentous tunnel, or under an aponeurotic margin
- One side fixed, one moves -> friction
  - More common in upper limb
- Inflamed or thickened nerve
- May see mass pressing on nerve – not true entrapment
- Secondary changes in muscles of nerve distribution

# Nerve entrapment syndromes

## History

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

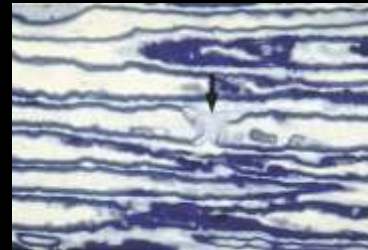
# Nerve entrapment syndromes

## Pathology

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- 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

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- 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

# Nerve entrapment syndromes

## Clinical

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- Most peripheral entrapped nerves Sens. and Motor
  - Notable exceptions:
    - Anterior interosseous nerve (motor)
    - Deep ulnar (motor)
    - Lateral femoral cutaneous (sensory)
    - Superficial branch of radial nerve (sensory)

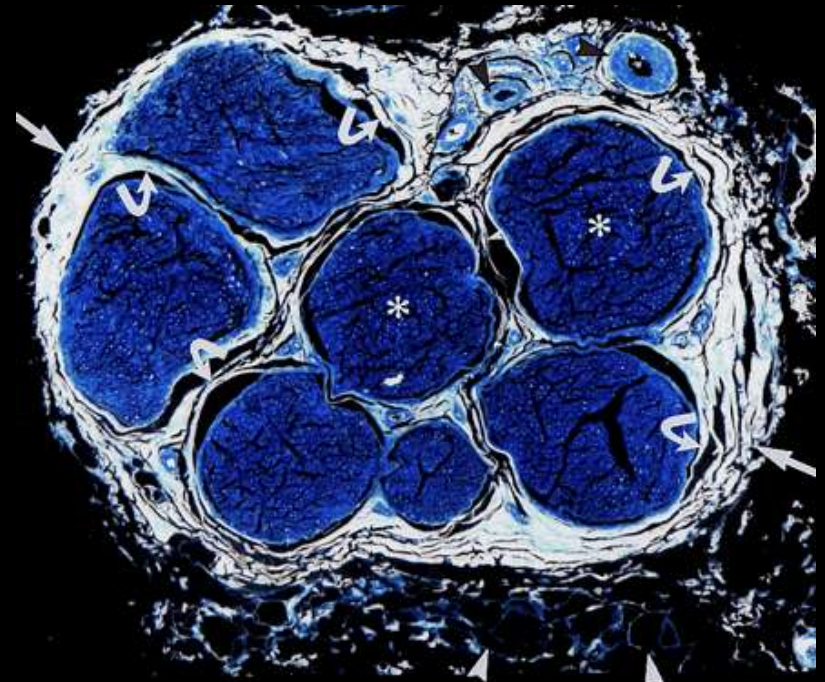


Nervi nervorum

# Nerve entrapment syndromes

## Normal Peripheral Nerve

- Peripheral nerve encased by epineurium
- Groups of axons encased by perineurium
- Fascicular appearance
- Profuse blood supply

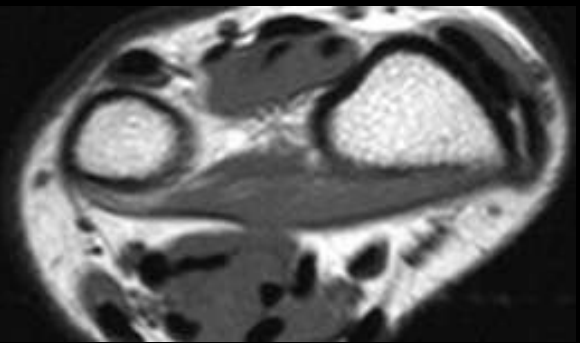


# Nerve entrapment syndromes

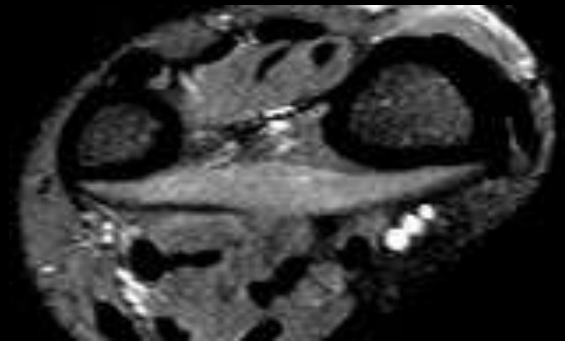
## Muscle signal intensity with entrapment/denervation

- Acute (< 1 month):
  - T1 - normal
  - STIR - ↑ SI
  - enhancement: +
- Subacute (1-6 months):
  - T1 - ± normal
  - STIR - ↑ SI
  - enhancement: ±
- Chronic (> 6 months):
  - T1 - ↑ SI
  - STIR - ↓ SI
  - enhancement - none

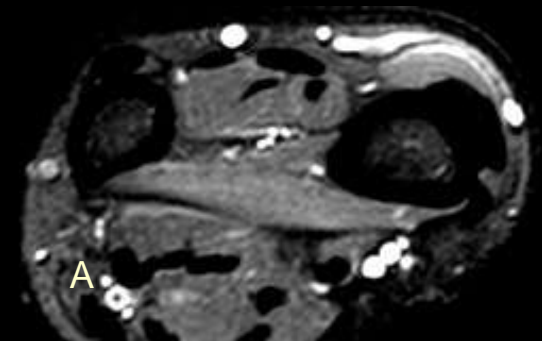
Ax T1



Ax PDFS



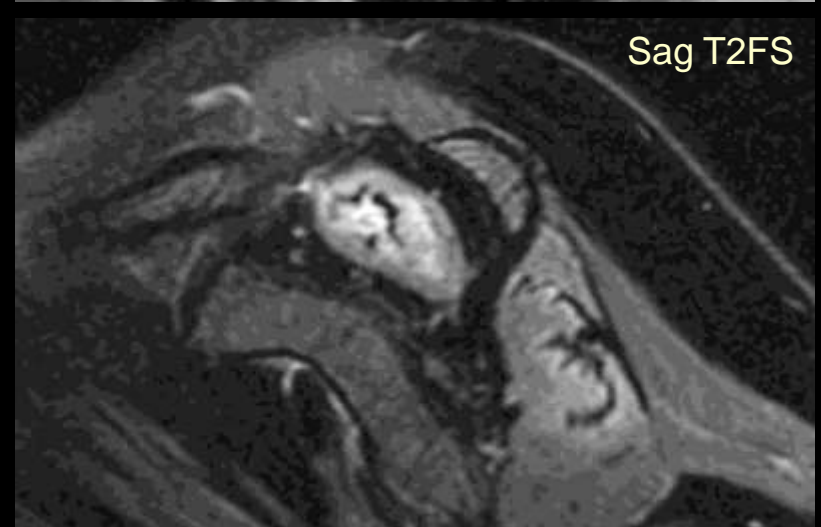
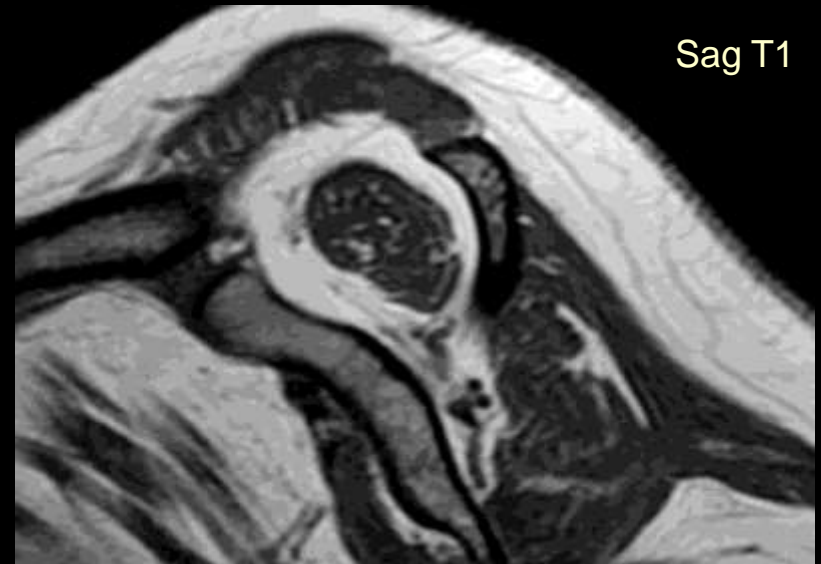
AxT1FSGd



# Nerve entrapment syndromes

## Muscle signal intensity with entrapment/denervation

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  - STIR -  $\uparrow$  SI
  - enhancement:  $\pm$
- Chronic (> 6 months):
  - T1 -  $\uparrow$  SI
  - STIR -  $\downarrow$  SI
  - enhancement - none



## Nerve entrapment syndromes

# Muscle signal intensity with entrapment/denervation

---

- Acute (< 1 month):
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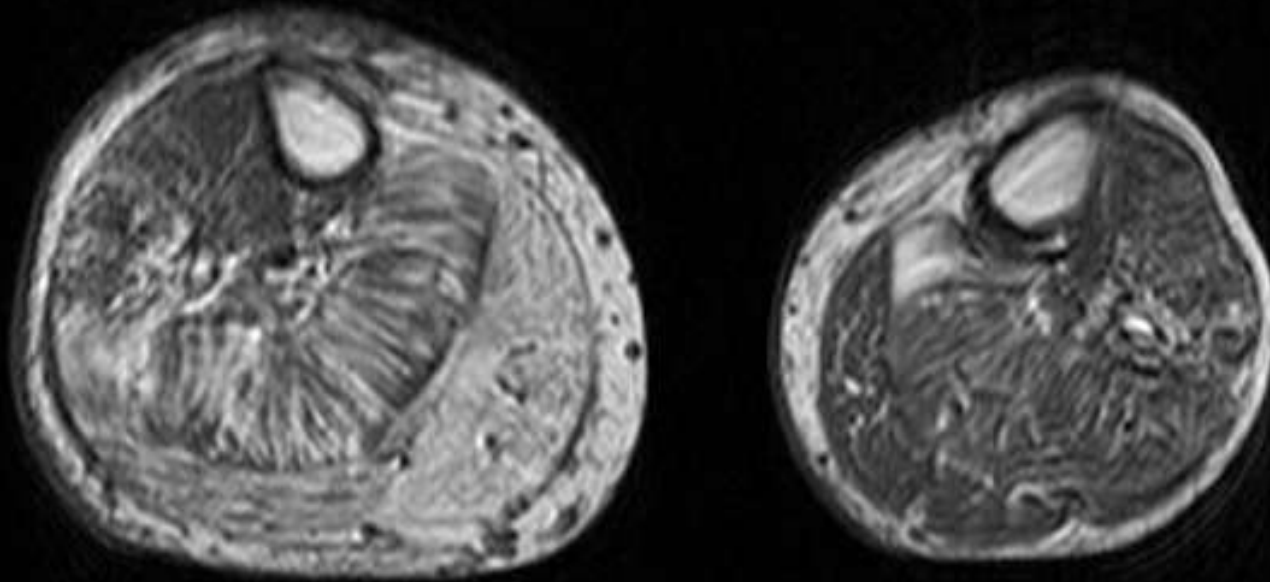




# Nerve entrapment syndromes

## Denervation Hypertrophy

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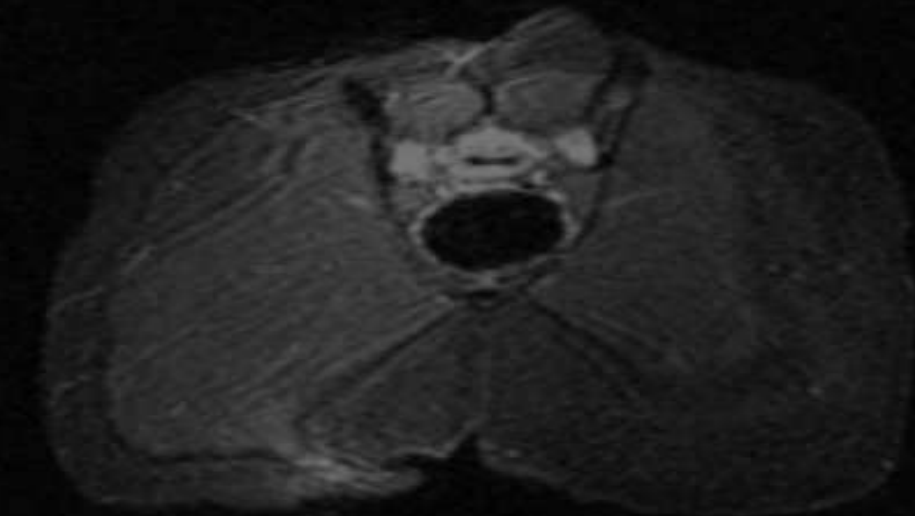
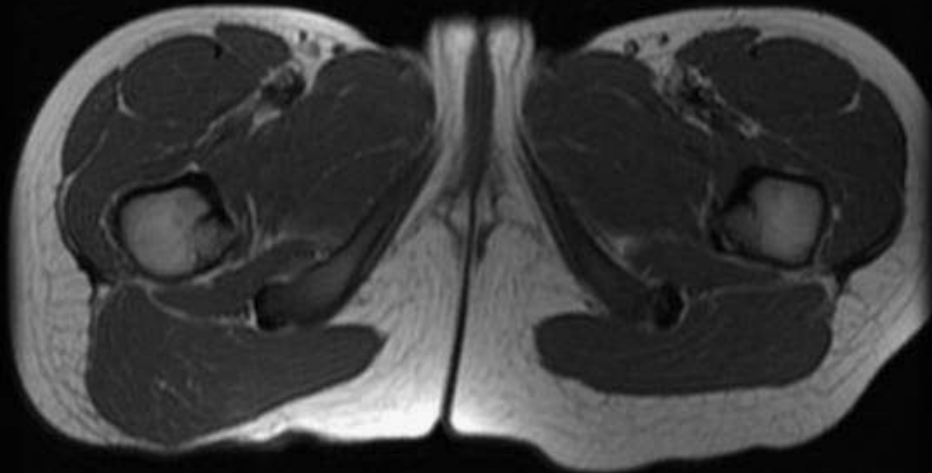
When muscle enlarges in response to denervation- Petersilge et al *JCAT*, 1995;Jul-Aug:19(4)

Tibial nerve

# Nerve entrapment syndromes

## Denervation Hypertrophy

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10-year old with right gluteal hypertrophy

When muscle enlarges in response to denervation- Petersilge et al *JCAT*, 1995;Jul-Aug:19(4)

[Suprascapular nerve](#)

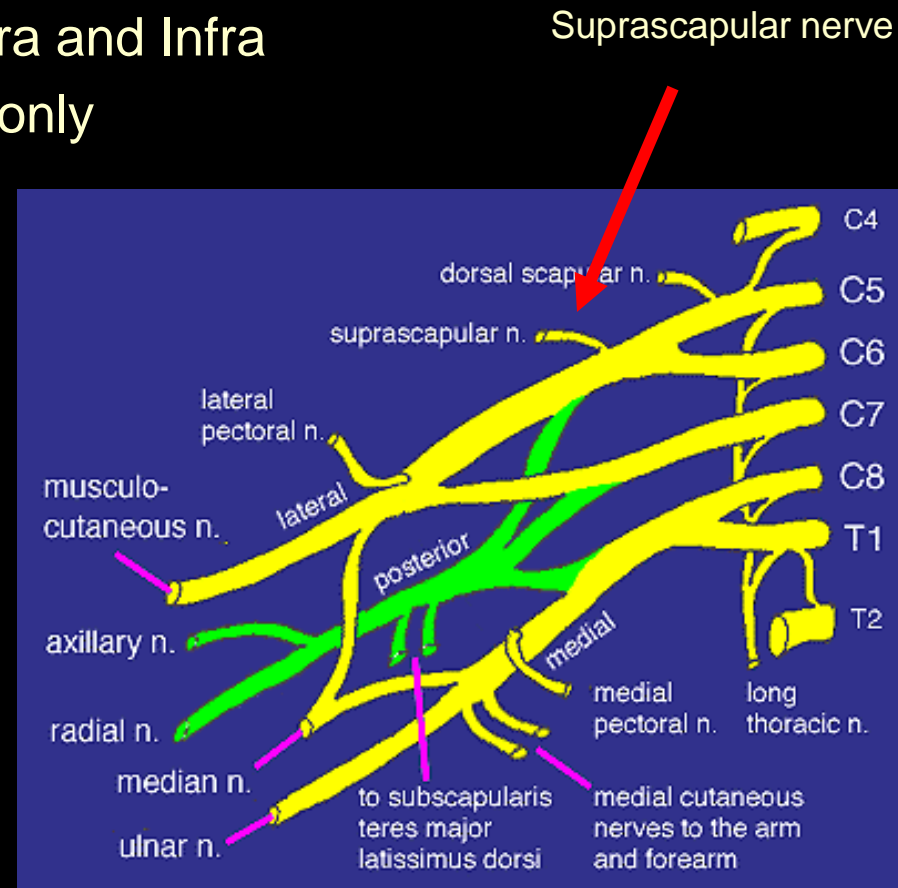
[Lower extremity](#)



# 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

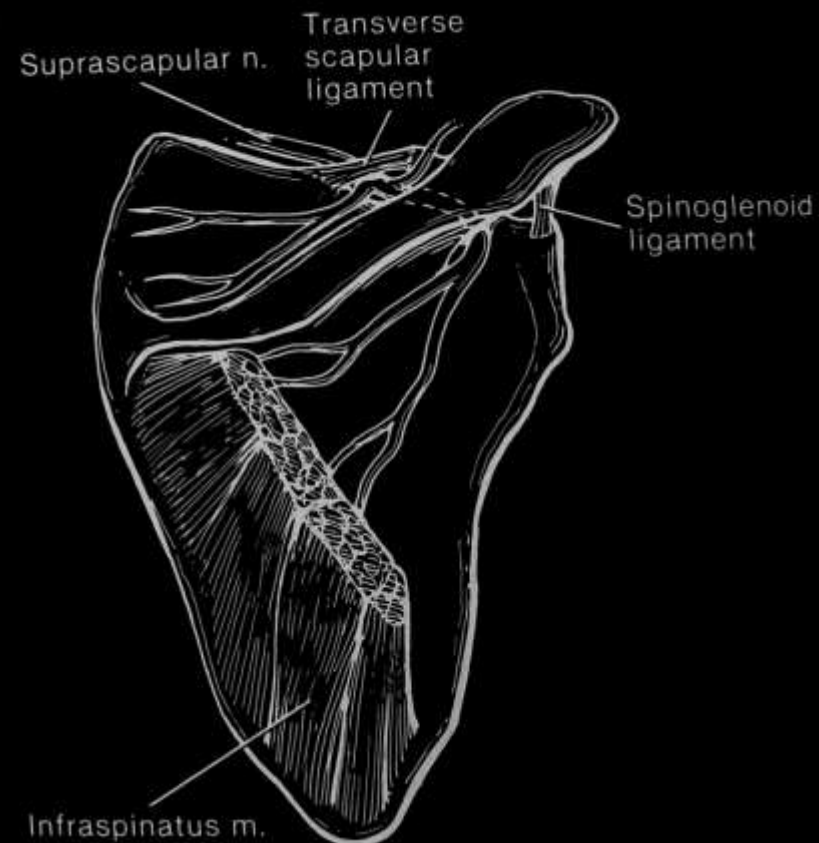
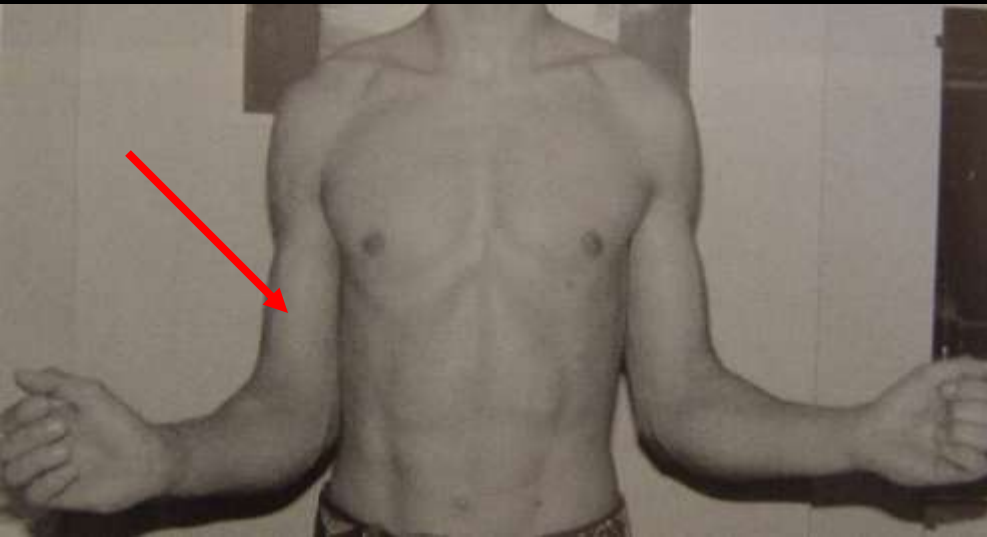


# Entrapment syndromes

## Suprascapular nerve

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

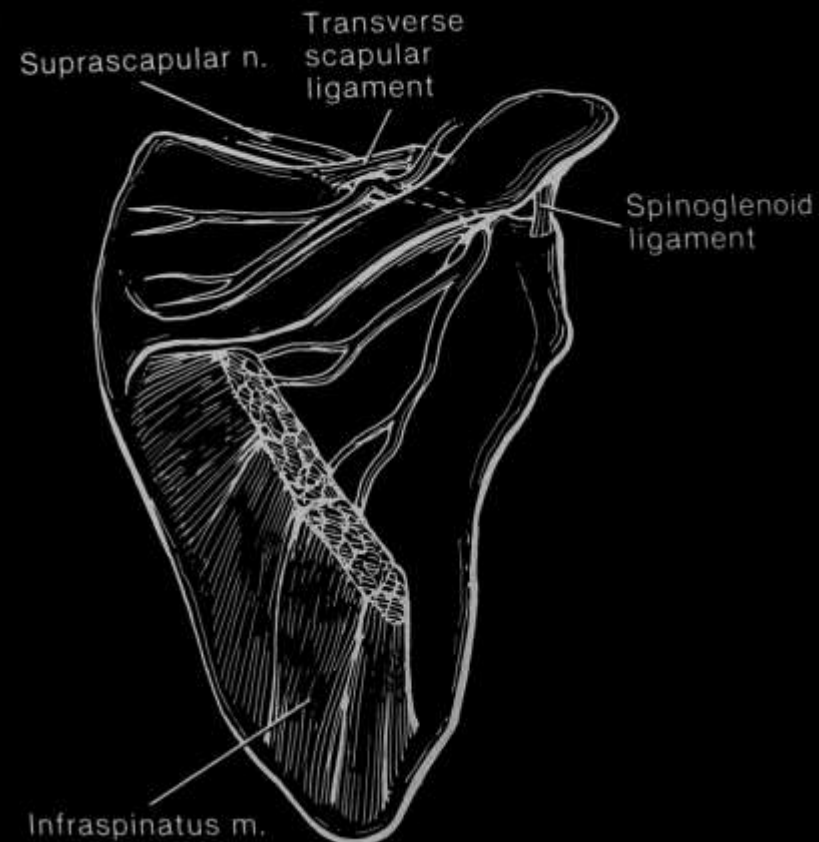


# Entrapment syndromes

## Suprascapular nerve

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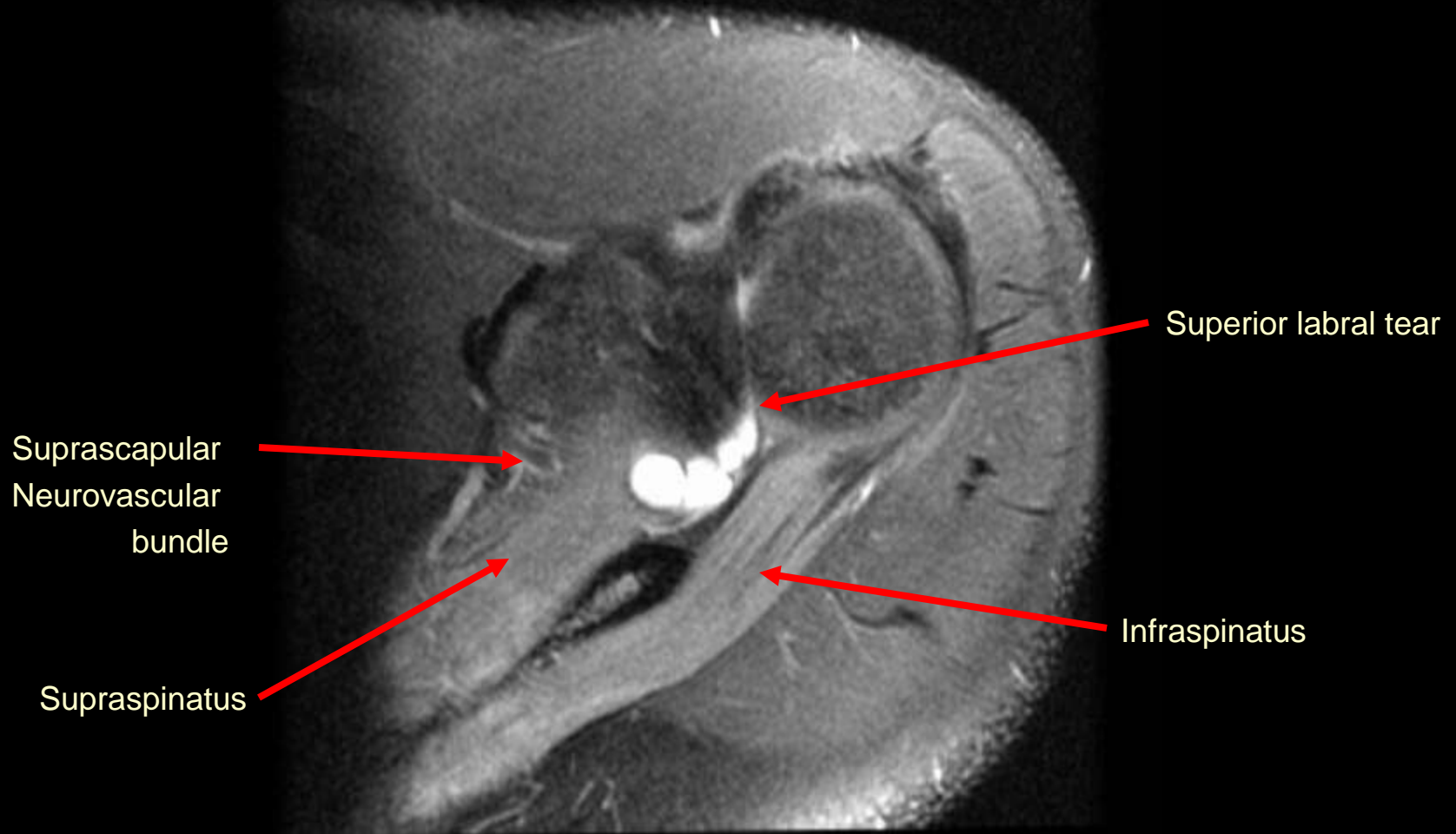
- Upper limb athletes
- Deep dull aching pain – sensory fibers to joint
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# Entrapment syndromes

## Suprascapular Nerve Palsy

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Ax PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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Suprascapular  
Neurovascular  
bundle

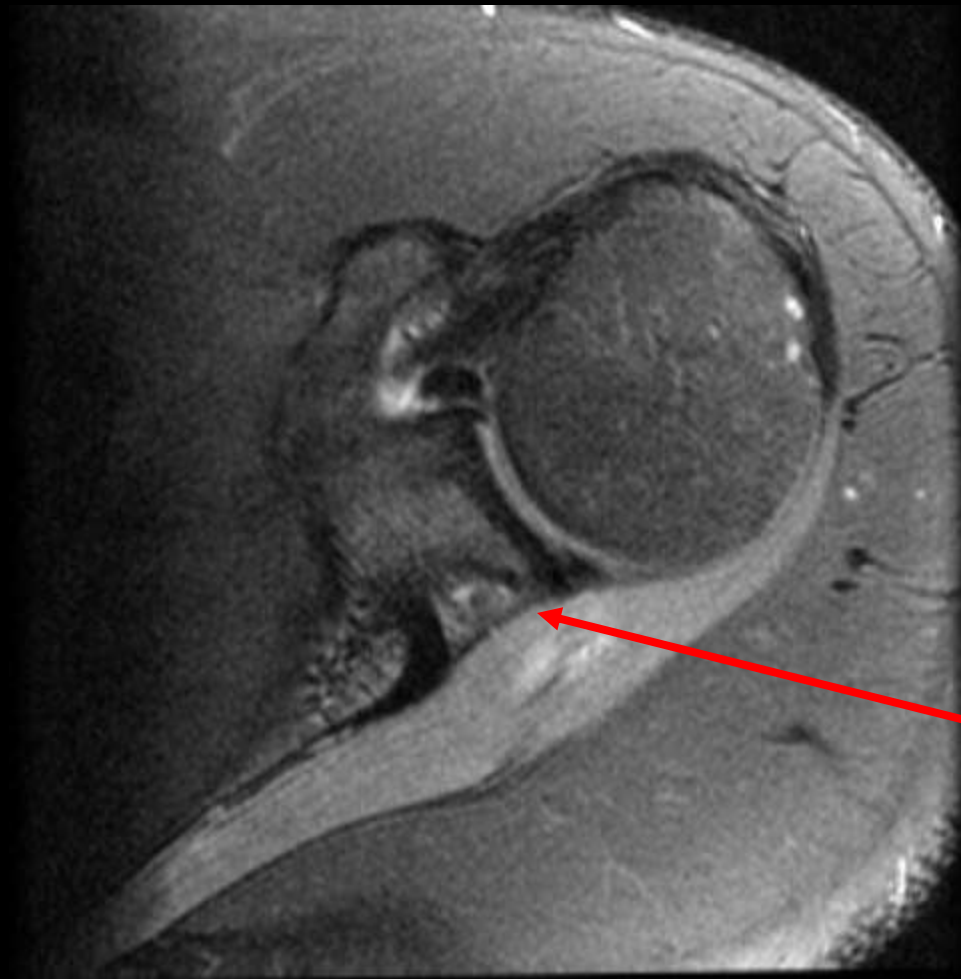


Ax PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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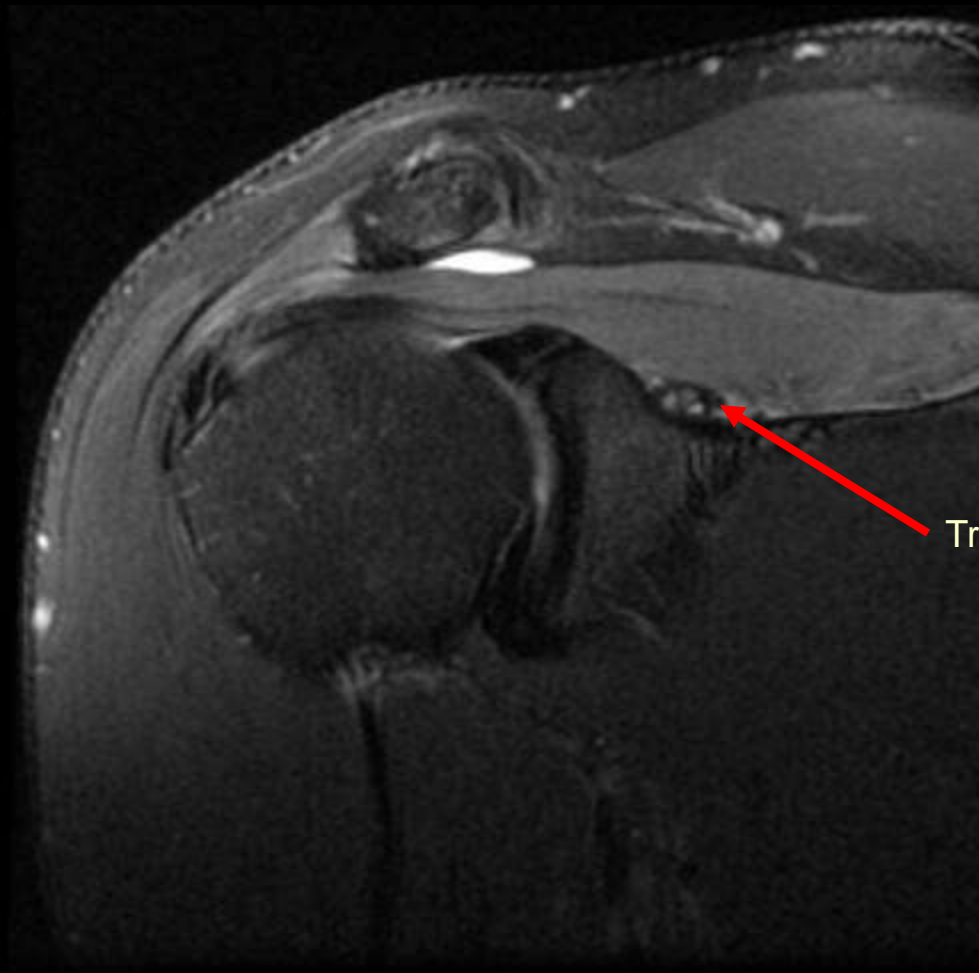
Spinoglenoid ligament

Ax PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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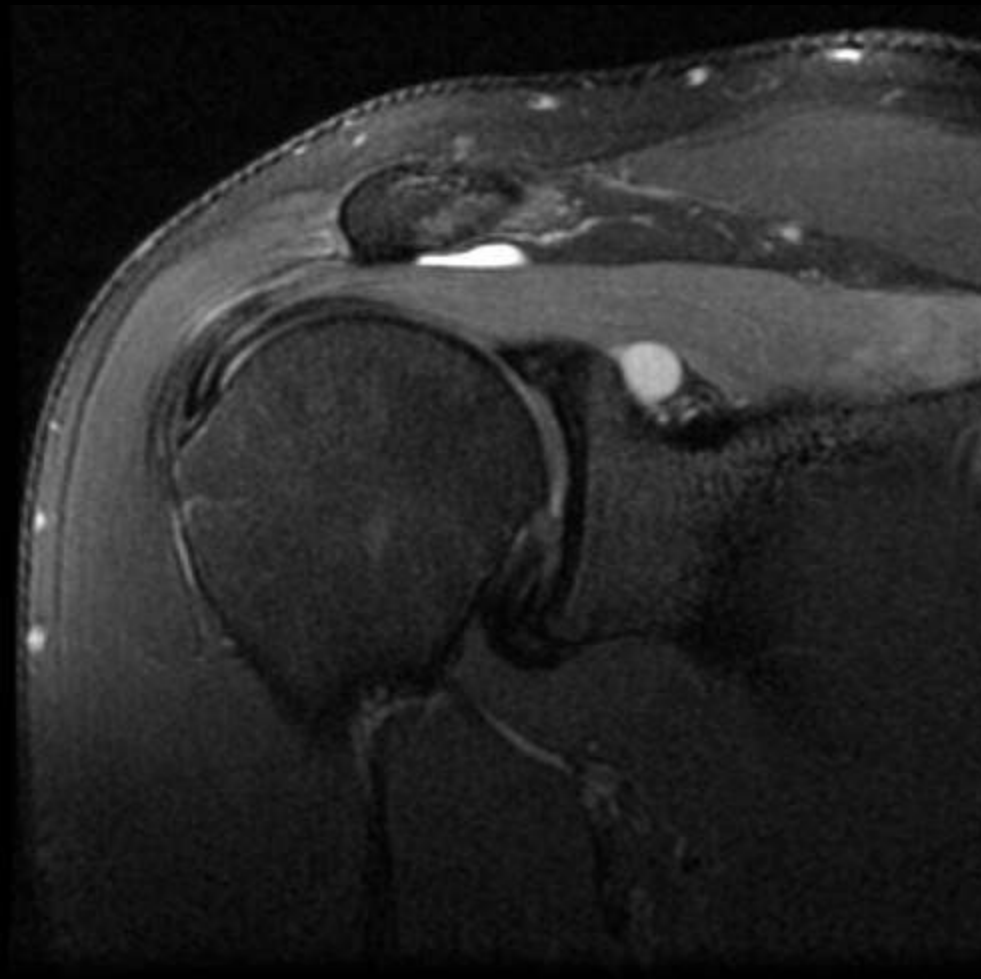
Transverse scapula ligament



# Entrapment syndromes

## Suprascapular Nerve Palsy

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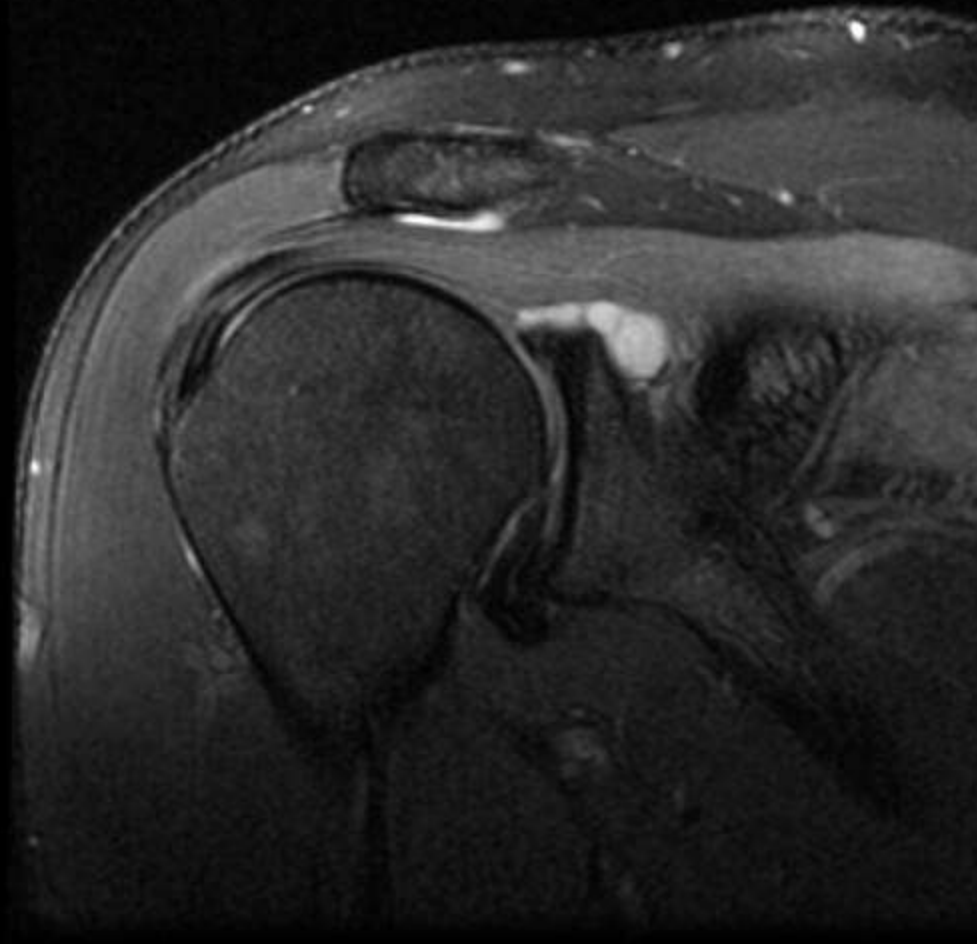
Cor PDFS



# Entrapment syndromes

## Suprascapular Nerve Palsy

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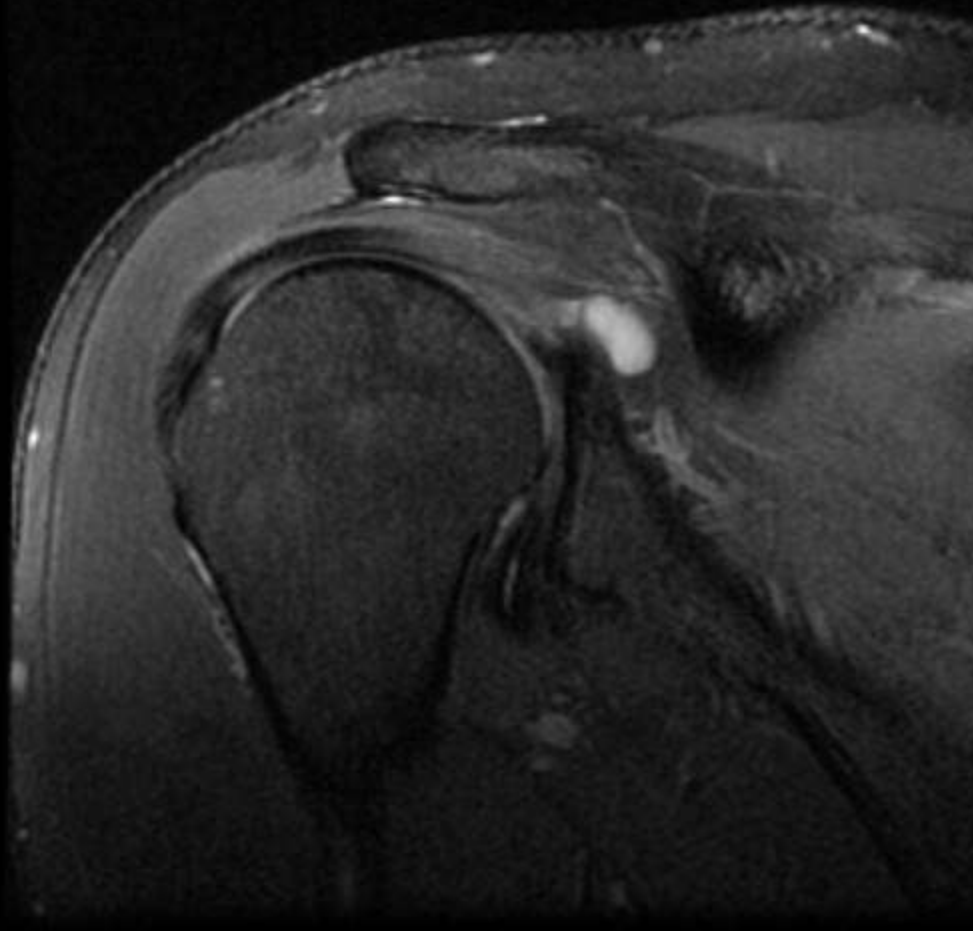


Cor PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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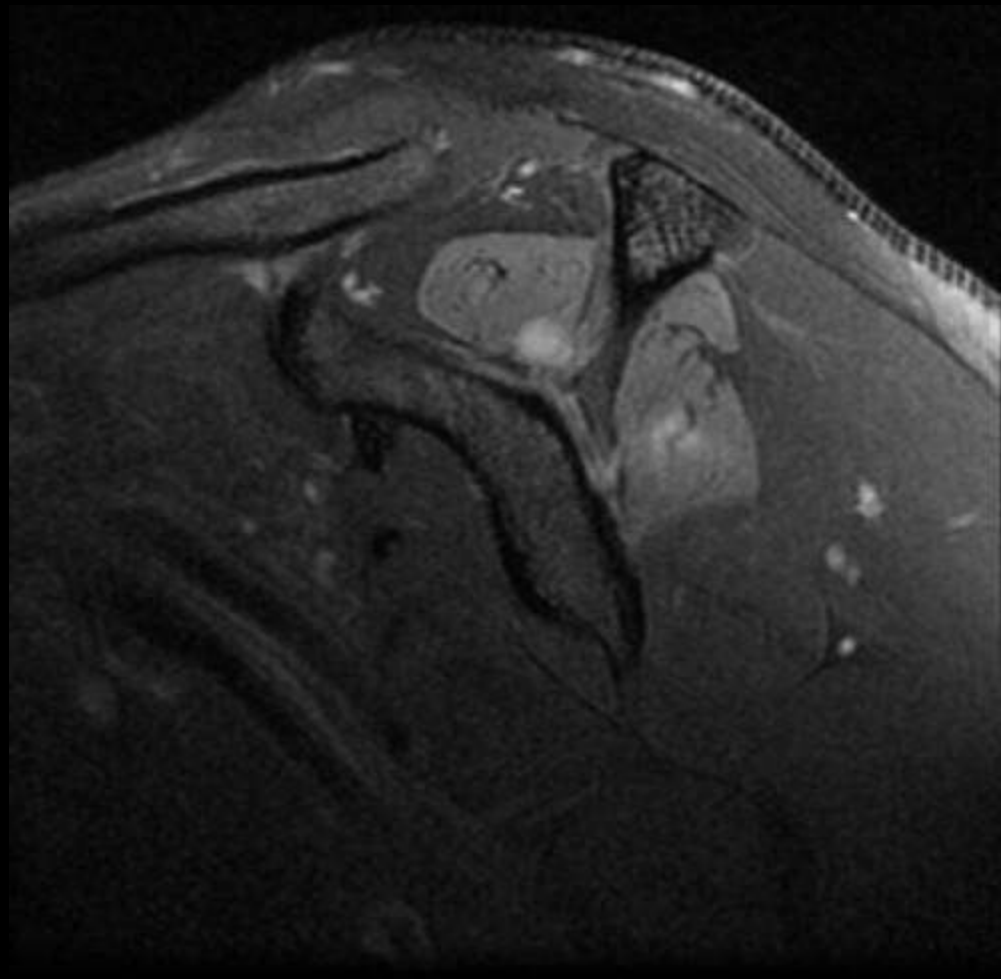


Cor PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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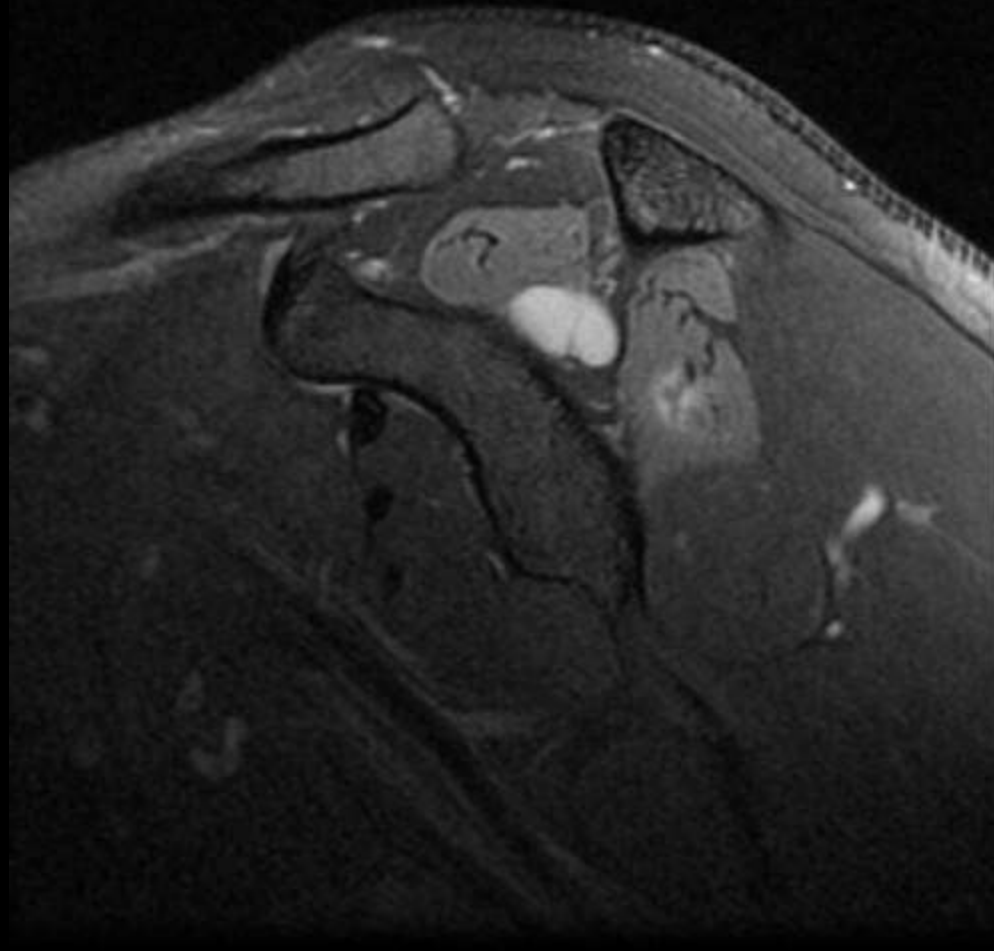


Sag PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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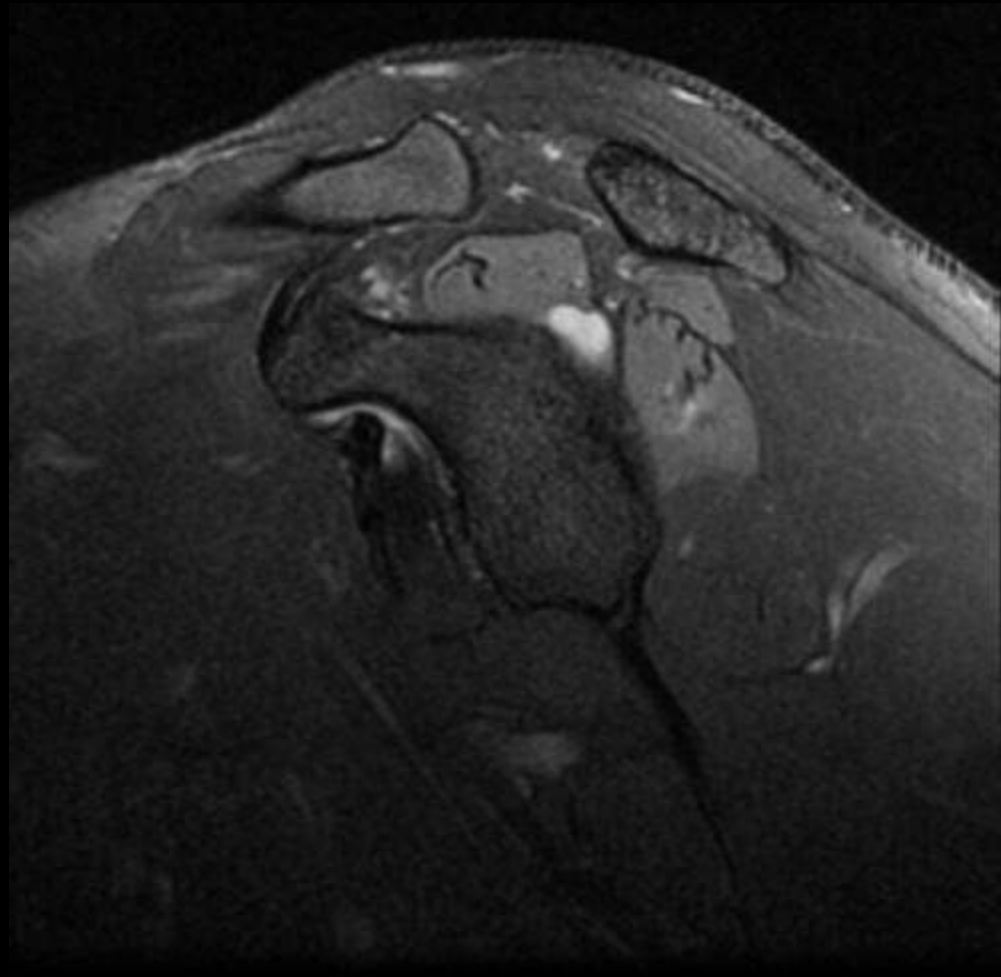


Sag PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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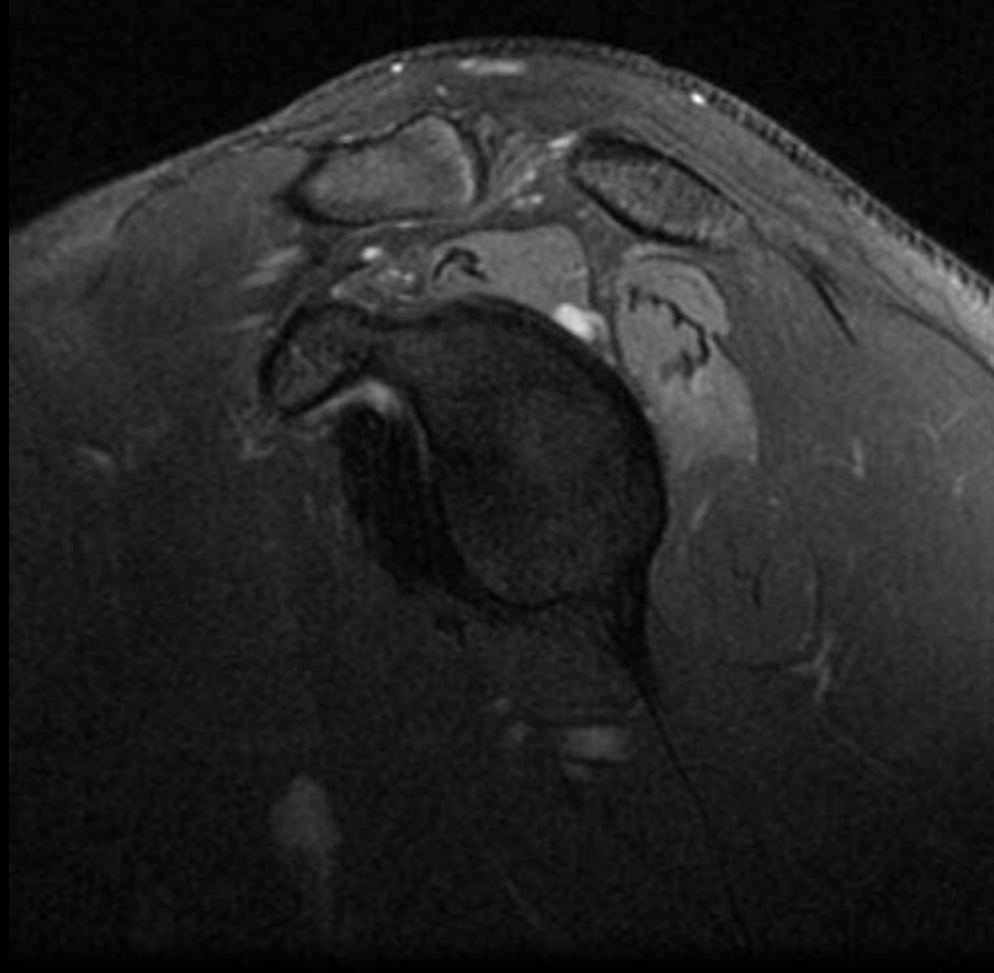


Sag PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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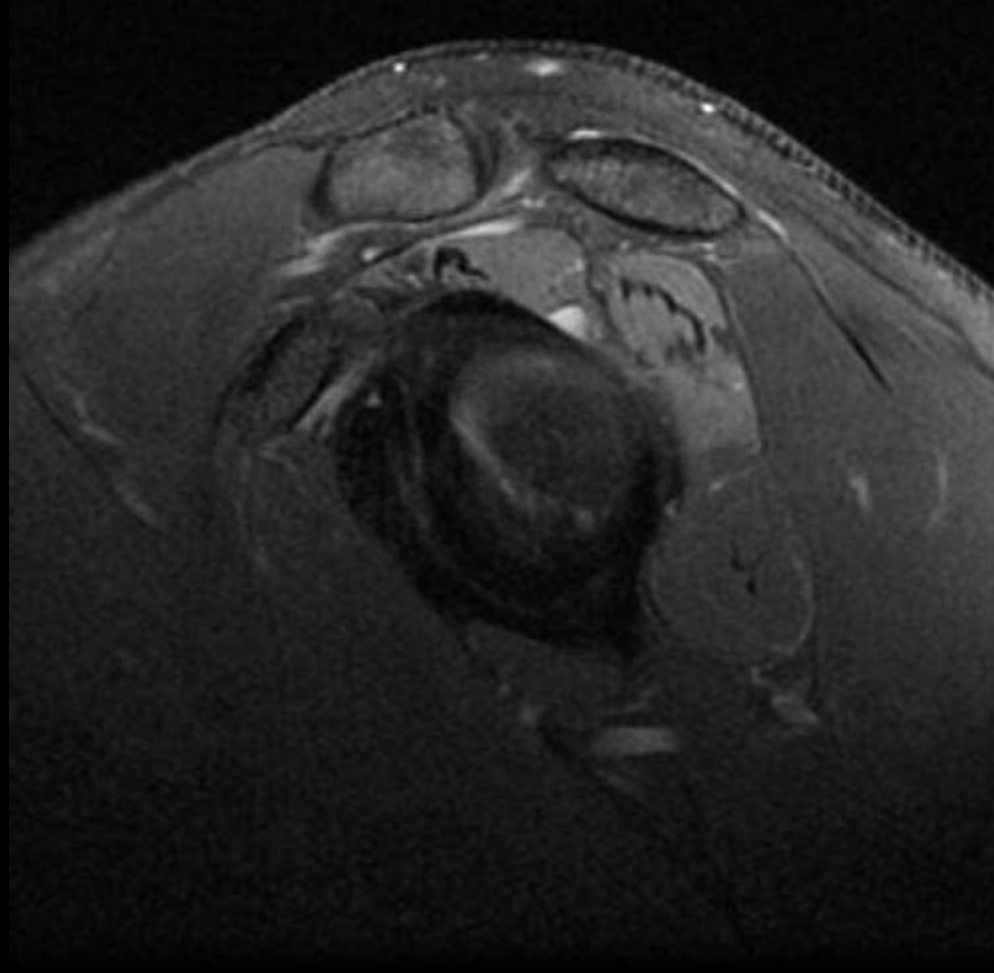


Sag PDFS

# Entrapment syndromes

## Suprascapular Nerve Palsy

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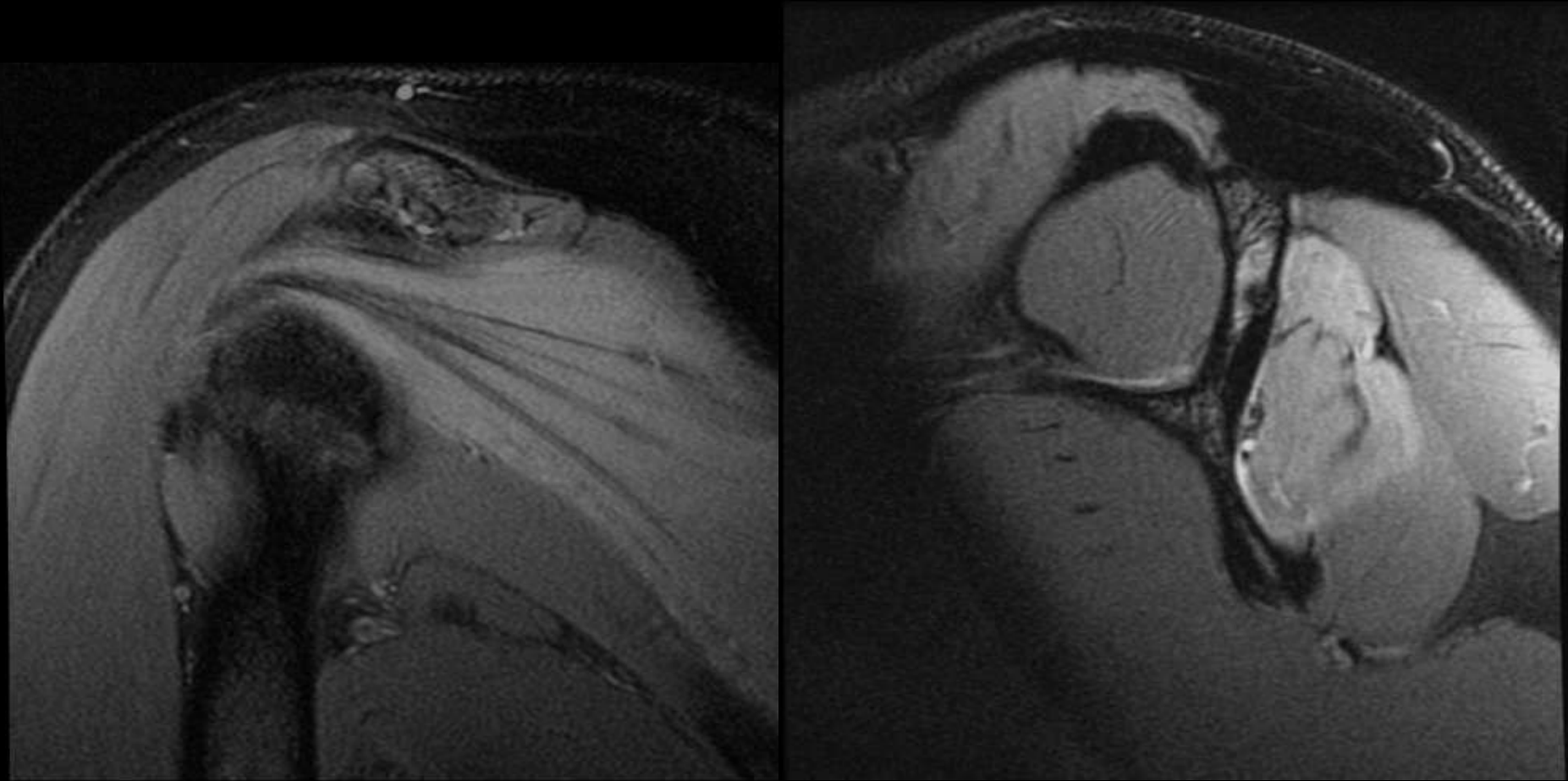


Sag PDFS

Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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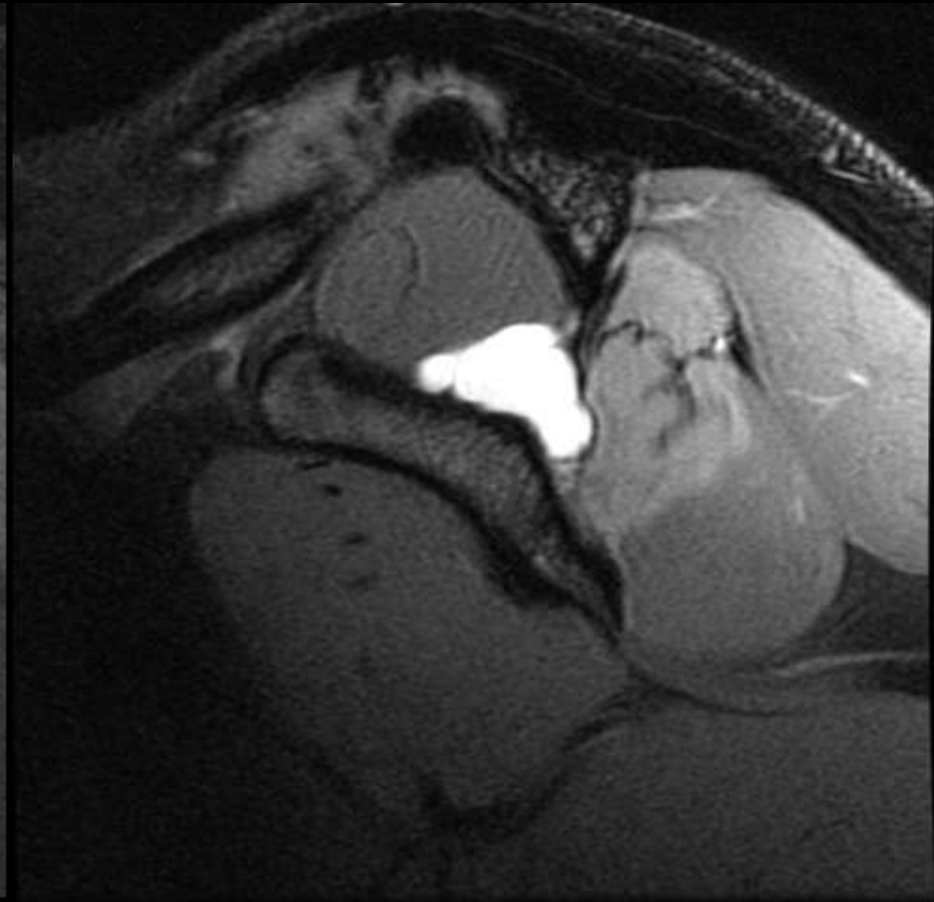
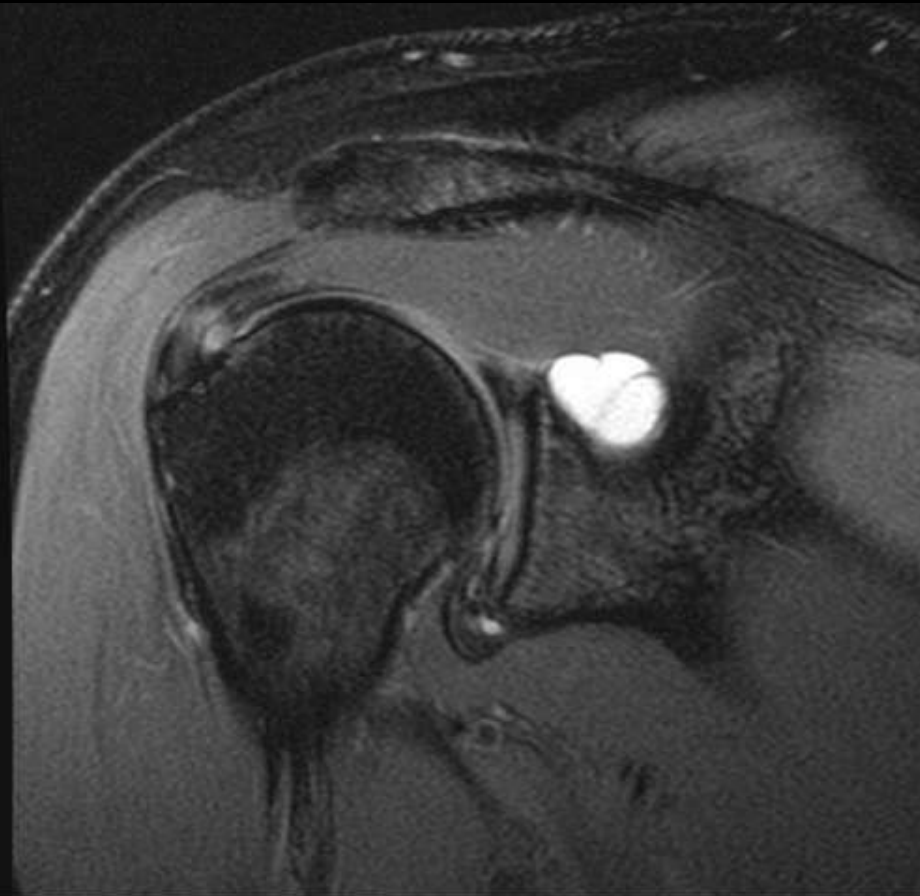
37yo M painter with shoulder pain and weakness when lifting paint cans



Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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37yo M painter with shoulder pain and weakness when lifting paint cans

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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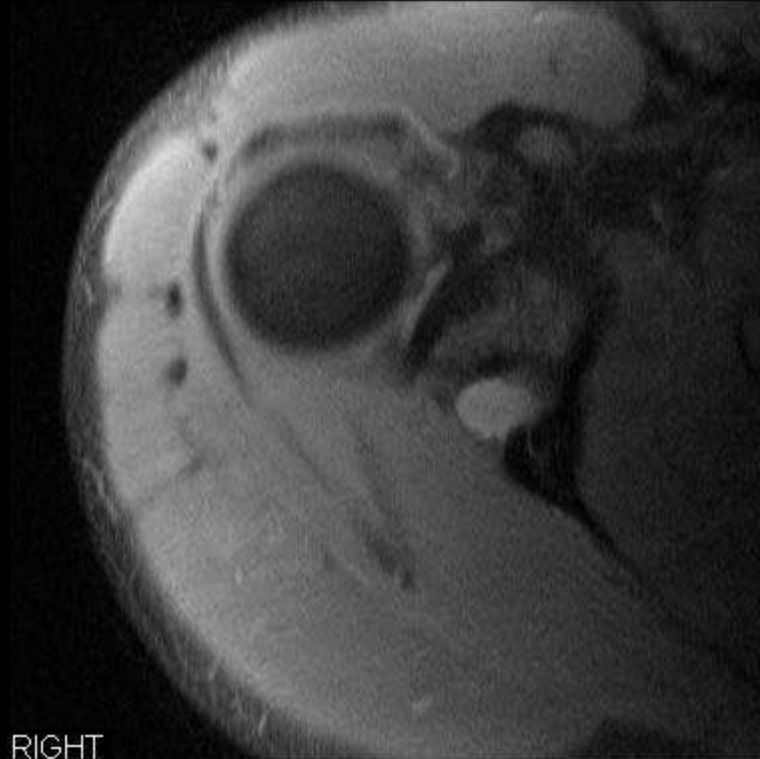
RIGHT

Ax PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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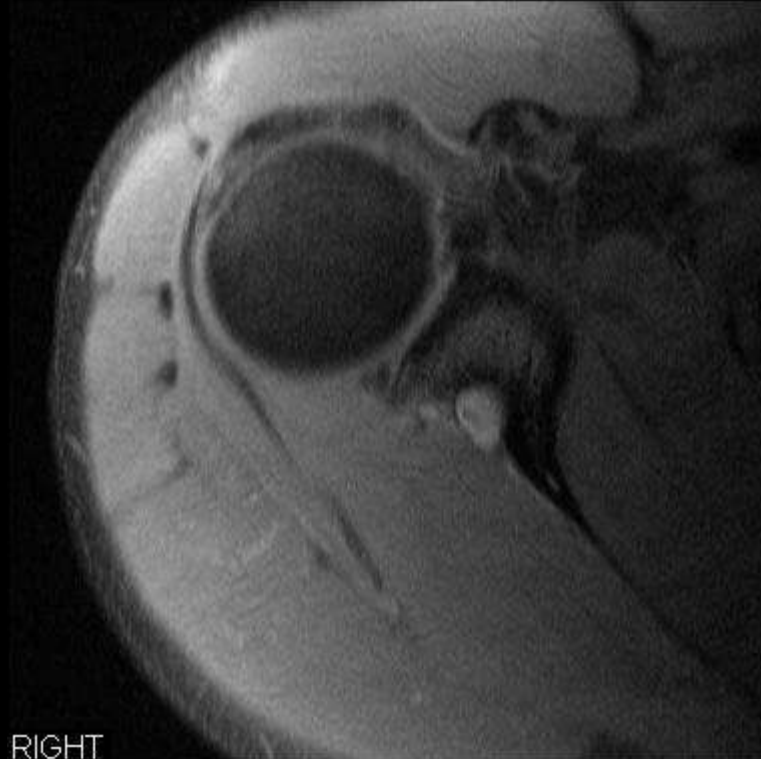
RIGHT

Ax PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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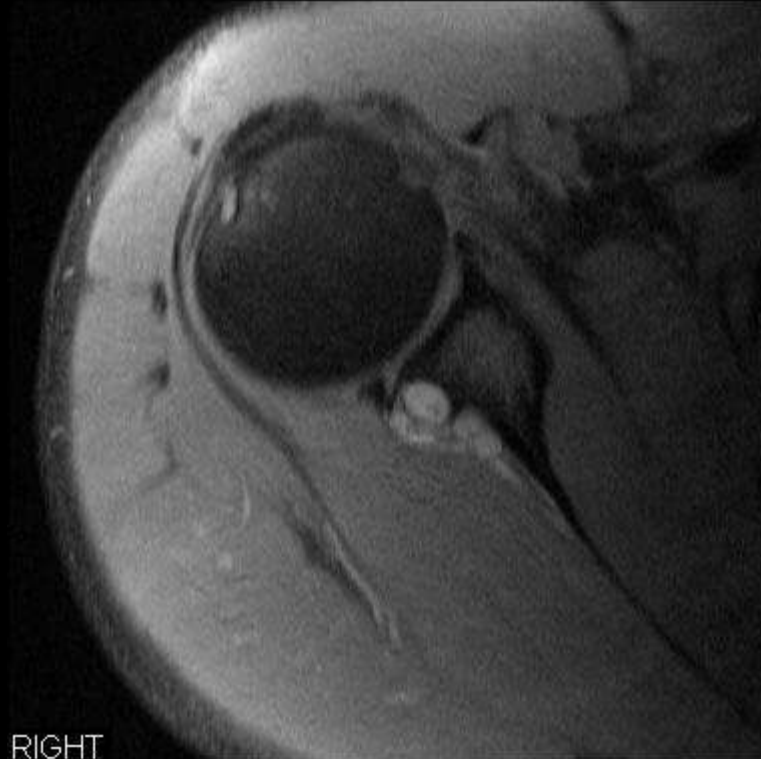
RIGHT

Ax PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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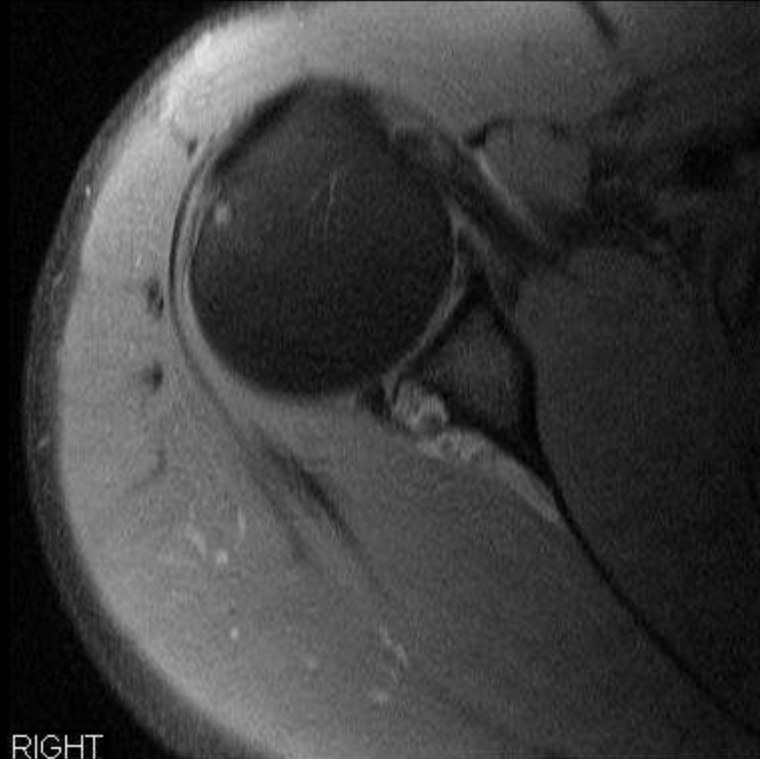
RIGHT

Ax PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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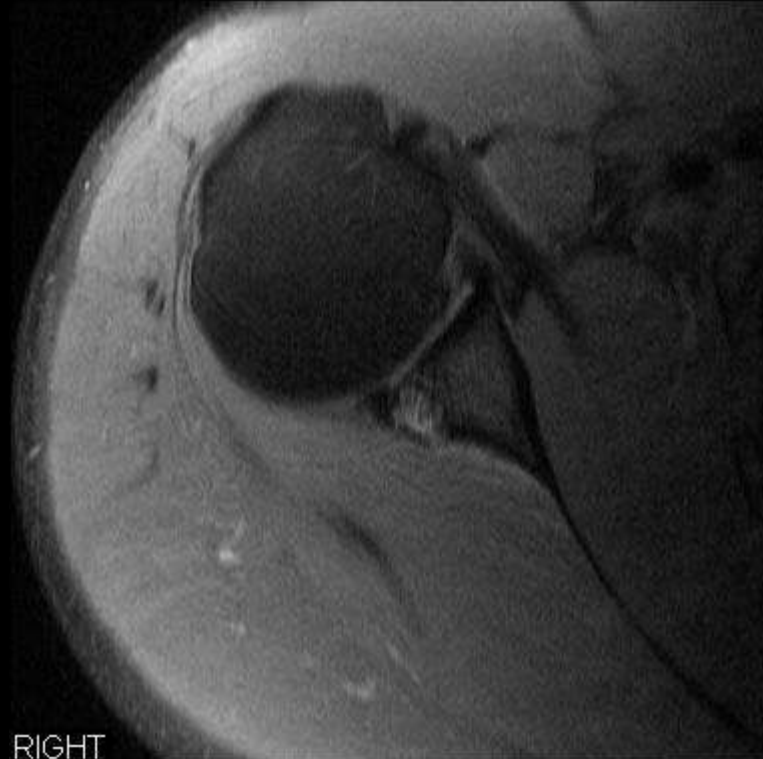
RIGHT

Ax PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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RIGHT

Ax PDFS



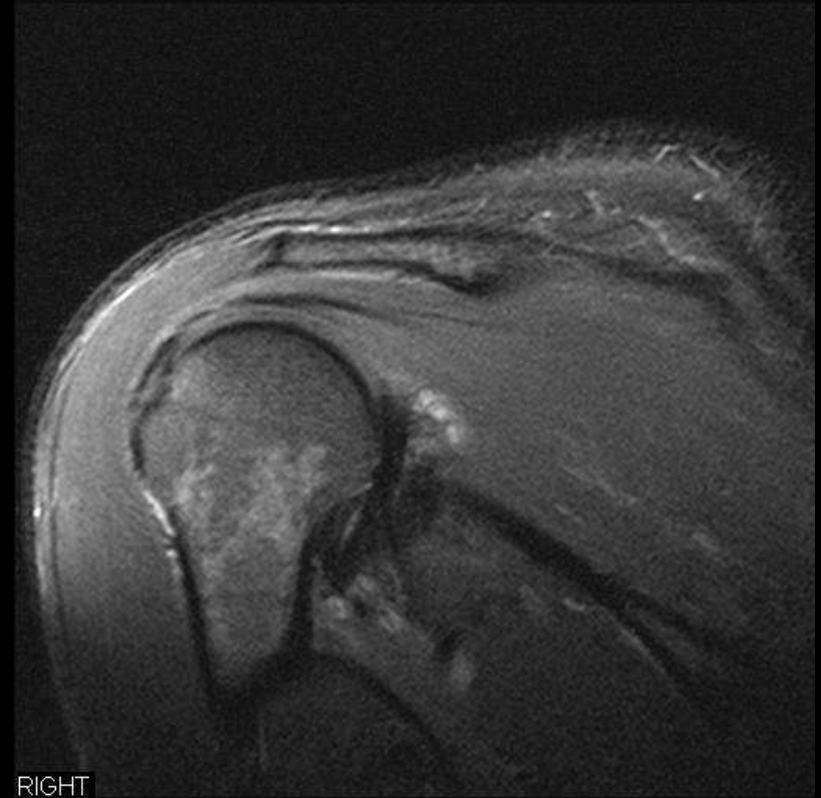
## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Cor T2



Cor PDFS



## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

---



Cor T2



Cor PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

---



Cor T2



Cor PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

---



Cor T2



Cor PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Cor T2



Cor PDFS



## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Cor T2



Cor PDFS

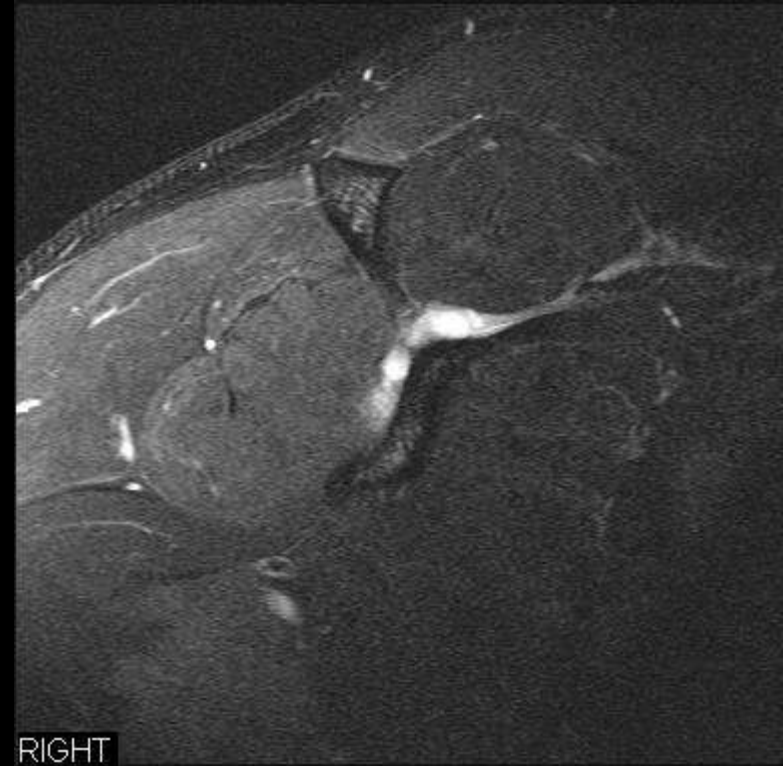
## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Sag T1



Sag PDFS

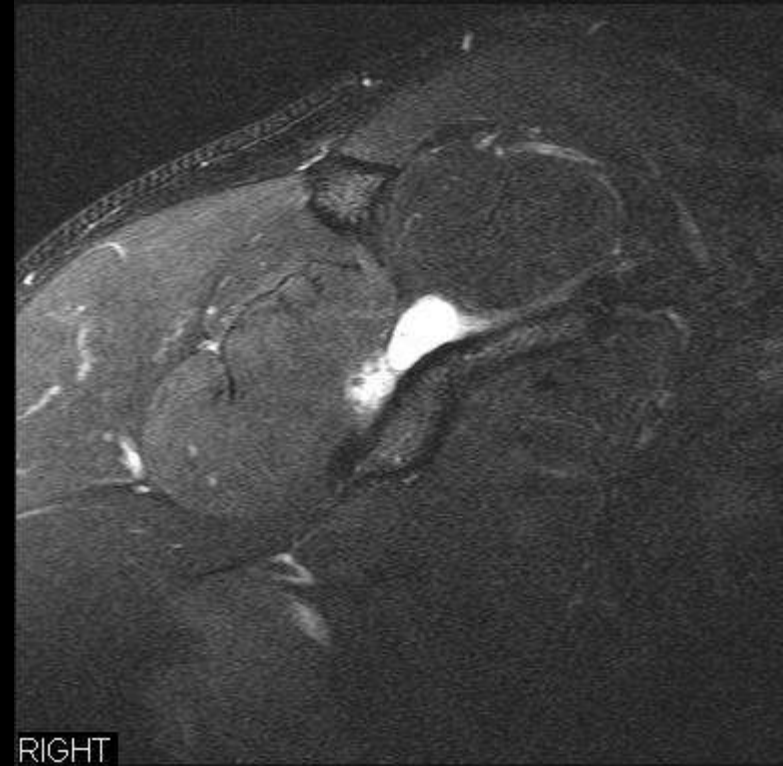
## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Sag T1



Sag PDFS



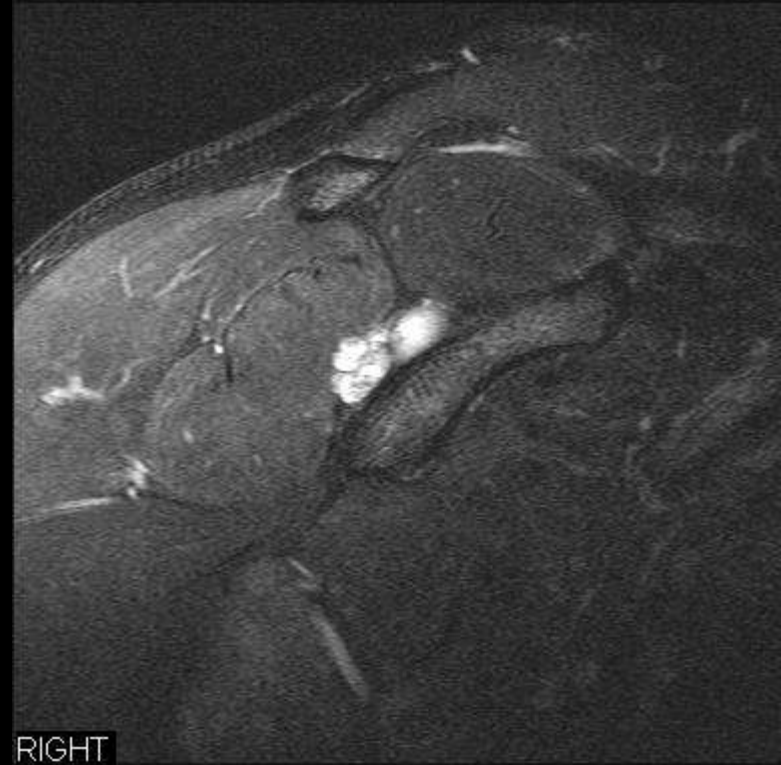
## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Sag T1



Sag PDFS

## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Sag T1

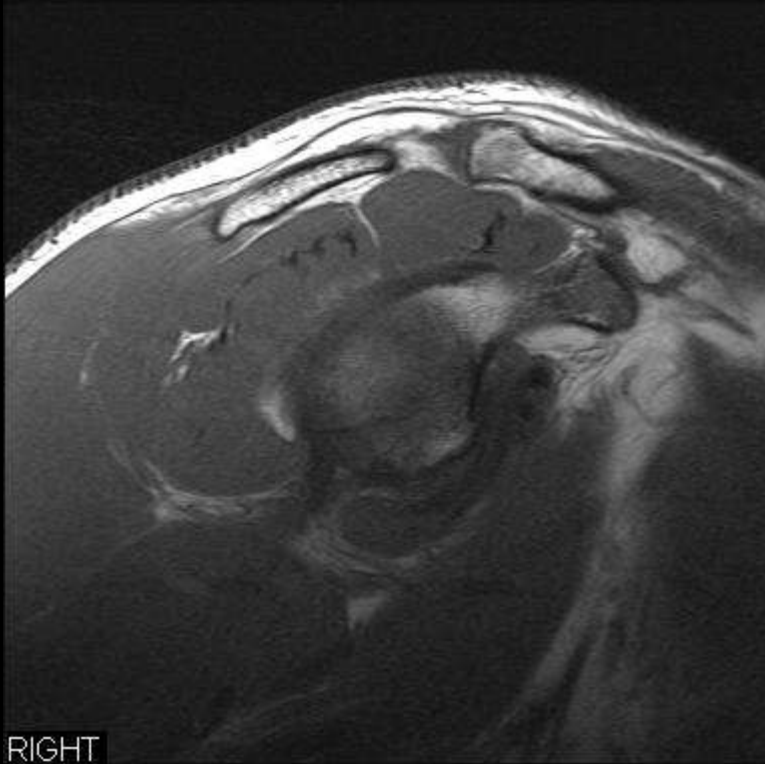


Sag PDFS

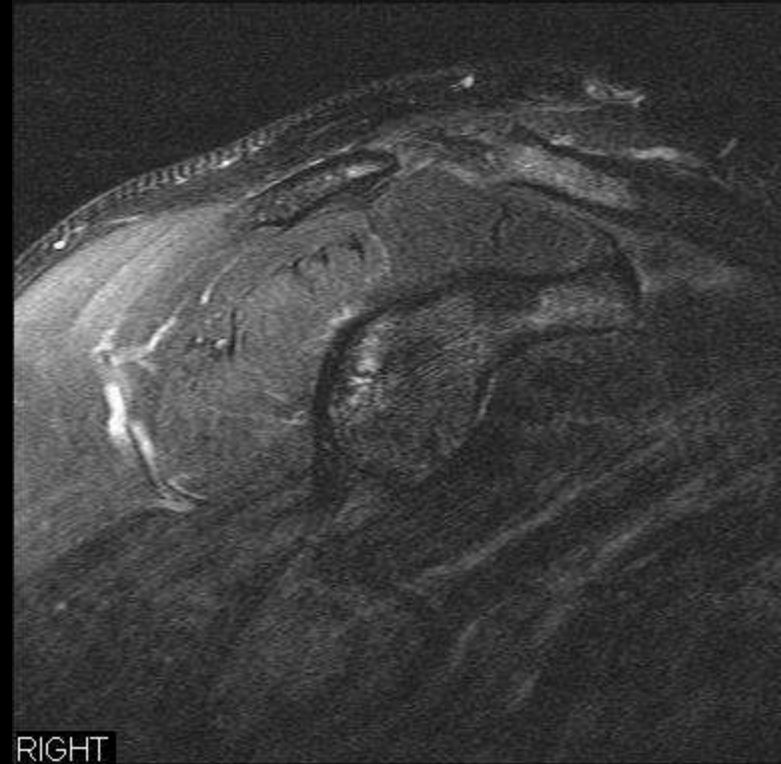
## Entrapment syndromes

# Spinoglenoid Notch Paralabral Cyst

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Sag T1



Sag PDFS

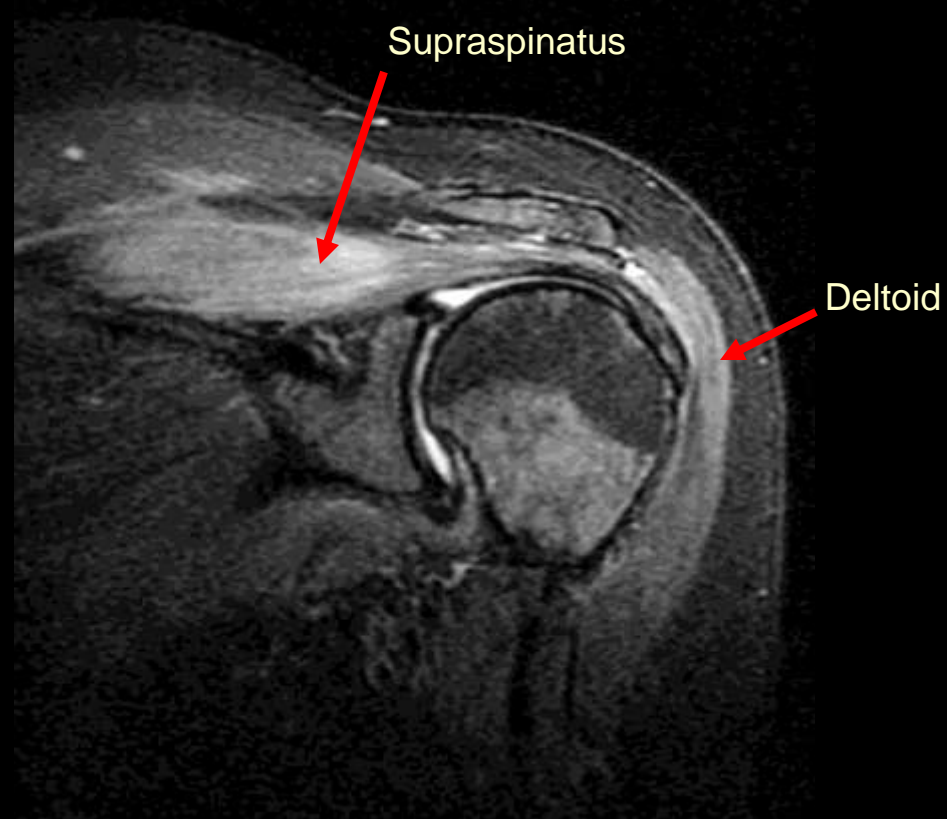
# Entrapment syndromes

## Denervation Neuropathy

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Cor PD



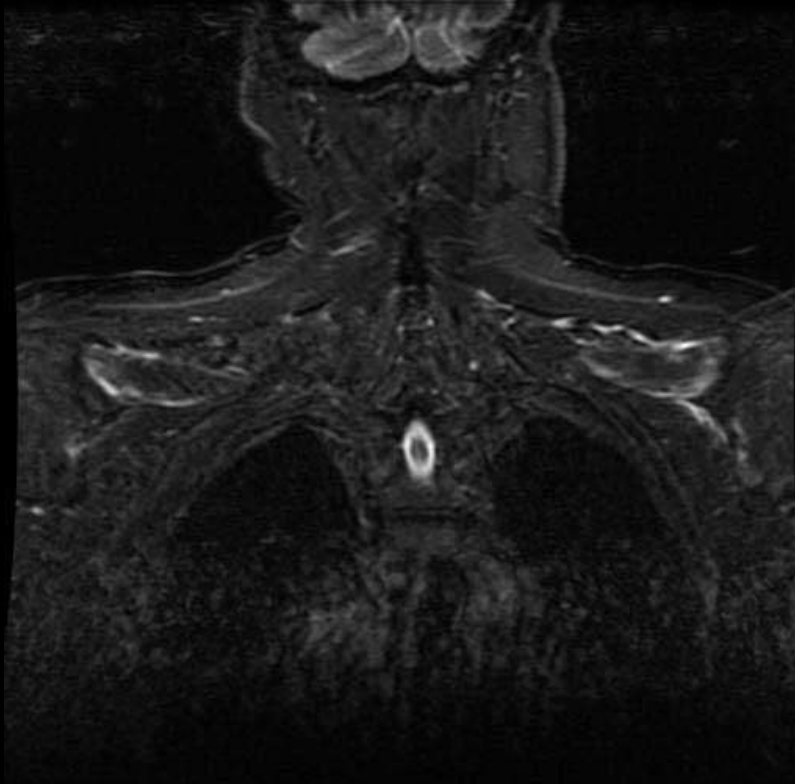
Cor IR



# Nerve Entrapment syndromes

## Bilateral Supraspinatus Edema

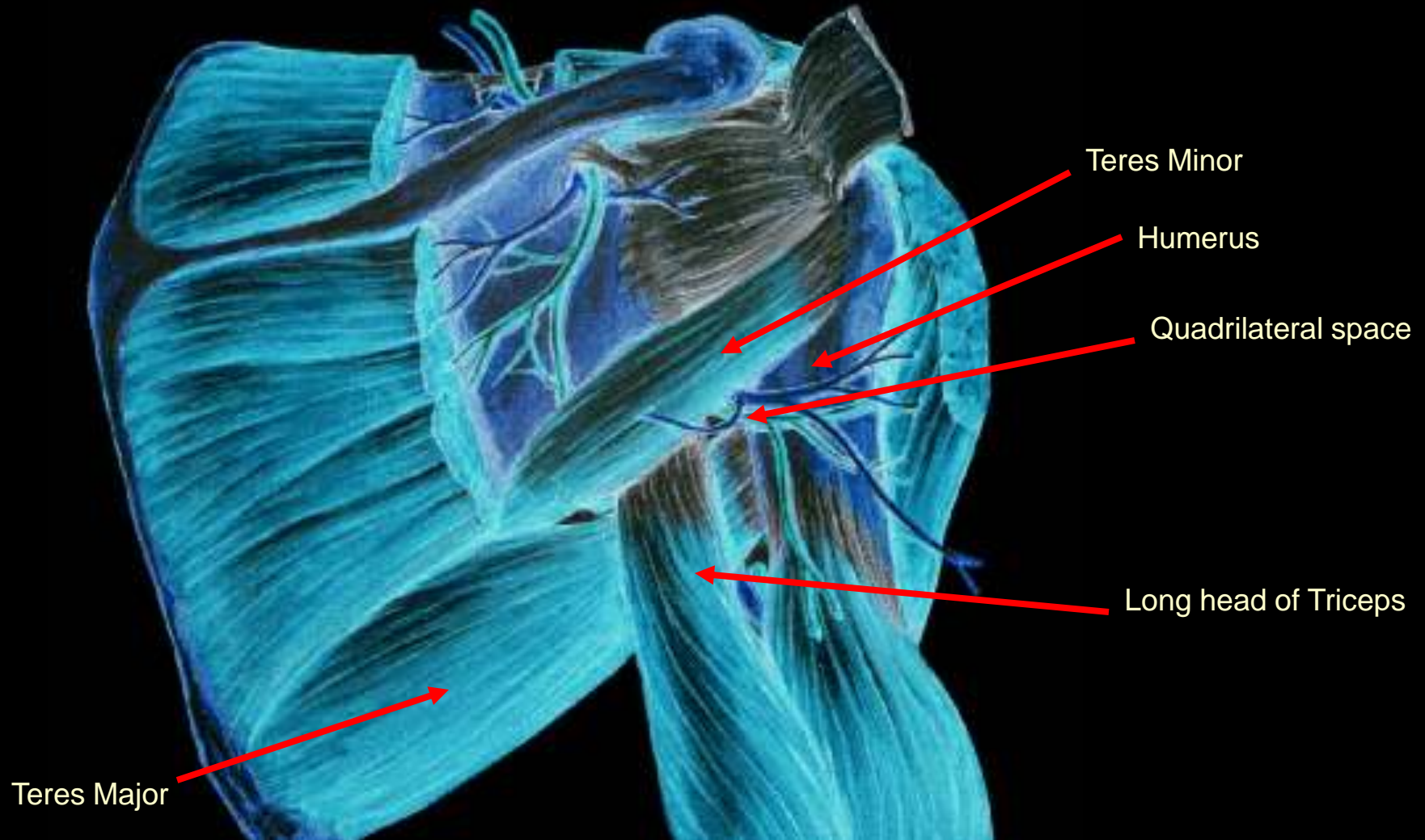
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# Entrapment syndromes

## Quadrilateral space

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# Entrapment syndromes

## Quadrilateral space

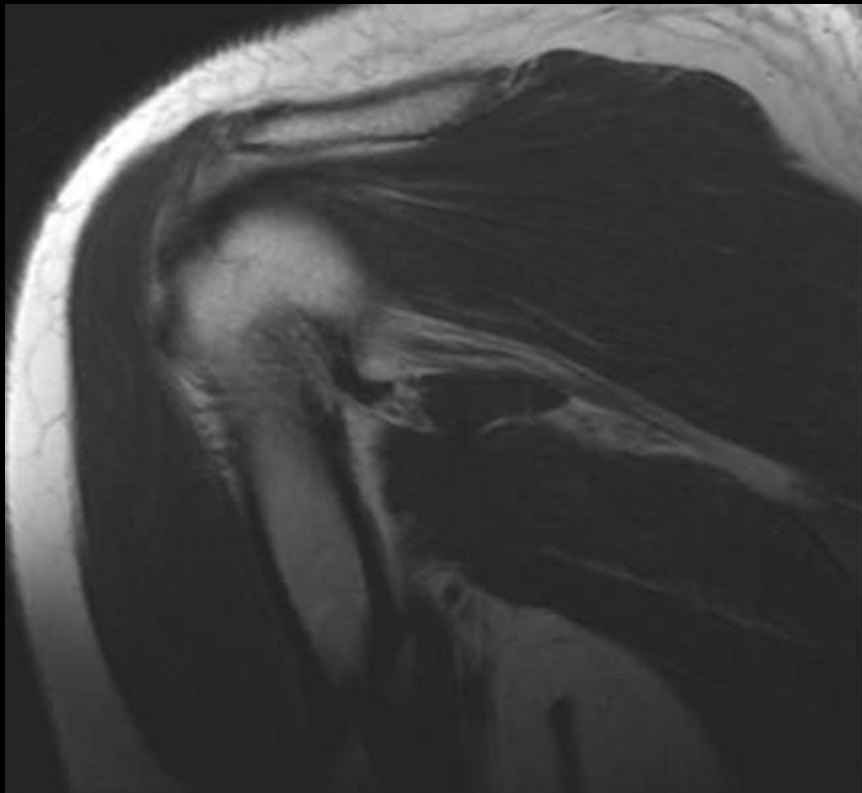
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- Compression of axillary nerve (and posterior humeral circumflex artery)
- Fibrous bands, mass, fx.
- Pain and paresthesias of lateral and posterosuperior aspect of shoulder
- Sxs. increase with abduction and ext. rotation
- Weakness and atrophy of deltoid and teres minor

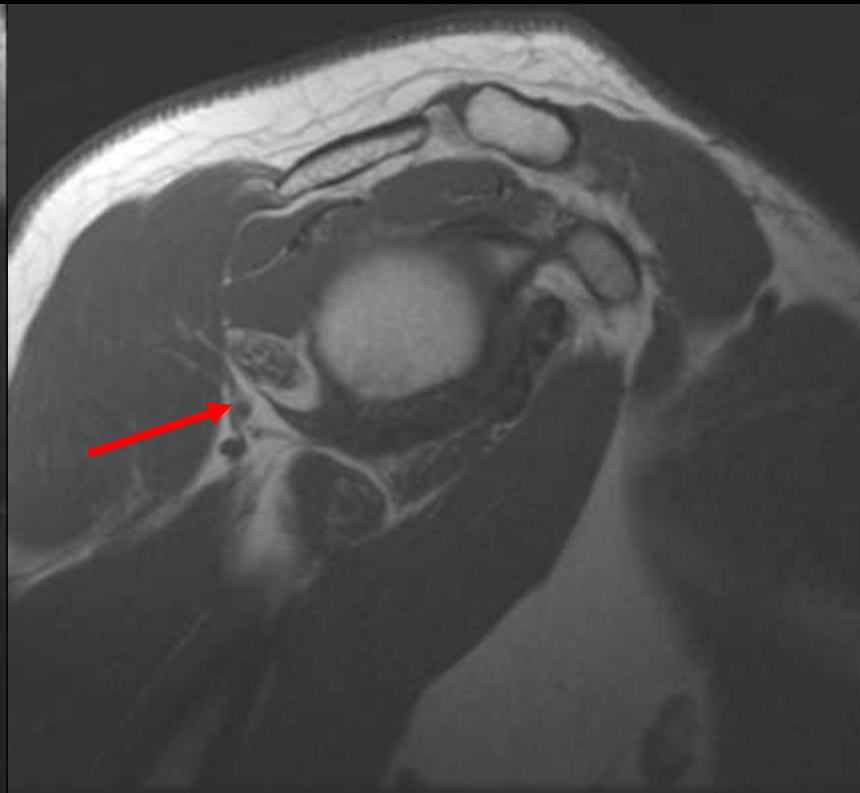


# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with fibrous band



Cor PD



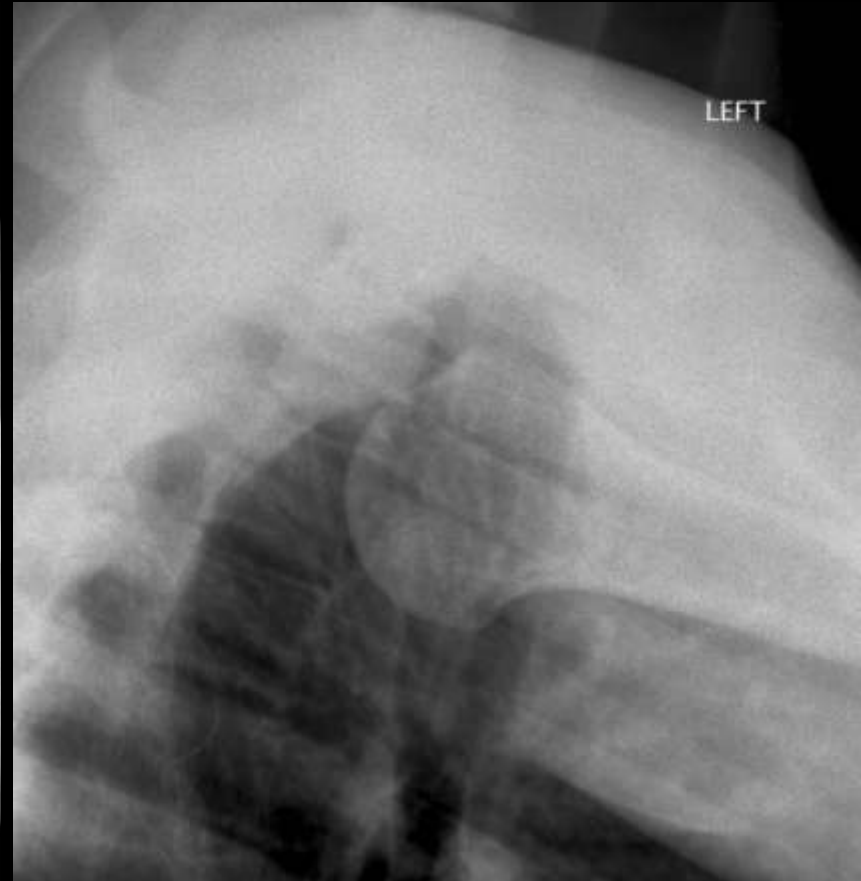
Sag T1

# Entrapment neuropathy - Axillary Nerve Teres Minor and Deltoid Atrophy

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April 06



LEFT

Axillary nerve atrophy following luxatio

# Entrapment neuropathy - Axillary Nerve Teres Minor and Deltoid Atrophy



May 06

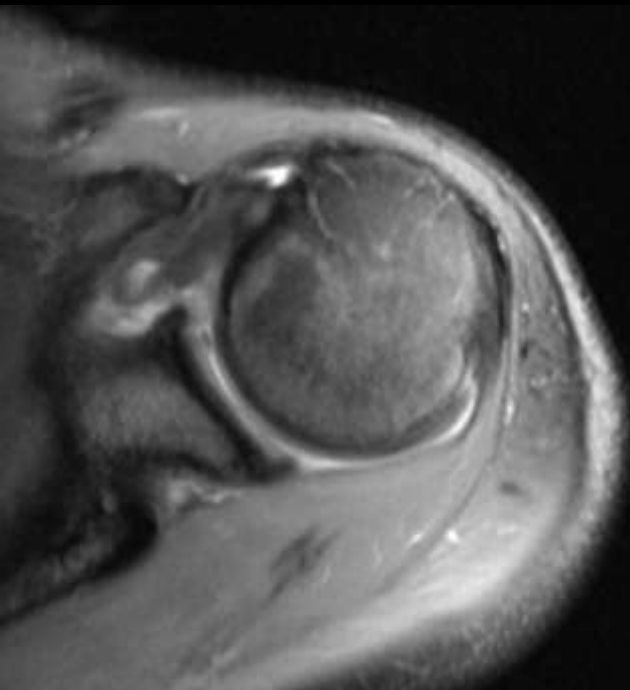


July 07

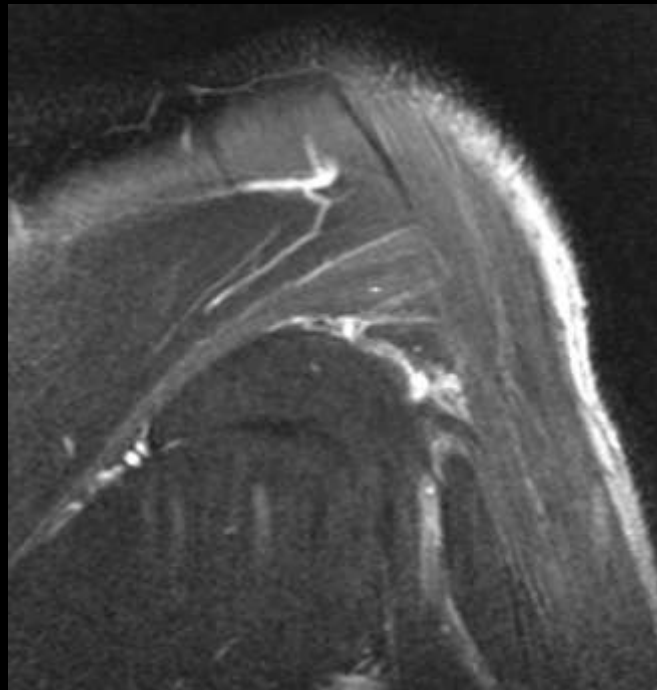
Axillary nerve atrophy following luxatio

# Entrapment neuropathy - Axillary Nerve Teres Minor and Deltoid Atrophy

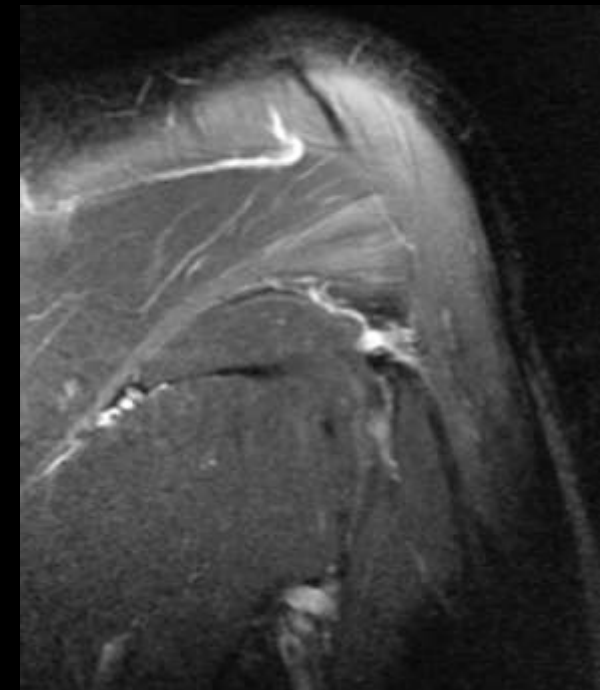
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Ax PDFS



Cor T2FS

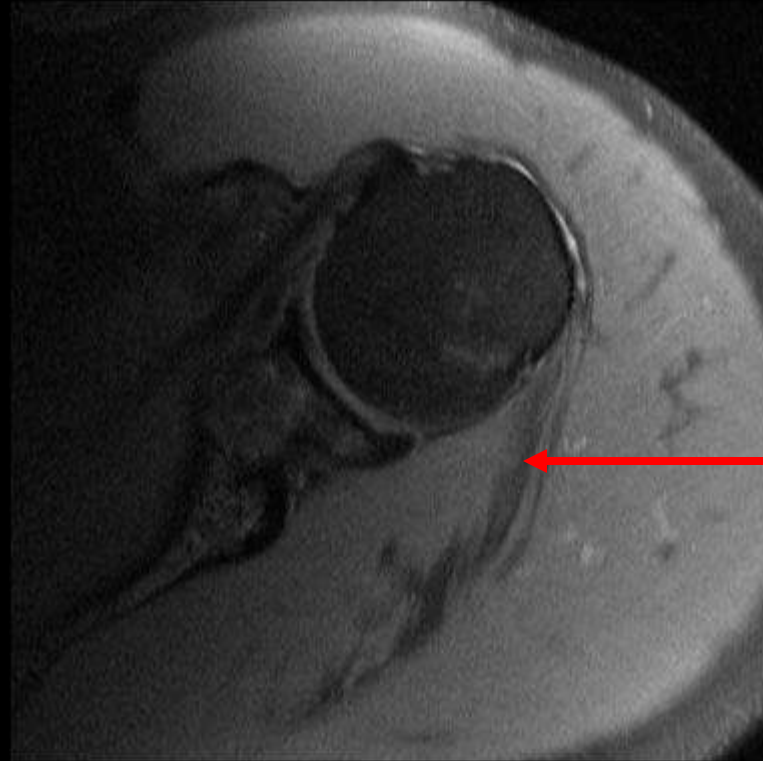


July 07

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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Teres minor

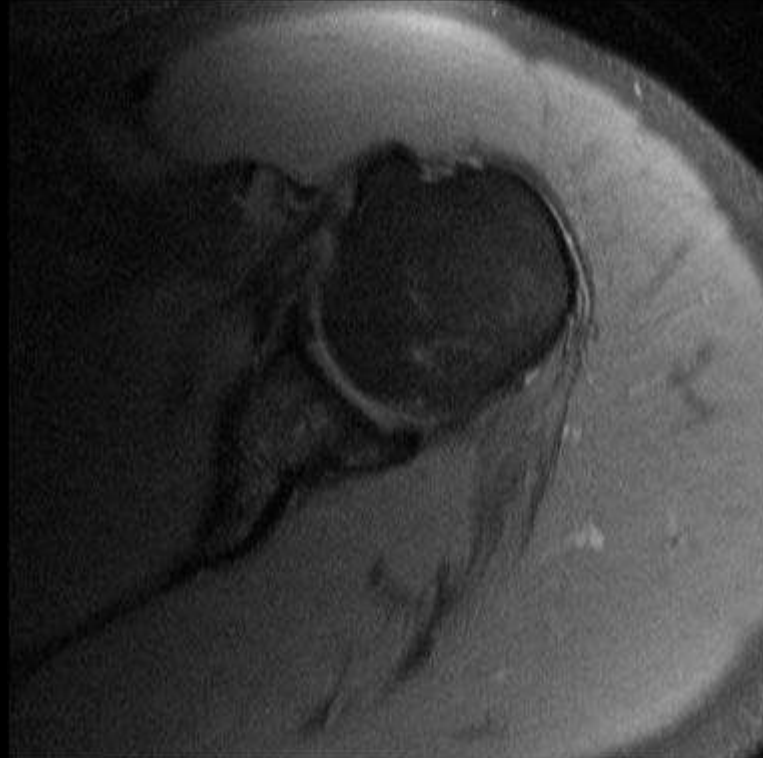
Ax PDFS



# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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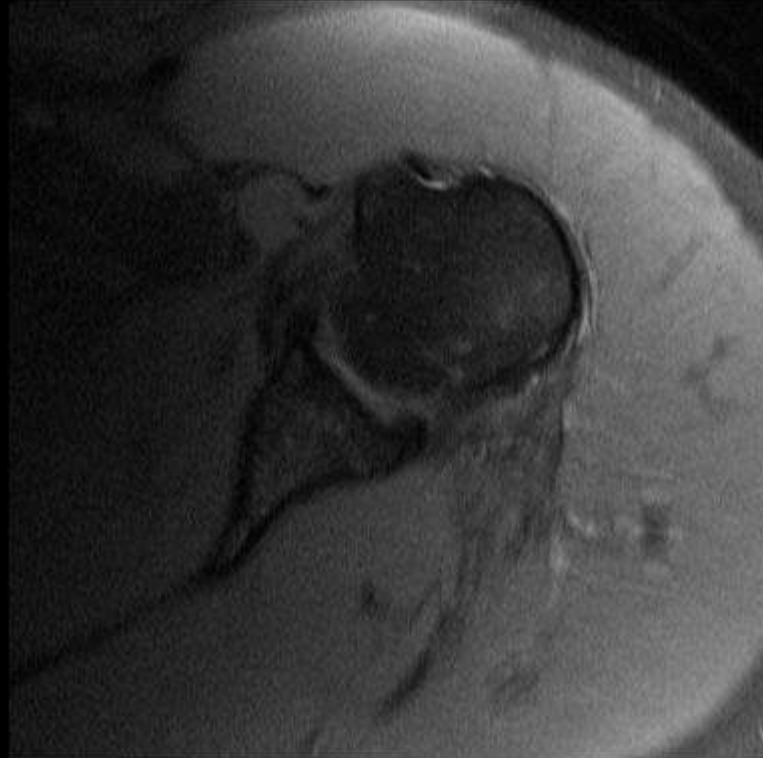


Ax PDFS

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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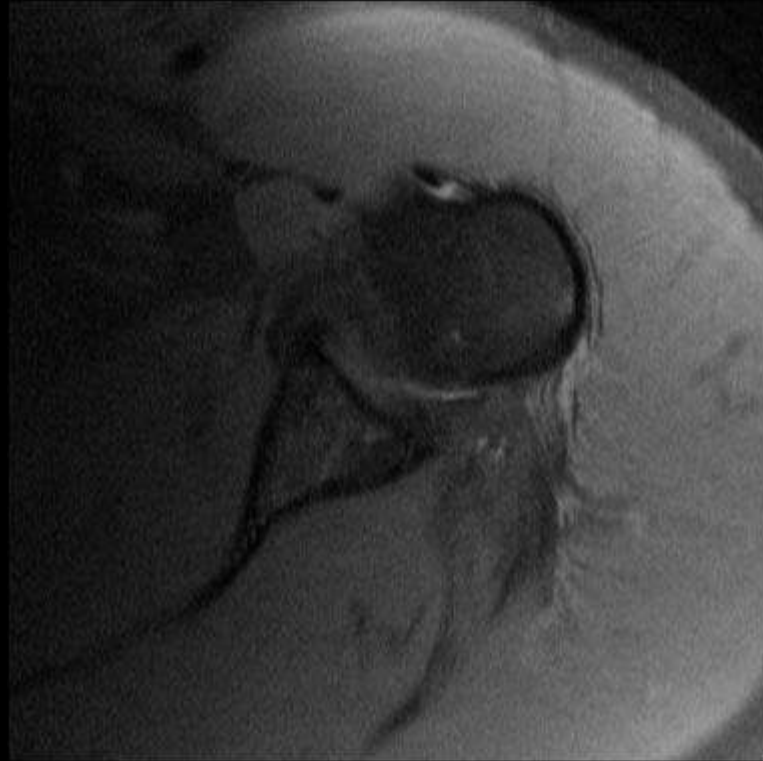


Ax PDFS

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

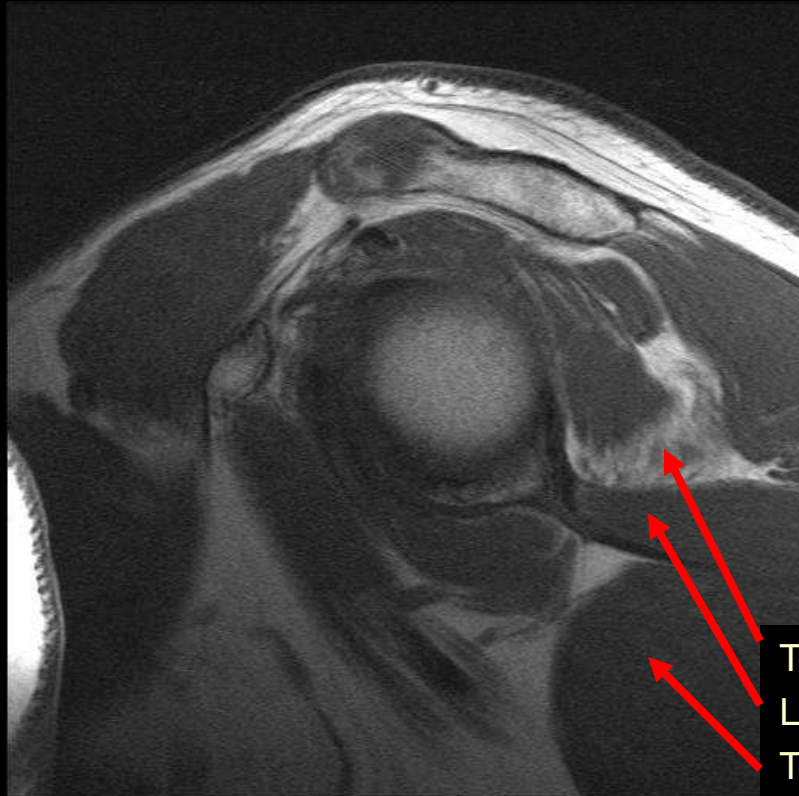
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Ax PDFS

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy



Sag T1

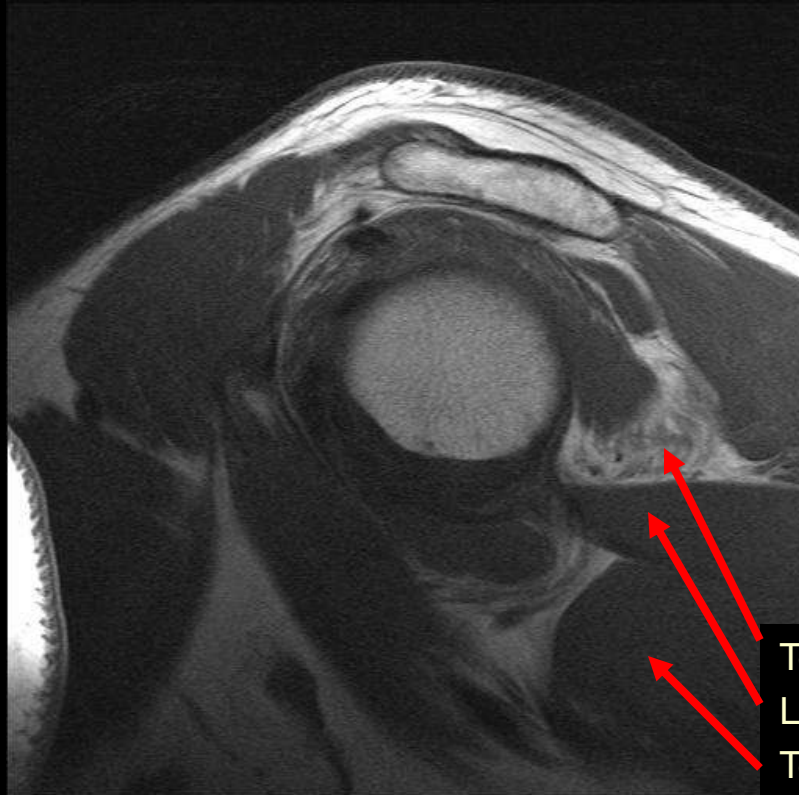


Sag PDFS

Teres Minor  
Long head of Triceps  
Teres Major

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy



Sag T1



Sag PDFS

Teres Minor  
Long head of Triceps  
Teres Major

# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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Sag T1



Sag PDFS

Quadrilateral space



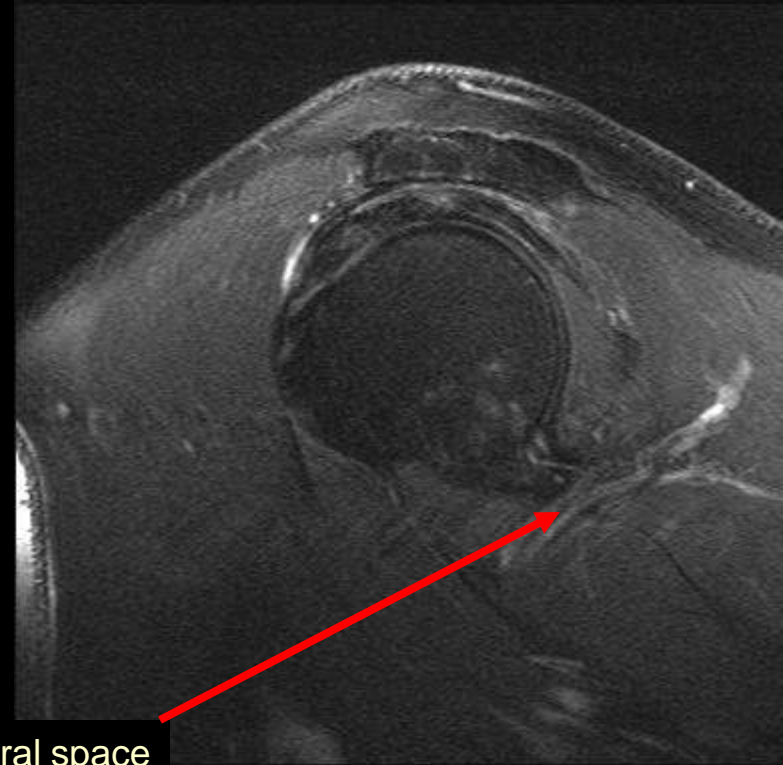
# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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Sag T1



Sag PDFS

Quadrilateral space

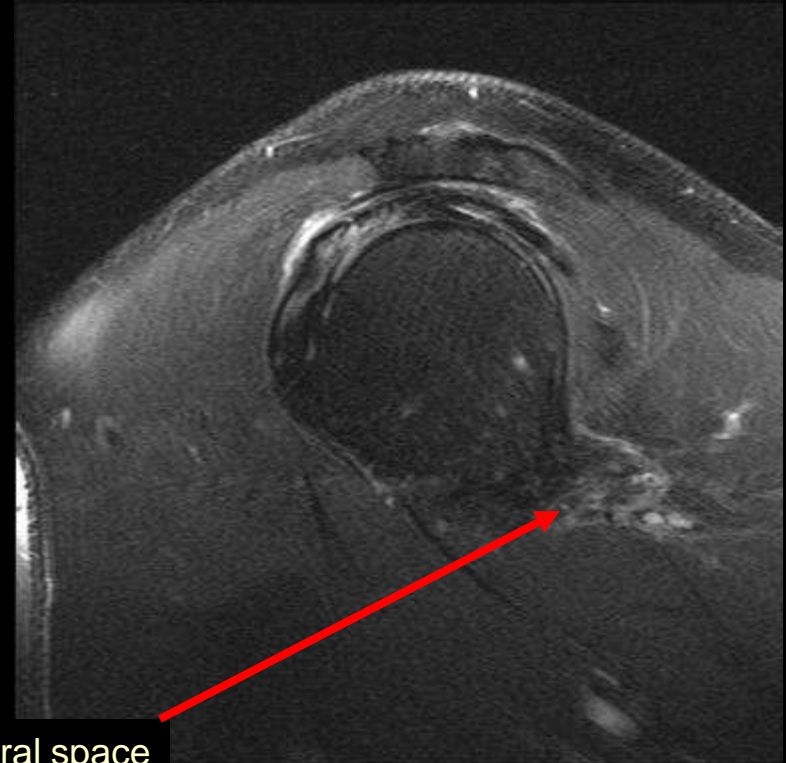
# Entrapment neuropathy - Axillary Nerve

## Teres Minor Atrophy

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Sag T1



Sag PDFS

Quadrilateral space

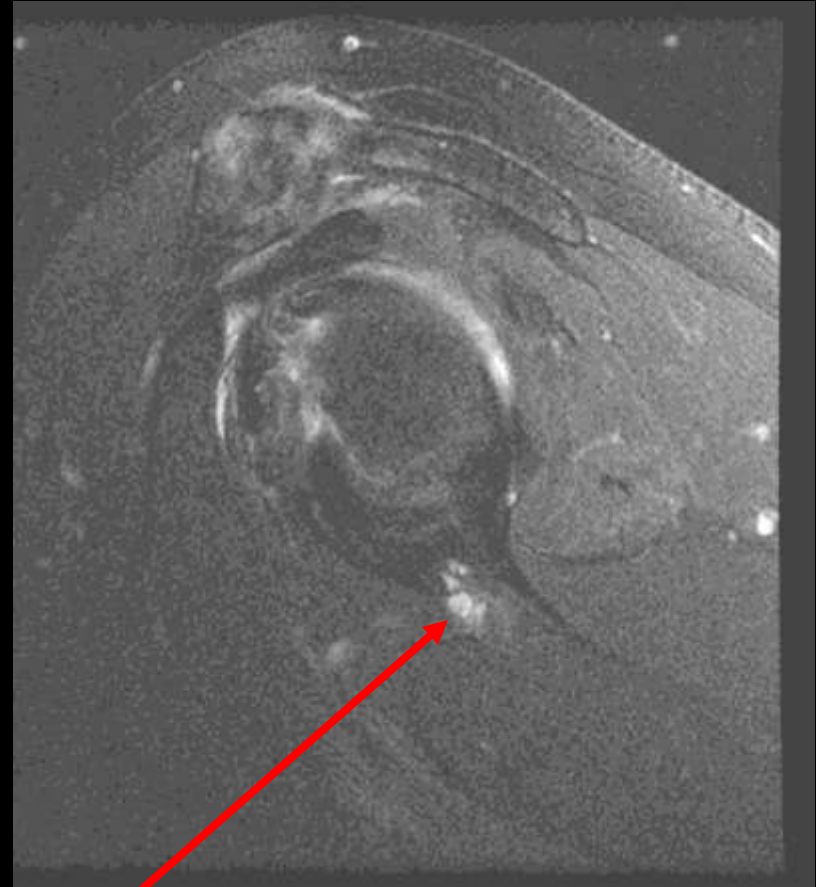
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Sag T1



Sag PDFS

Quadrilateral space ganglion

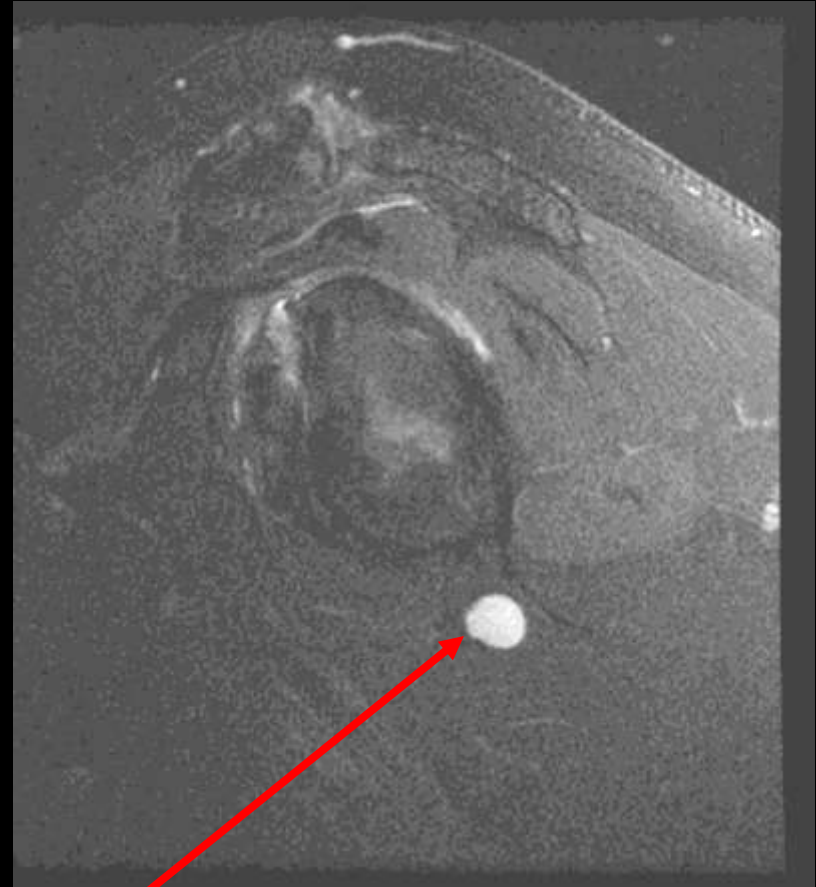
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Sag T1



Sag PDFS

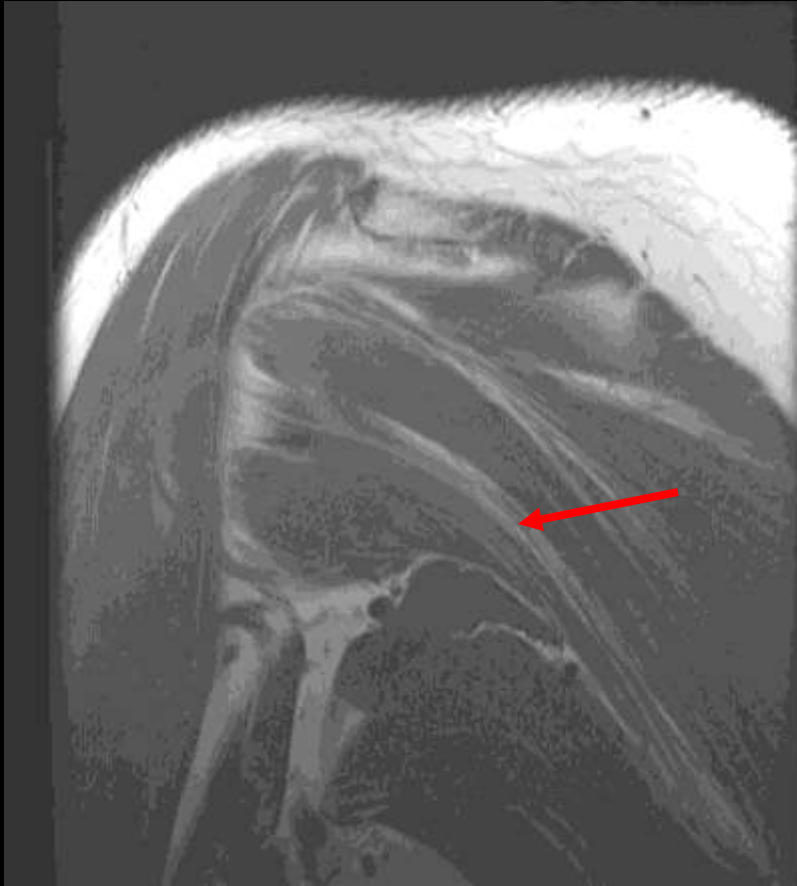
Quadrilateral space ganglion



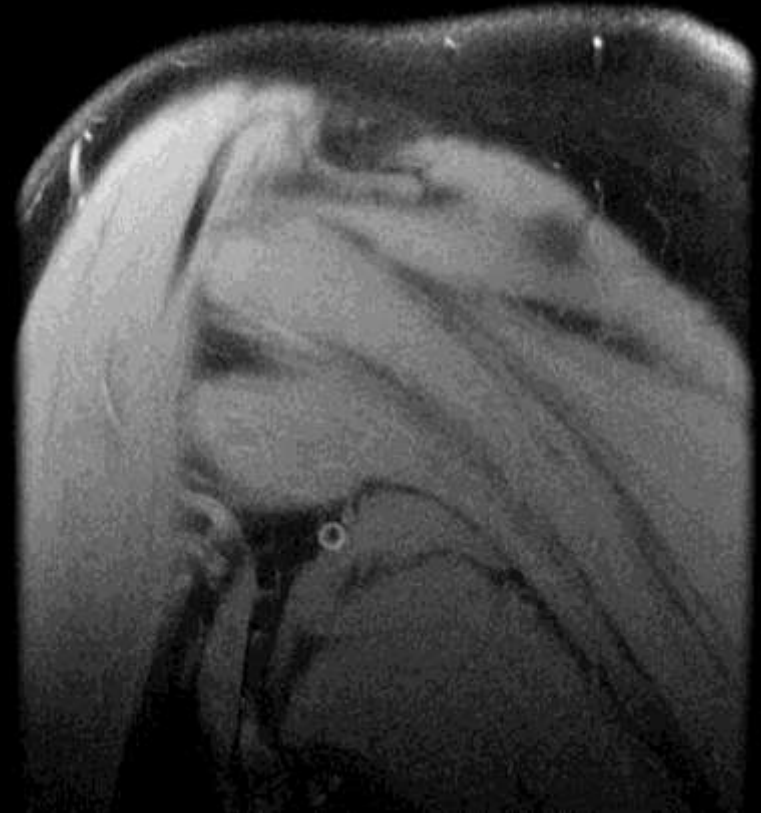
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Coronal PD

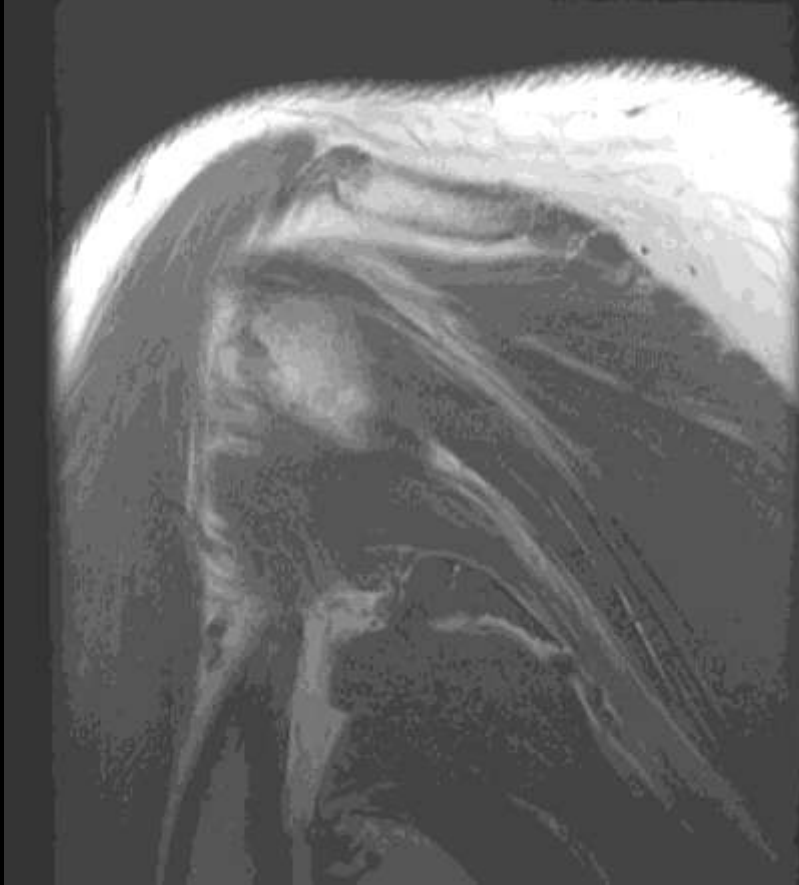


Coronal PDFS

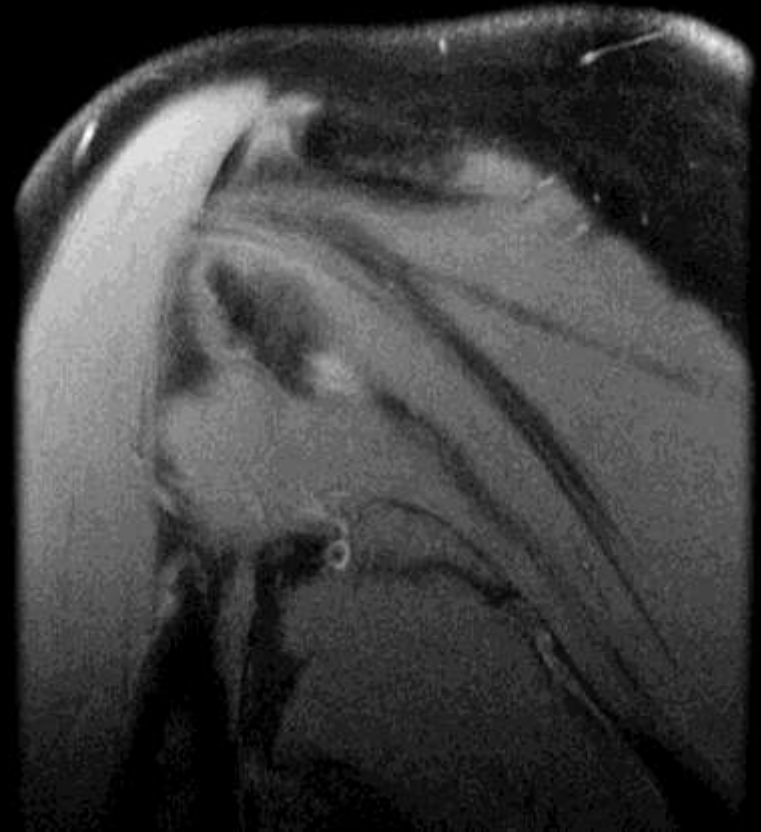
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

---



Coronal PD



Coronal PDFS



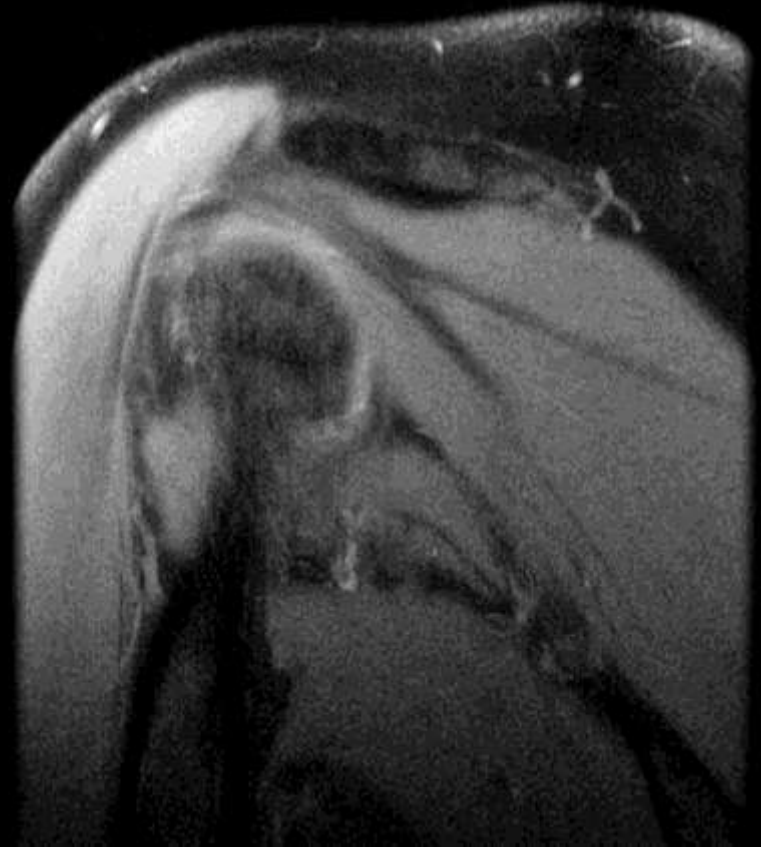
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Coronal PD



Coronal PDFS

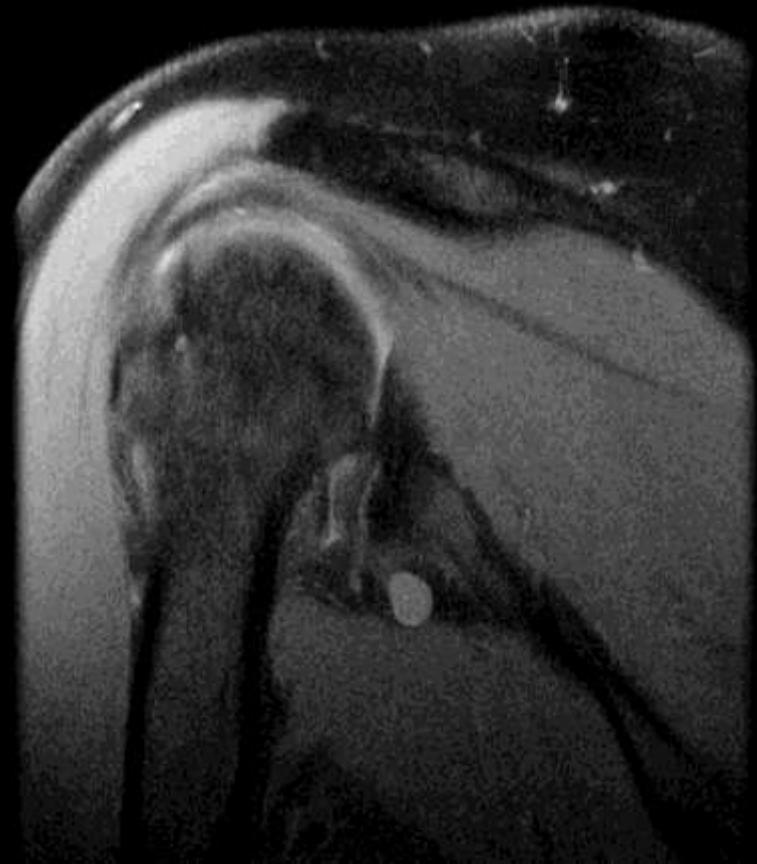
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Coronal PD

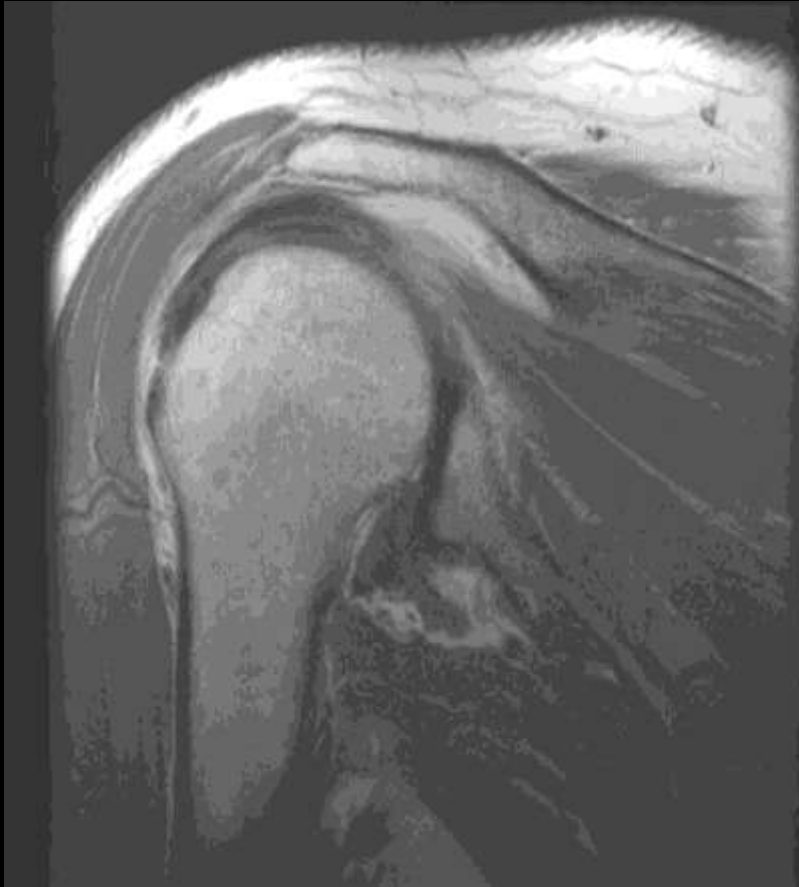


Coronal PDFS

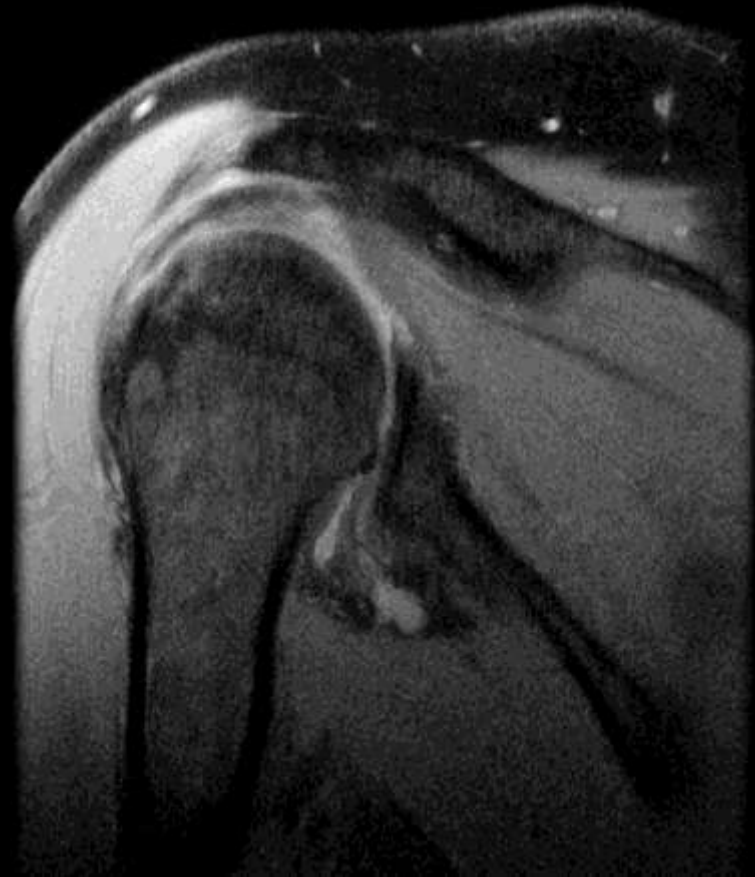
# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Coronal PD

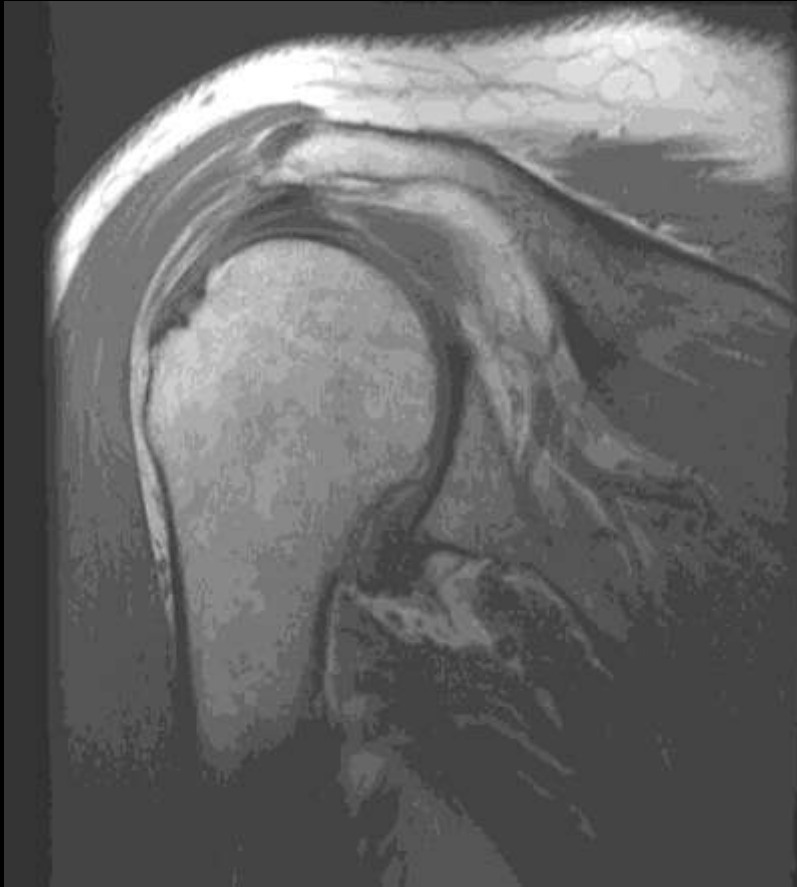


Coronal PDFS

# Entrapment neuropathy - Axillary Nerve

## Teres minor atrophy with inferior labral ganglion

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Coronal PD



Coronal PDFS

# Entrapment neuropathy

## Median Nerve

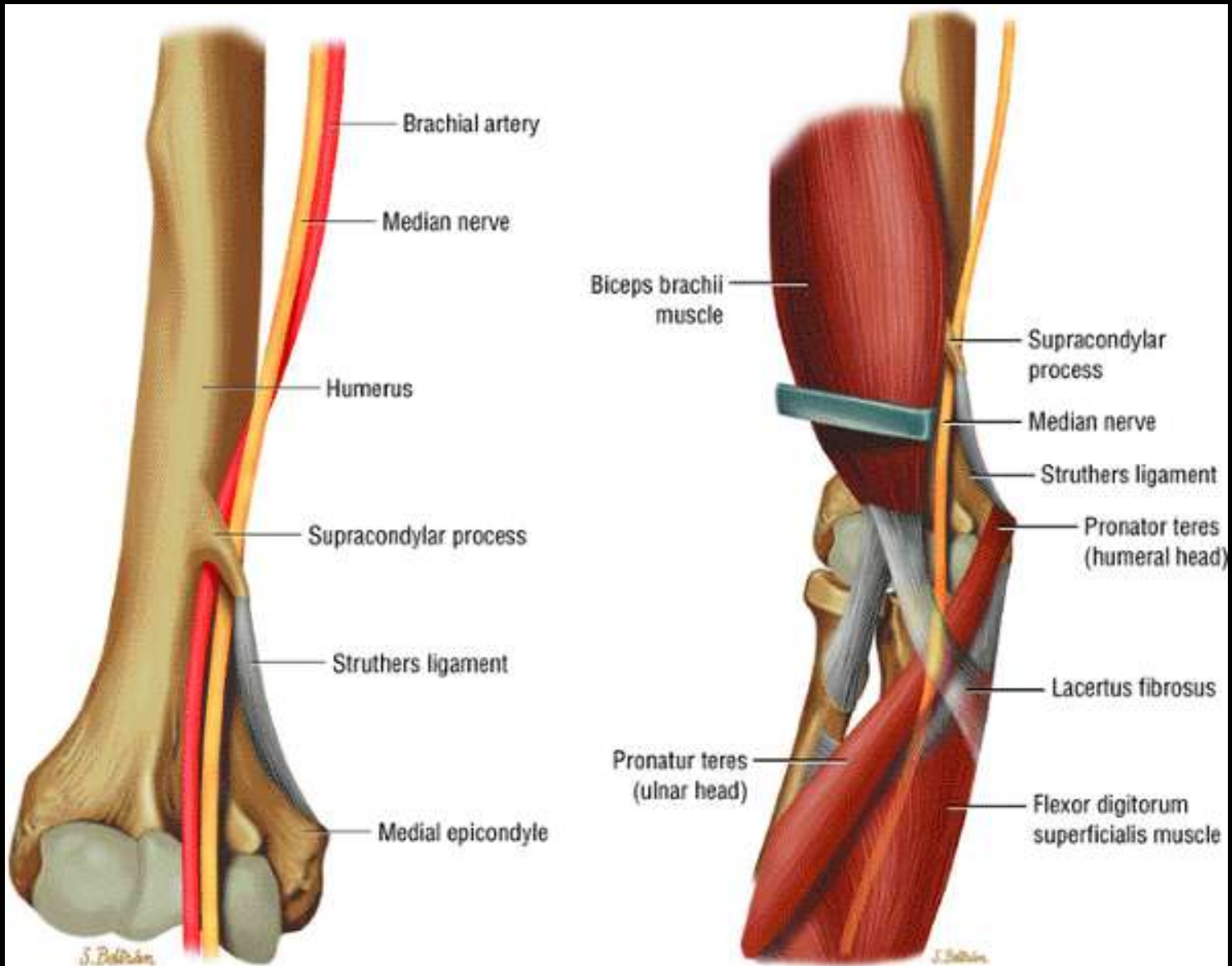
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- C5-T1
  - Ligament of Struthers
  - Lacertus fibrosus
  - Pronator Syndrome
    - Between heads of pronator teres
  - Anterior Interosseous Syndrome
    - Within forearm
  - Carpal Tunnel Syndrome





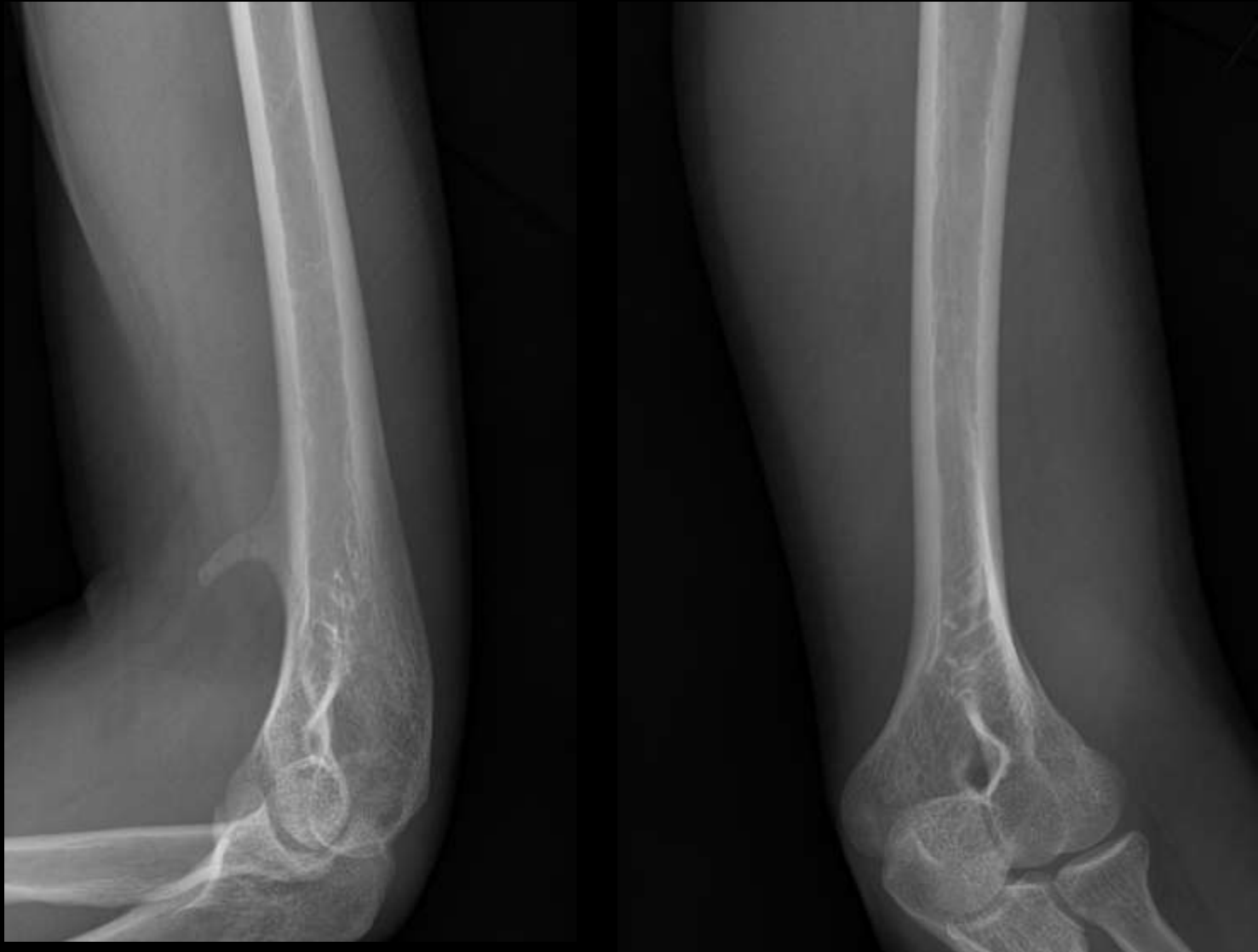
# Entrapment neuropathy - Median Nerve Ligament of Struthers





# Entrapment neuropathy - Median Nerve Ligament of Struthers

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Open water swimmer, arm pain    Avian Spur fracture

# Entrapment neuropathy - Median Nerve Ligament of Struthers

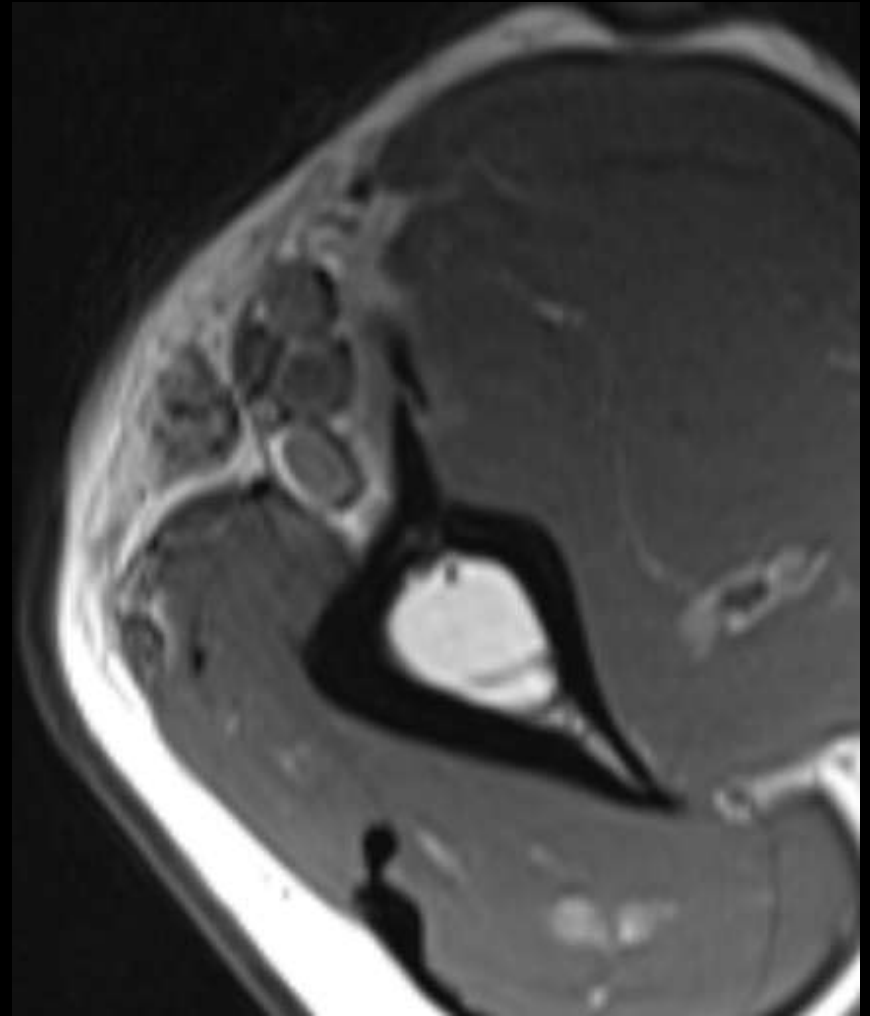
---



Open water swimmer, arm pain    Avian Spur fracture

# Entrapment neuropathy - Median Nerve Ligament of Struthers

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Open water swimmer, arm pain    Avian Spur fracture

# Avian Spur

---

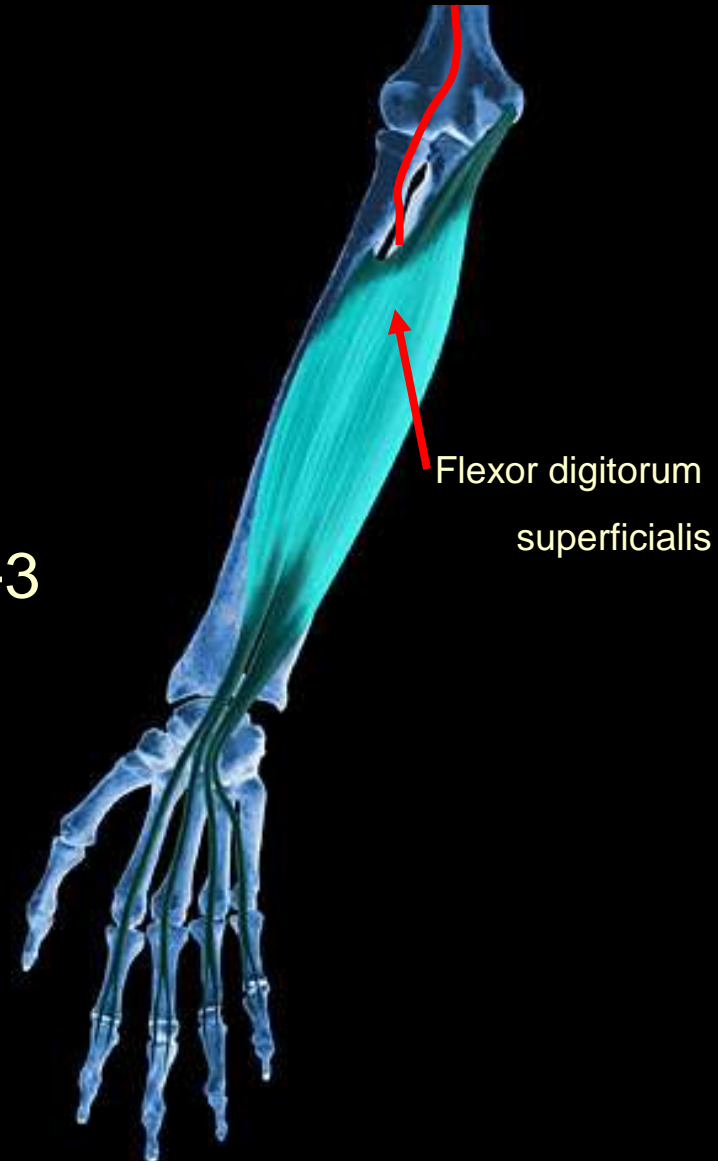
- 3% population
- Potential nerve entrapment caused by ligament of Struthers or accessory muscle slips/fascia
- Fracture may precipitate the neuropathy
  - Hematoma/callus in a constrained space

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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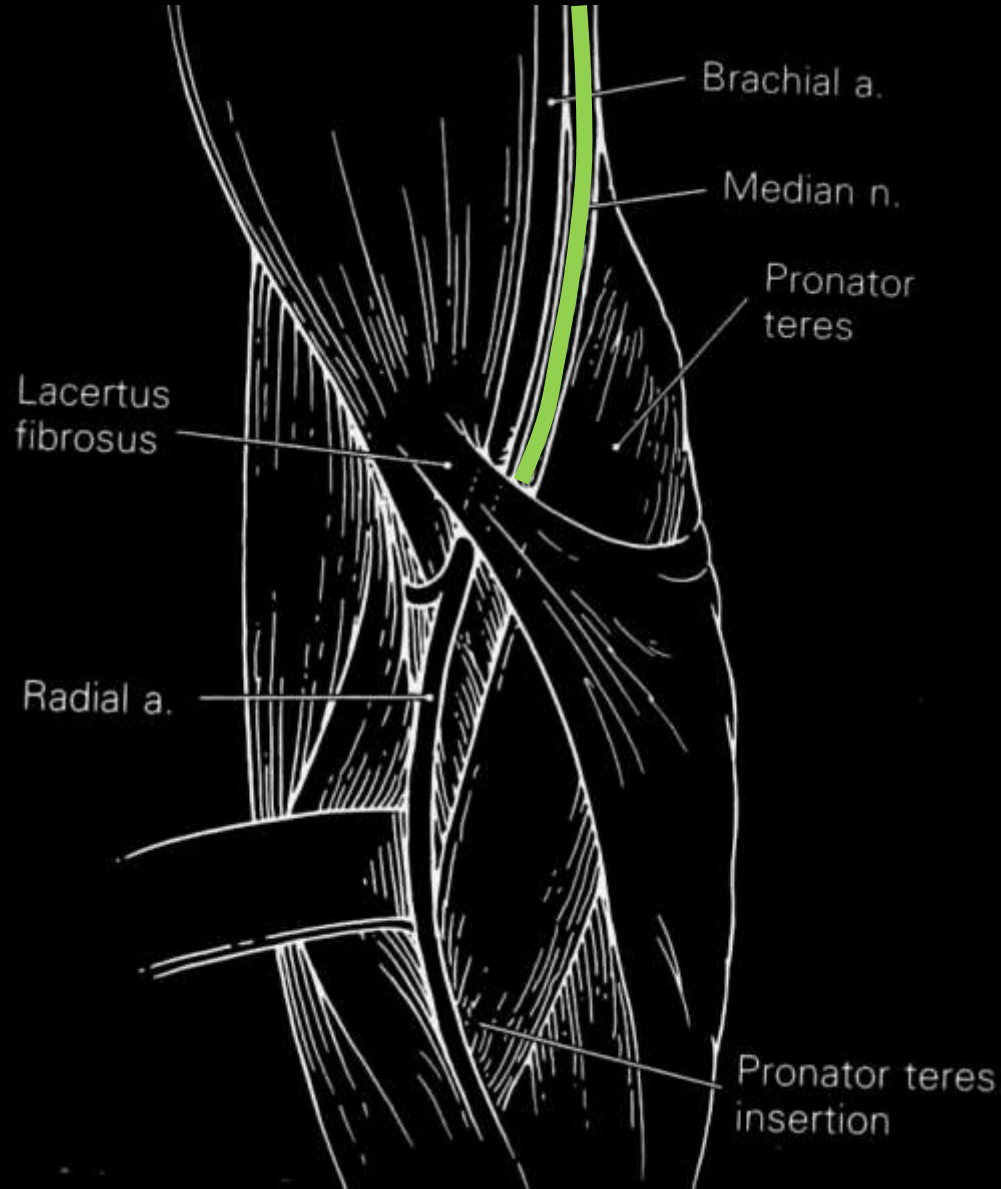
- AKA Kiloh-Nevin Syndrome
- Purely motor
  - Pronator quadratus
  - Flexor Pollicis Longus
  - Flexor Digitorum Profundus 2+3
- Passes deep to aponeurotic free border of FDS to lie between FPL and FDP



# Entrapment neuropathy

## Median Nerve

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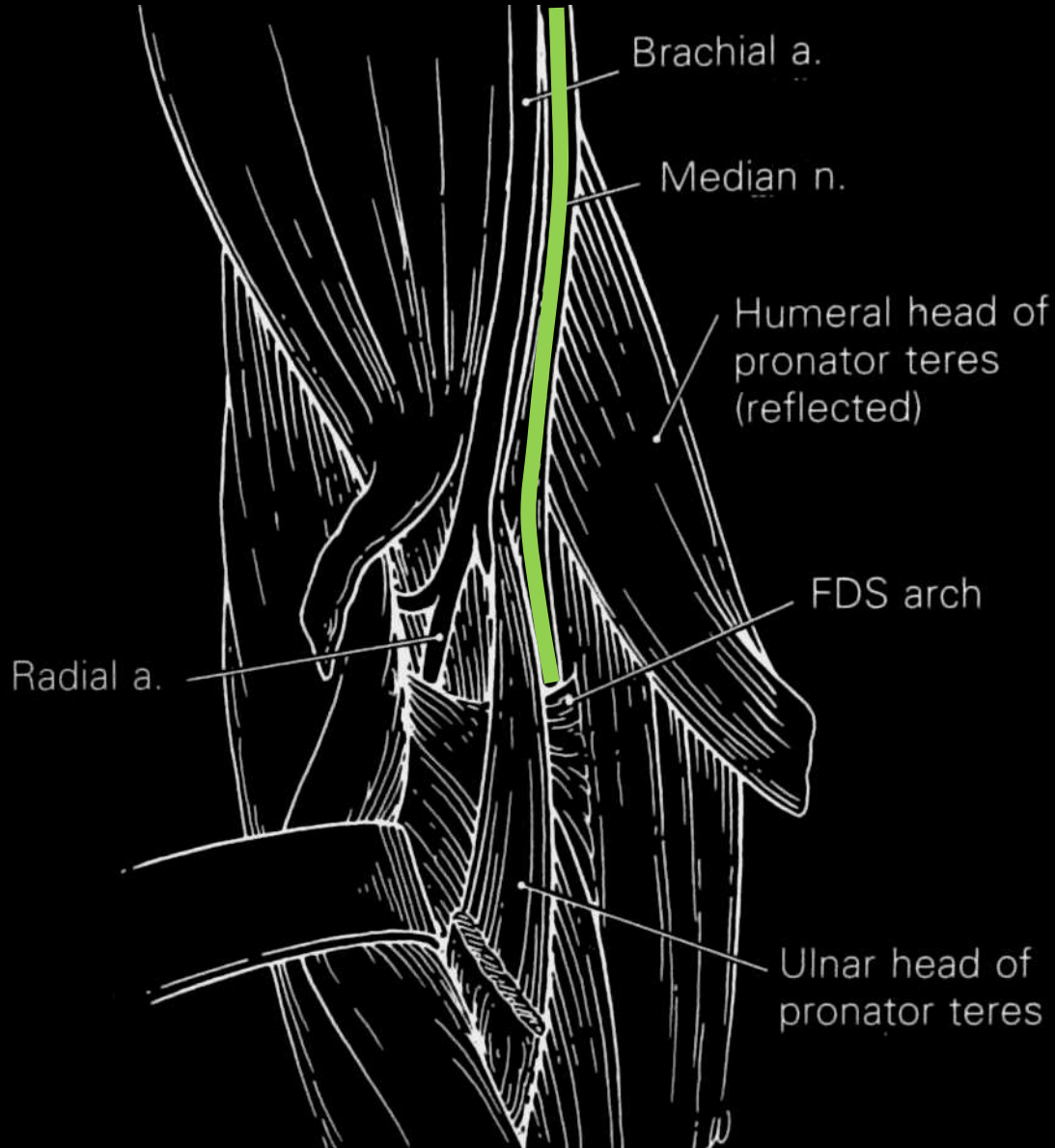




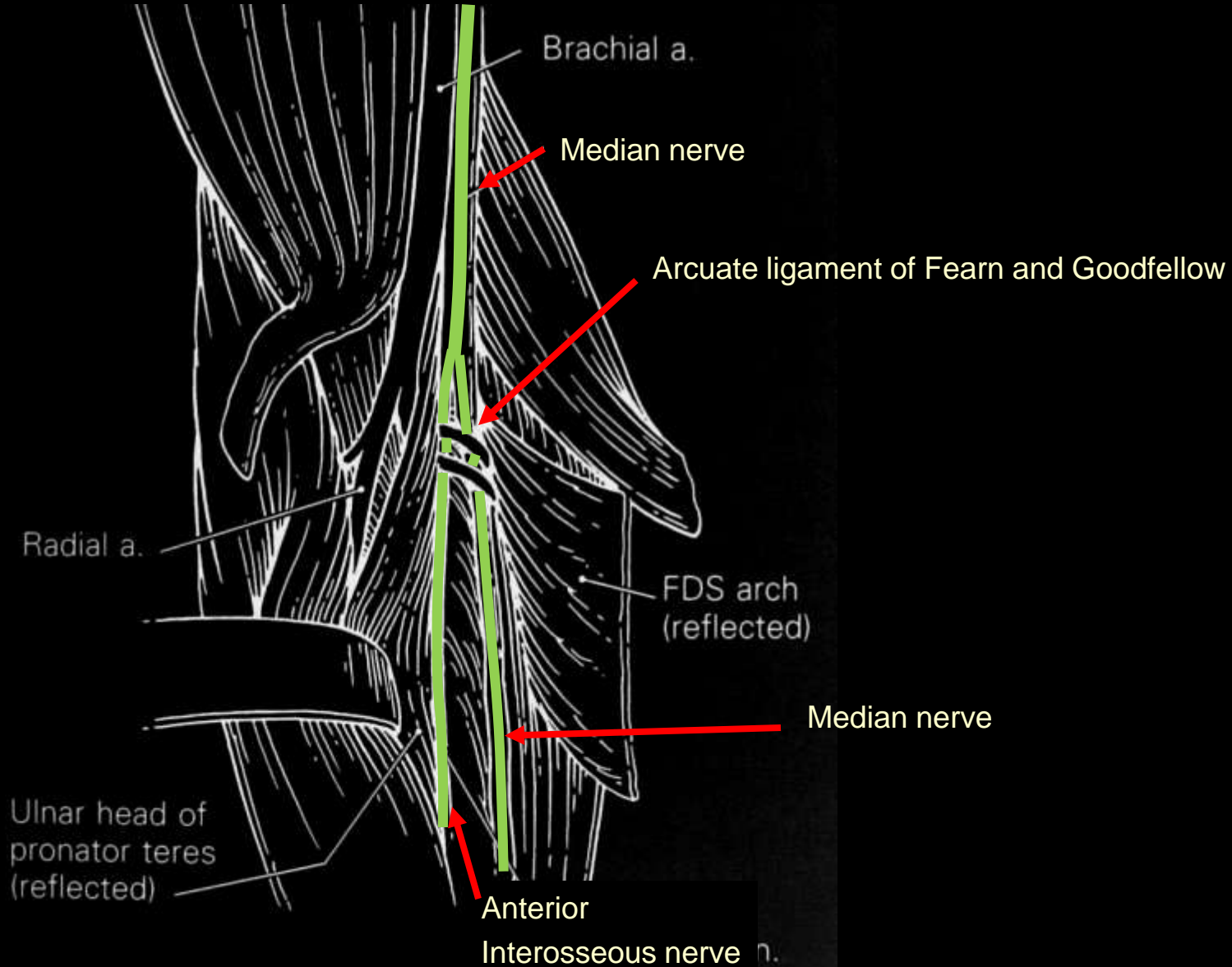
# Entrapment neuropathy

## Median Nerve

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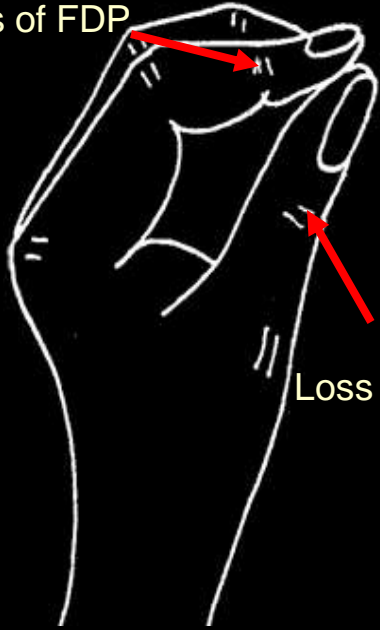
# Entrapment neuropathy Median Nerve



# Entrapment neuropathy - Median Nerve - Anterior Interosseous Syndrome

## The "Circle Sign"

Loss of FDP



Loss of FPL



•normal



•Isolated palsy of flexor pollicis longus



•Isolated palsy of flexor digitorum profundus (index finger)

•flexor pollicis longus palsy

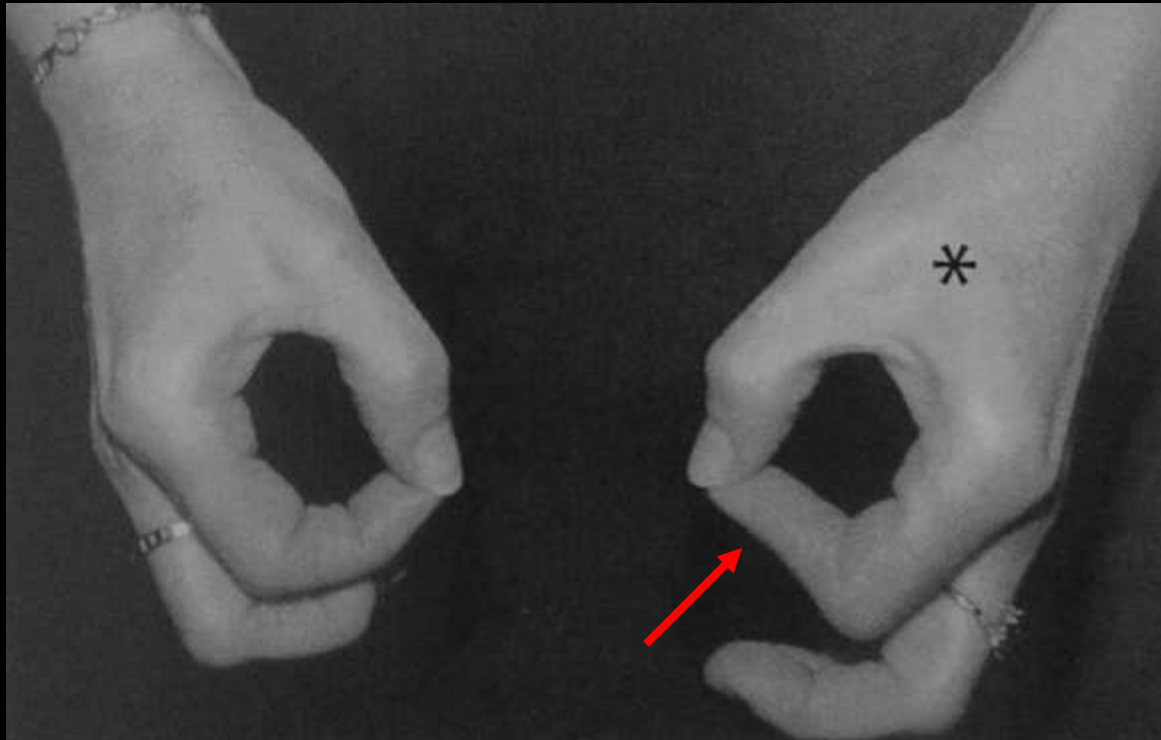
• +

•flexor digitorum profundus (index finger) palsy

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Weakness FDP > FPL

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

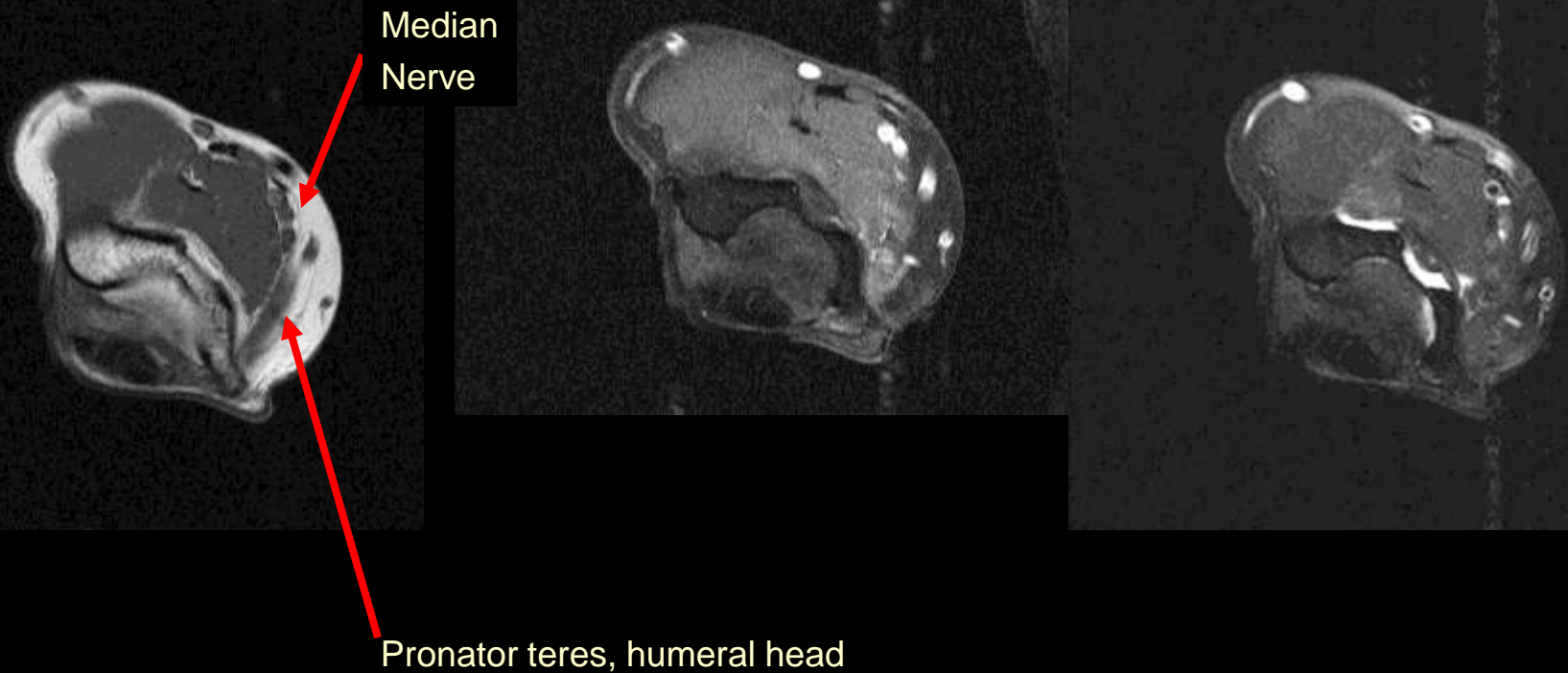
Ax PDFS

Ax T2FS

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

Ax PDFS

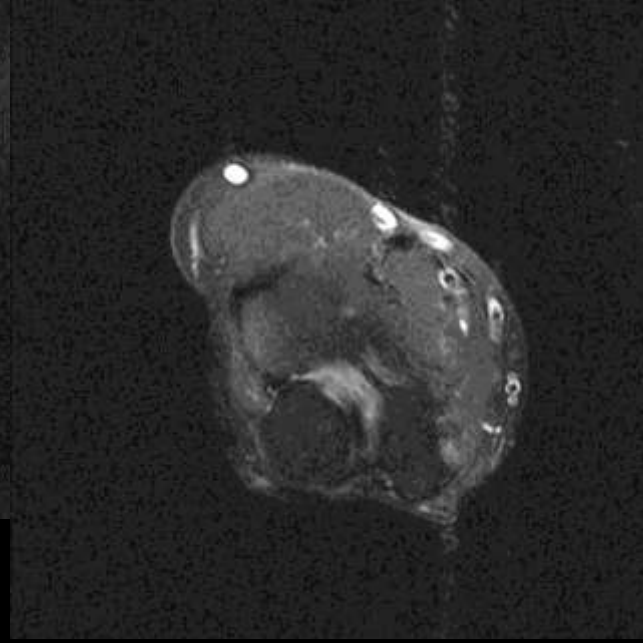
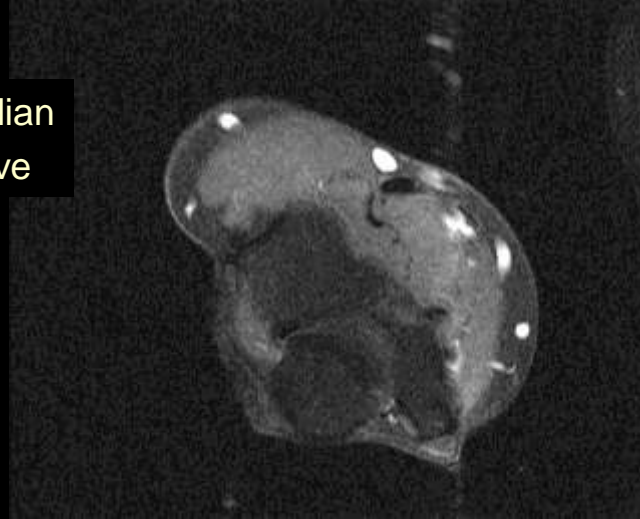
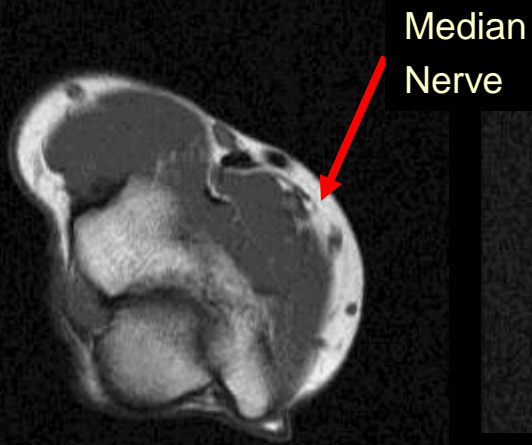
Ax T2FS



# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

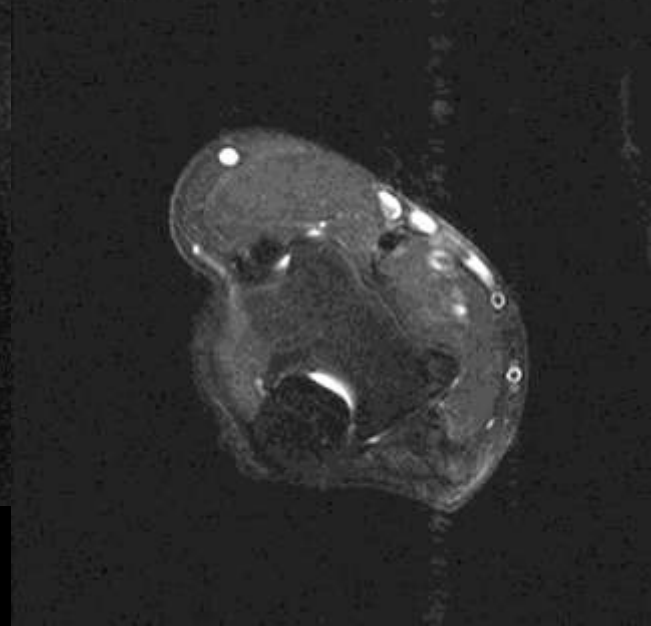
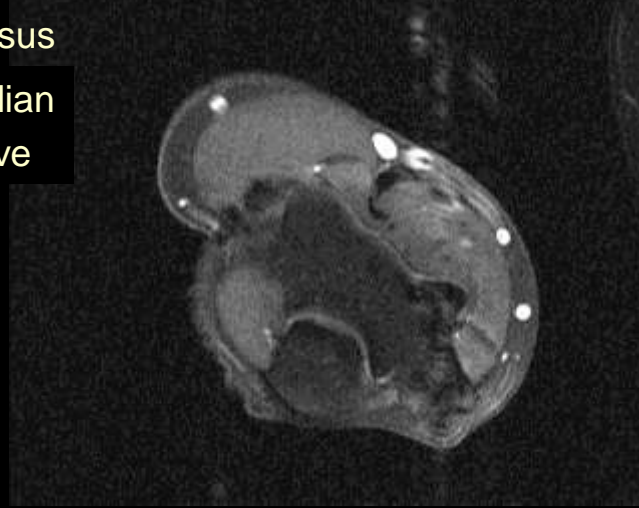
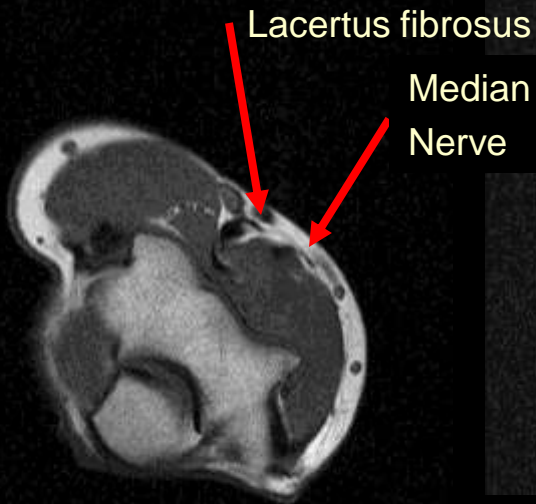
Ax PDFS

Ax T2FS

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

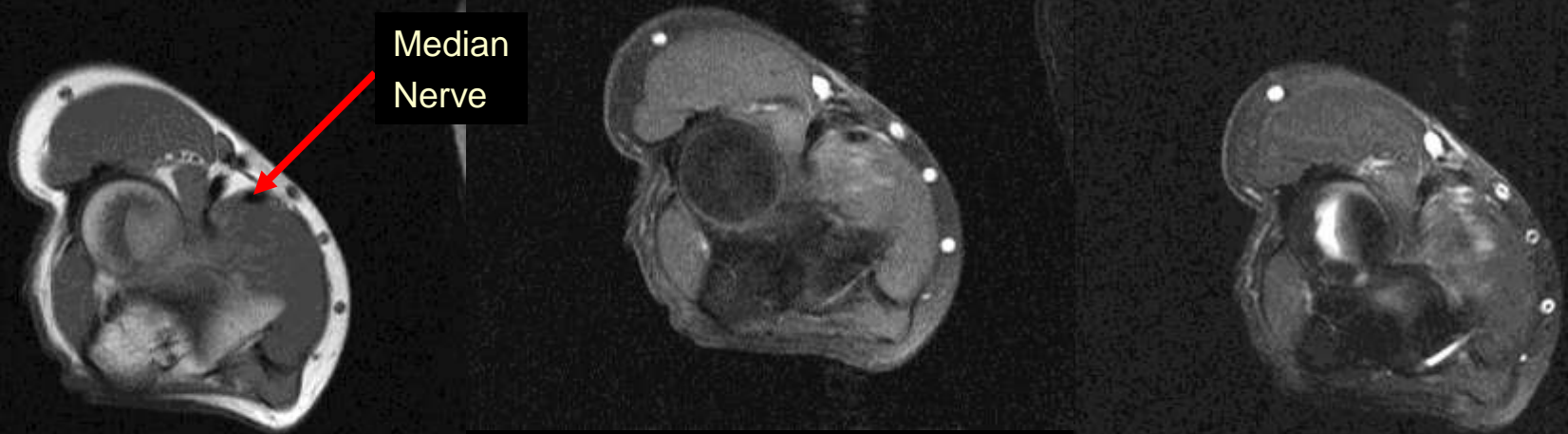
Ax PDFS

Ax T2FS

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

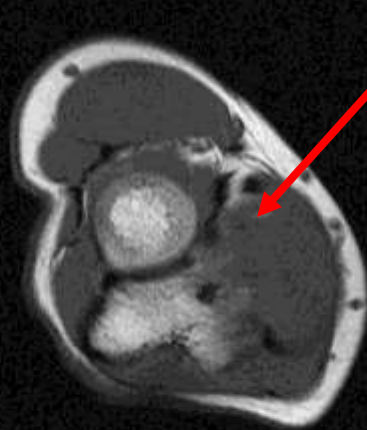
Ax PDFS

Ax T2FS

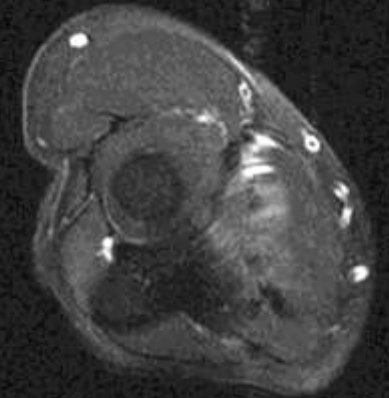
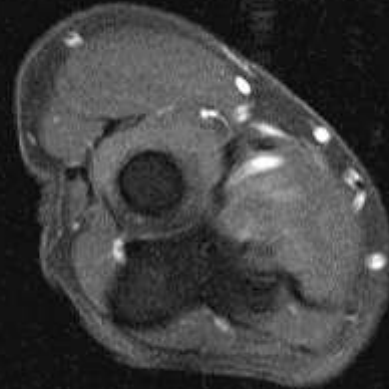
# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Median  
Nerve



Ax T1

Ax PDFS

Ax T2FS

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Ax T1

Ax PDFS

Ax T2FS



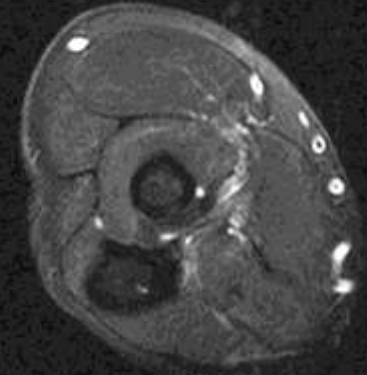
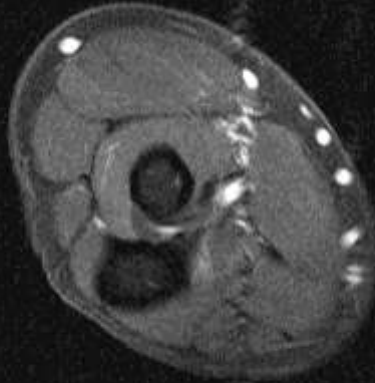
# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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Median  
Nerve



Ax T1

Ax PDFS

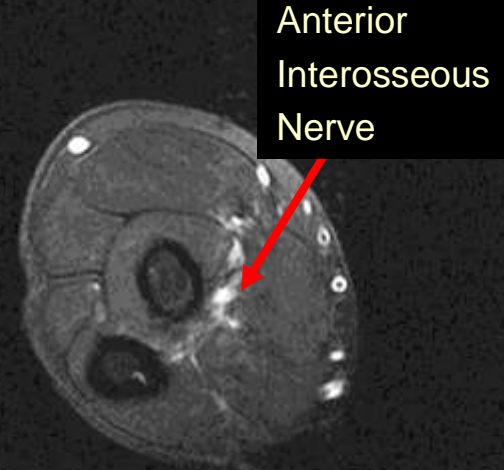
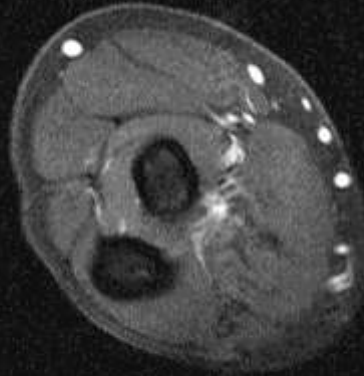
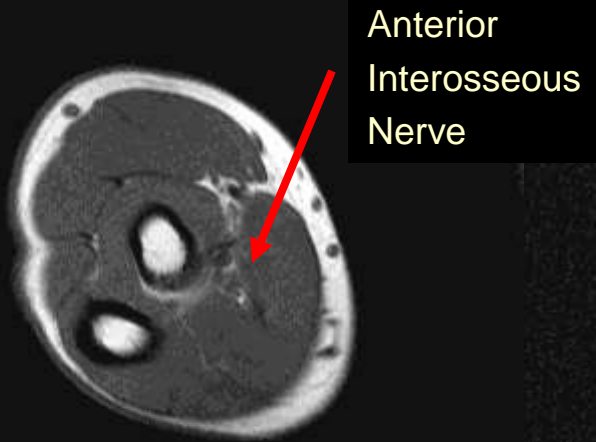
Ax T2FS



# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

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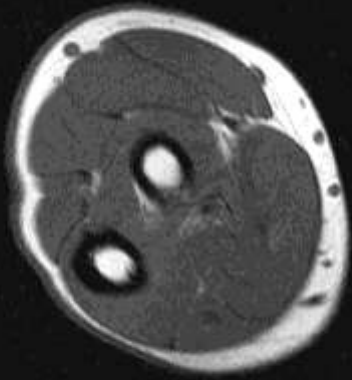
Ax T1

Ax PDFS

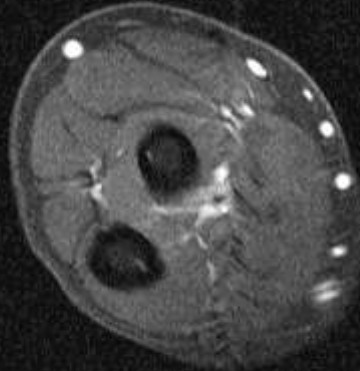
Ax T2FS

# Entrapment neuropathy - Median Nerve Anterior Interosseous Syndrome

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Ax T1



Ax PDFS

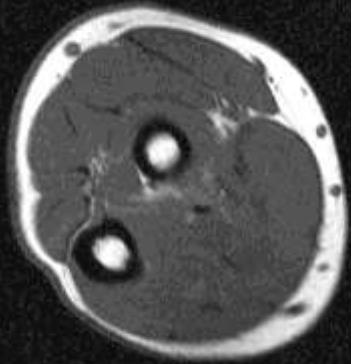


FDP 2+3  
FDP 4+5

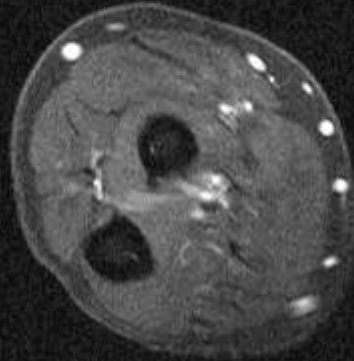
Ax T2FS

# Entrapment neuropathy - Median Nerve Anterior Interosseous Syndrome

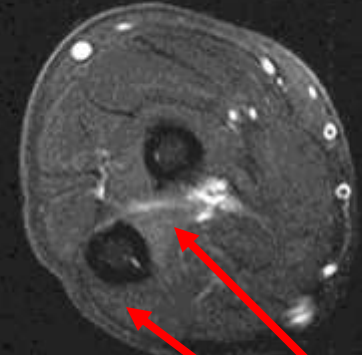
---



Ax T1



Ax PDFS



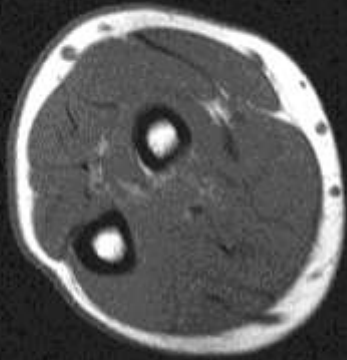
FDP 2+3  
FDP 4+5

Ax T2FS

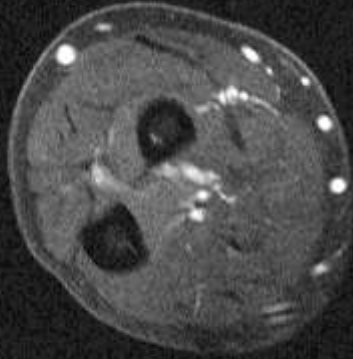
# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

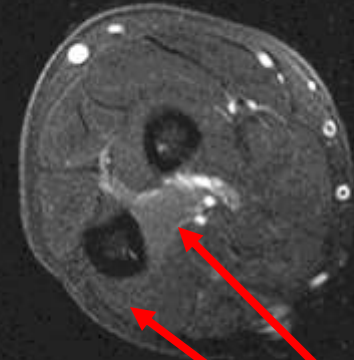
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Ax T1



Ax PDFS

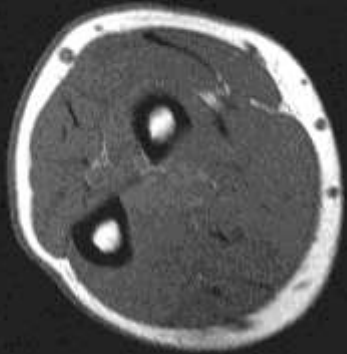


FDP 2+3  
FDP 4+5

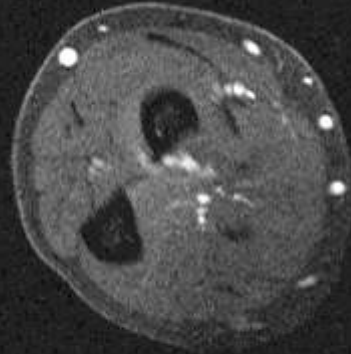
Ax T2FS

# Entrapment neuropathy - Median Nerve Anterior Interosseous Syndrome

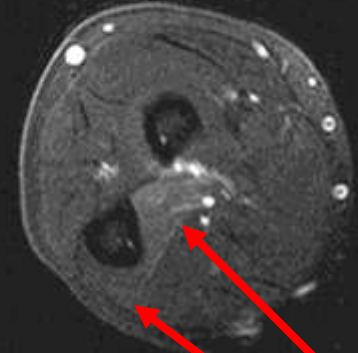
---



Ax T1



Ax PDFS

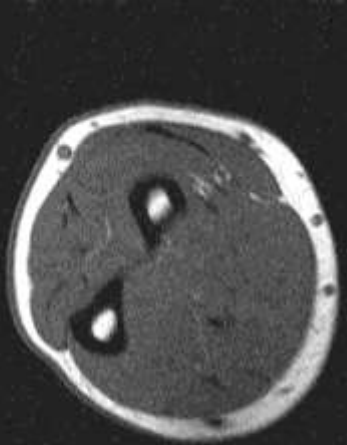


FDP 2+3  
FDP 4+5

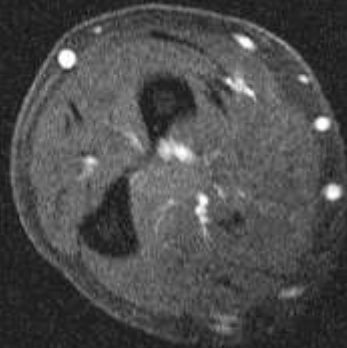
Ax T2FS

# Entrapment neuropathy - Median Nerve Anterior Interosseous Syndrome

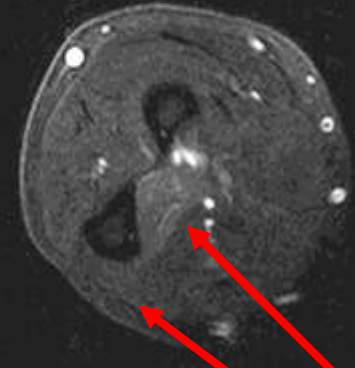
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Ax T1



Ax PDFS



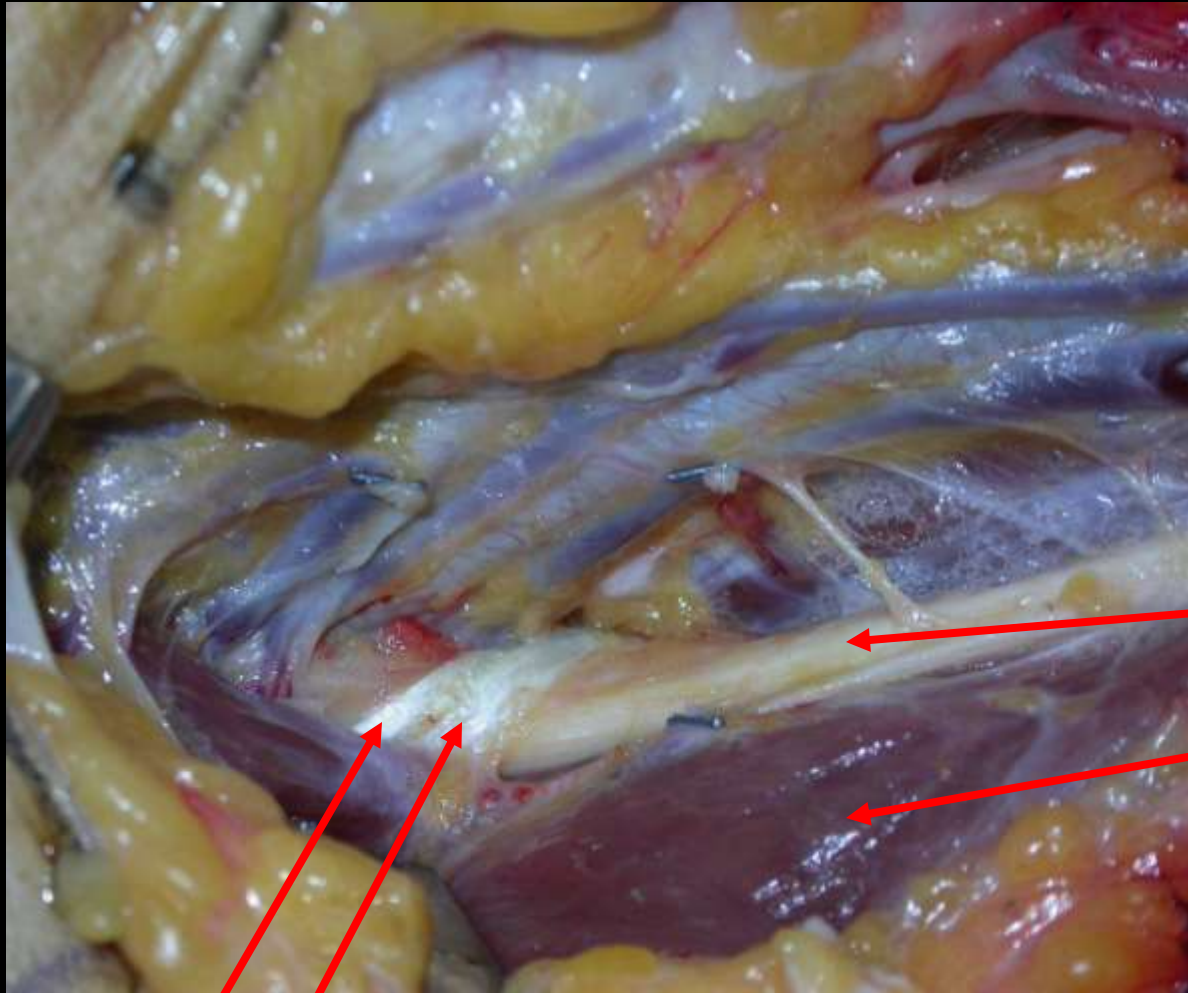
FDP 2+3  
FDP 4+5

Ax T2FS



# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome



Proximal

Median Nerve

Humeral head  
of Pronator

Fibrous bands between heads of Pronator Teres and FDS

Arcuate ligament of Fearn and Goodfellow

Courtesy; Lorenzo Pacelli

# Entrapment neuropathy - Median Nerve

## Anterior Interosseous Syndrome

---

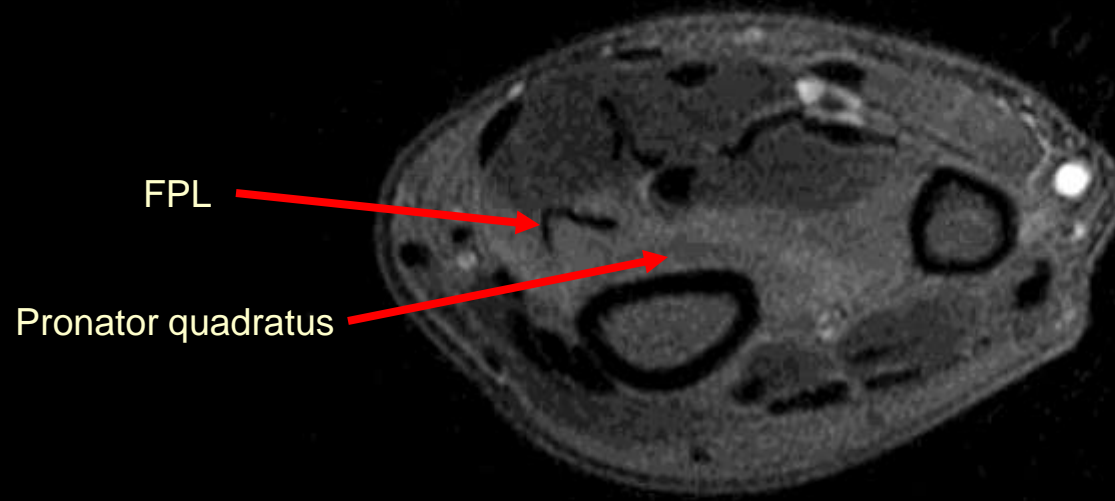


Following release, grey Anterior interosseous nerve

Courtesy; Lorenzo Pacelli

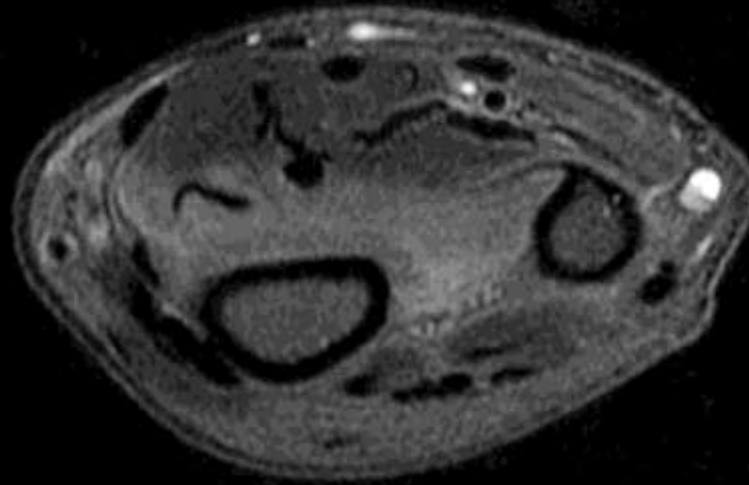
# Anterior interosseus nerve syndrome

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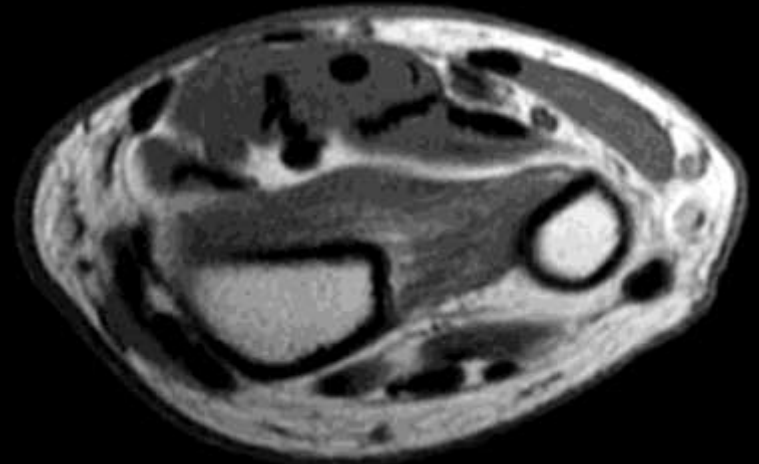
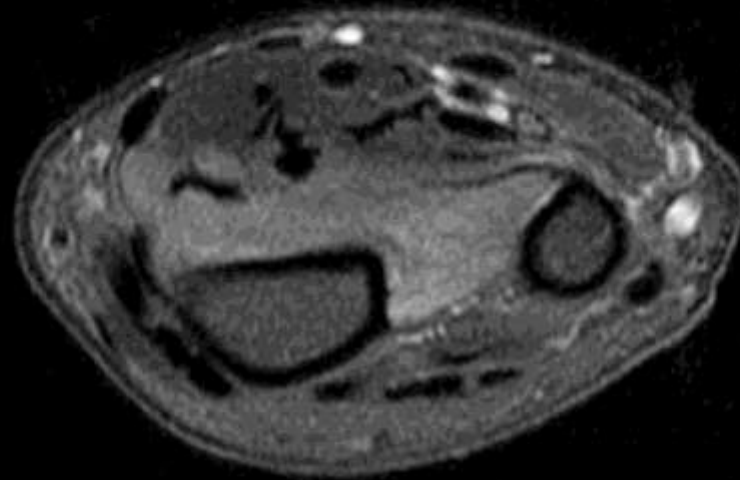
# Anterior interosseus nerve syndrome

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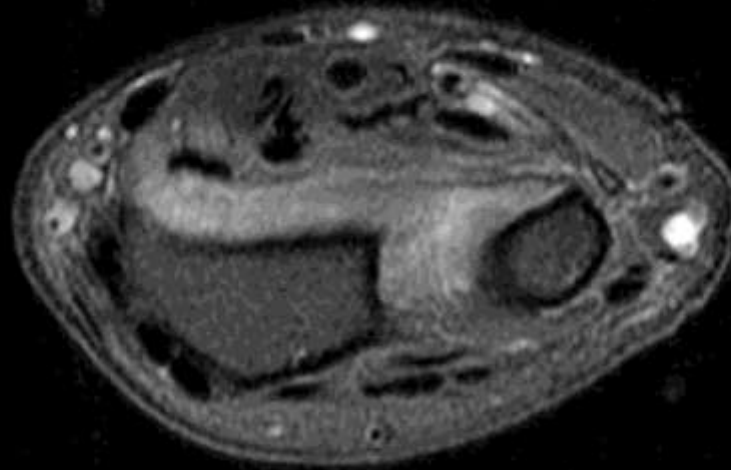
# Anterior interosseus nerve syndrome

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# Anterior interosseus nerve syndrome

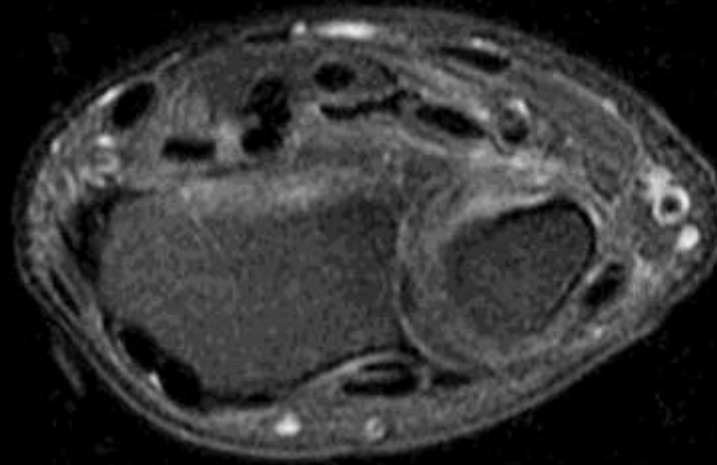
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# Anterior interosseus nerve syndrome

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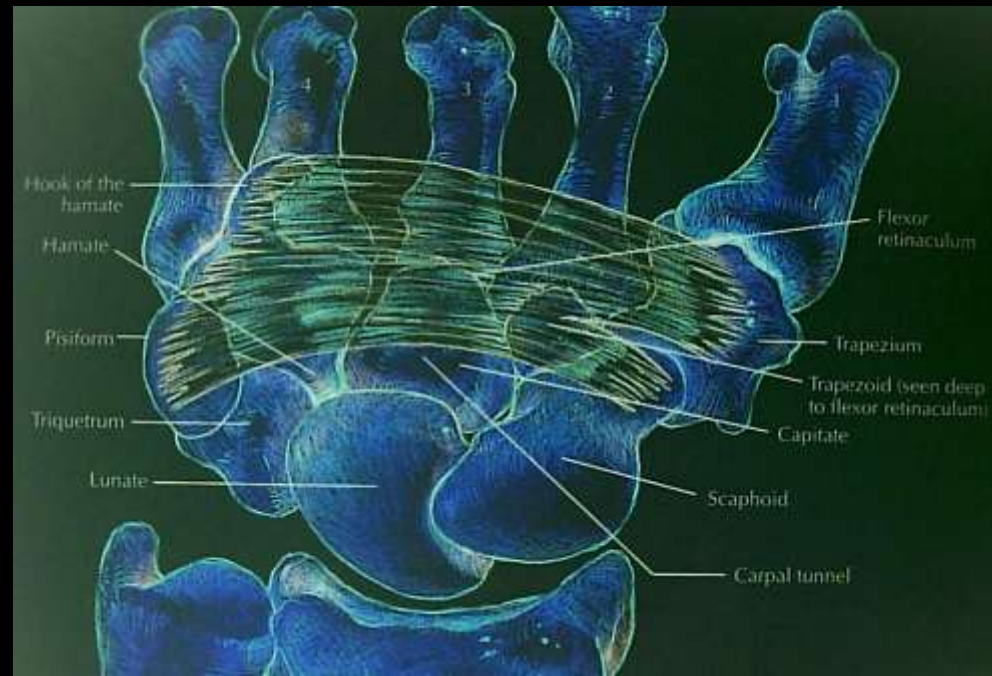
Profound FPL weakness, Edema in FPL and Pro quad

# Entrapment neuropathy - Median Nerve

## Carpal Tunnel Syndrome - Anatomy

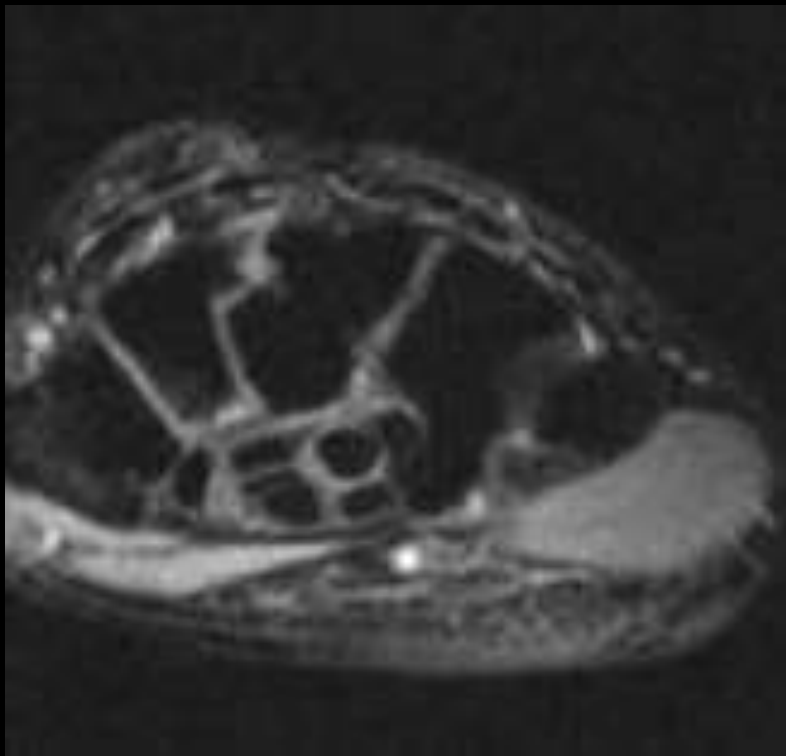
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- Sensory branch for thenar eminence leaves proximal to retinaculum
- Motor branch to thenar muscles leaves distal to retinaculum
- Much variance

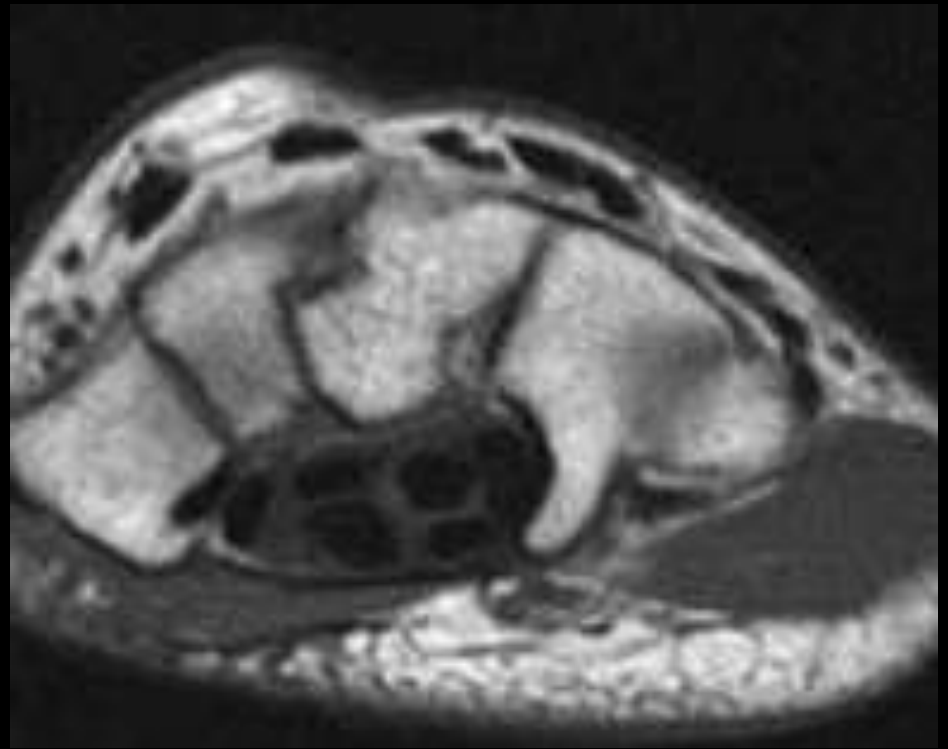


# Entrapment neuropathy - Median Nerve

## Normal Carpal tunnel



Ax STIR



Ax T1

# Entrapment neuropathy - Median Nerve

## Carpal Tunnel Syndrome - Clinical

---

- Dull ache at wrist extending up to elbow
- Worse at night
- Paresthesia radial fingers 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 - Clinical

---

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# Entrapment neuropathy - Median Nerve

## Carpal Tunnel Syndrome - Clinical

---

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## Entrapment neuropathy - Median Nerve

# Carpal Tunnel Syndrome - Clinical

---

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# Entrapment neuropathy - Median Nerve

## Carpal Tunnel Syndrome - Clinical

---

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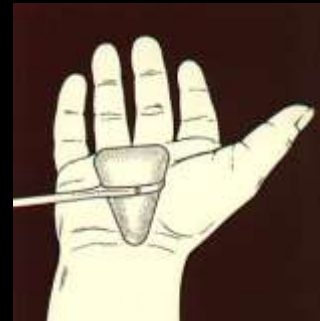


## Entrapment neuropathy - Median Nerve

# Carpal Tunnel Syndrome - Clinical

---

- Dull ache at wrist extending up to elbow
- Worse at night
- Paresthesia radial fingers and thumb
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- Phalen sign – Worse on forced flexion
- Tinel sign – Paresthesia on tapping



# Entrapment neuropathy - Median Nerve

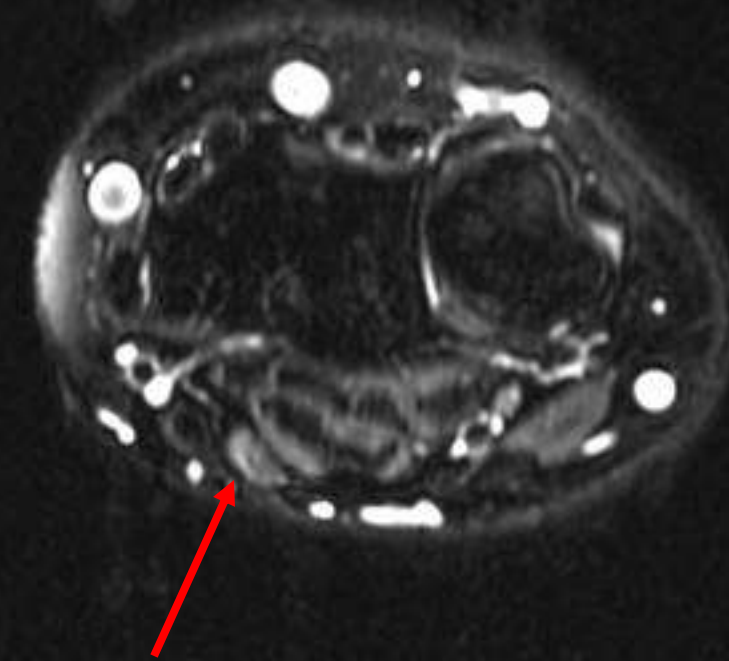
## Carpal Tunnel Syndrome - MRI

---

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

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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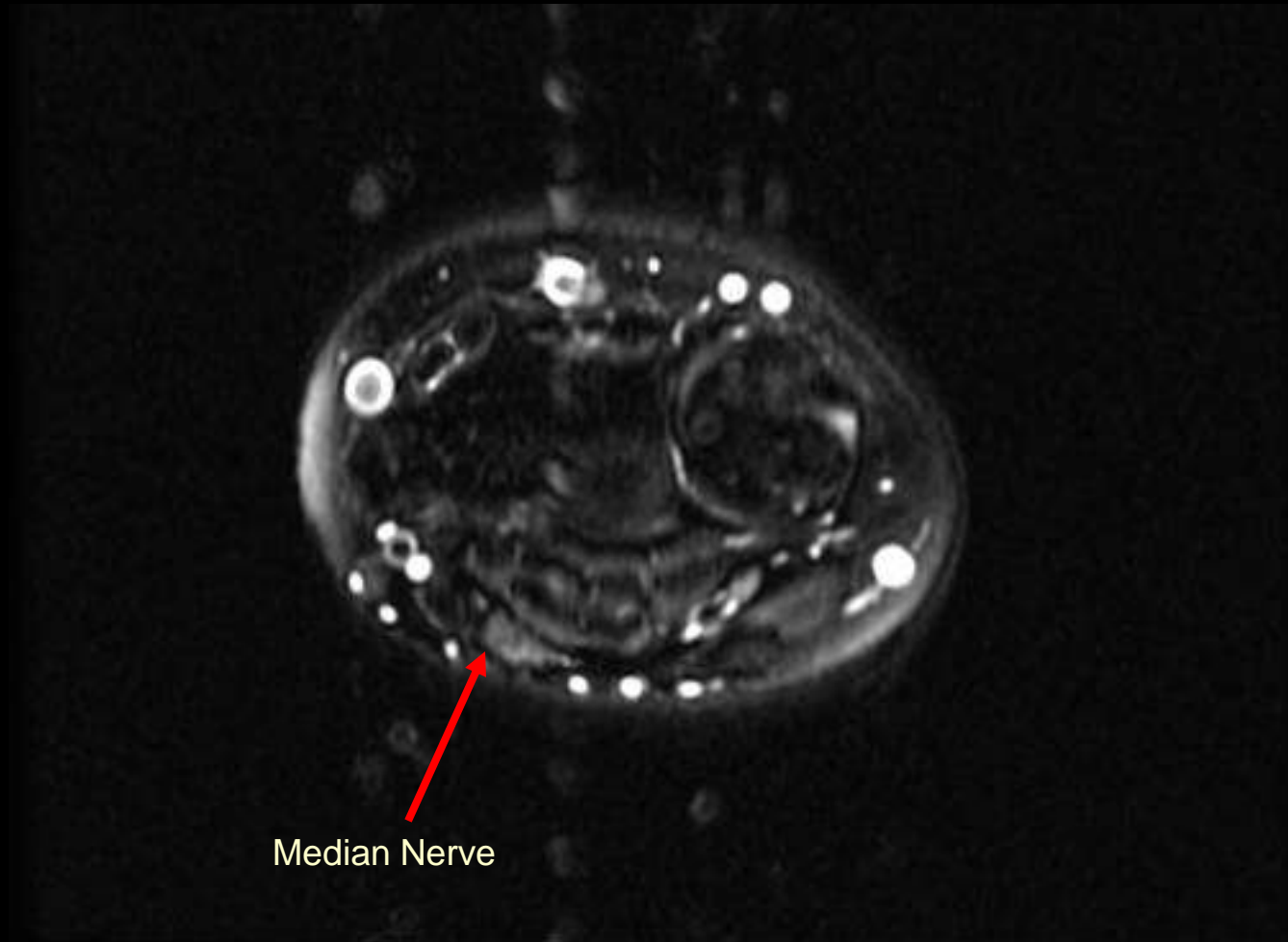
Median Nerve

AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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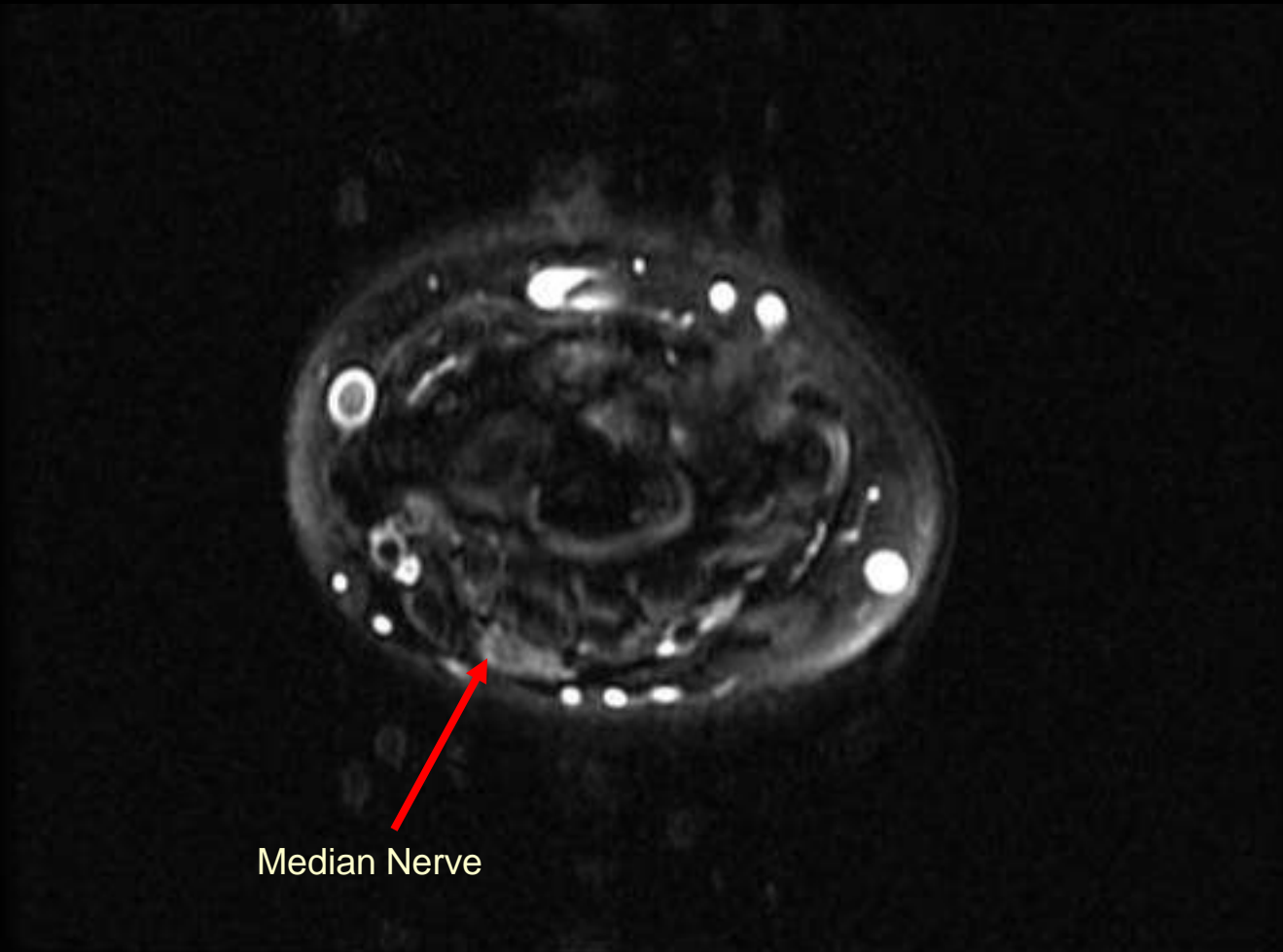
AxT2 FS

18 F wrist pain for years



# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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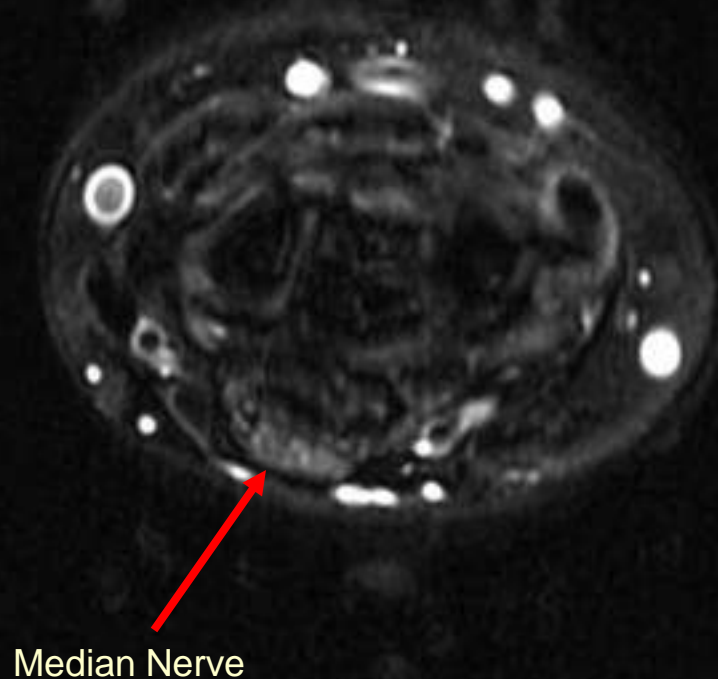
Median Nerve

AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

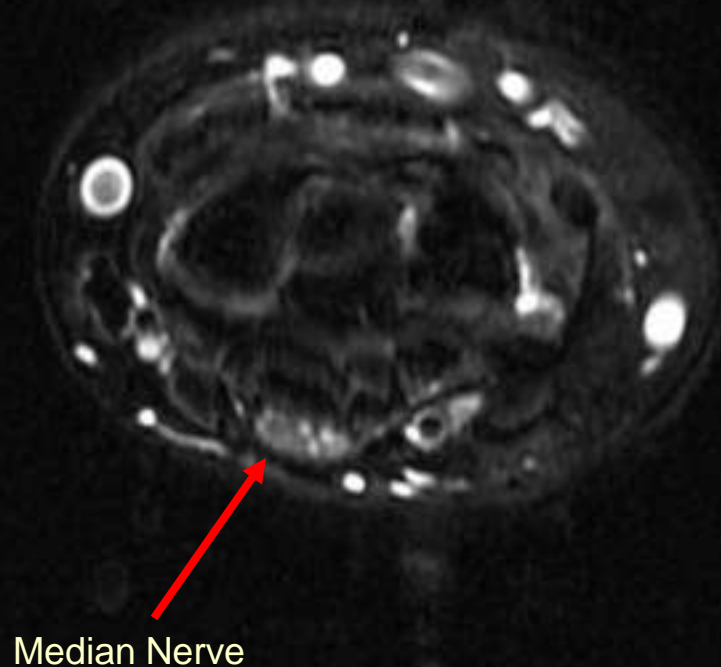
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AxT2 FS

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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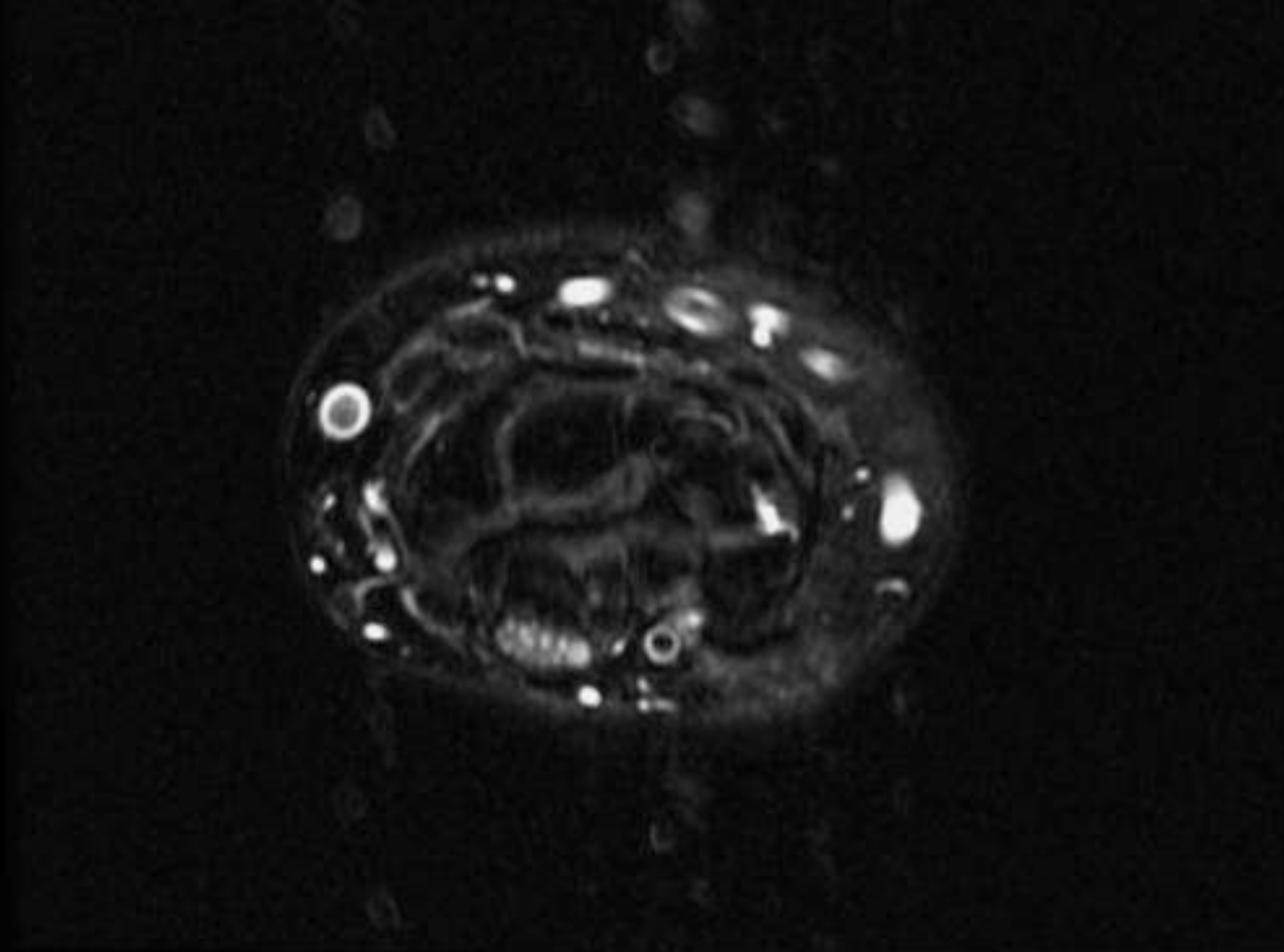


AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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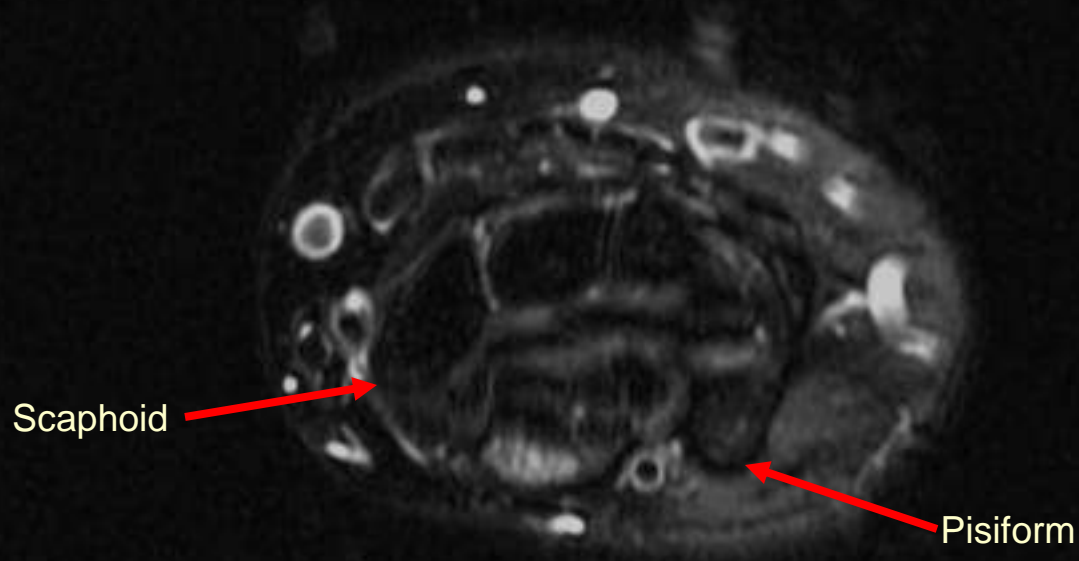


AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

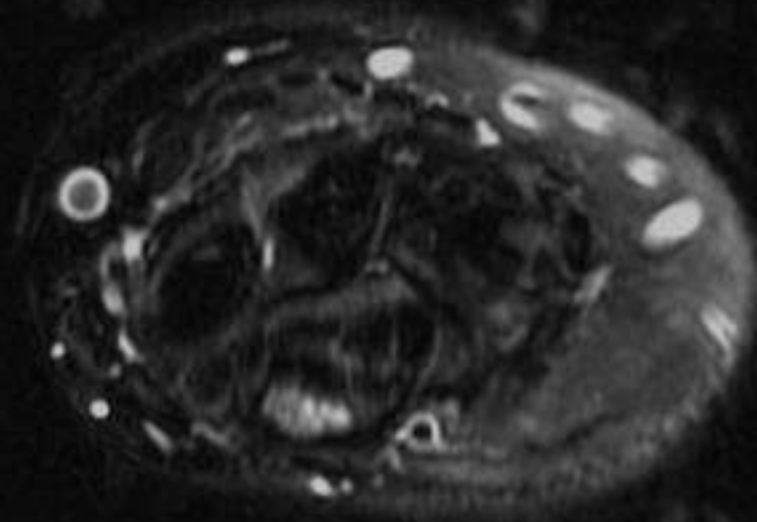
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AxT2 FS

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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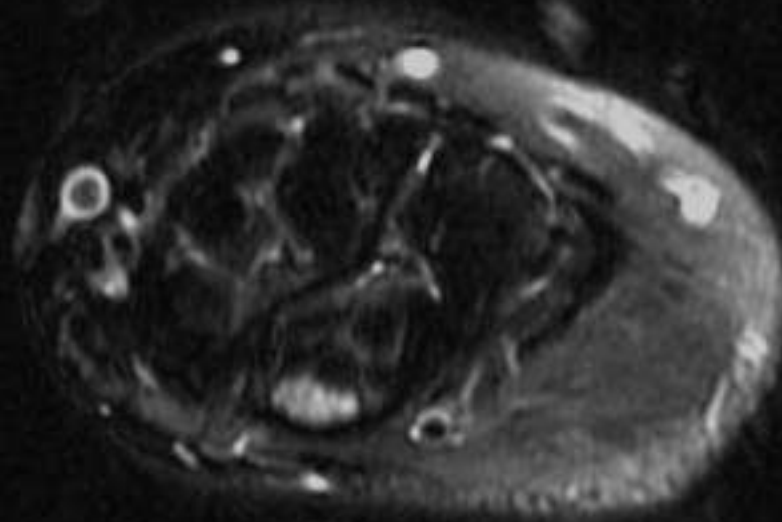
AxT2 FS

18 F wrist pain for years



# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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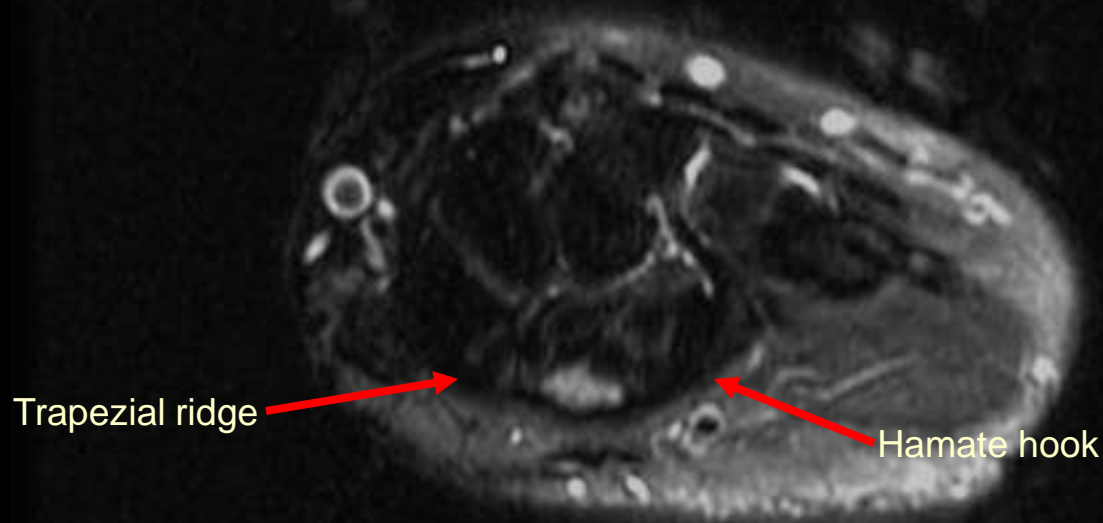


AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

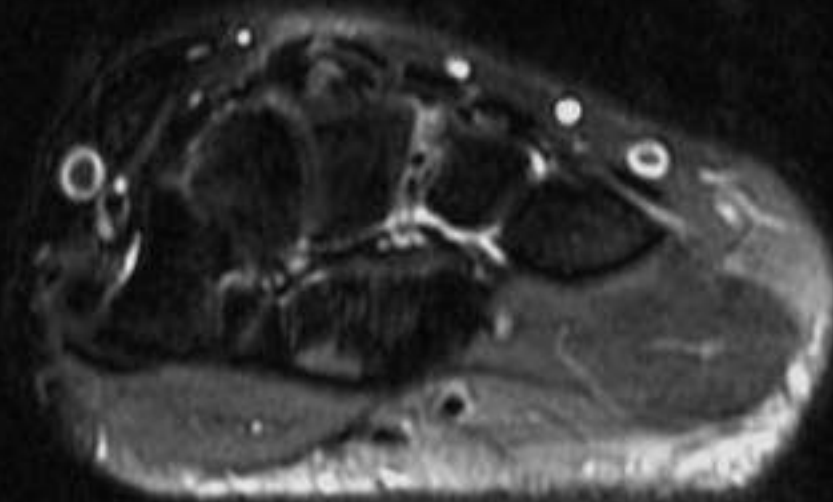
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AxT2 FS

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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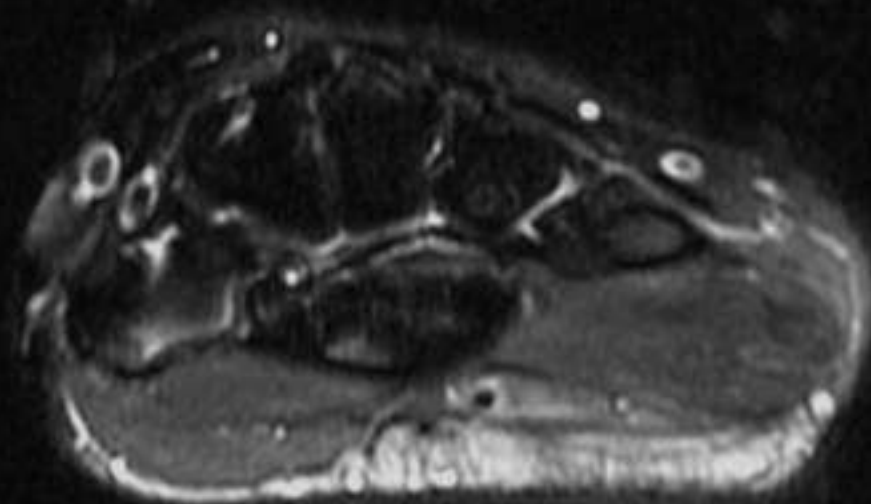


AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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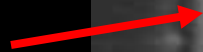
AxT2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve Carpal Tunnel Syndrome

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Median nerve



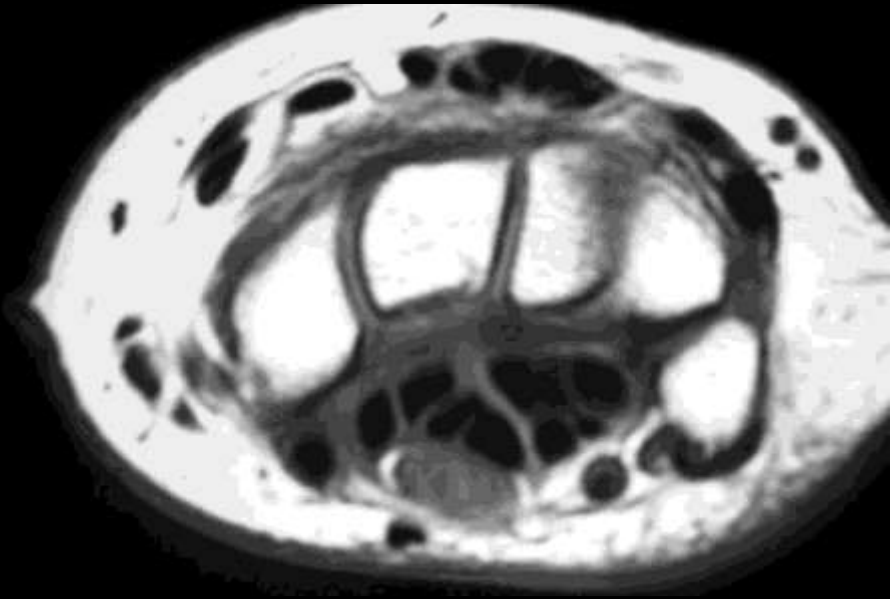
SAG T2 FS

18 F wrist pain for years

# Entrapment neuropathy - Median Nerve - CTS

## Thickened Inflamed Nerve

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Ax T1



Ax T2

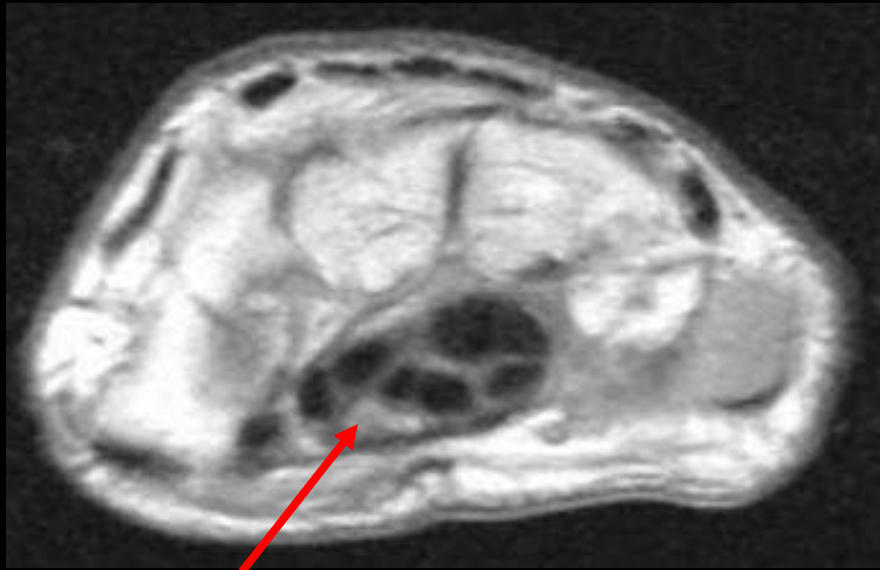
- Increased signal intensity of median nerve
- Swelling of median nerve proximally
- Flattening of median nerve distally
- Bowing of flexor retinaculum



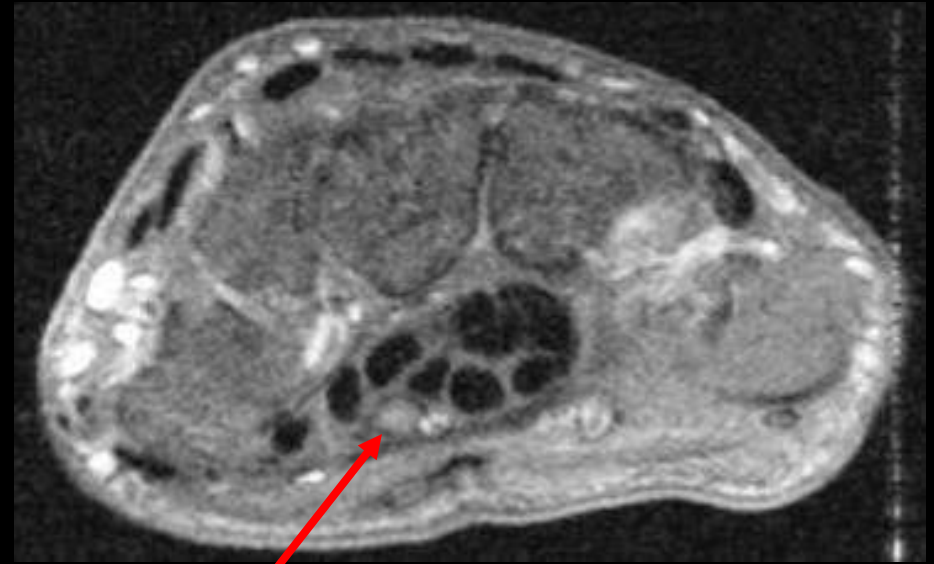
# Entrapment neuropathy - Median Nerve - CTS

## Median Nerve Enhances Normally

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Ax T1



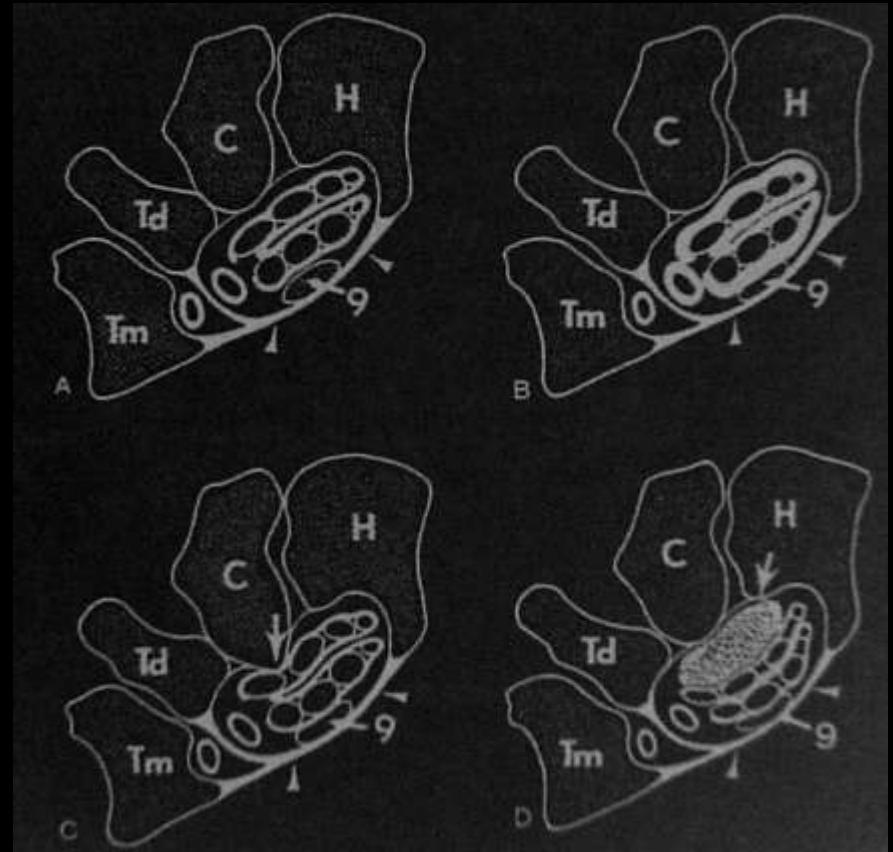
Ax T1FSGd

# Entrapment neuropathy - Median Nerve

## Carpal Tunnel Syndrome - Causes

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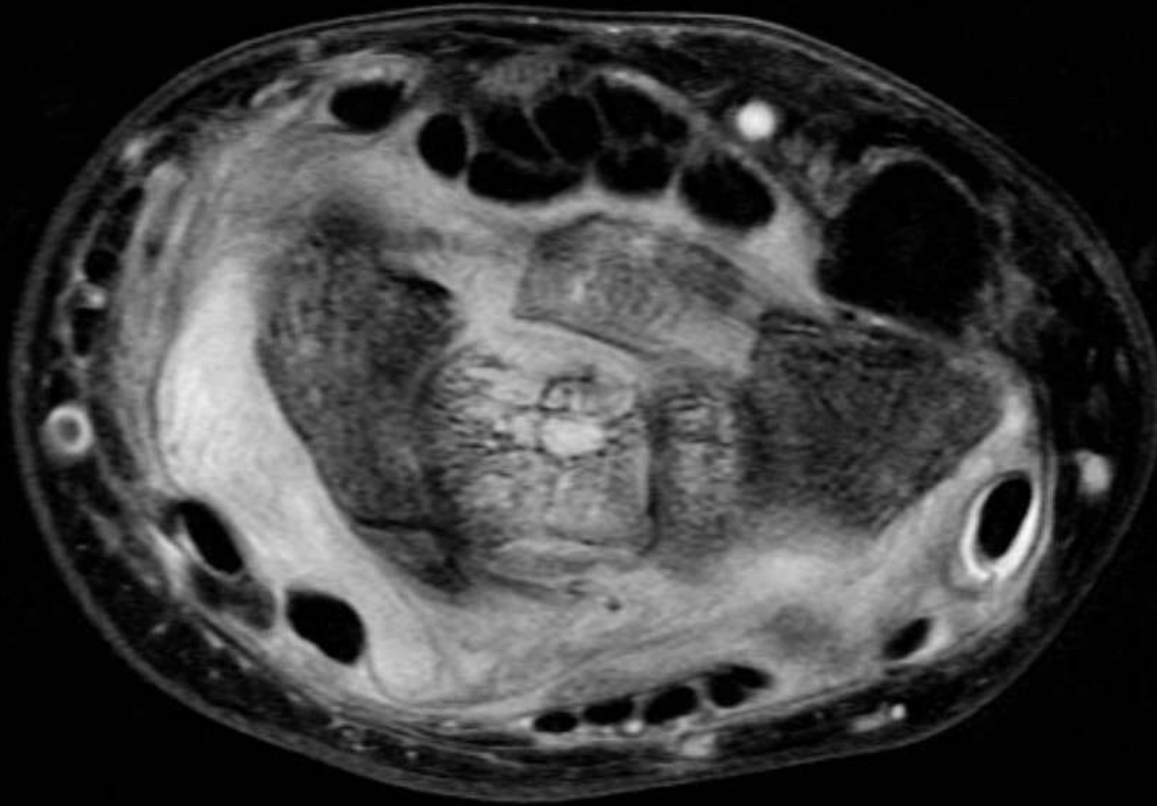
- Bursitis
- Osseous spur
- Mass



# Entrapment neuropathy - Median Nerve - CTS

## Rheumatoid Arthritis

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Ax T2FS

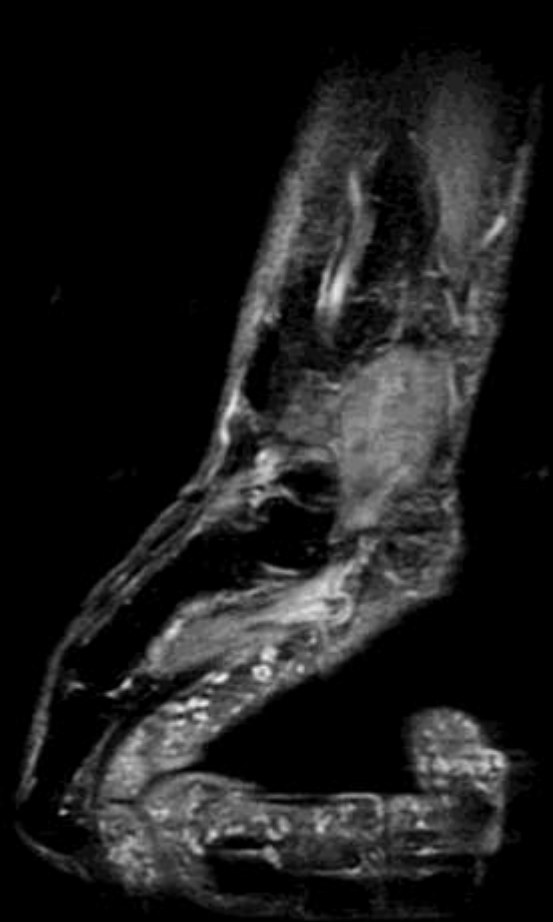
# Entrapment neuropathy - Median Nerve - CTS

## Carpal Tunnel Gout

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Sag T1



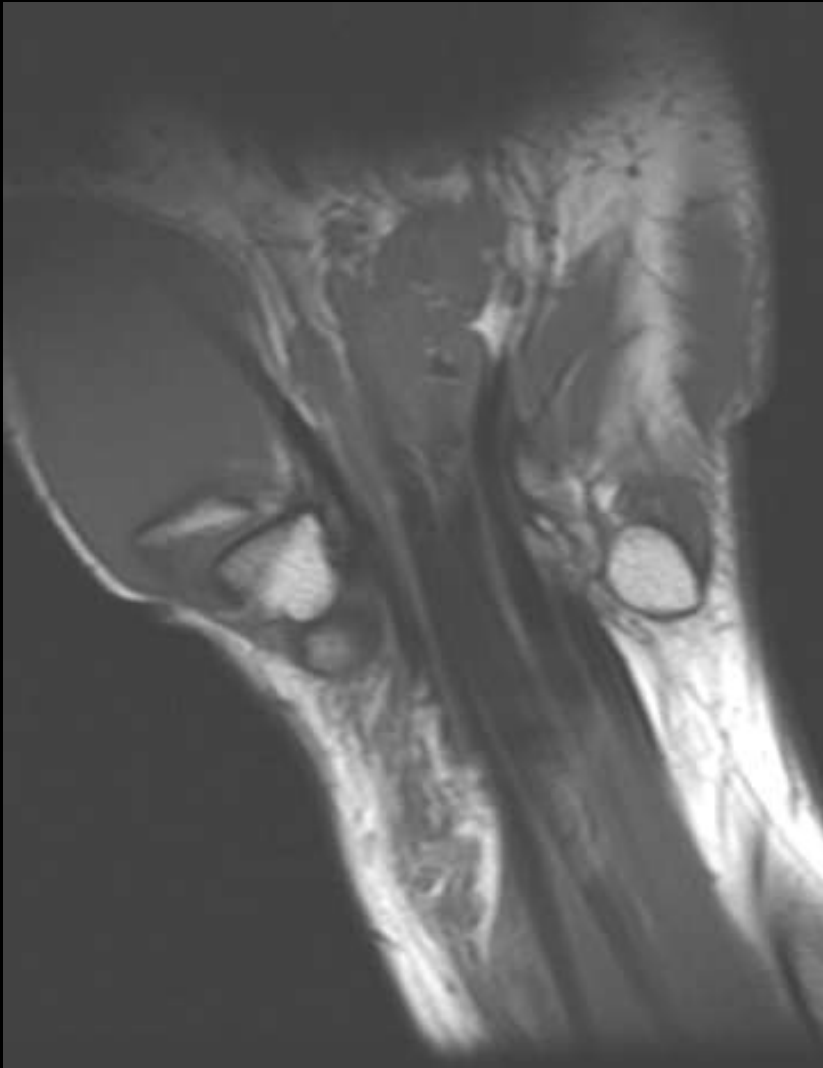
Sag PDFS



Sag T2FS

# Entrapment neuropathy - Median Nerve - CTS

## Neurofibromatosis



Cor T1

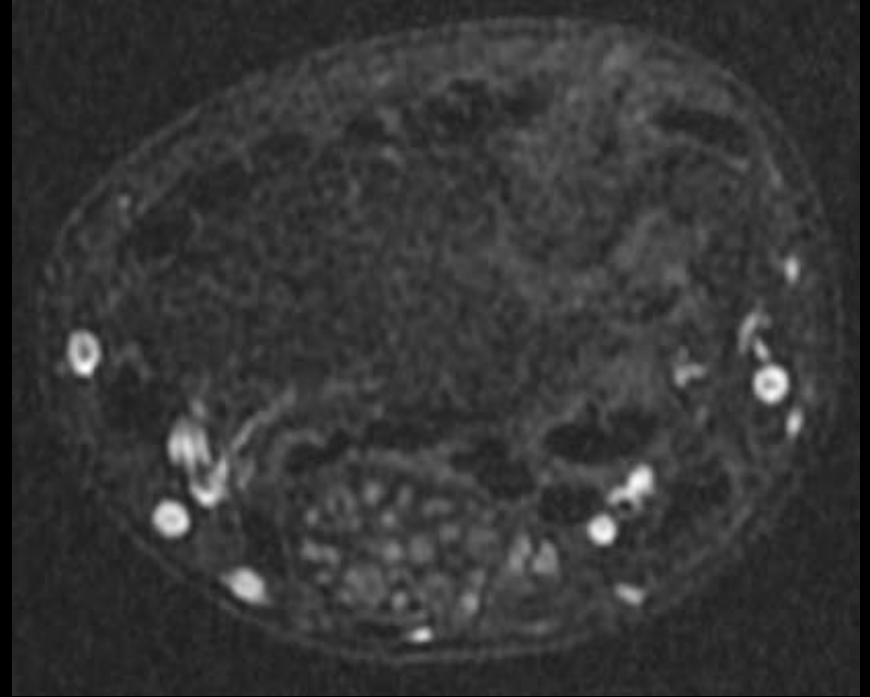
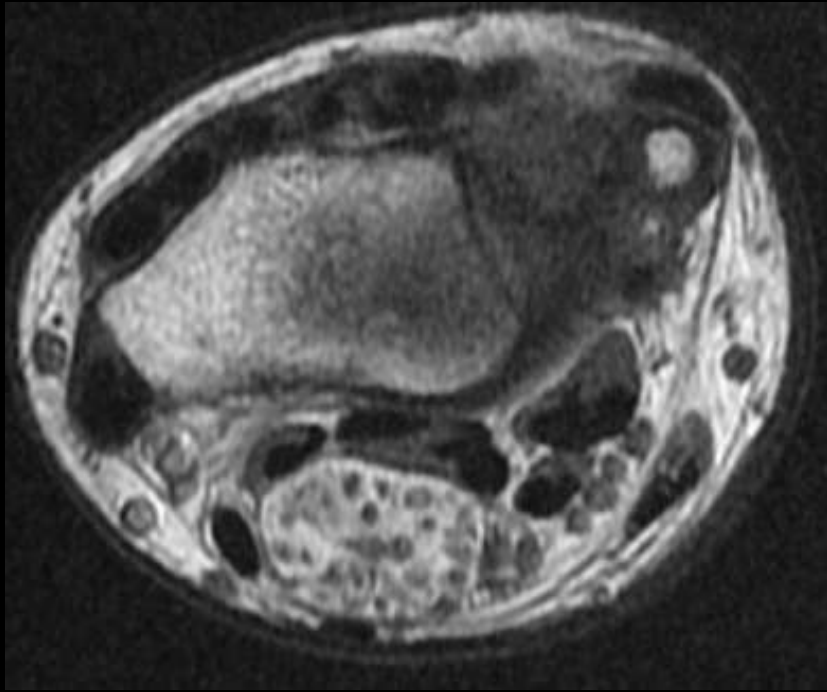


Cor PDFS

# Entrapment neuropathy - Median Nerve - Carpal tunnel syndrome

## Fibrolipomatous Hamartoma

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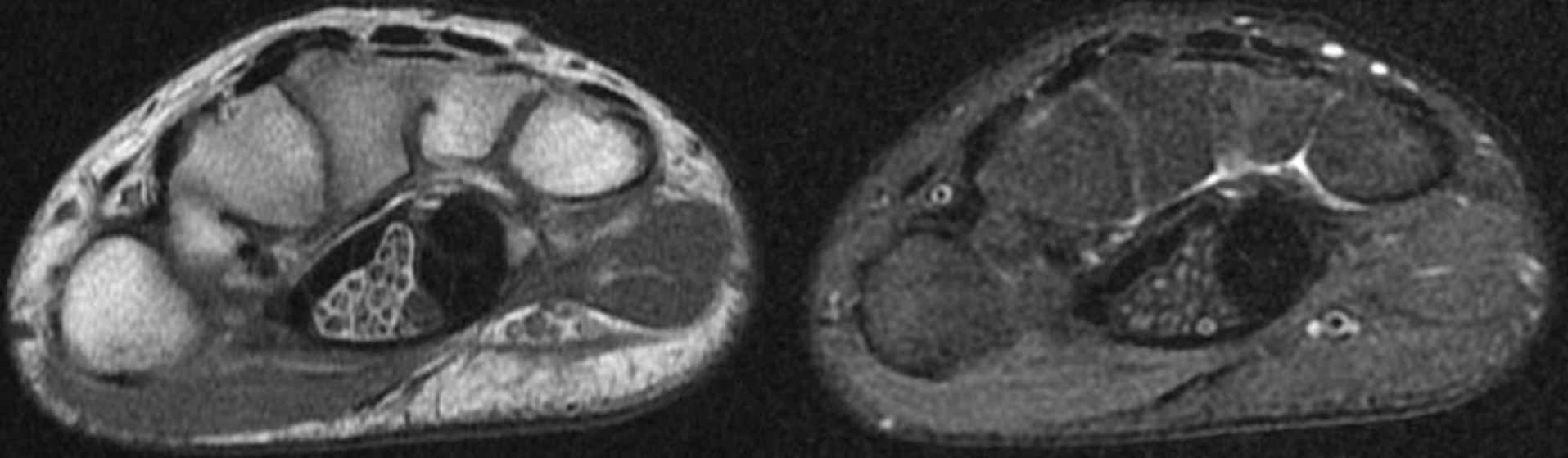




# Entrapment neuropathy - Median Nerve - Carpal tunnel syndrome

## Fibrolipomatous Hamartoma

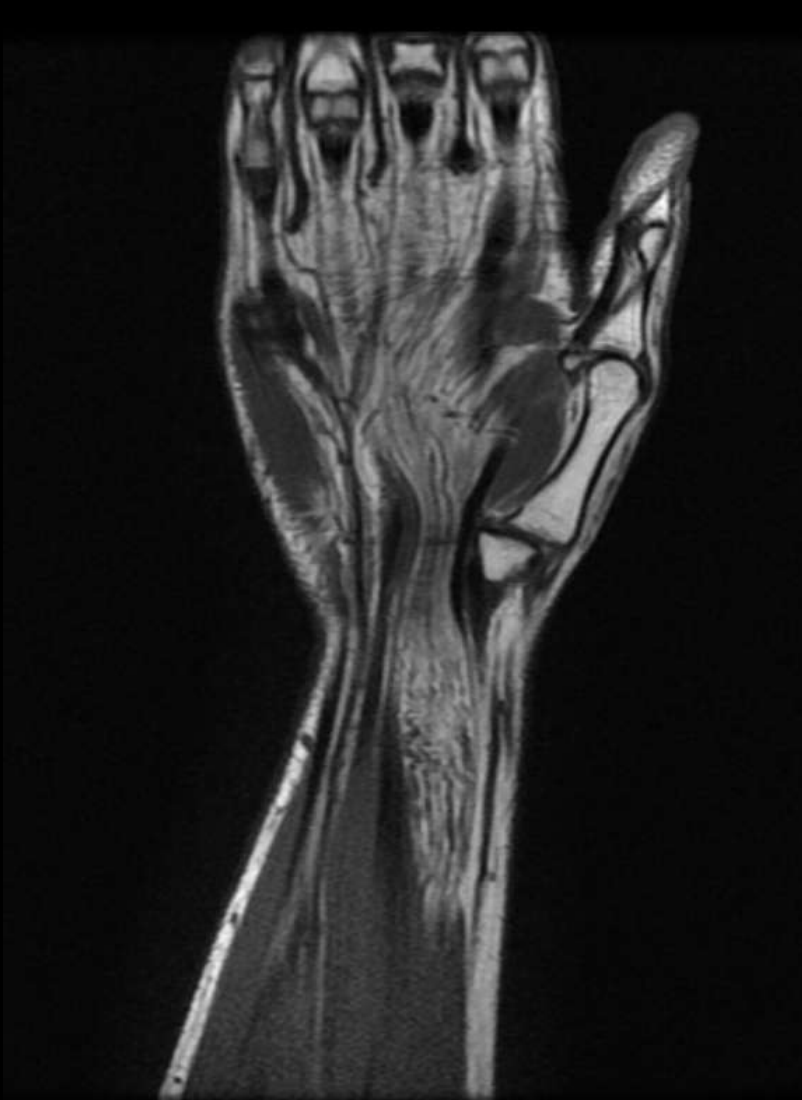
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# Entrapment neuropathy - Median Nerve - Carpal tunnel syndrome

## Fibrolipomatous Hamartoma

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Fibrolipomatous Hamartoma Median Nerve

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

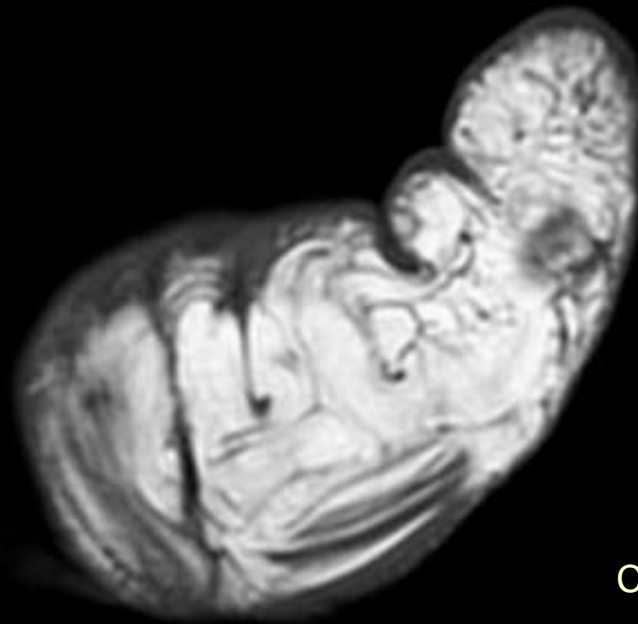
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# Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome

## Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

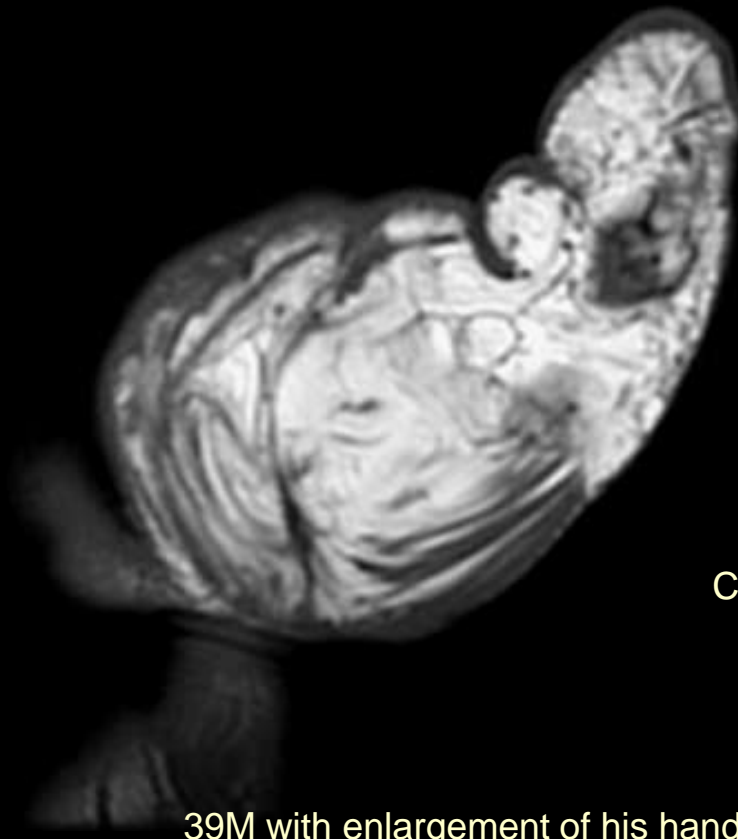
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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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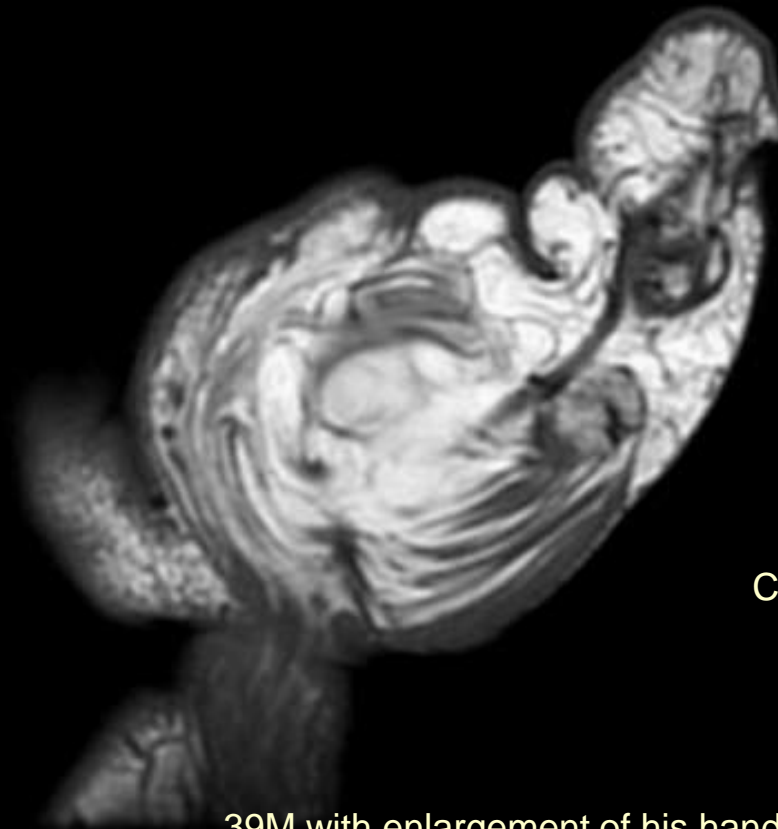


Cor T1

39M with enlargement of his hand since birth with discomfort and pain

# Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Cor T1

39M with enlargement of his hand since birth with discomfort and pain



Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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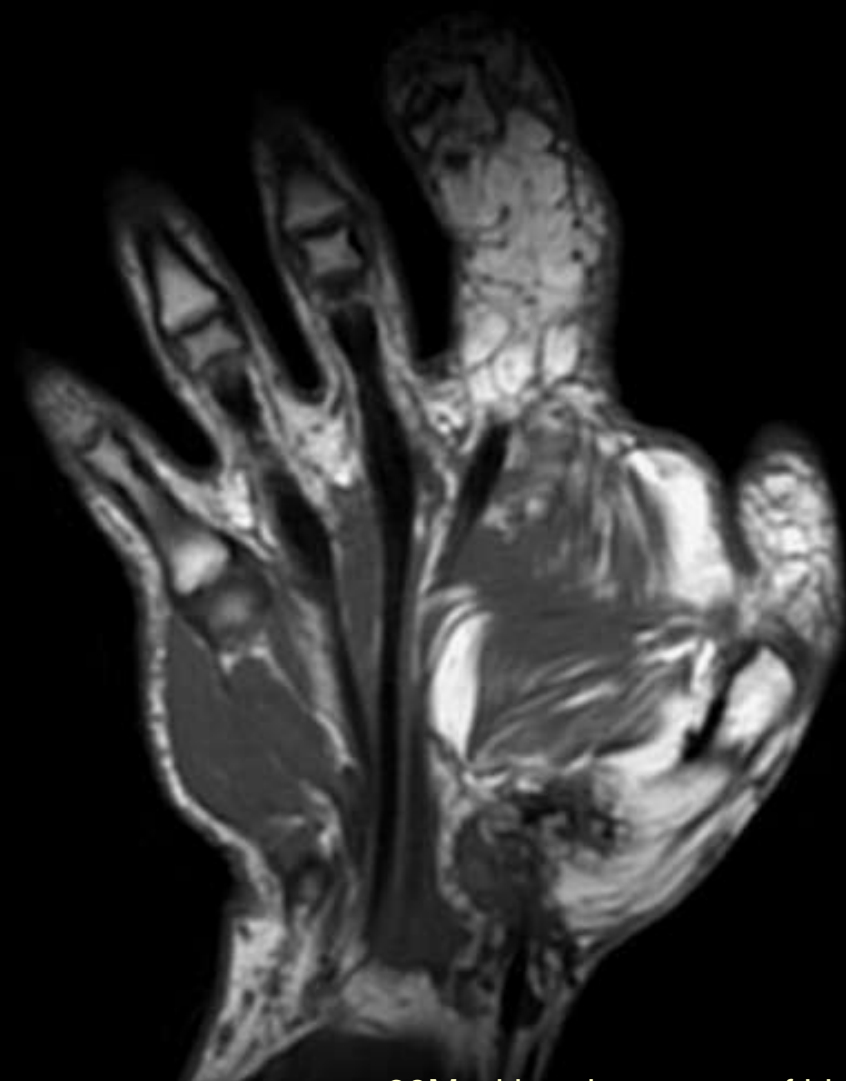


Cor T1

39M with enlargement of his hand since birth with discomfort and pain

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

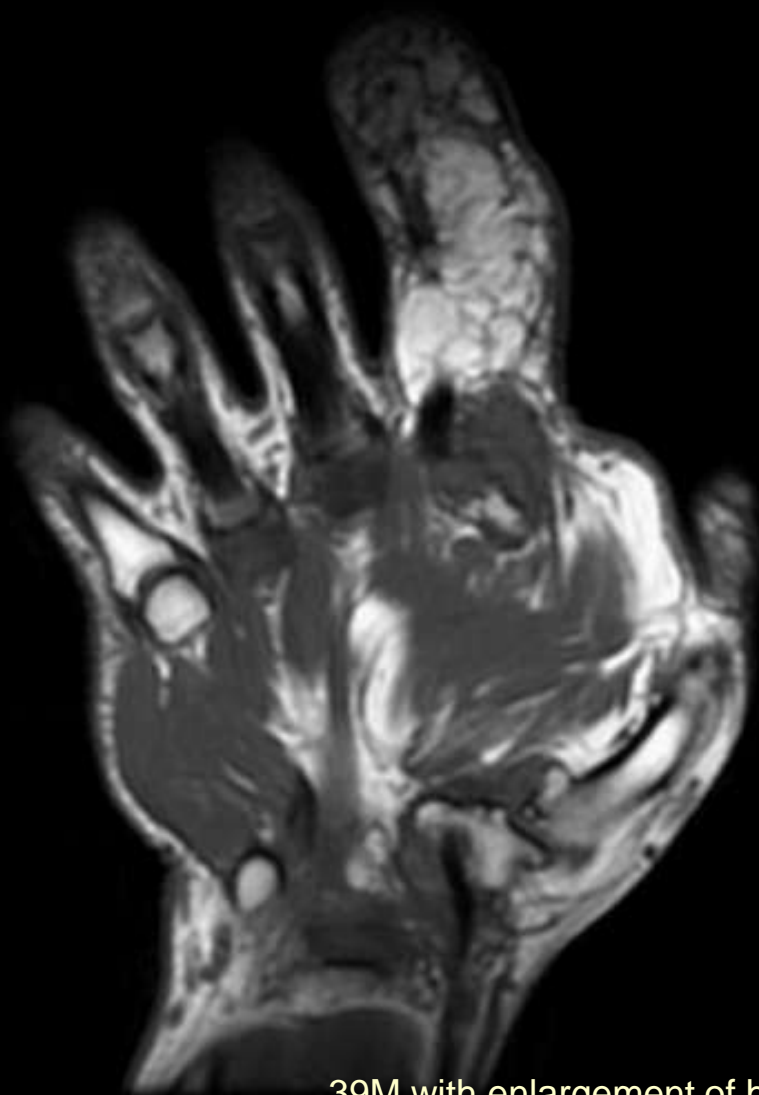
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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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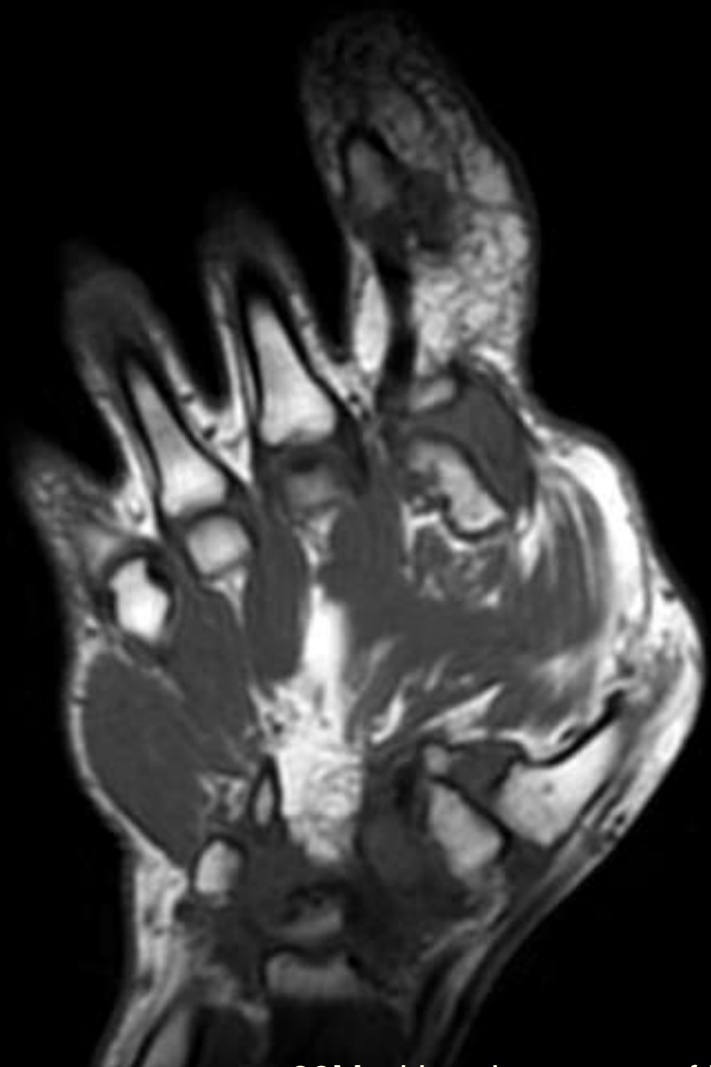


Cor T1



Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

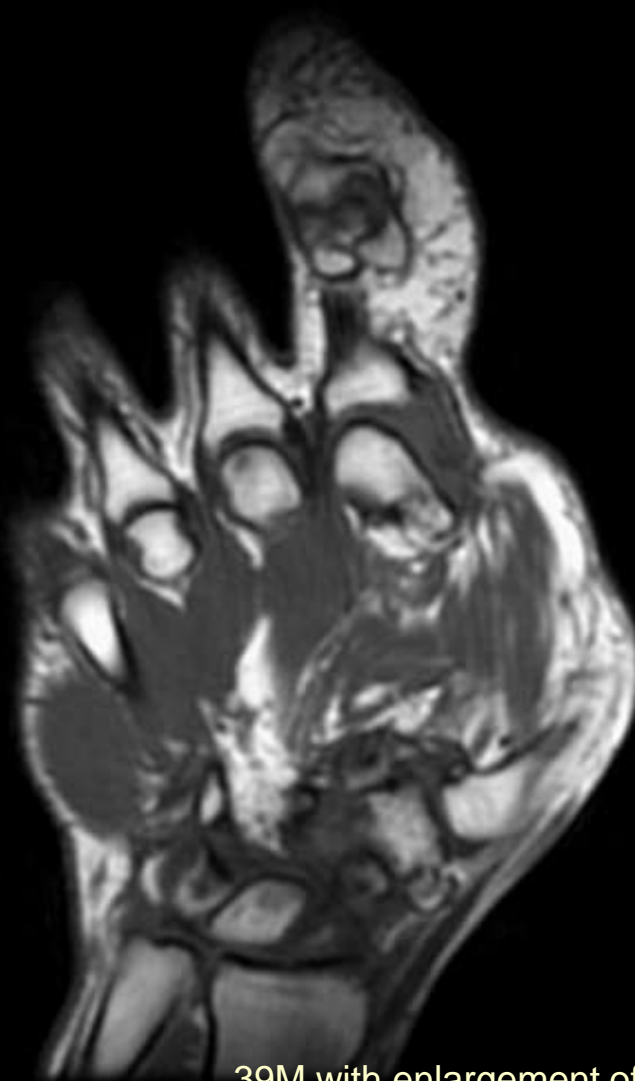
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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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Cor T1

Entrapment neuropathy - Median Nerve – Carpal tunnel syndrome  
Fibrolipomatous hamartoma - Macrodystrophia lipomatosa

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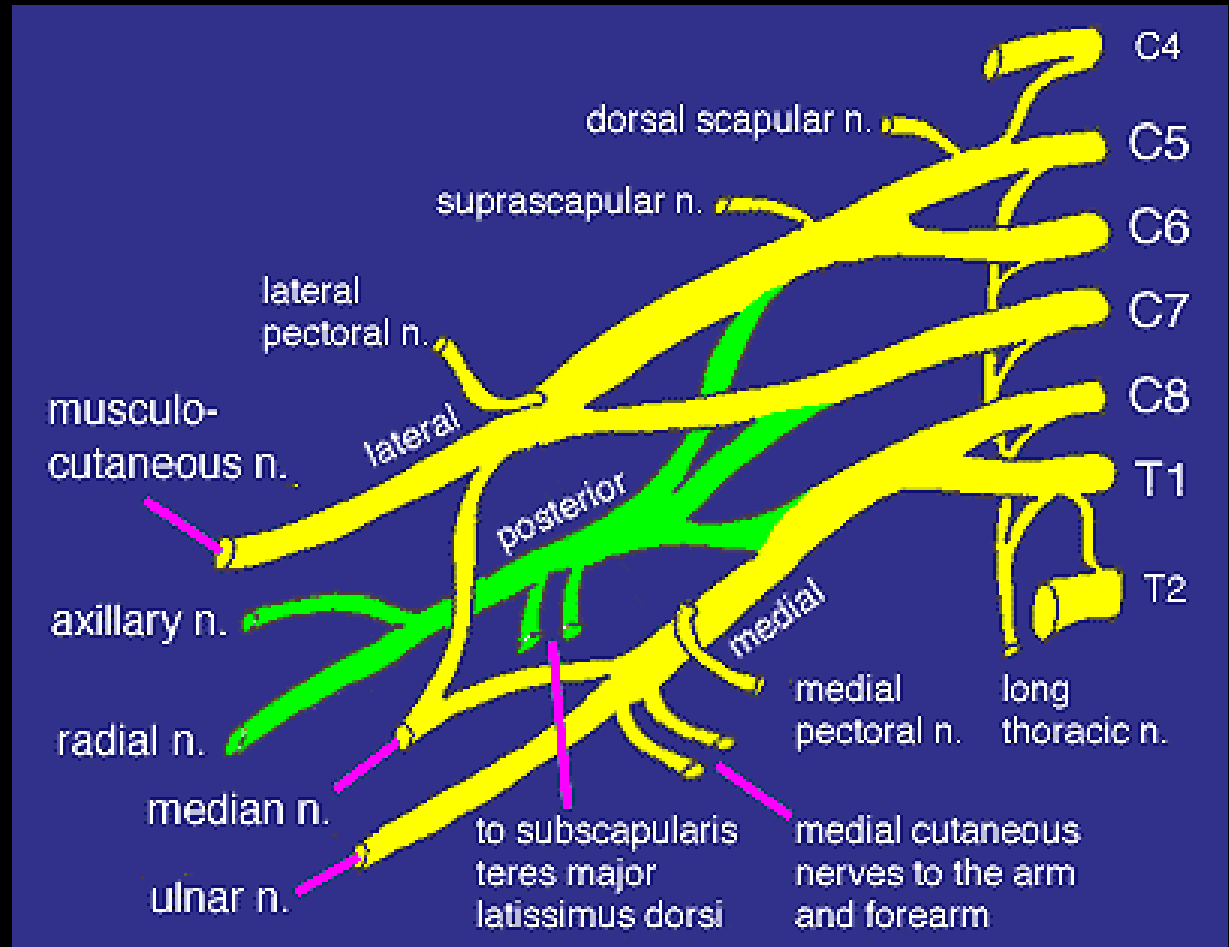


Cor T1

# Entrapment neuropathy

## Ulnar Nerve

- C8-T1



## Entrapment neuropathy

# Ulnar Nerve - Anatomy

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- 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 – Sites of Compression

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- 1<sup>st</sup> 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
  - Guyon's canal
  - Ulnar tunnel syndrome



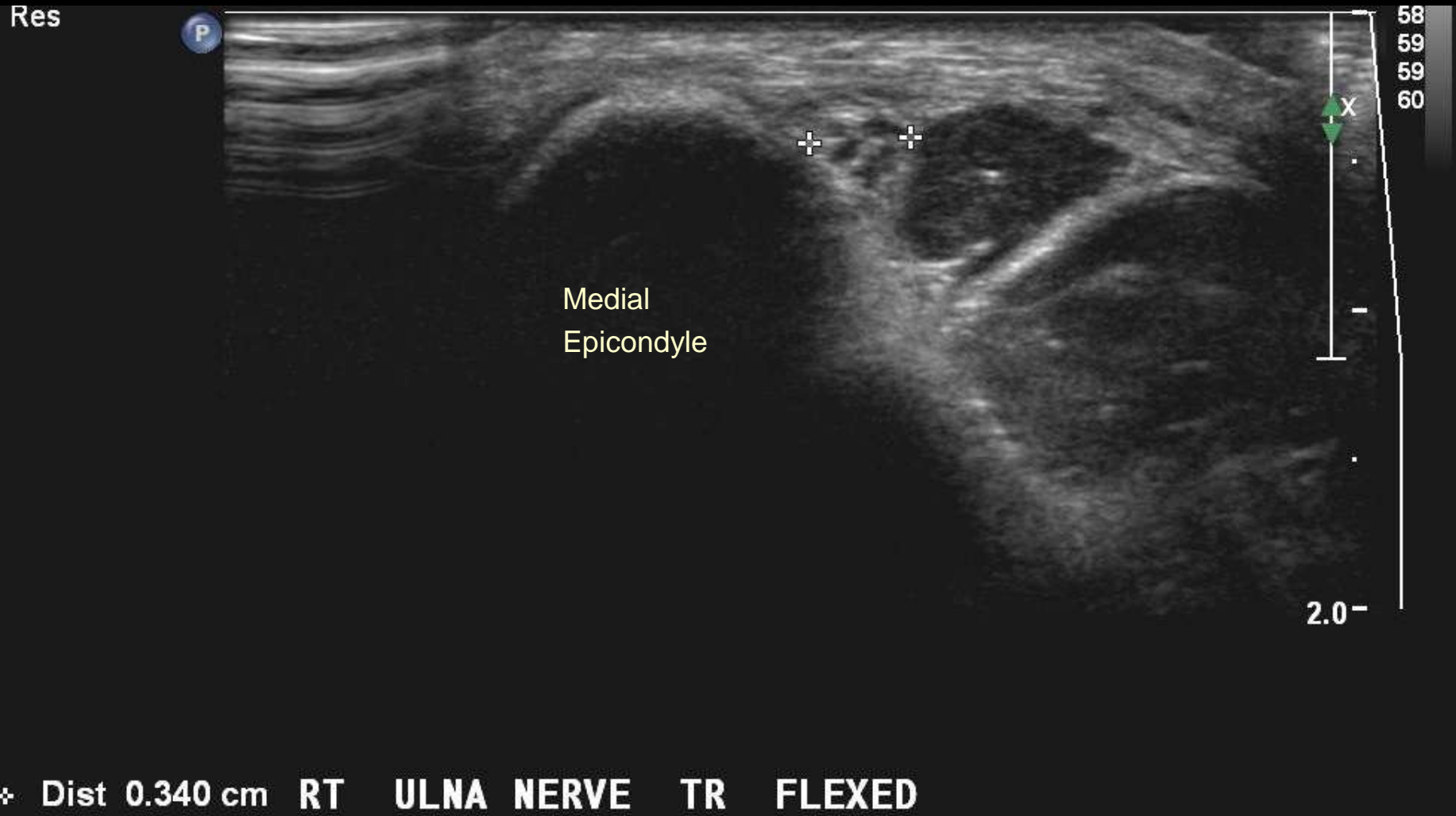
# Entrapment neuropathy - Ulnar Nerve Cubital Tunnel

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# Entrapment neuropathy - Ulnar Nerve

## Cubital Tunnel - Normal Ulnar Nerve

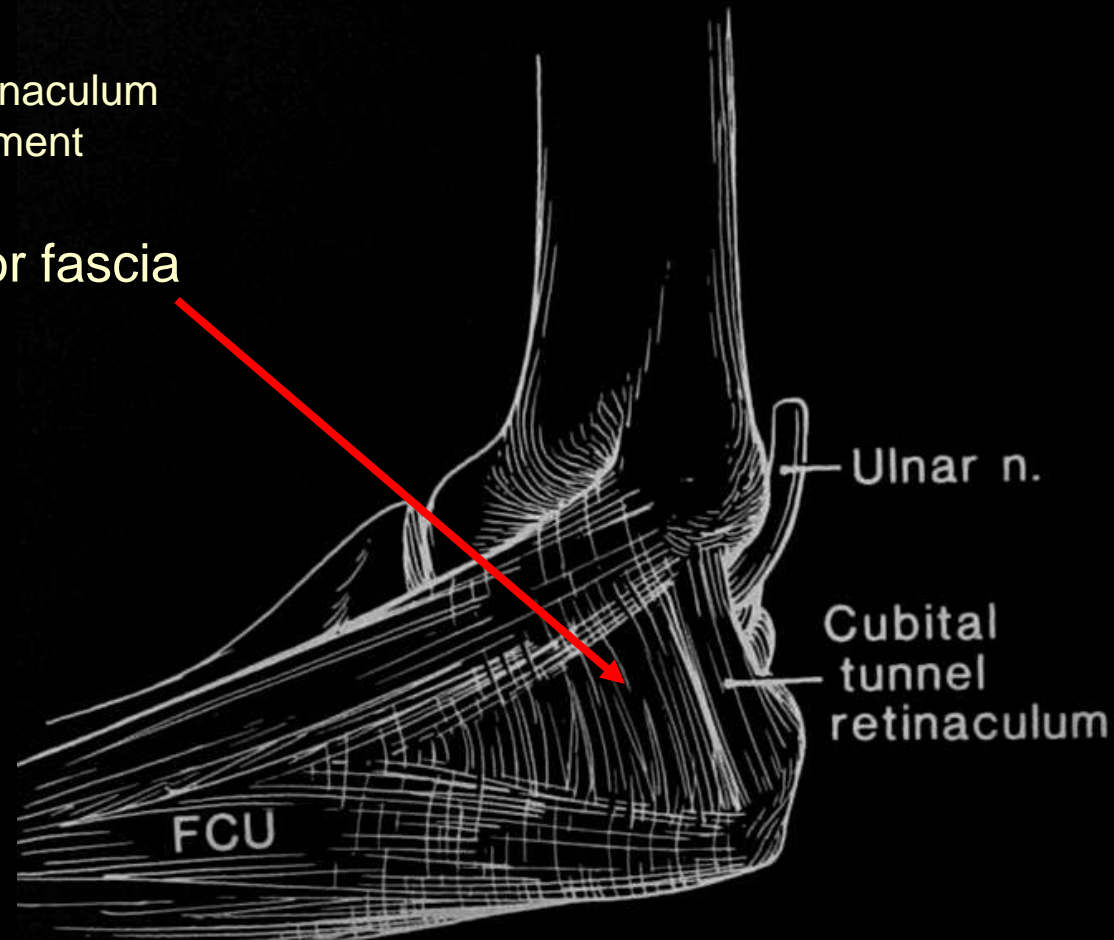


# Entrapment neuropathy - Ulnar Nerve

## Cubital tunnel syndrome - Anatomy

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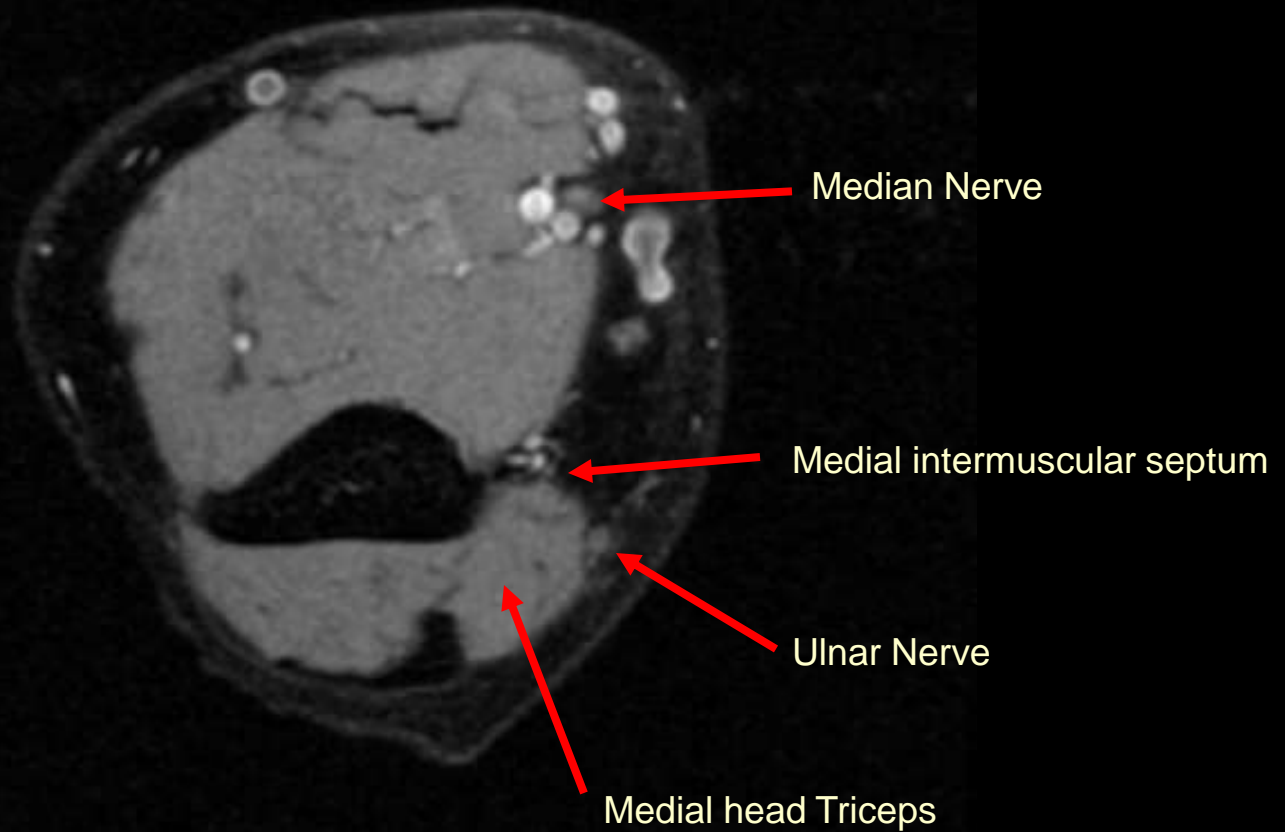
- Cubital tunnel anatomy
  - Anterior – medial epicondyle
  - Lateral – Olecranon
  - Floor – Posterior band of UCL
  - Posteromedial –
    - Cubital tunnel retinaculum
    - AKA Arcuate ligament
- Osborne's ligament or fascia



# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

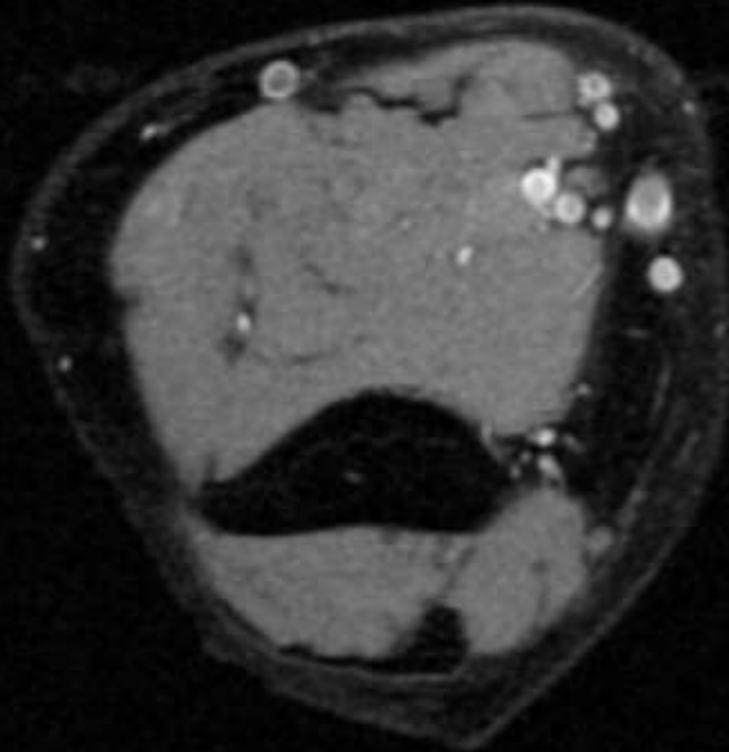
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

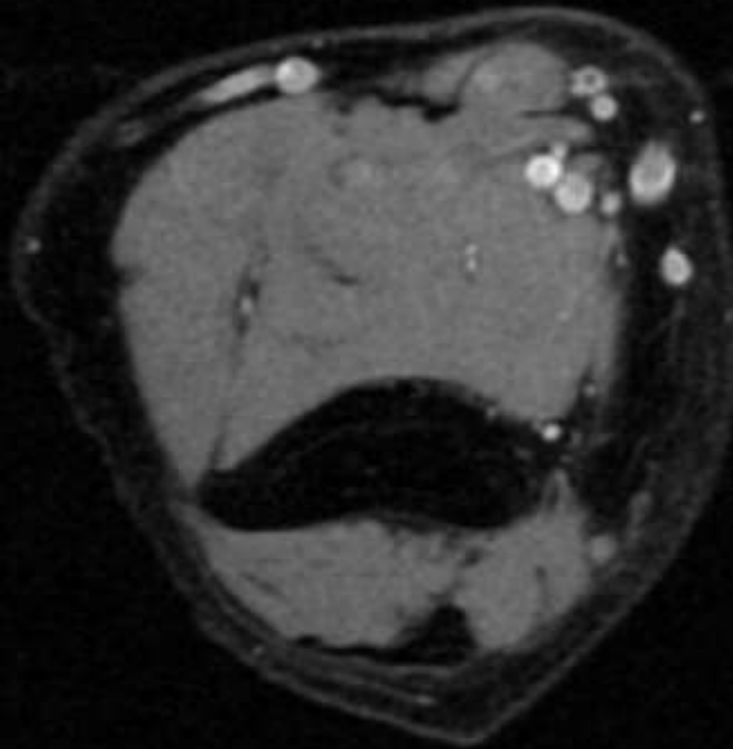
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

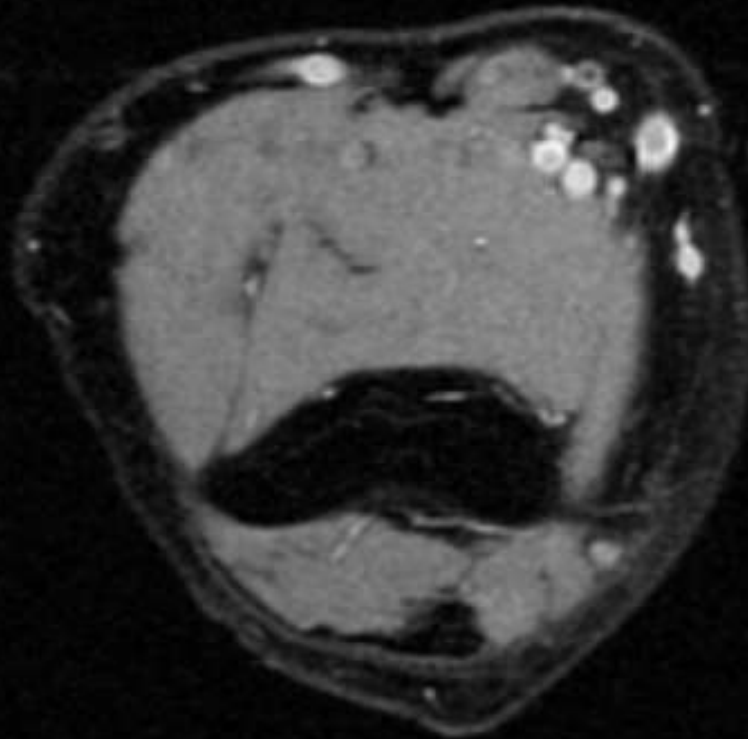
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

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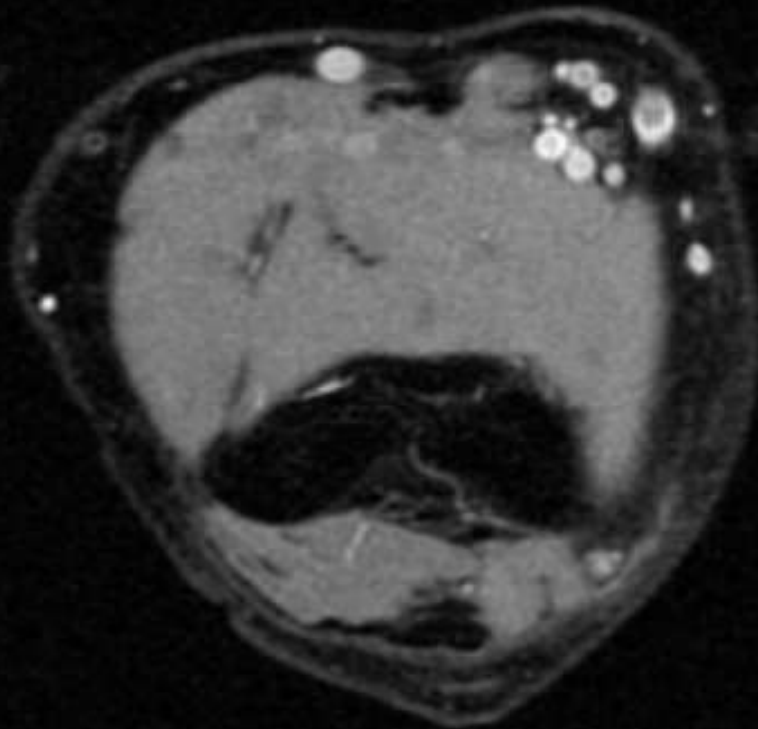




# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

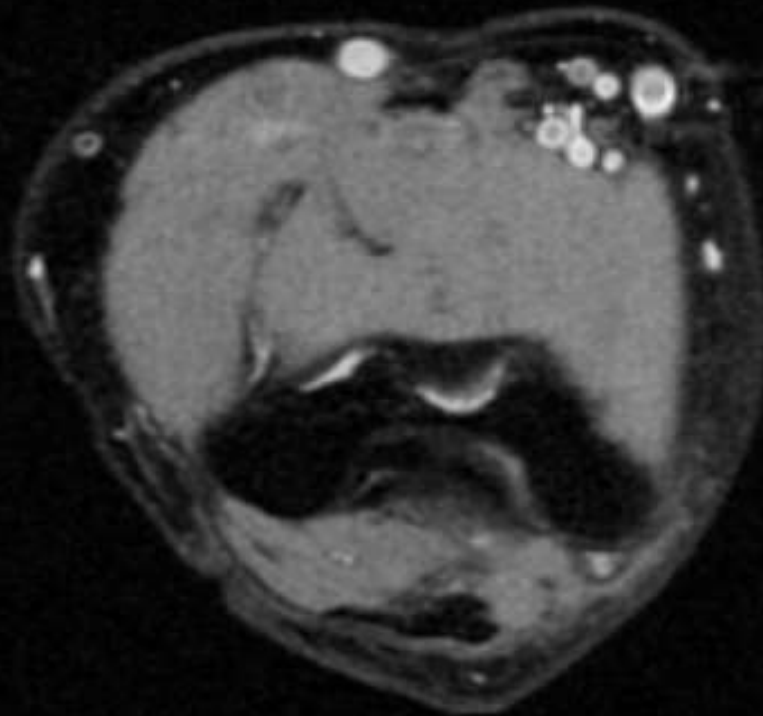
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

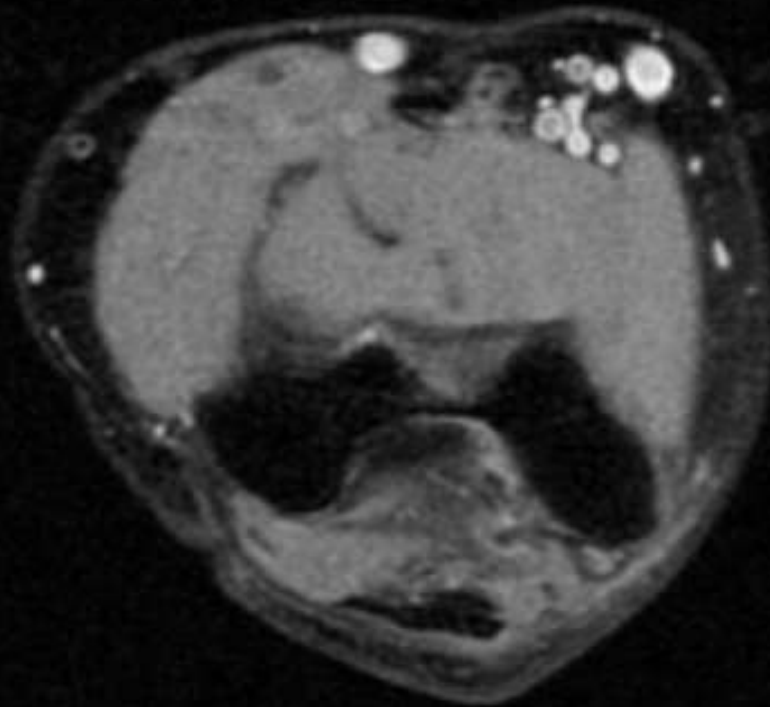
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

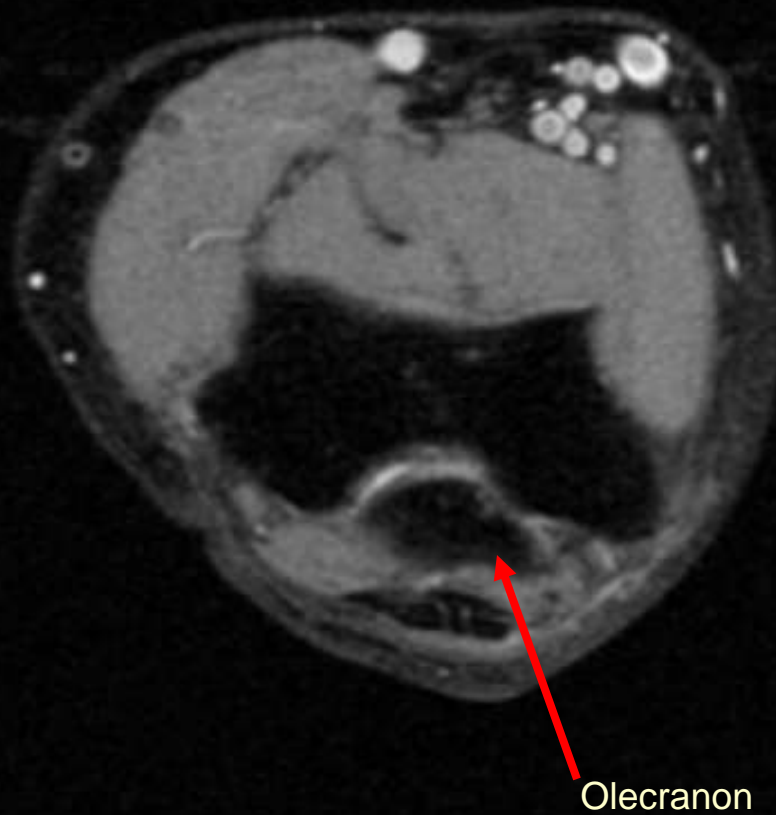
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

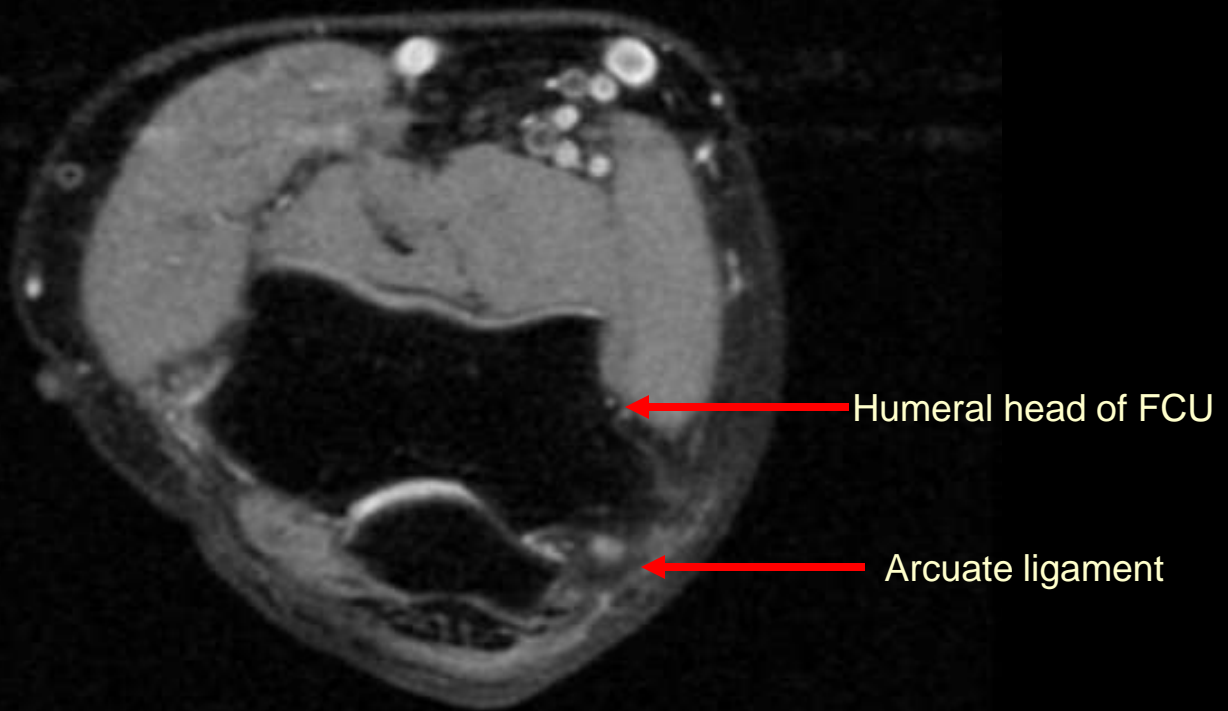
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

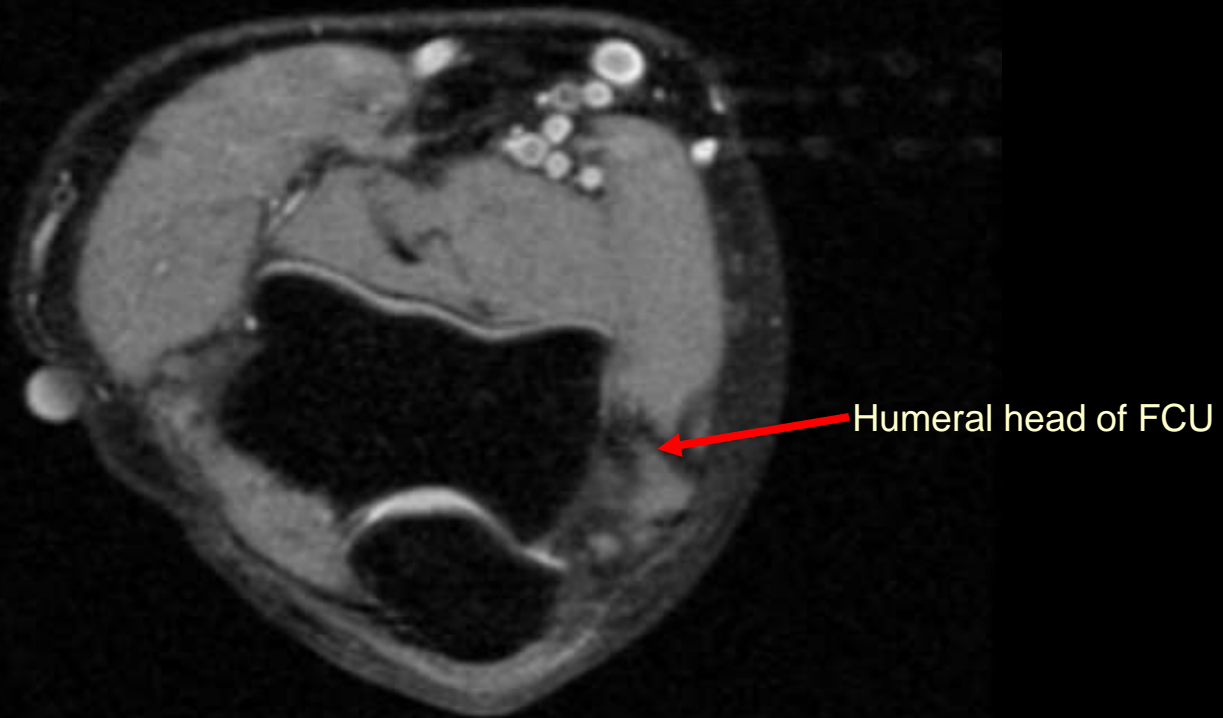
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

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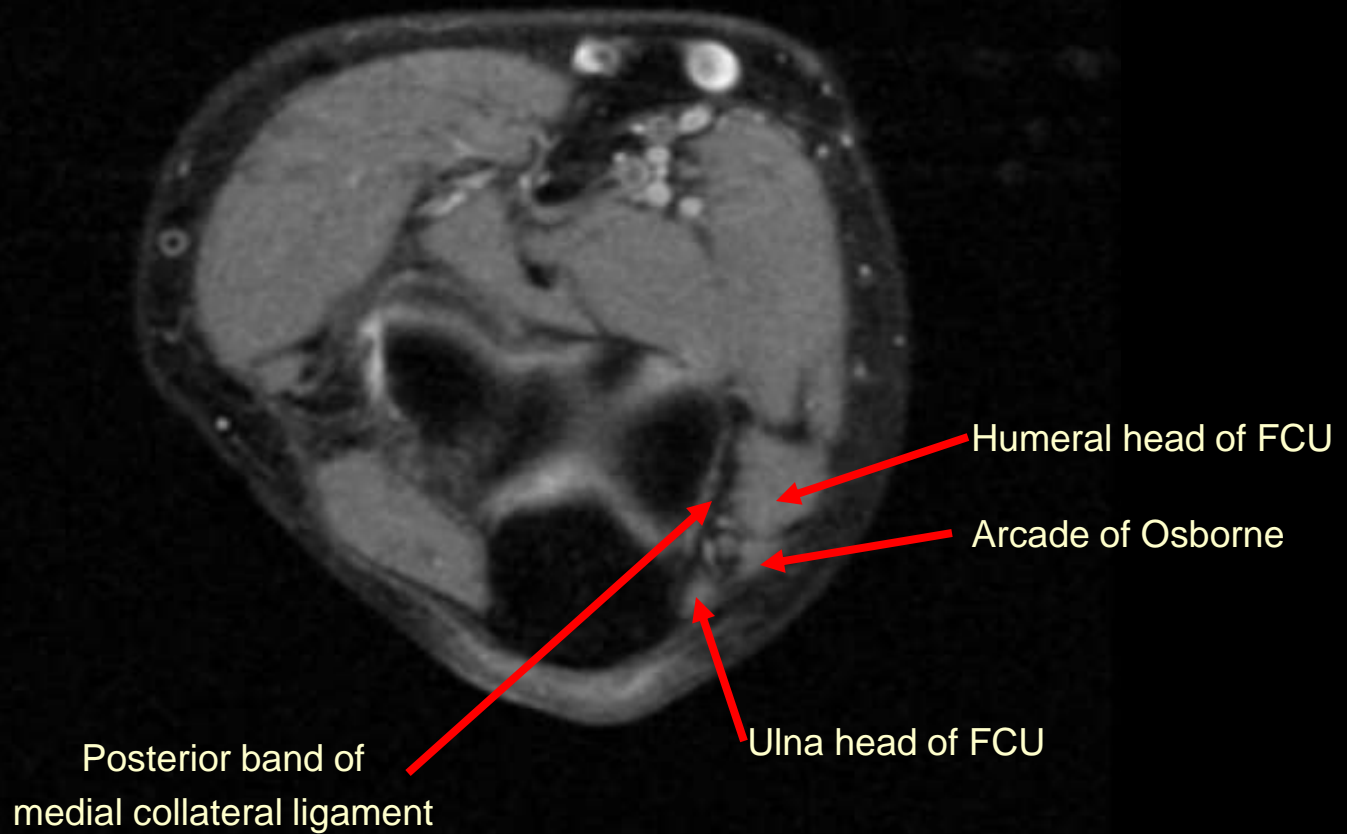




# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

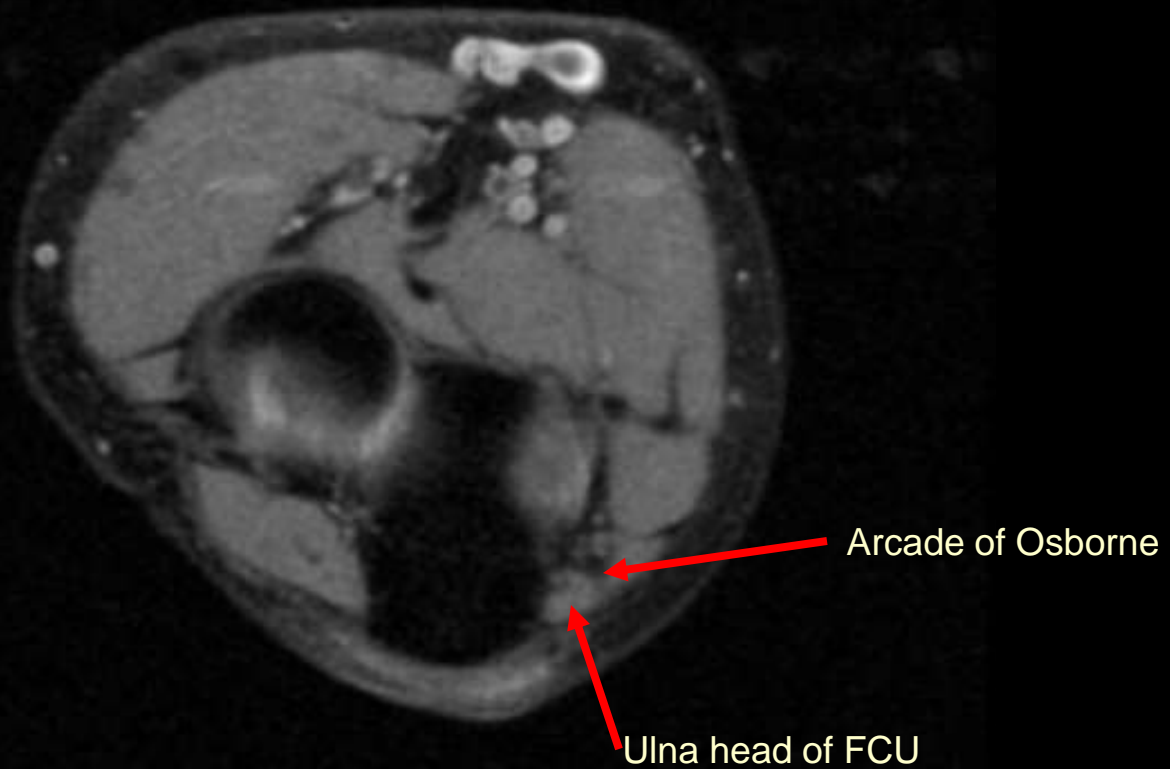
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

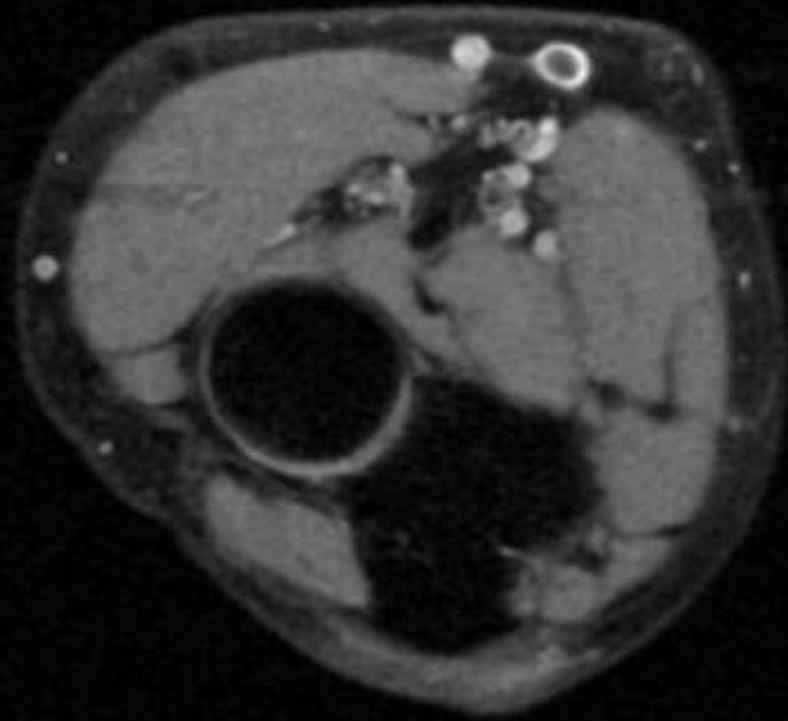
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

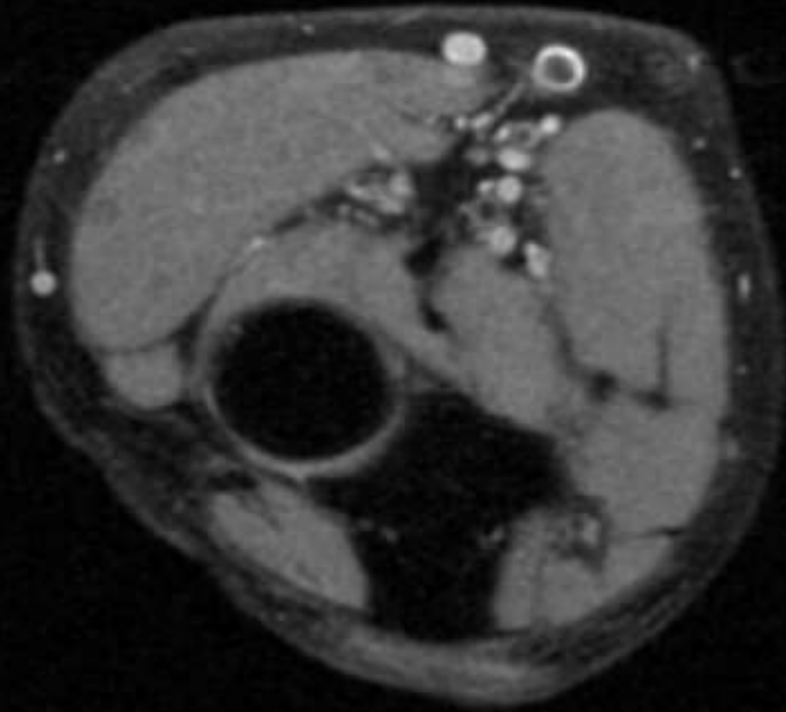
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

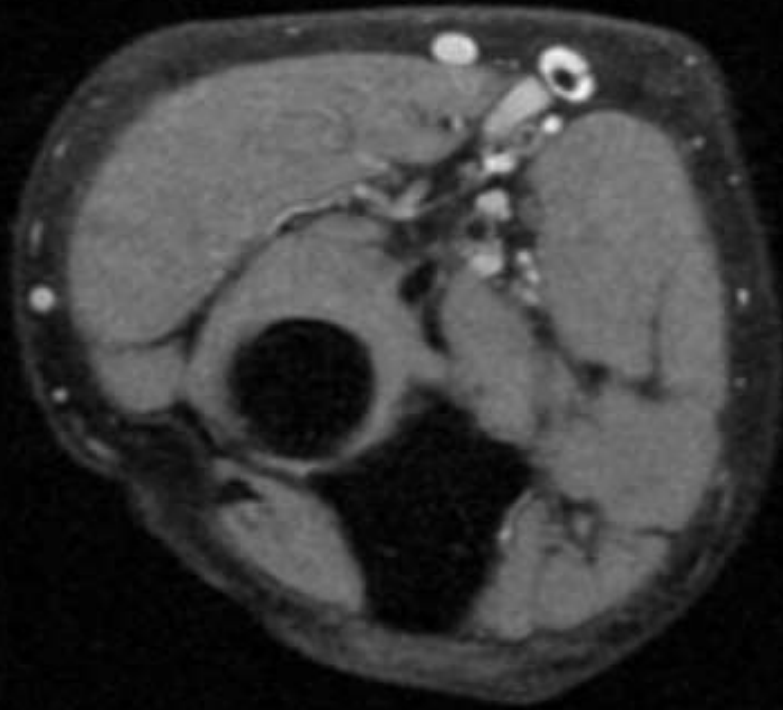
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

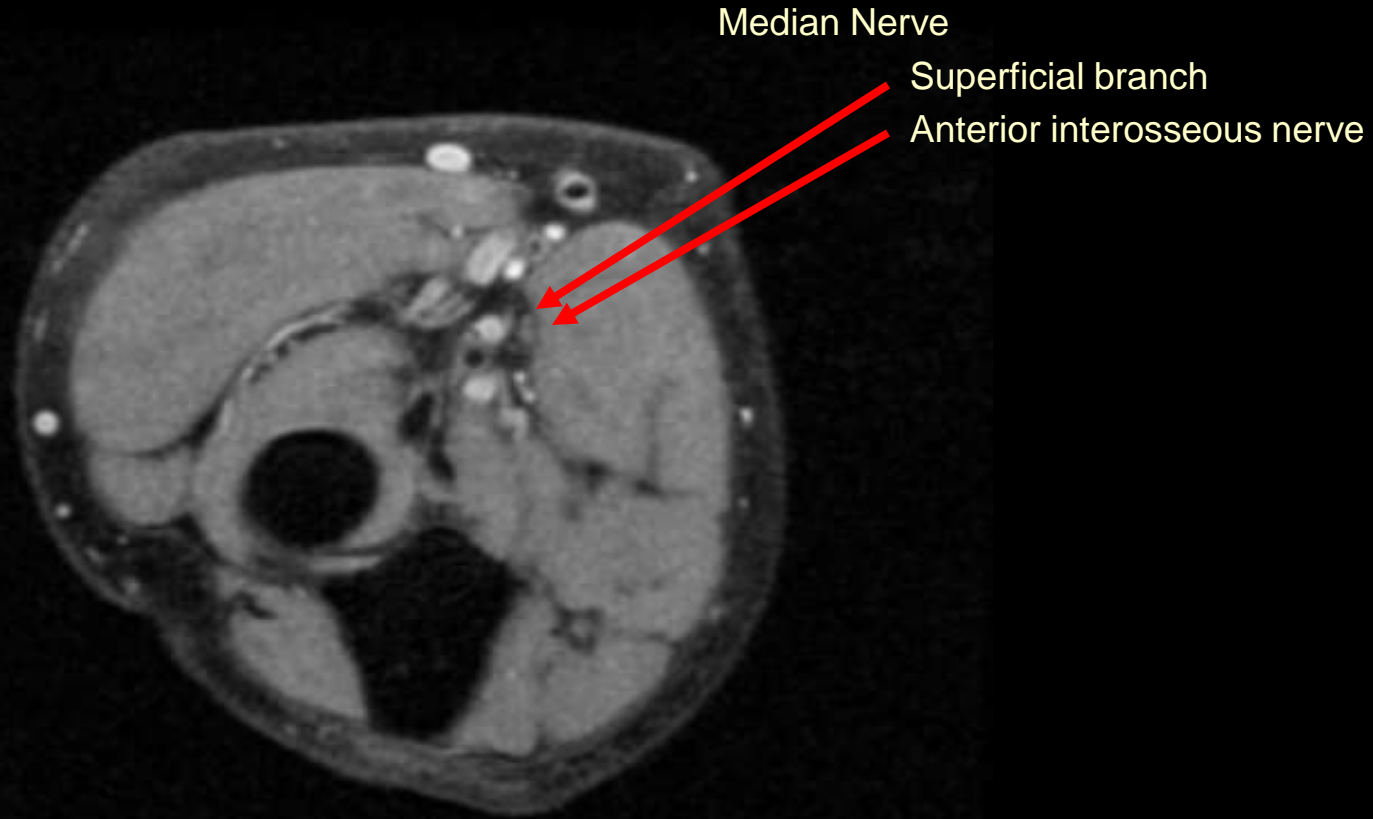
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

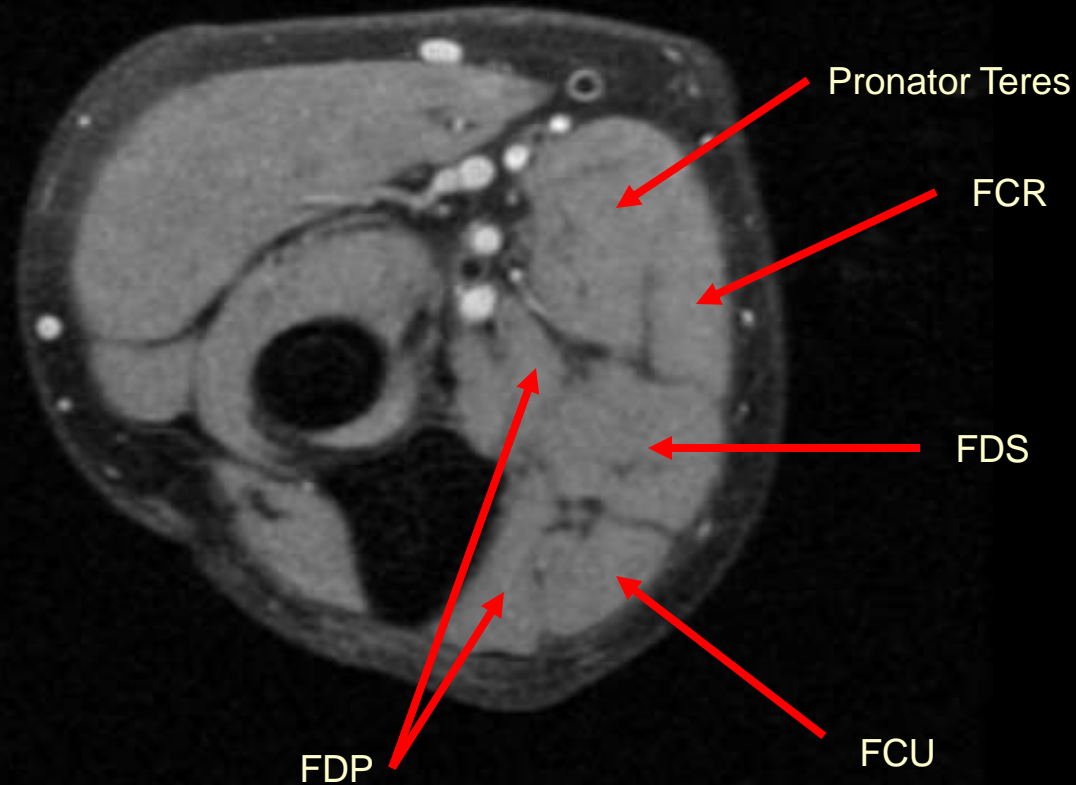
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

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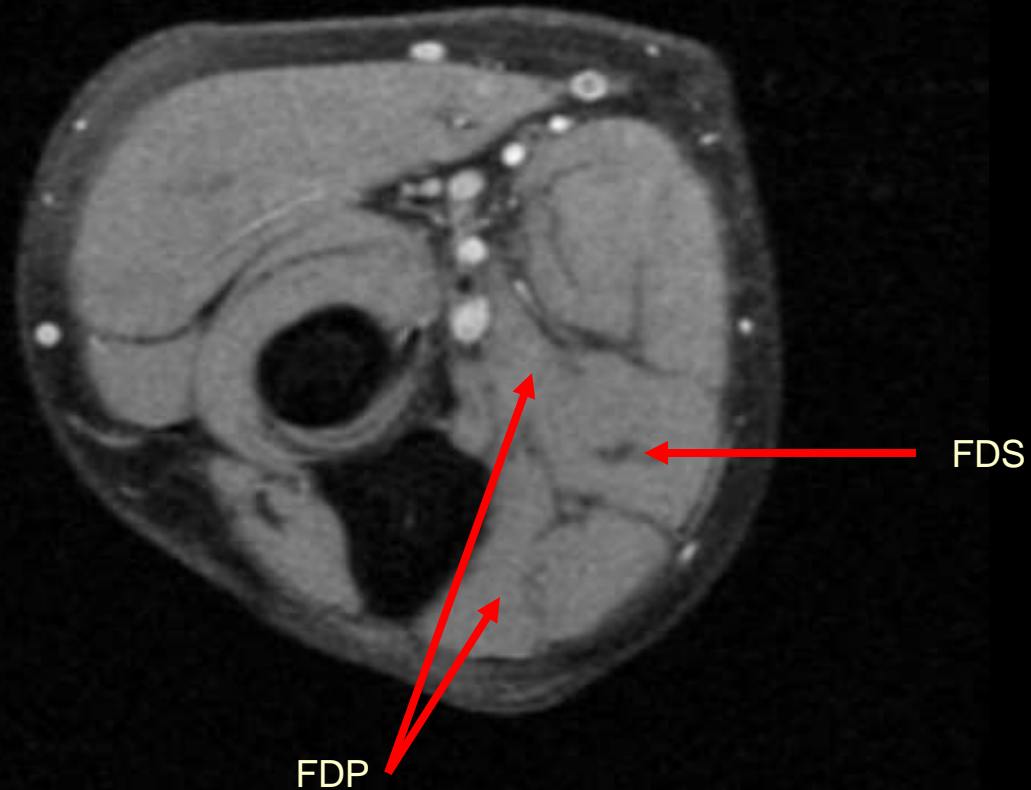




# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuritis

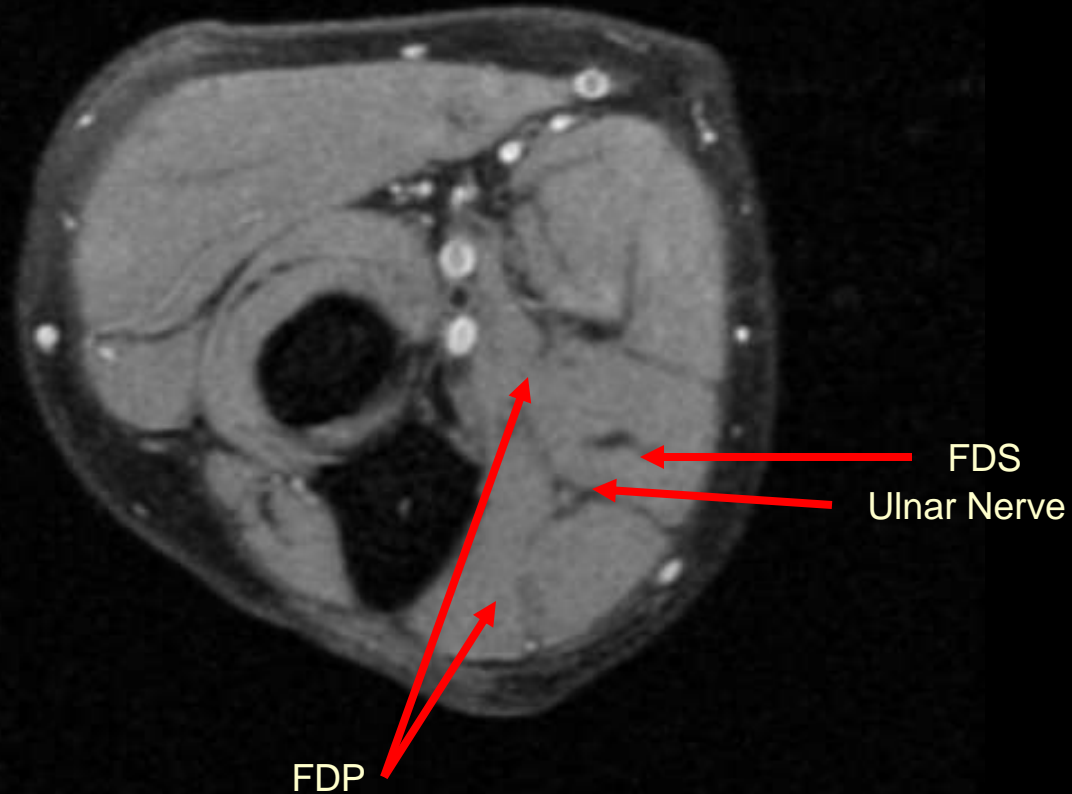
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

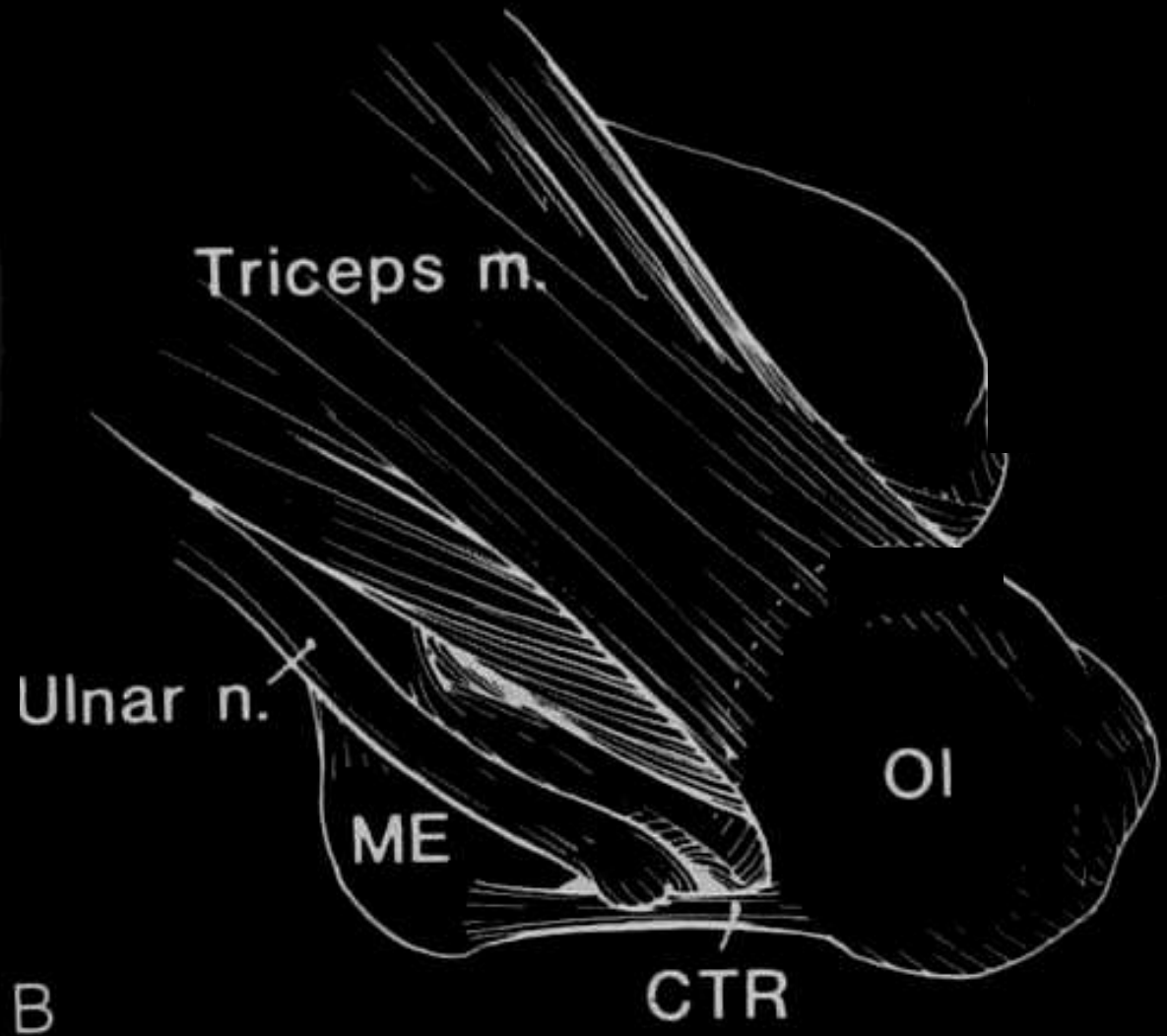
## Ulnar Neuritis

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# Entrapment neuropathy - Ulnar Nerve Cubital tunnel syndrome

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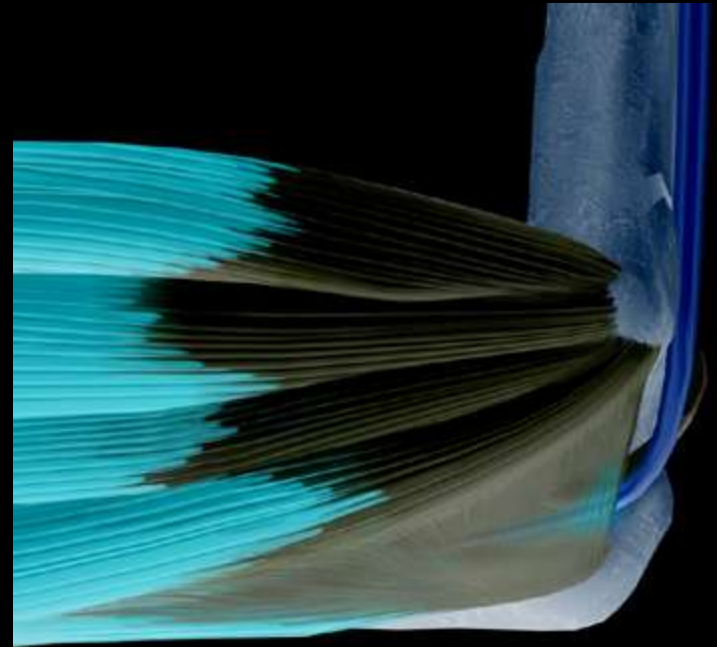
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# Entrapment neuropathy - Ulnar Nerve

## Cubital tunnel syndrome

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- 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 - Clinical

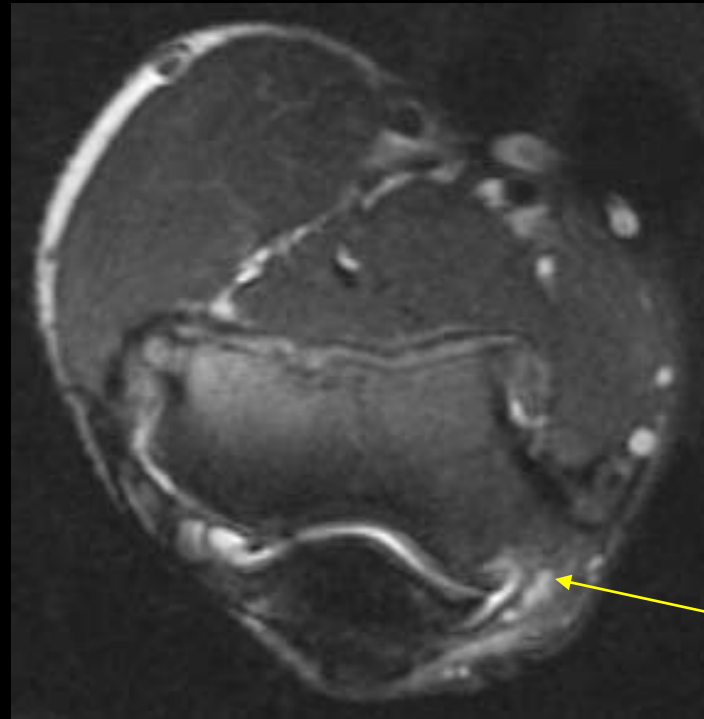
- Ring and little finger paresthesia
- Discomfort medial forearm
- Pain medial elbow
- Tapping nerve causes distress
- Occ. Weak finger add/abd
- Ulnar claw hand



# Cubital tunnel syndrome - Causes

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

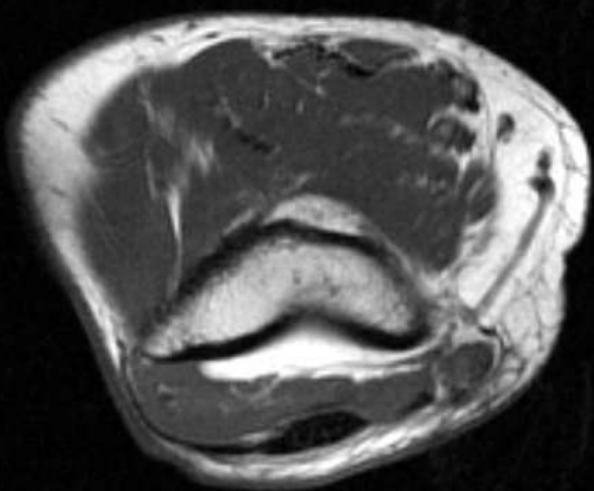


# Entrapment neuropathy - Ulna Nerve

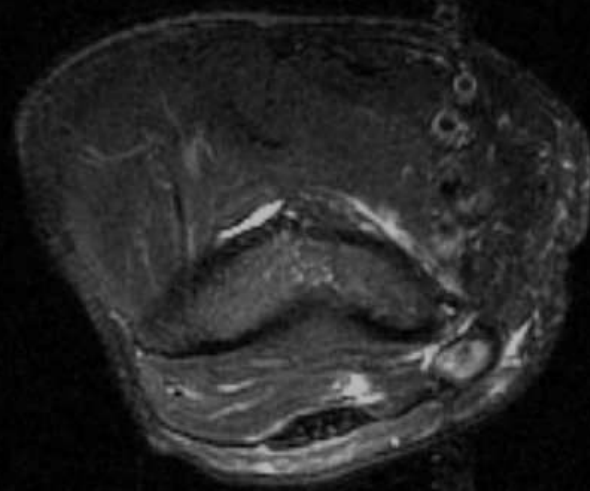
## Cubital tunnel syndrome - MRI

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



Ax T1



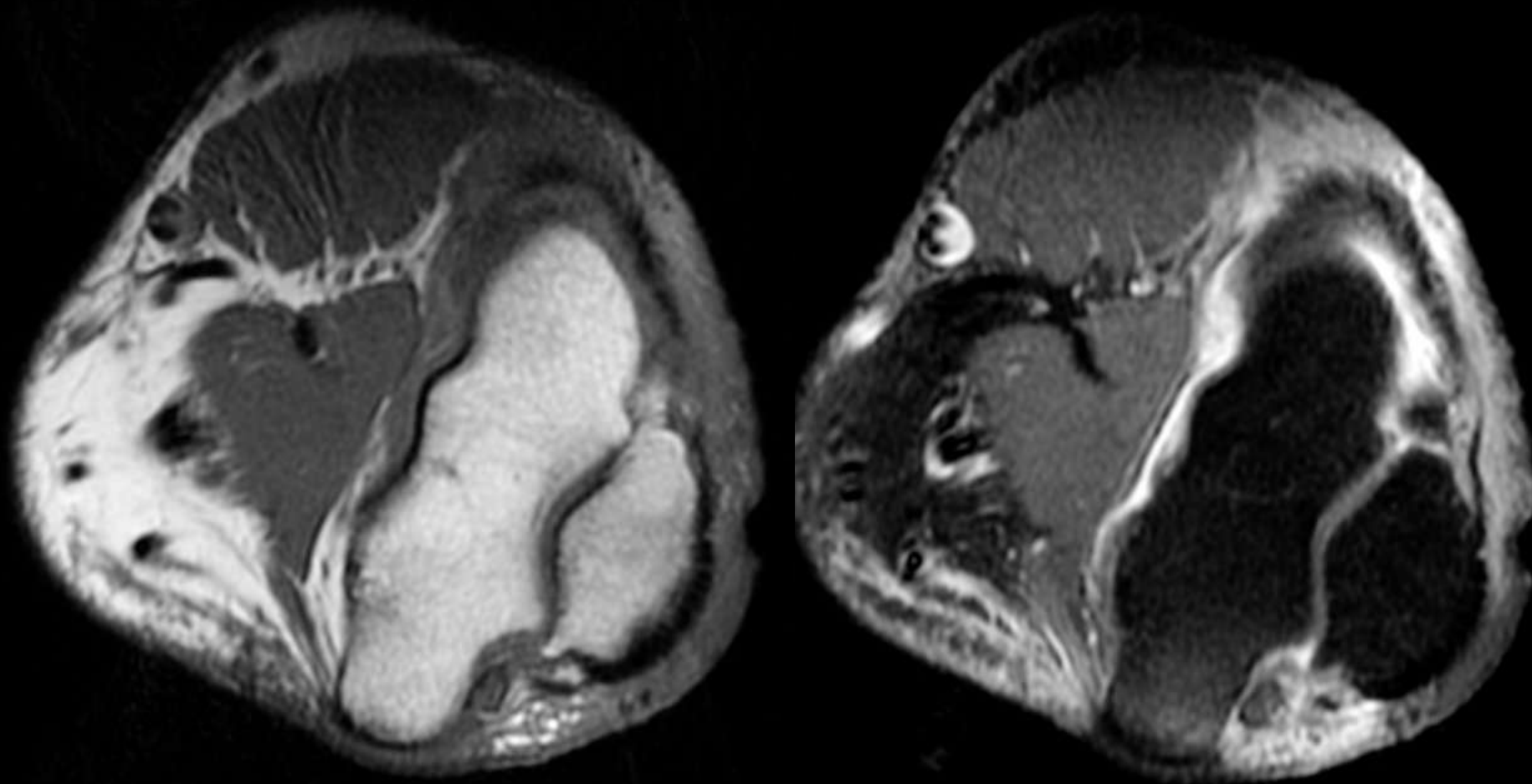
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Entrapment neuropathy - Ulnar Nerve

# Cubital tunnel syndrome - Osteophytes

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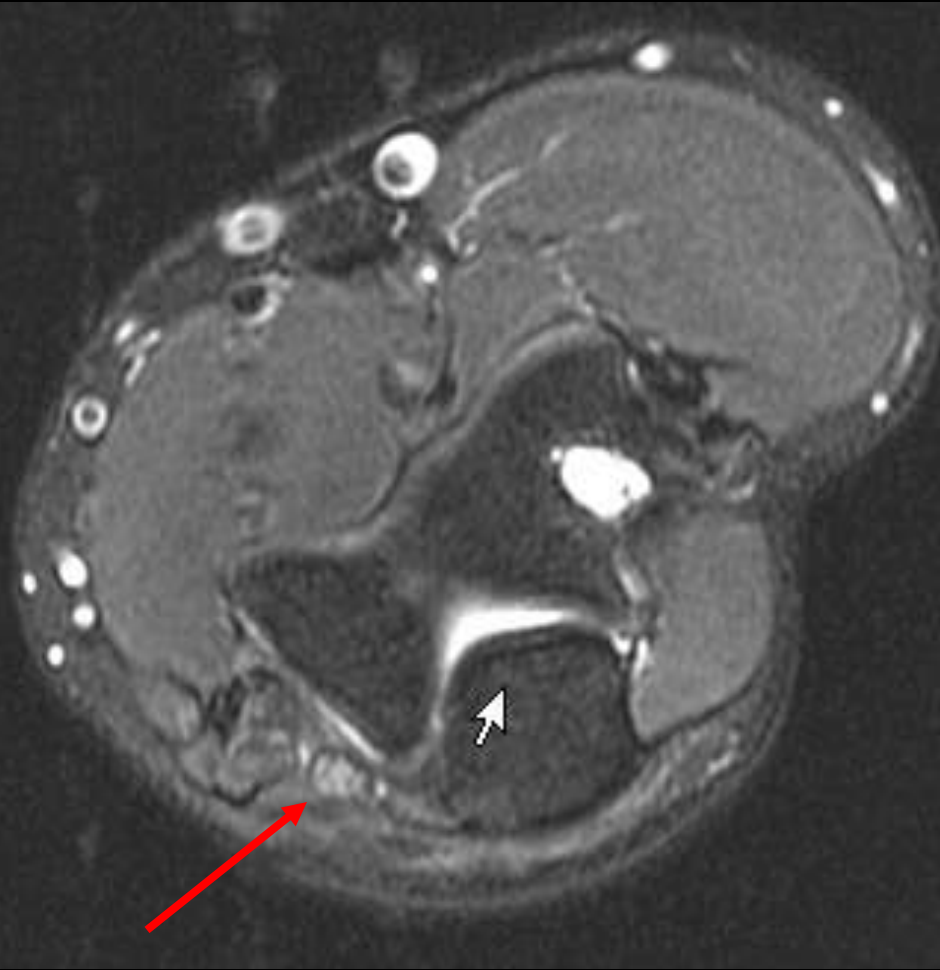


Peri Ulnar nerve inflammation

# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulnar Neuropathy

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Ax T2FS



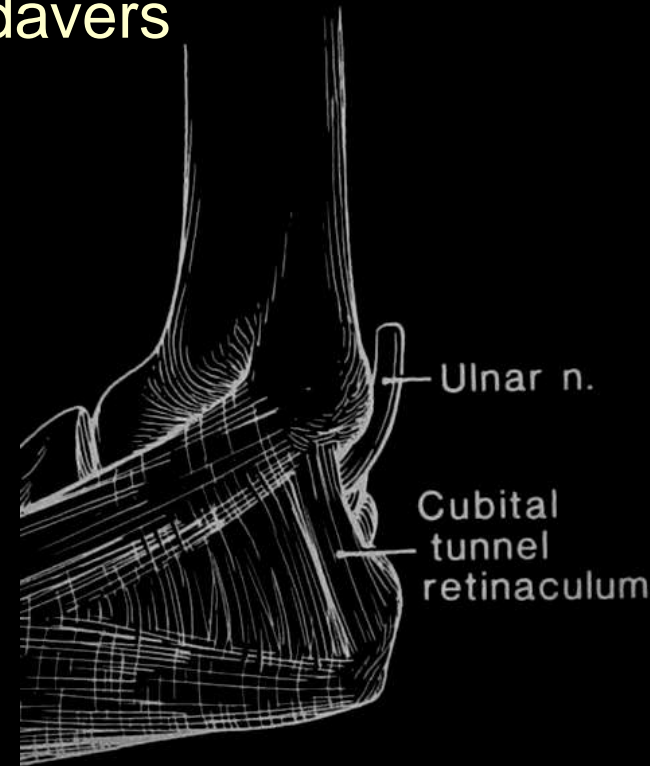
Ax STIR

# Entrapment neuropathy - Ulna Nerve - Cubital Tunnel Syndrome

## Anconeus epitrochlearis

- Cubital tunnel retinaculum - 27 cadavers

- Absent (1)
  - Allows subluxation on flexion
- 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

## Entrapment neuropathy - Ulnar Nerve

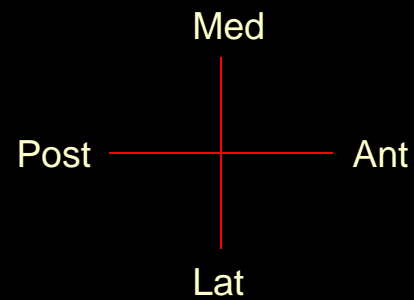
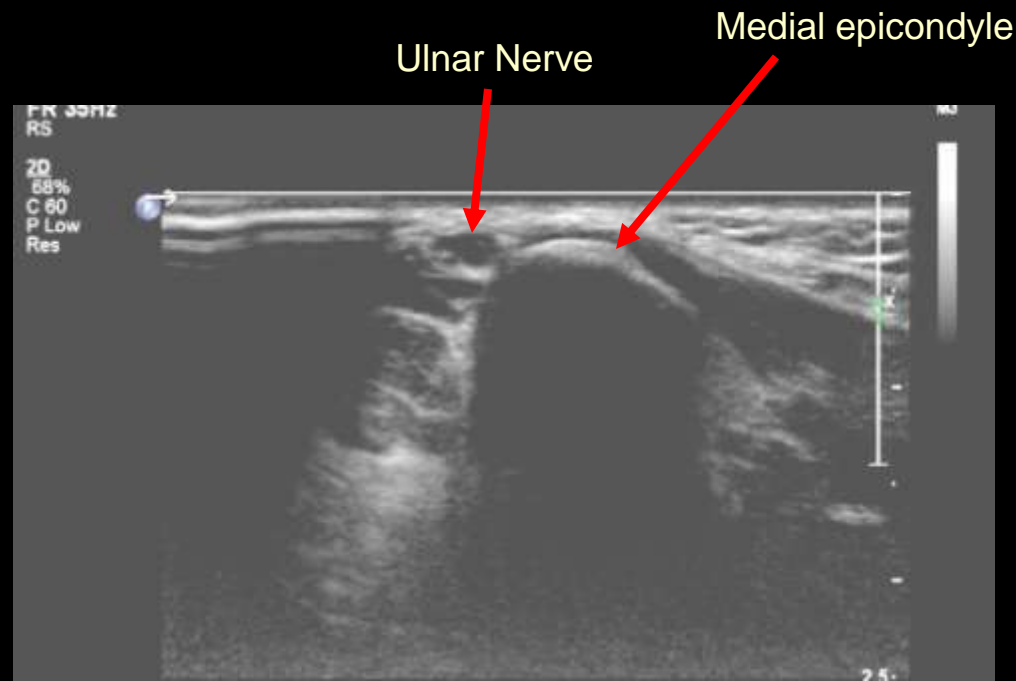
# Cubital tunnel syndrome

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

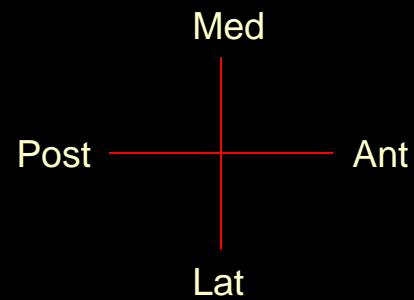
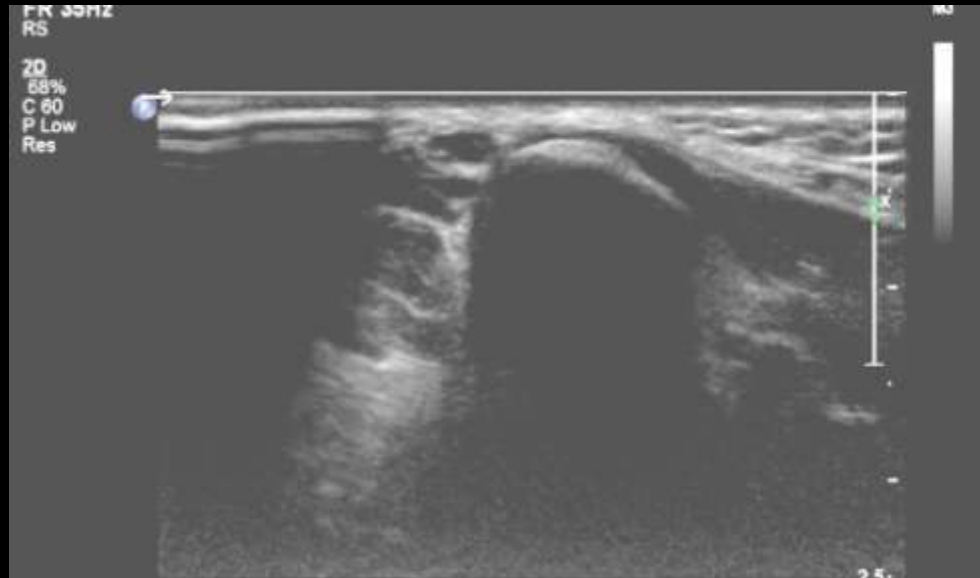
# Ulnar Nerve Subluxation in flexion

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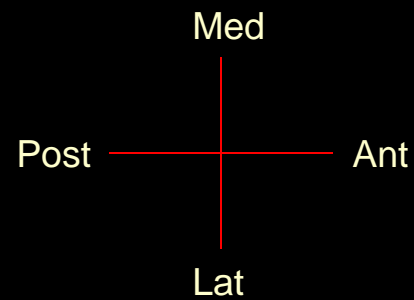
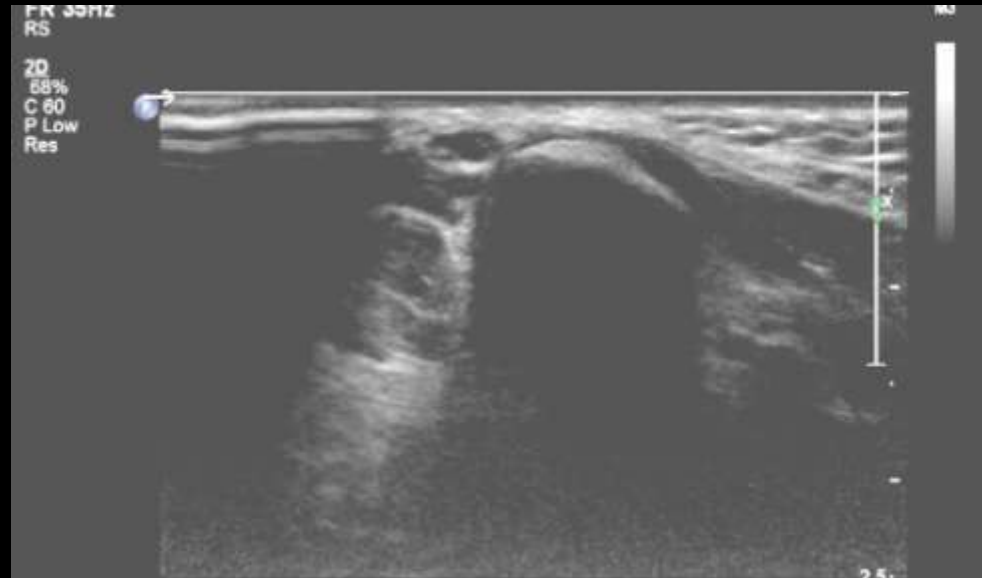
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

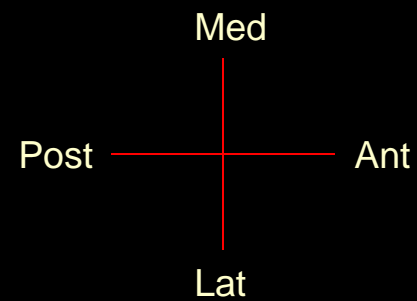
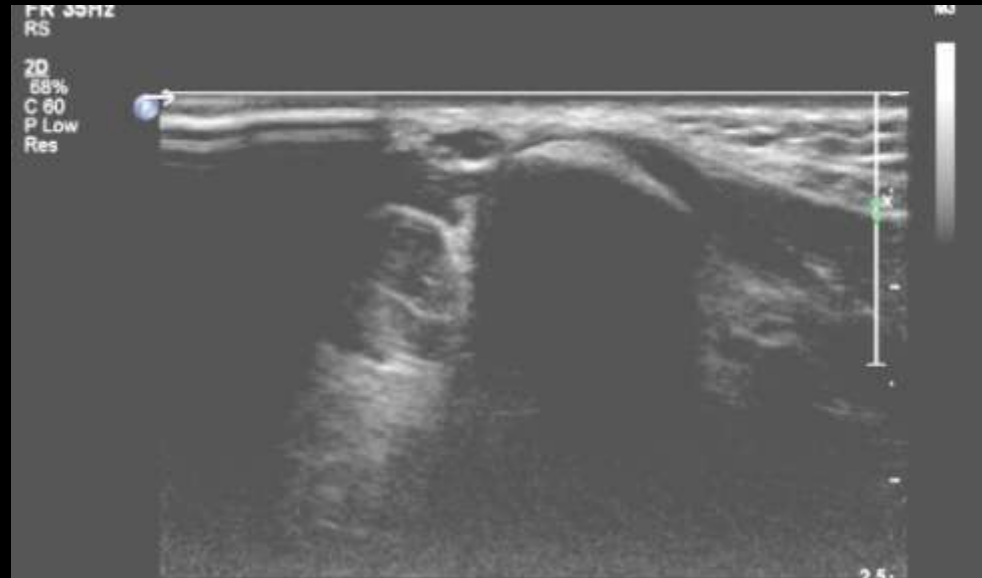
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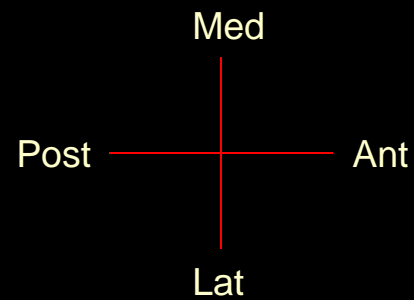
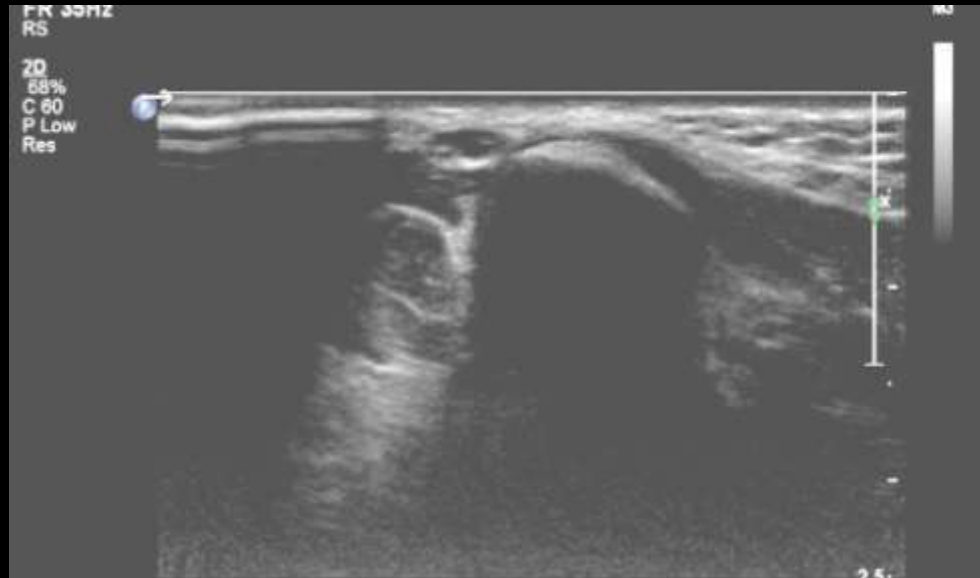
# Ulnar Nerve Subluxation in flexion

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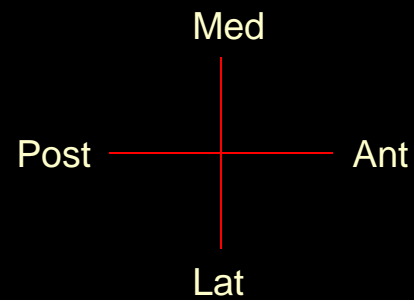
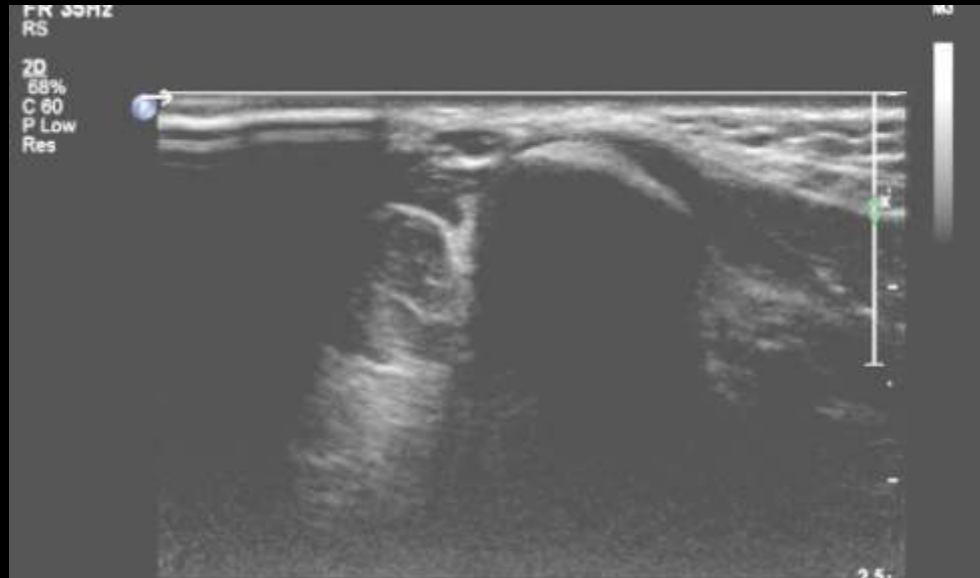
# Ulnar Nerve Subluxation in flexion

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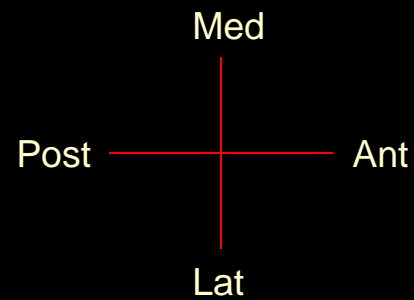
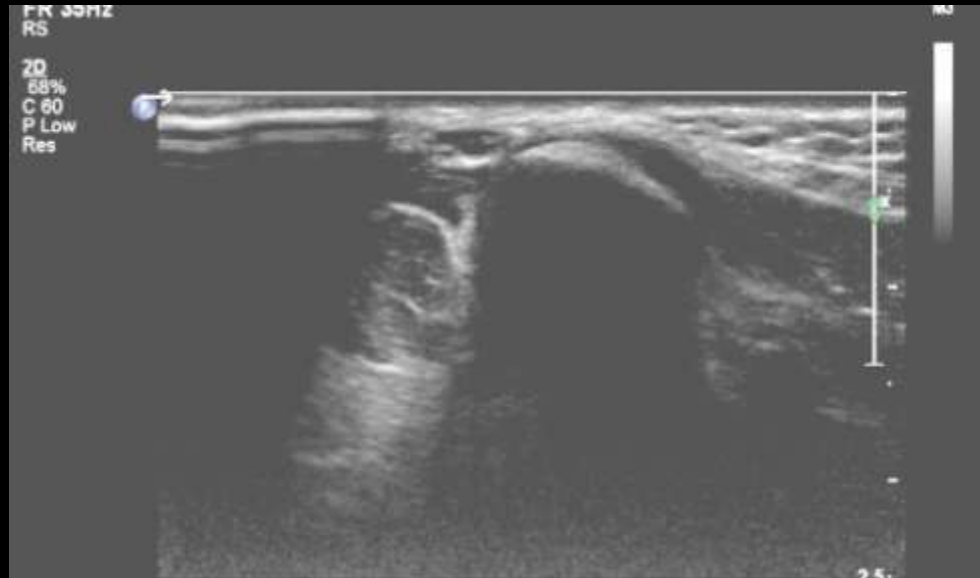
# Ulnar Nerve Subluxation in flexion

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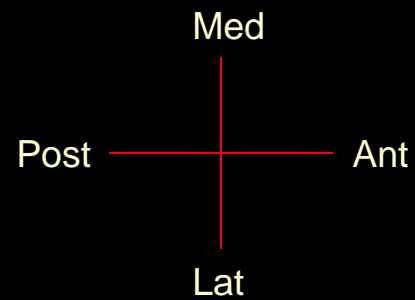
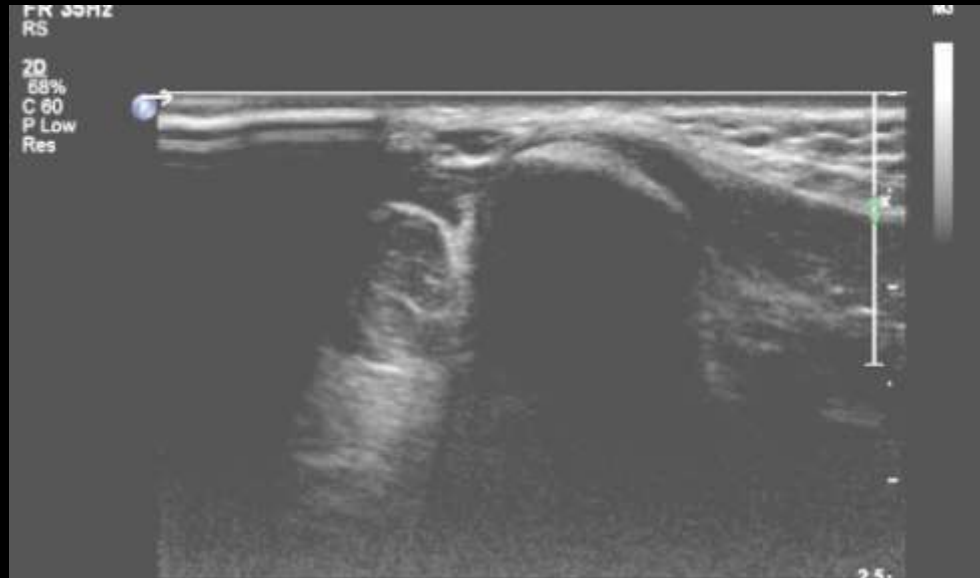
# Ulnar Nerve Subluxation in flexion

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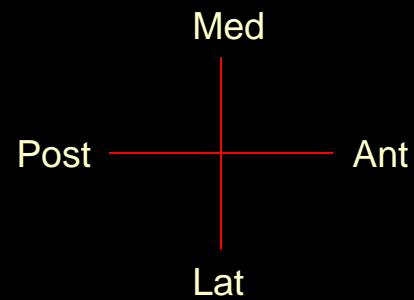
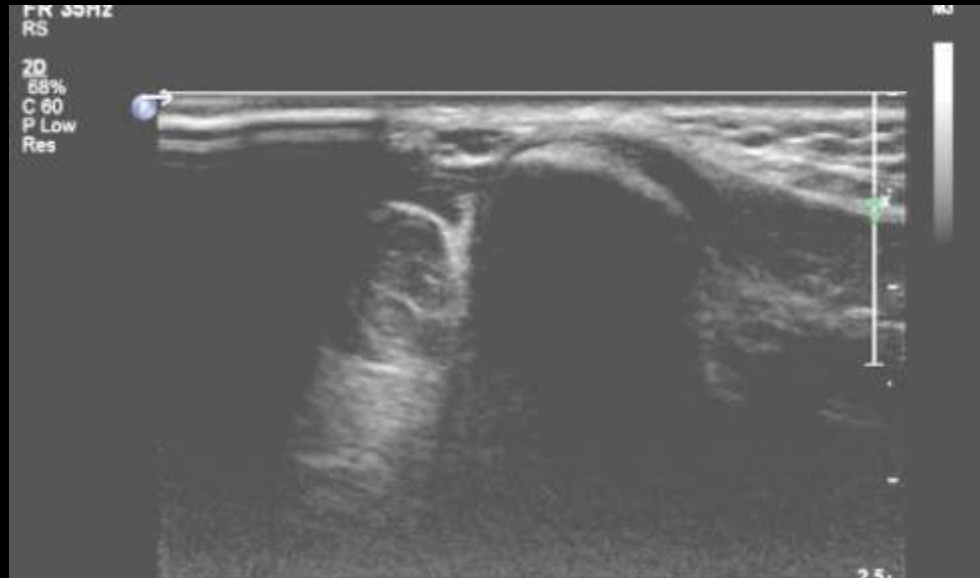
# Ulnar Nerve Subluxation in flexion

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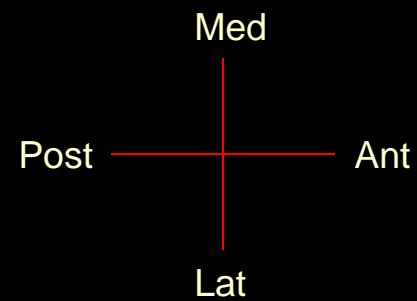
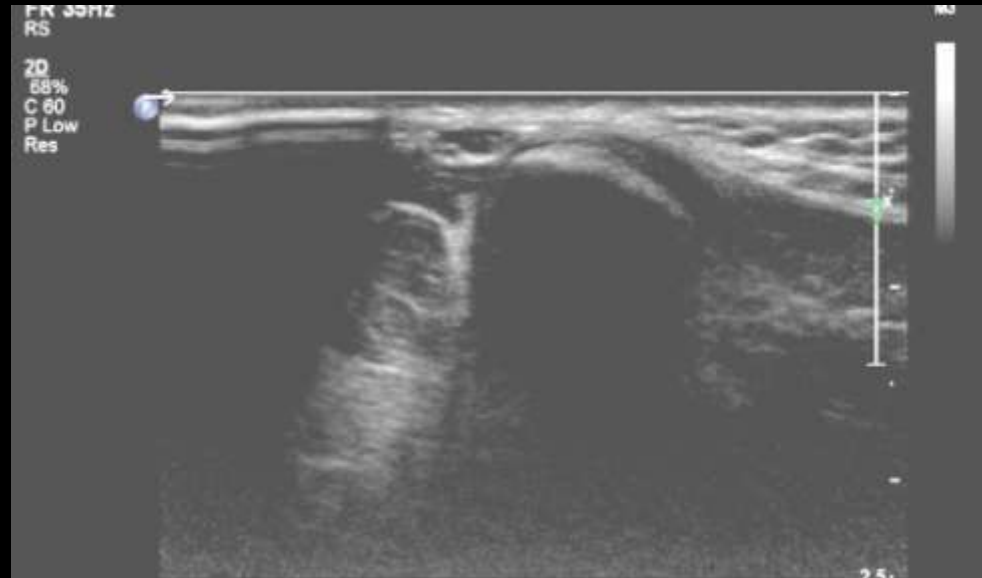
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

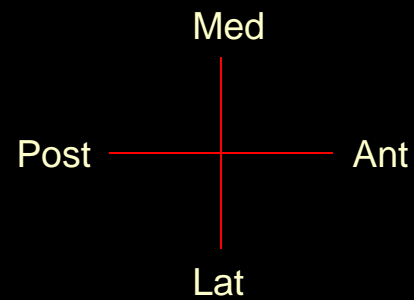
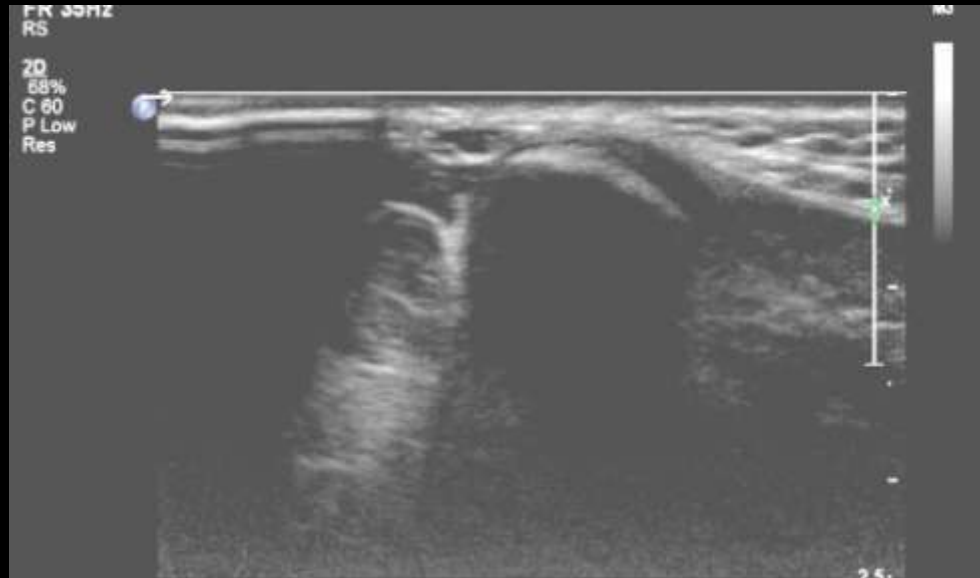
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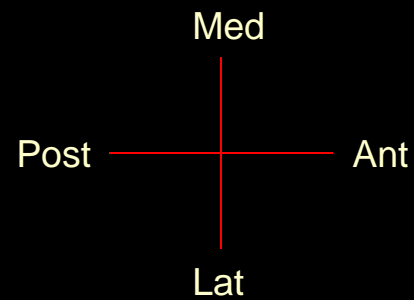
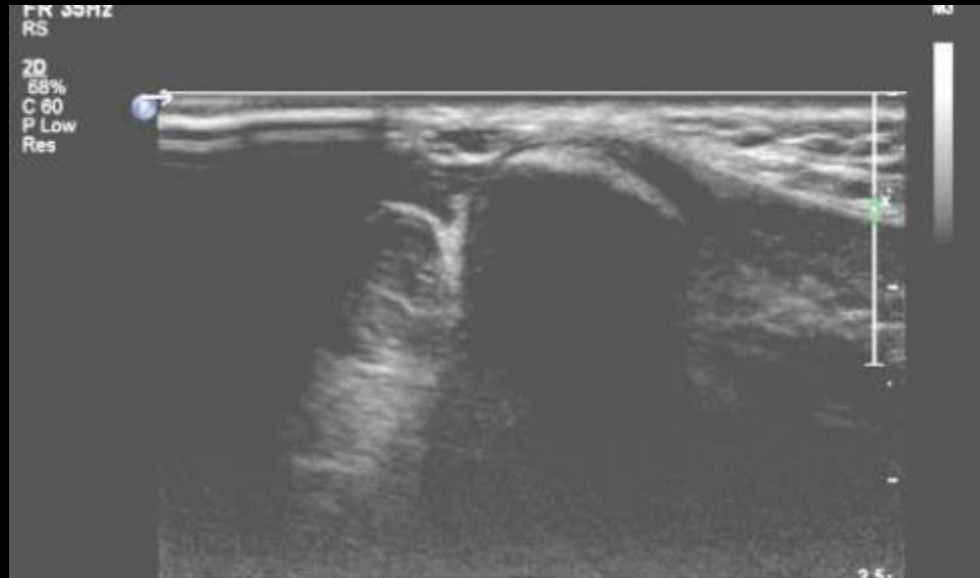
# Ulnar Nerve Subluxation in flexion

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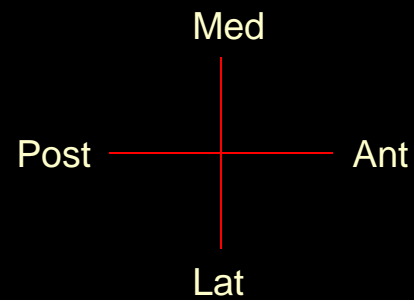
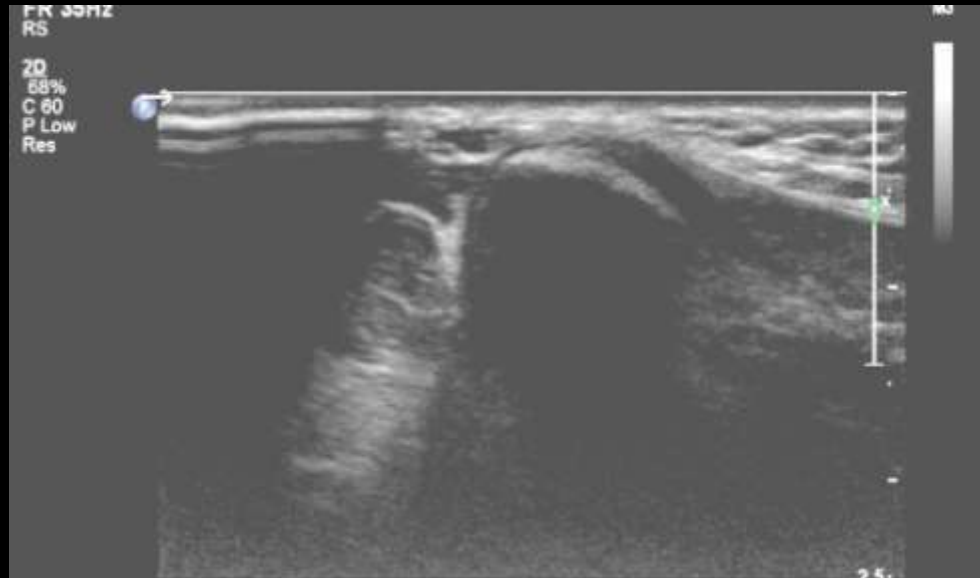
# Ulnar Nerve Subluxation in flexion

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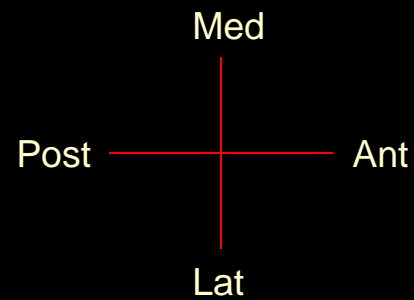
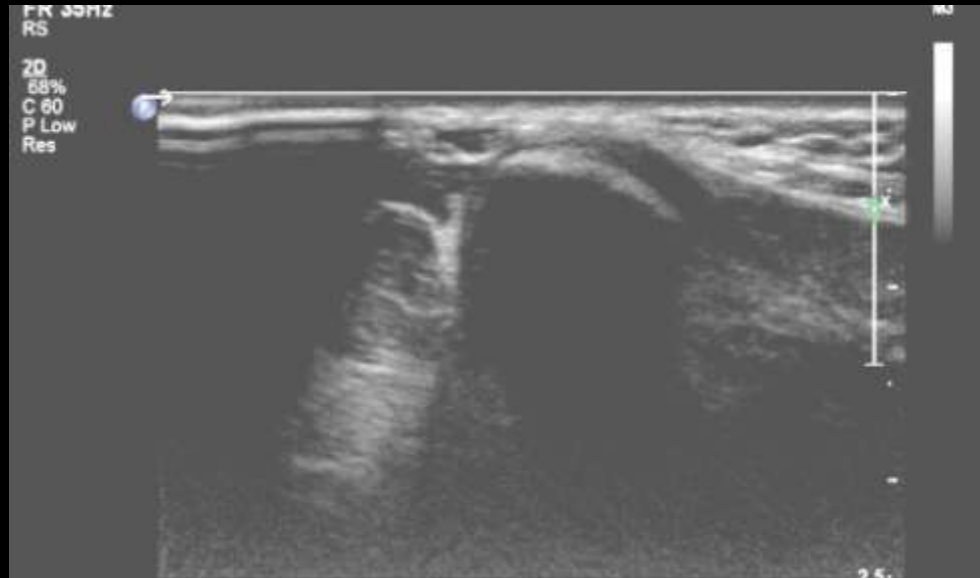
# Ulnar Nerve Subluxation in flexion

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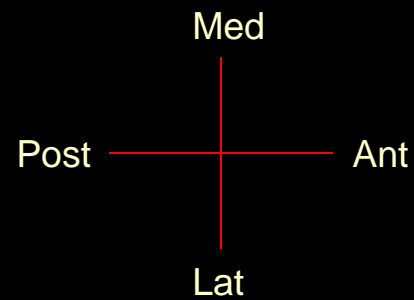
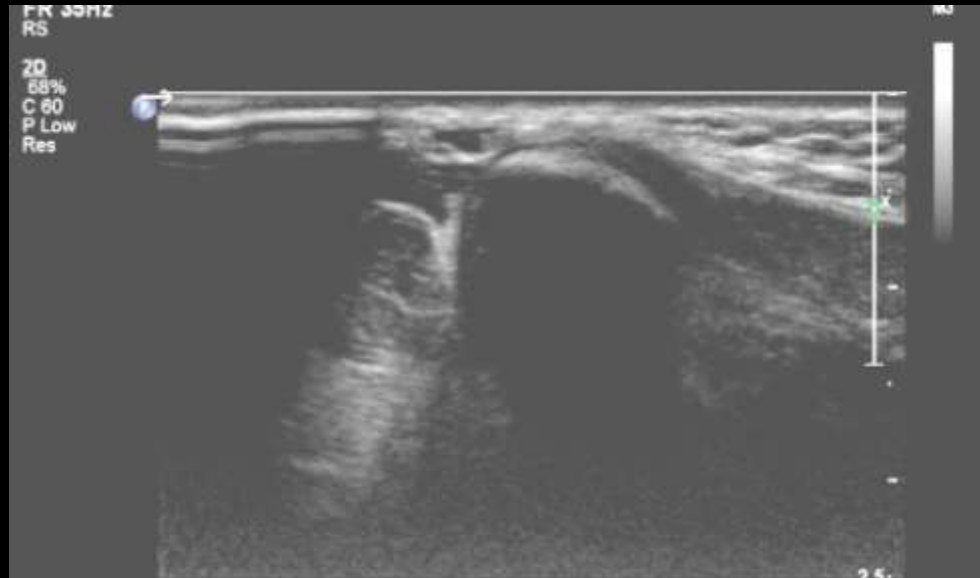
# Ulnar Nerve Subluxation in flexion

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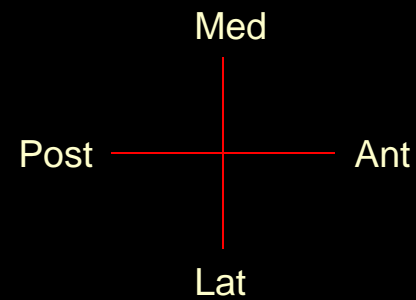
# Ulnar Nerve Subluxation in flexion

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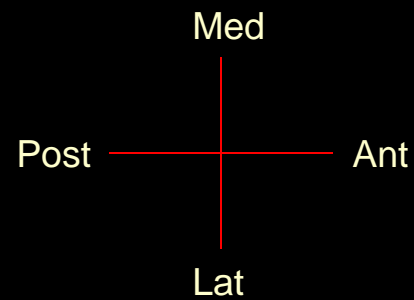
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

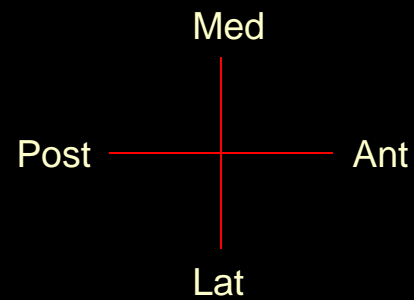
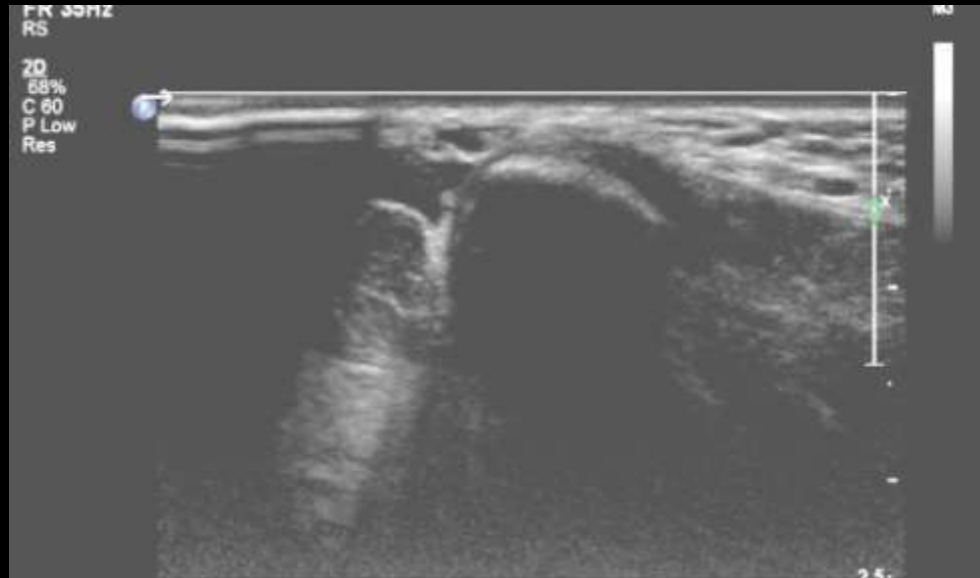
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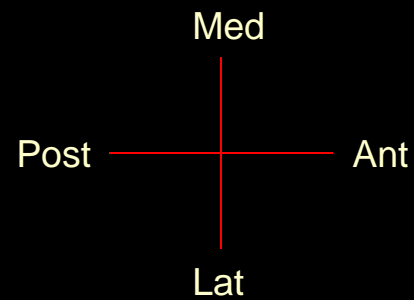
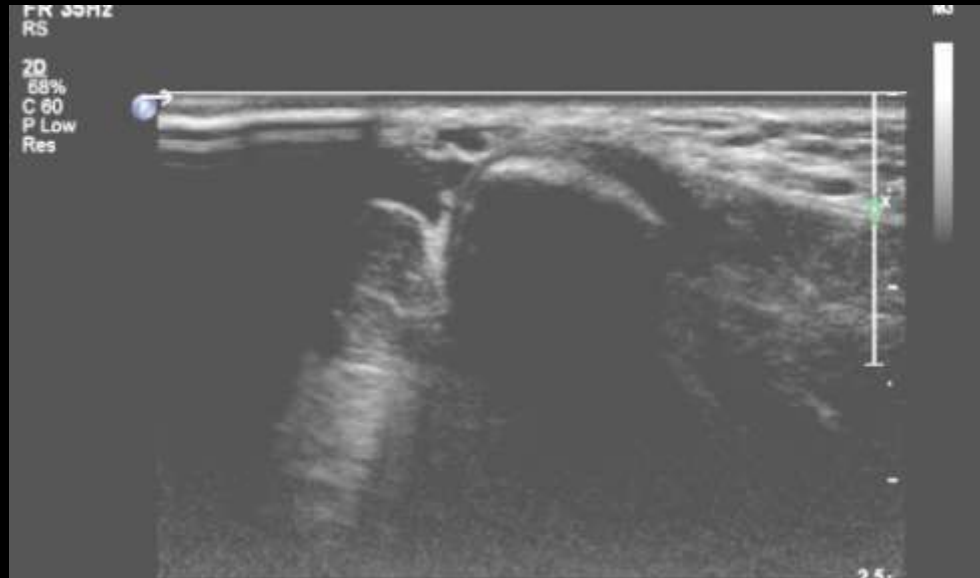
# Ulnar Nerve Subluxation in flexion

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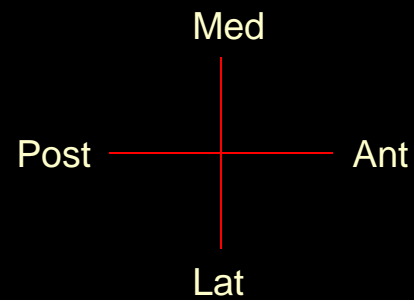
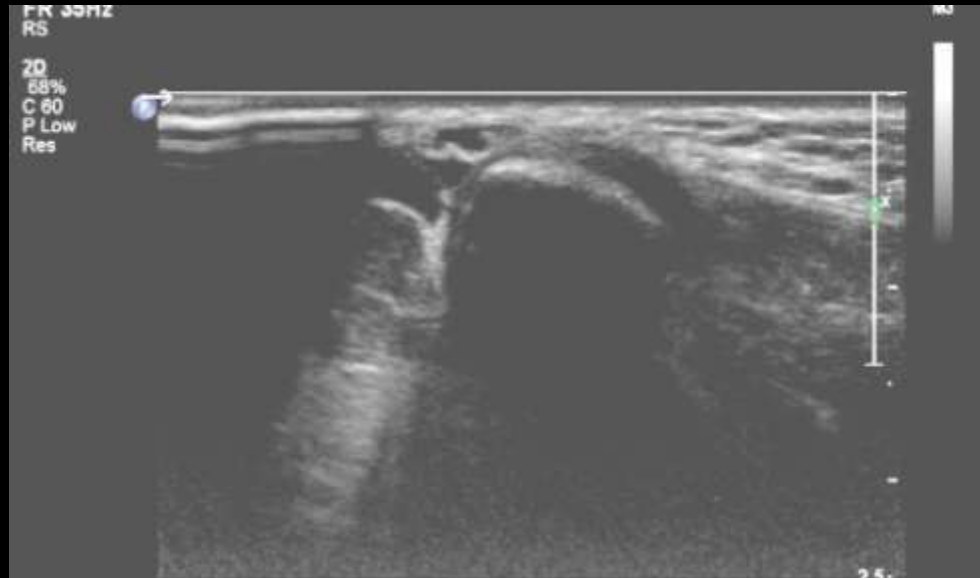
# Ulnar Nerve Subluxation in flexion

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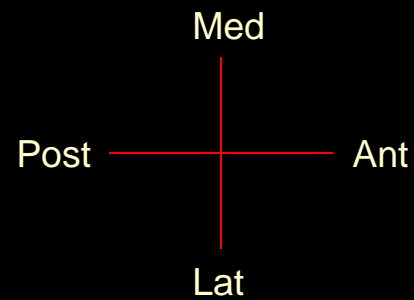
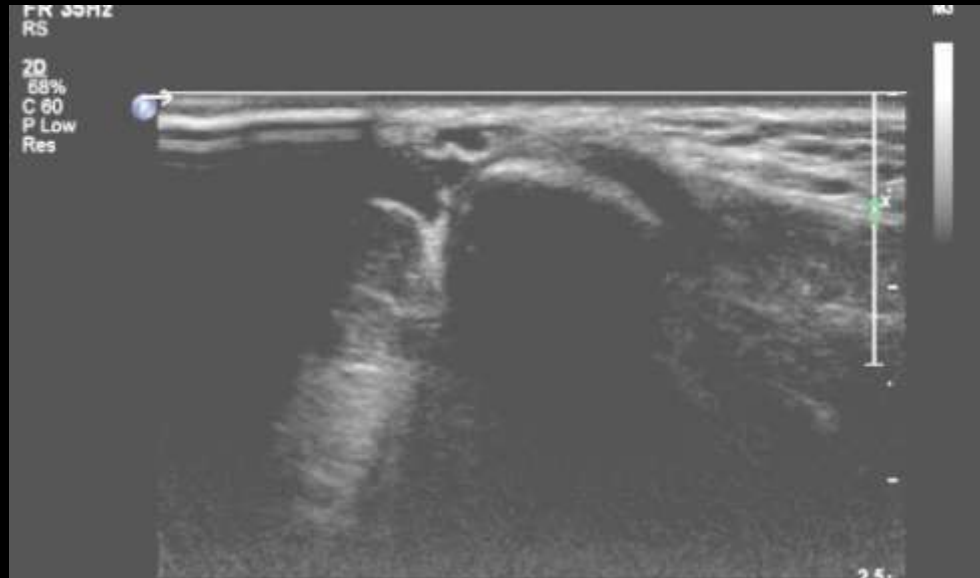
# Ulnar Nerve Subluxation in flexion

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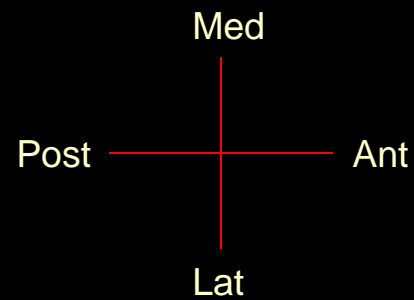
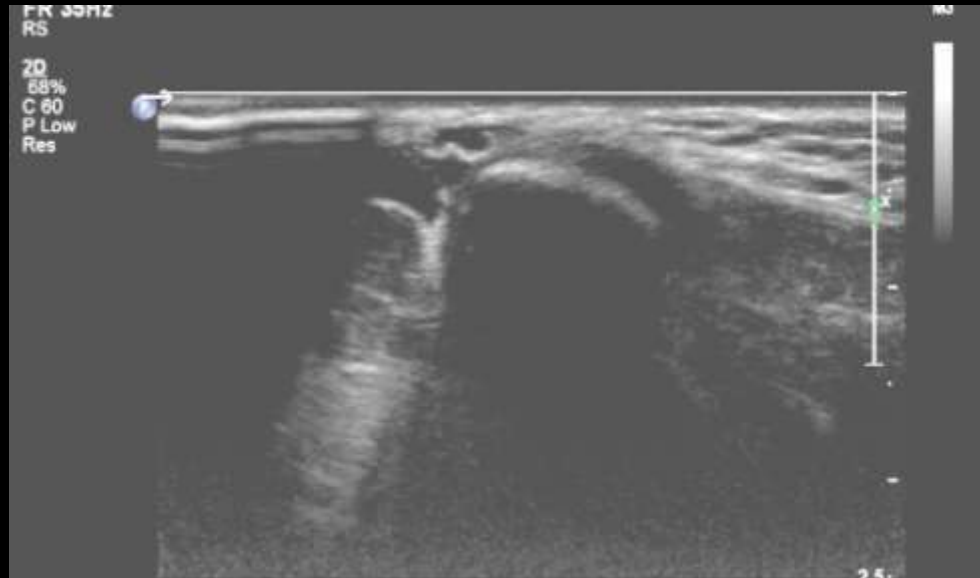
# Ulnar Nerve Subluxation in flexion

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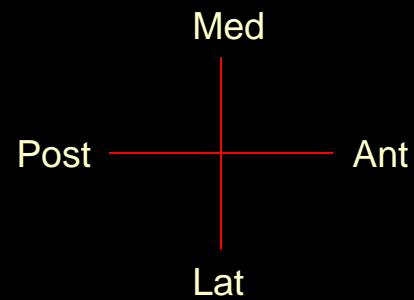
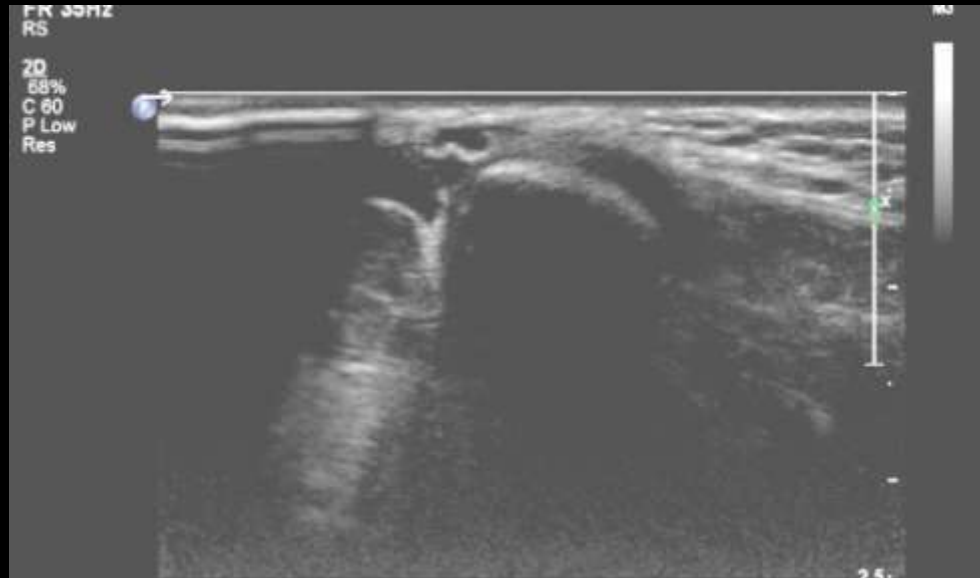
# Ulnar Nerve Subluxation in flexion

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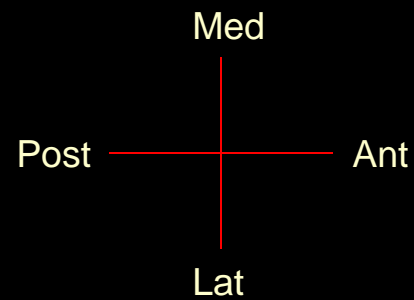
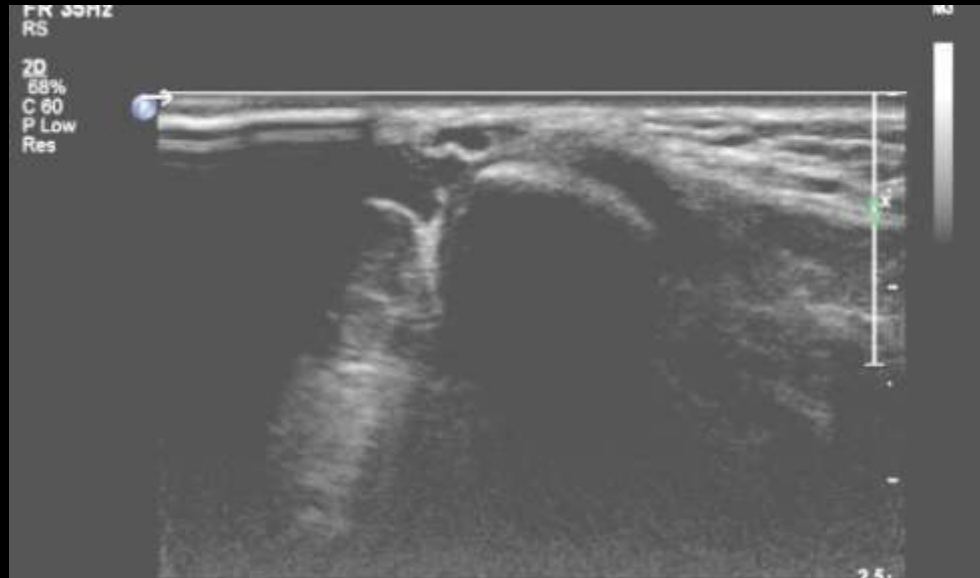
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

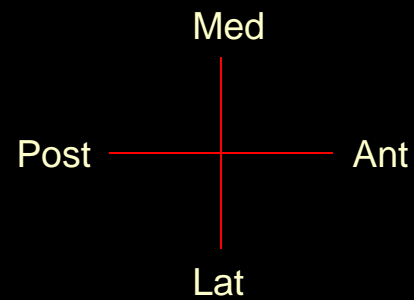
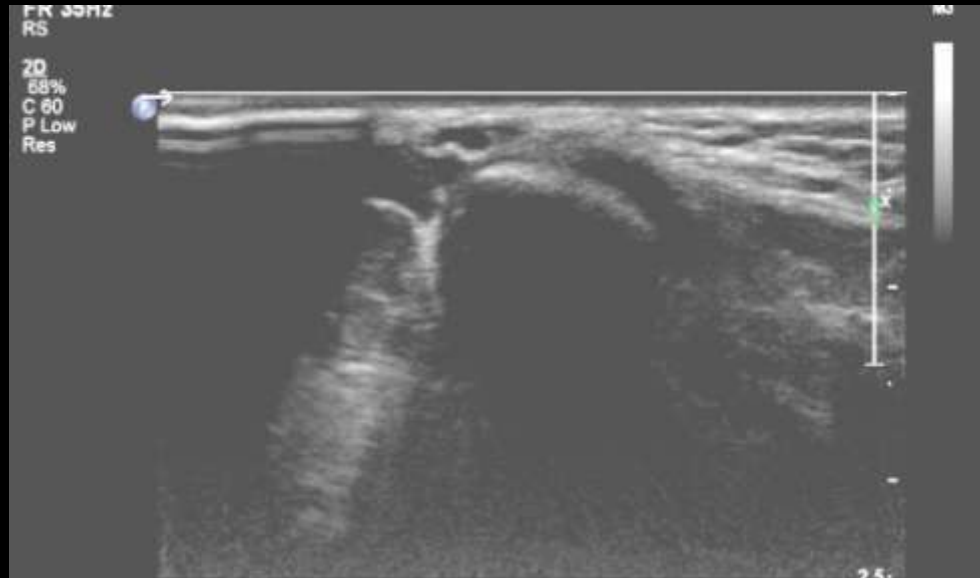
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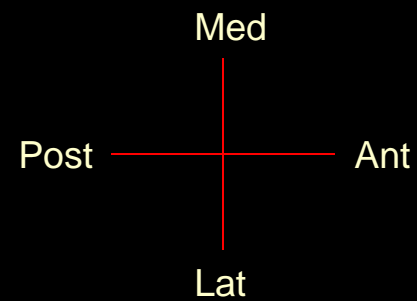
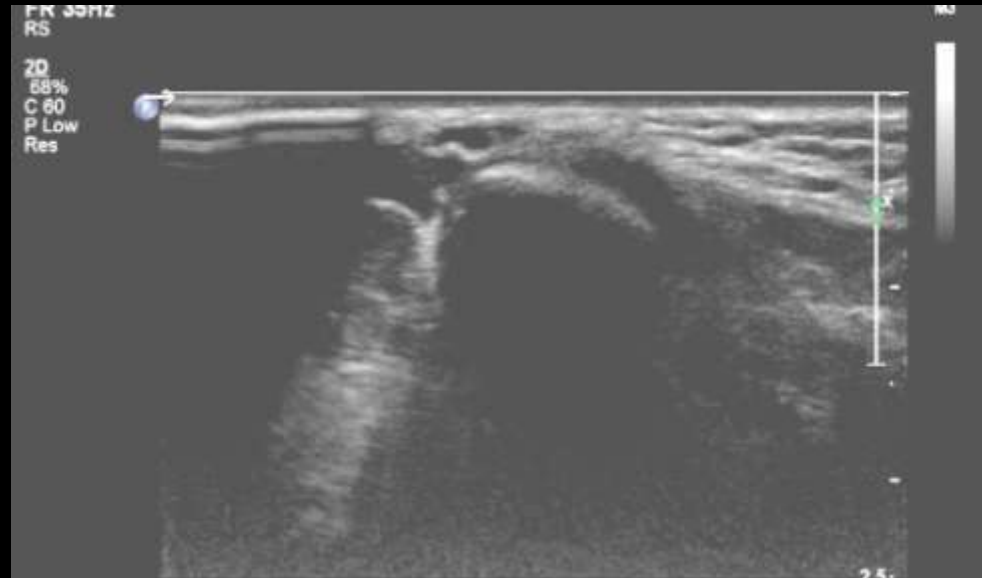
# Ulnar Nerve Subluxation in flexion

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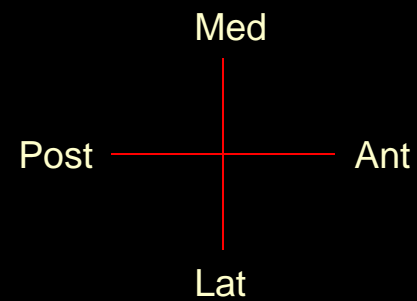
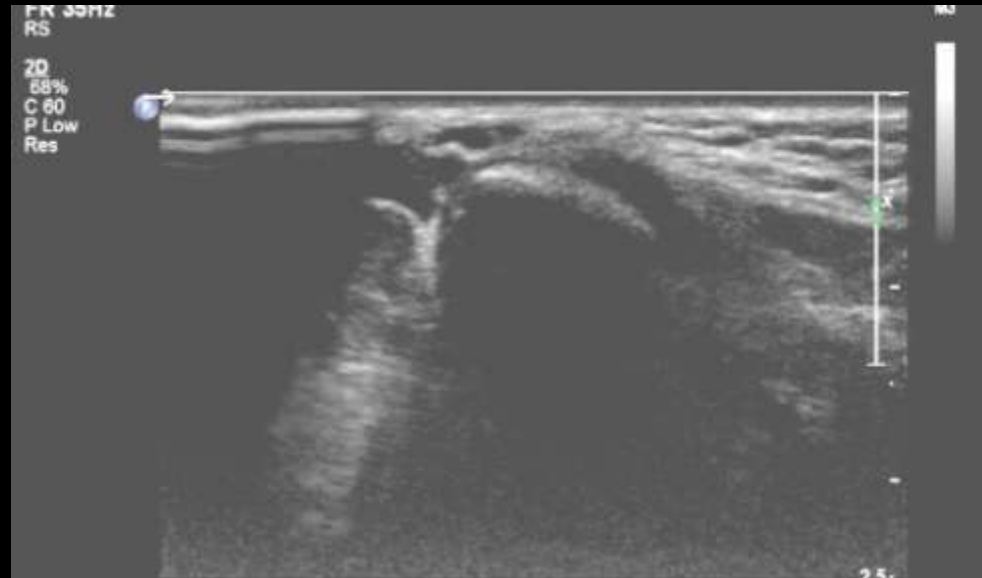
# Ulnar Nerve Subluxation in flexion

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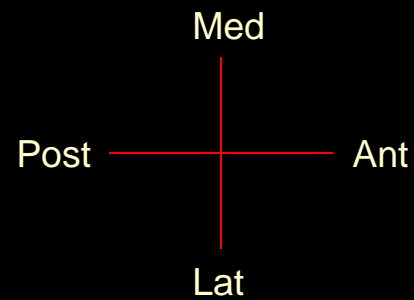
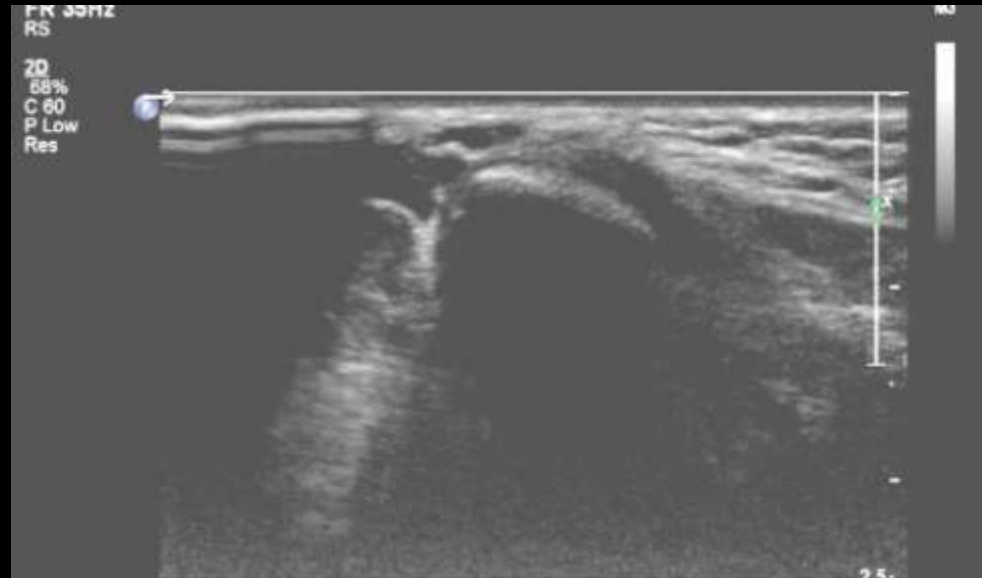
# Ulnar Nerve Subluxation in flexion

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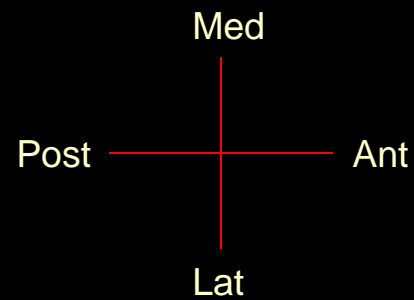
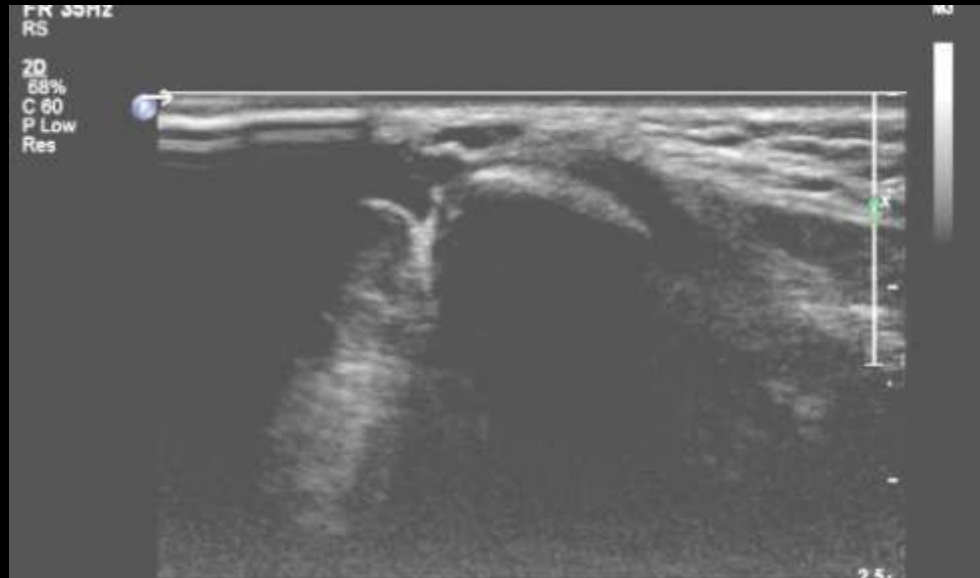
# Ulnar Nerve Subluxation in flexion

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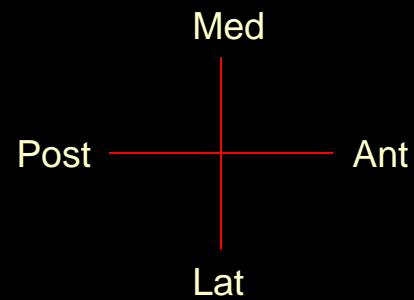
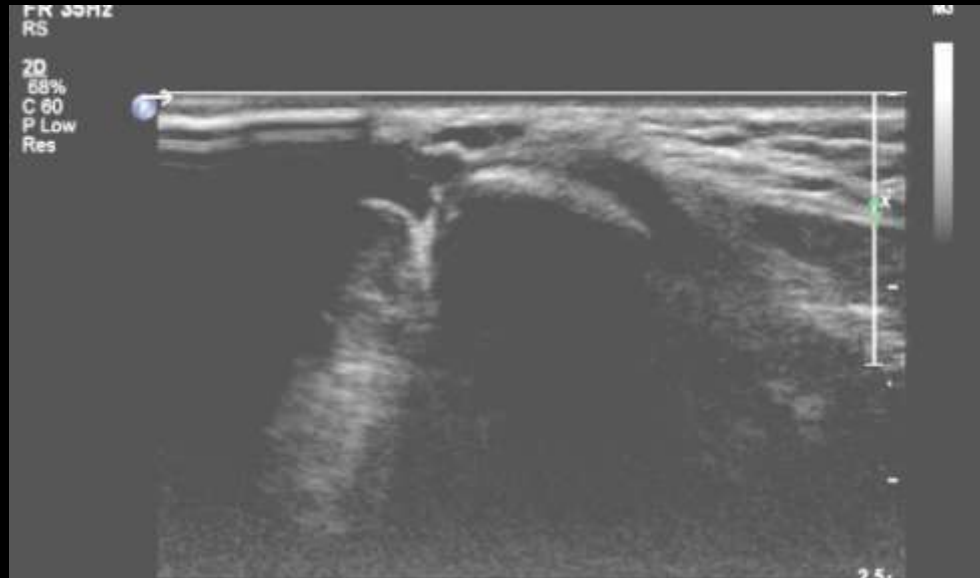
# Ulnar Nerve Subluxation in flexion

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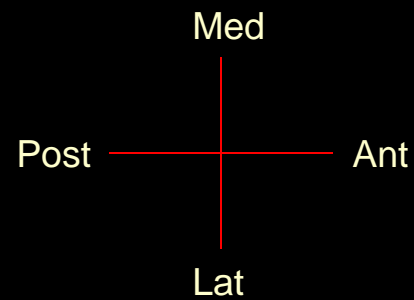
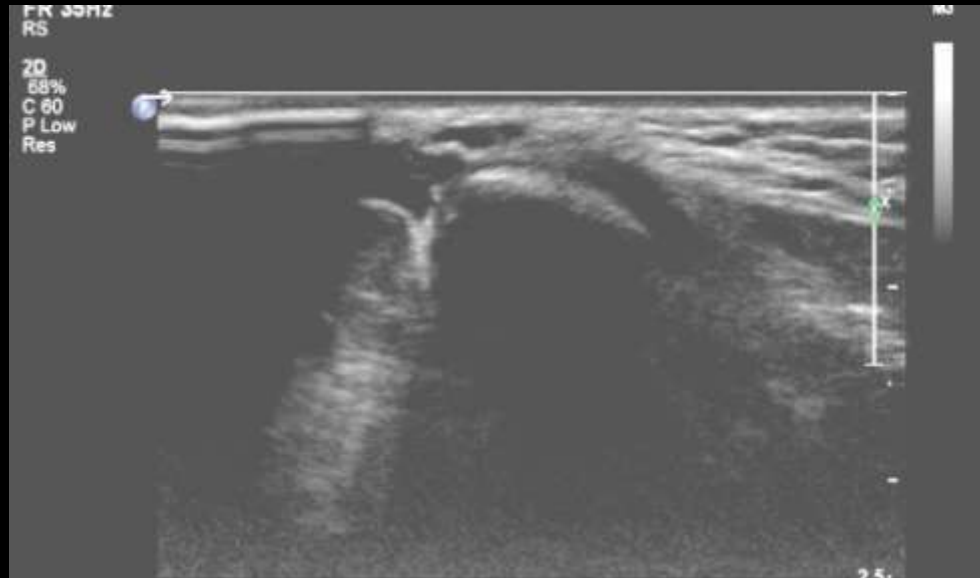
# Ulnar Nerve Subluxation in flexion

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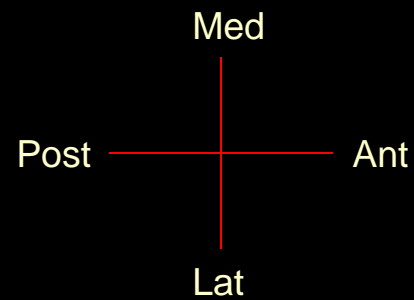
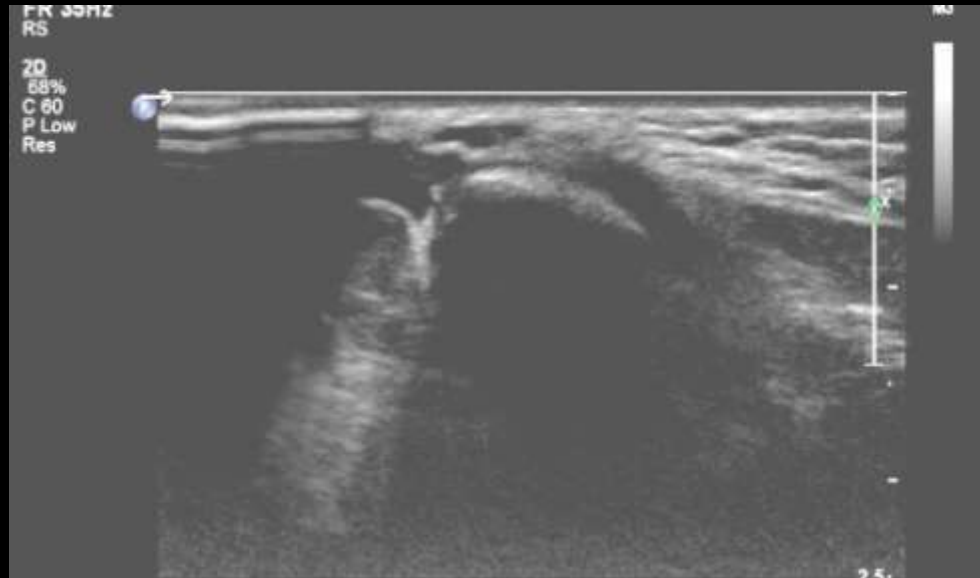
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

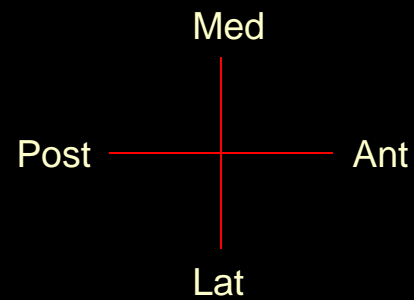
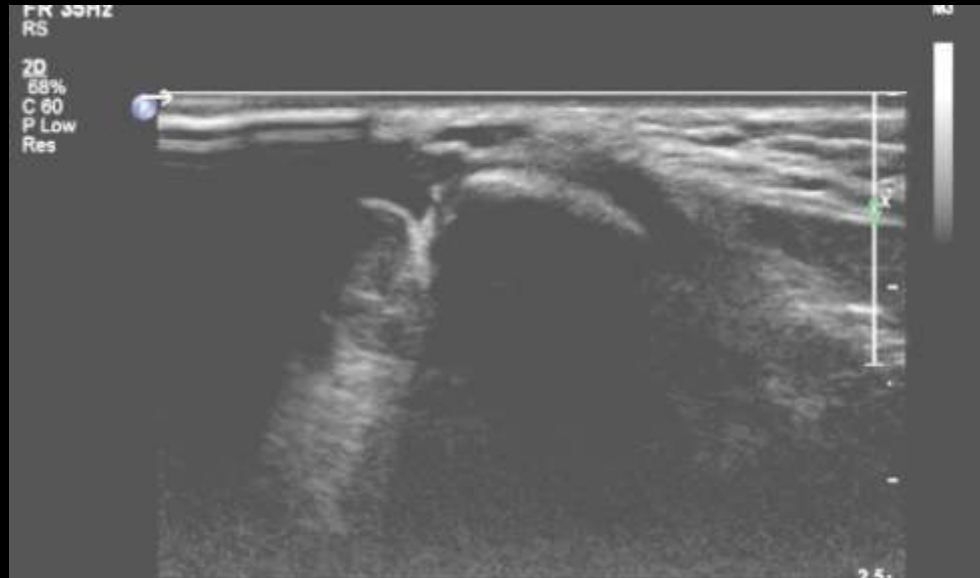
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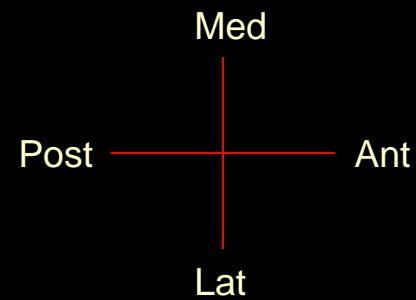
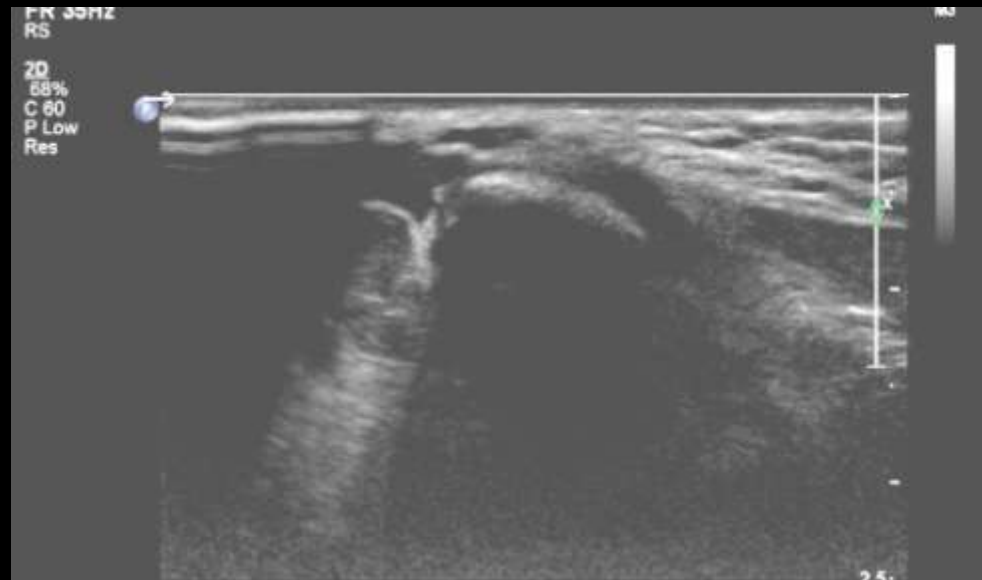
# Ulnar Nerve Subluxation in flexion

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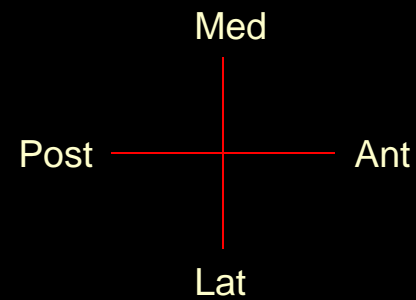
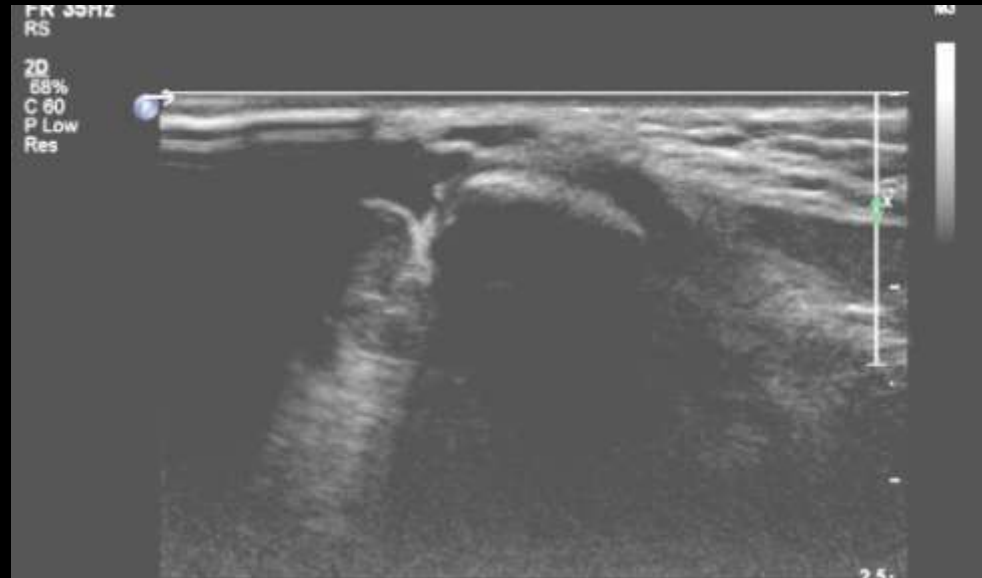
# Ulnar Nerve Subluxation in flexion

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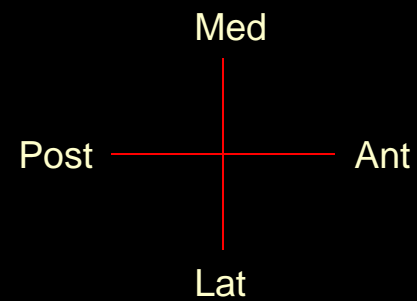
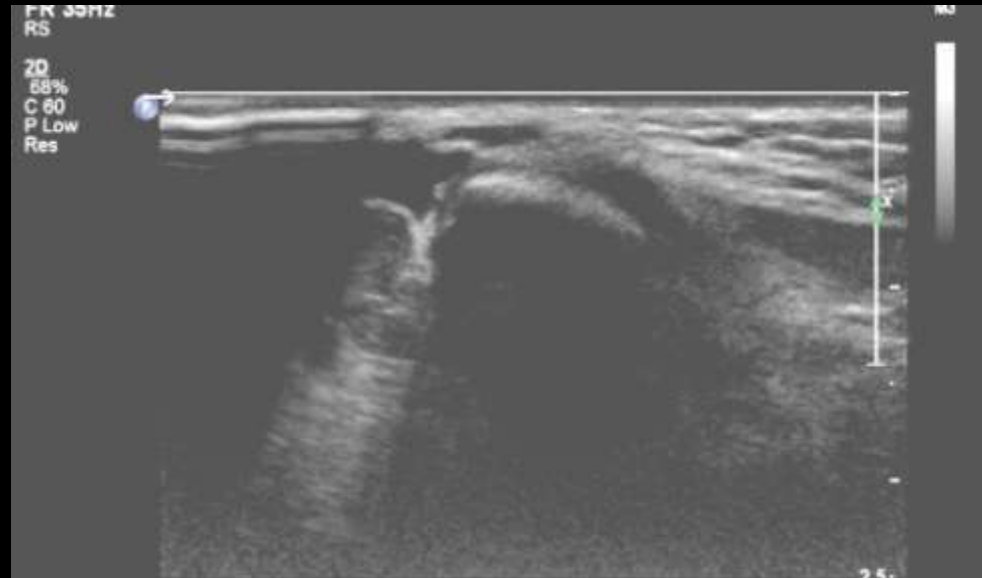
# Ulnar Nerve Subluxation in flexion

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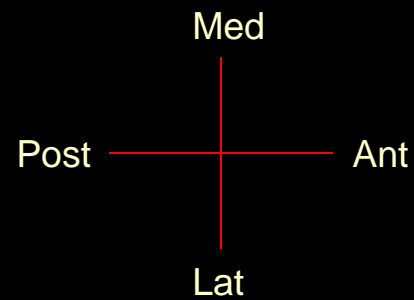
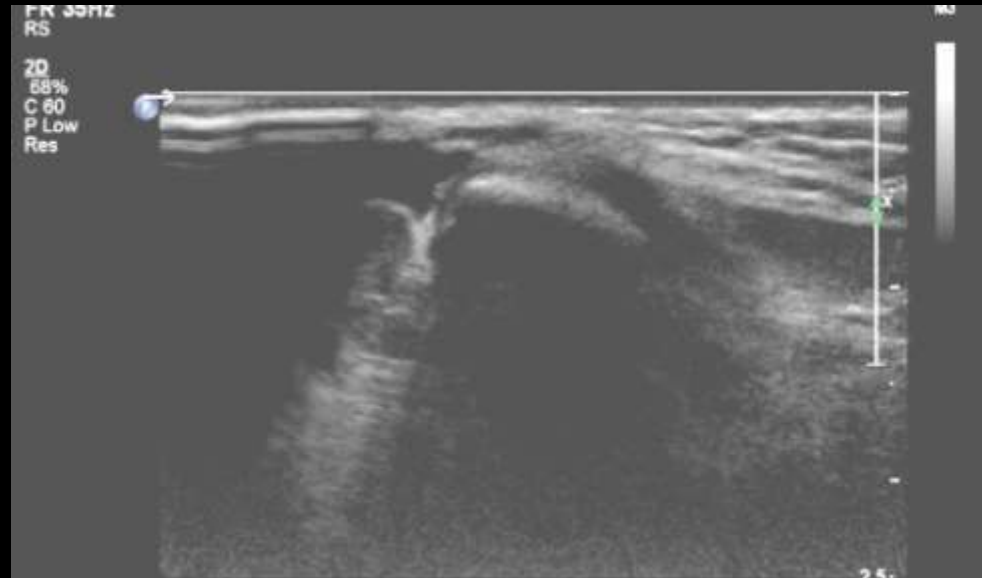
# Ulnar Nerve Subluxation in flexion

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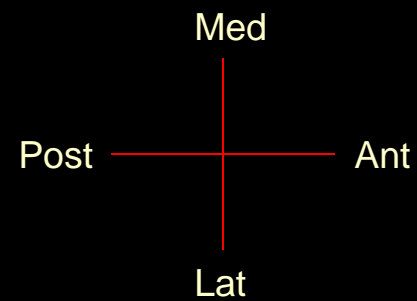
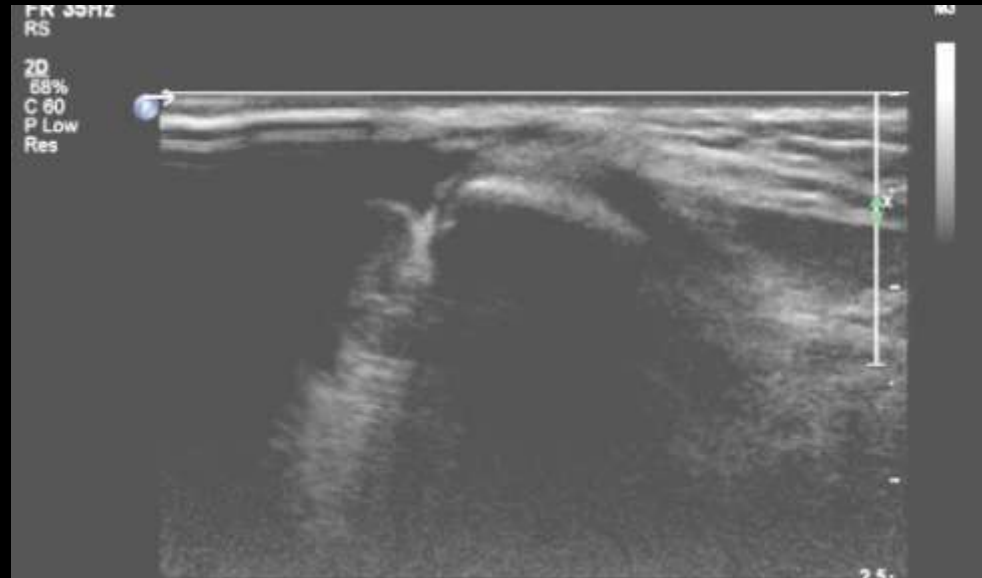
# Ulnar Nerve Subluxation in flexion

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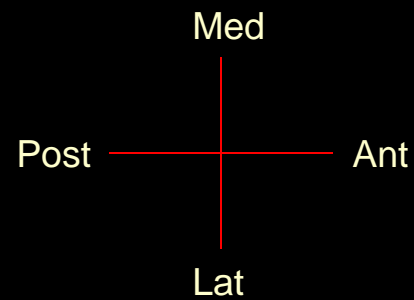
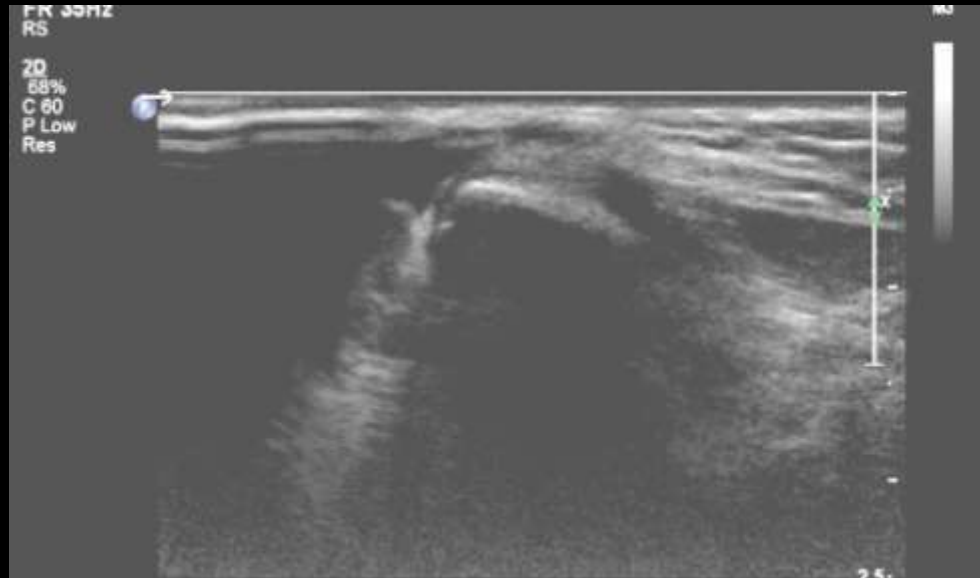
# Ulnar Nerve Subluxation in flexion

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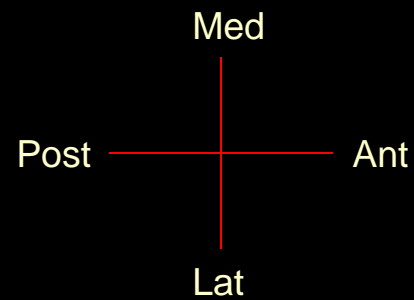
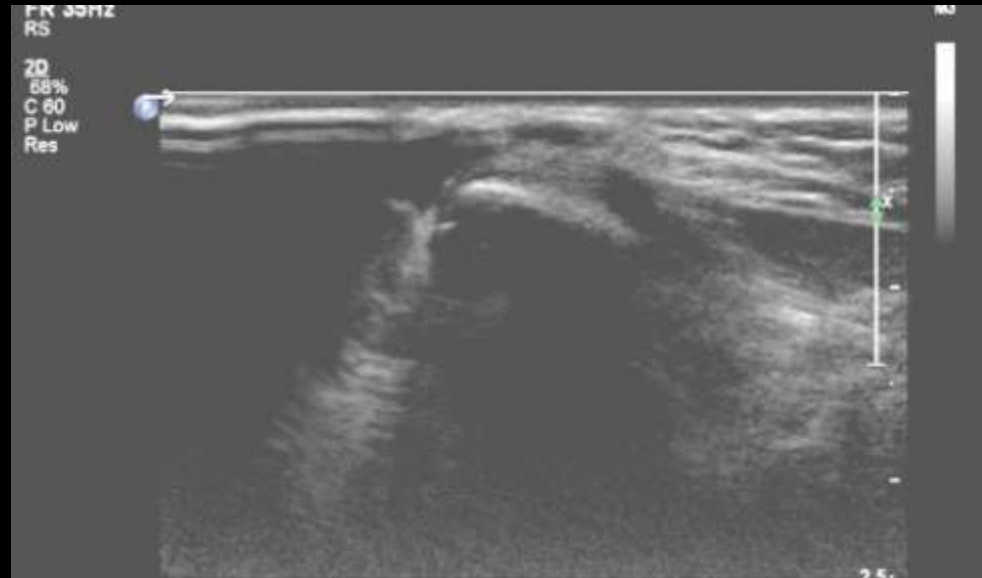
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

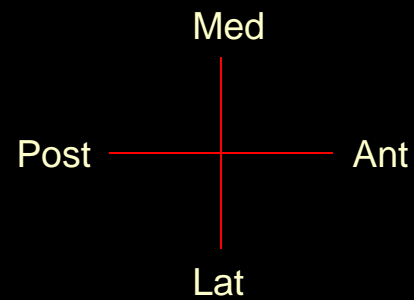
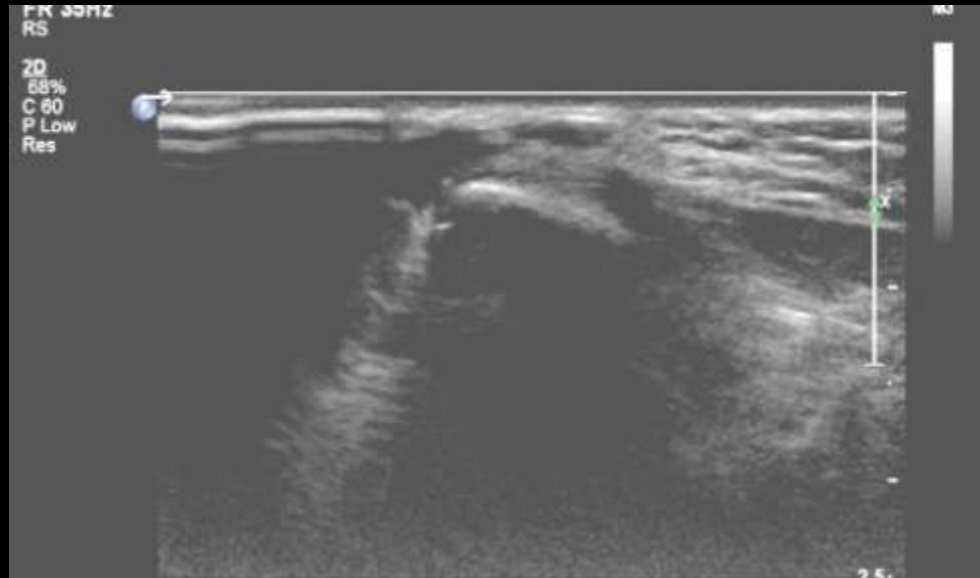
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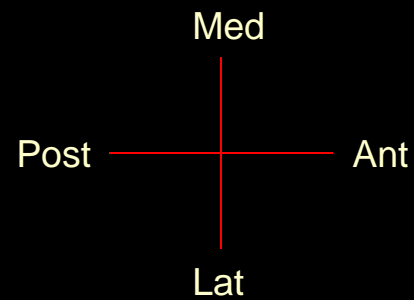
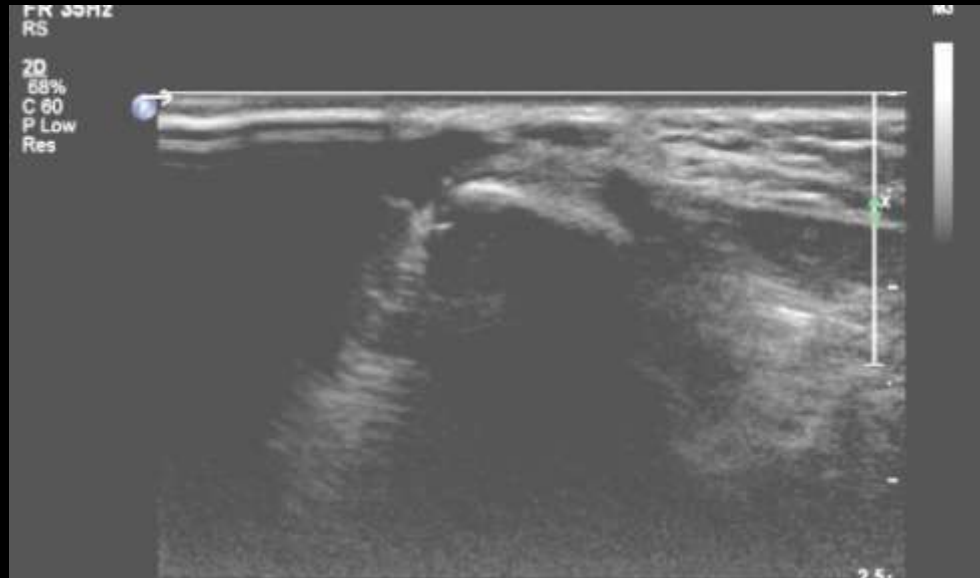
# Ulnar Nerve Subluxation in flexion

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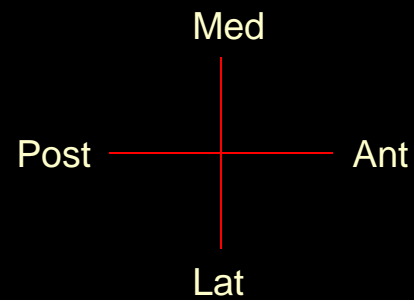
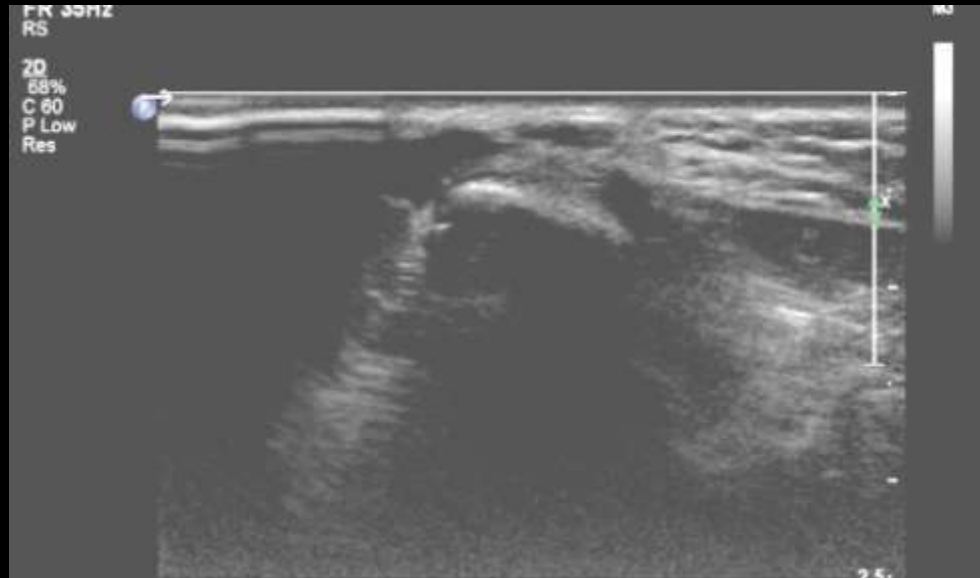
# Ulnar Nerve Subluxation in flexion

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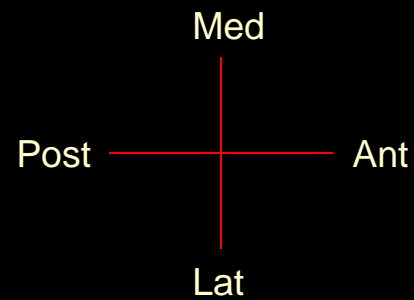
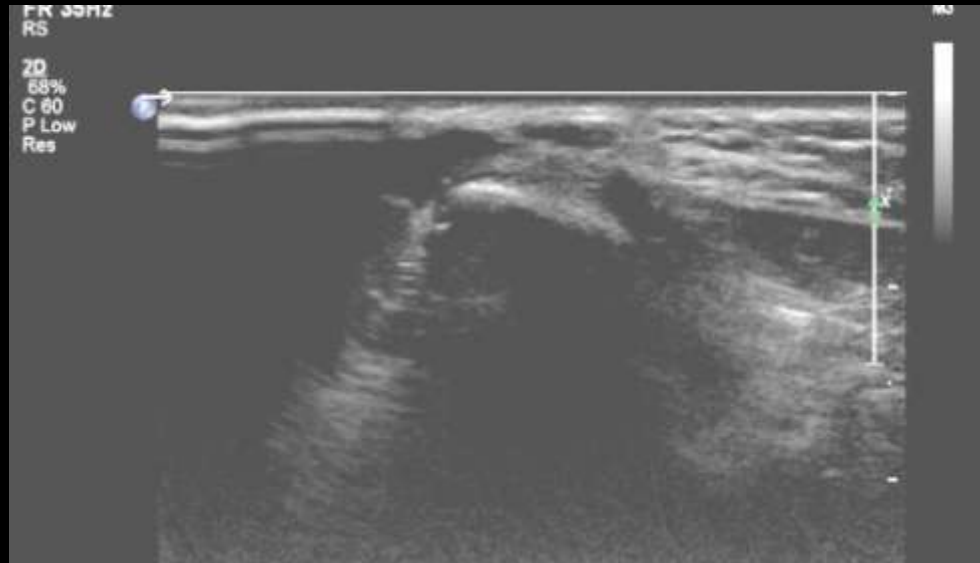
# Ulnar Nerve Subluxation in flexion

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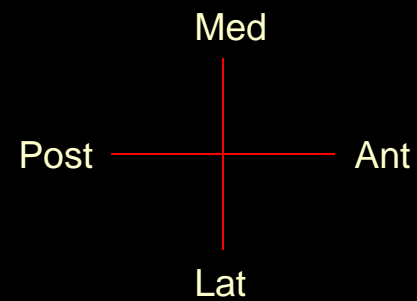
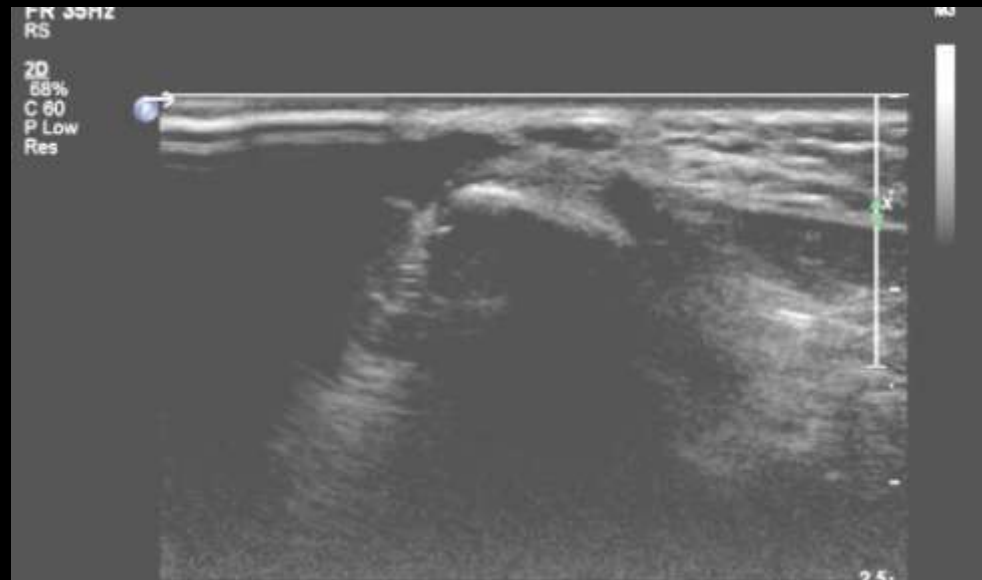
# Ulnar Nerve Subluxation in flexion

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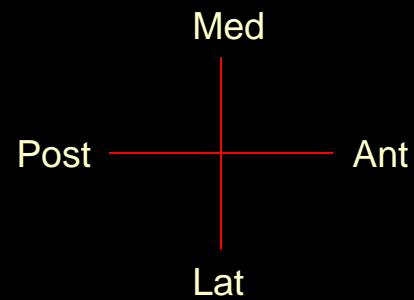
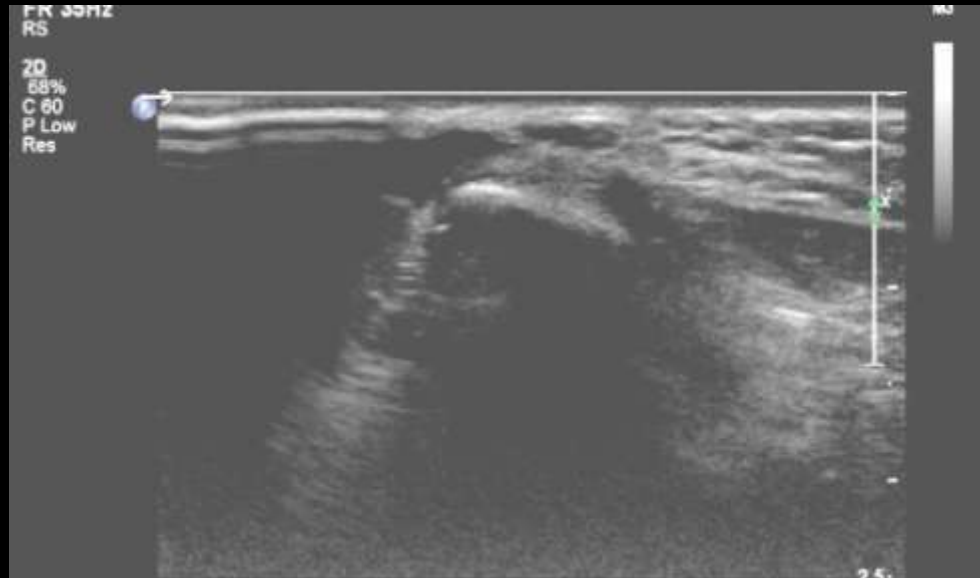
# Ulnar Nerve Subluxation in flexion

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# Ulnar Nerve Subluxation in flexion

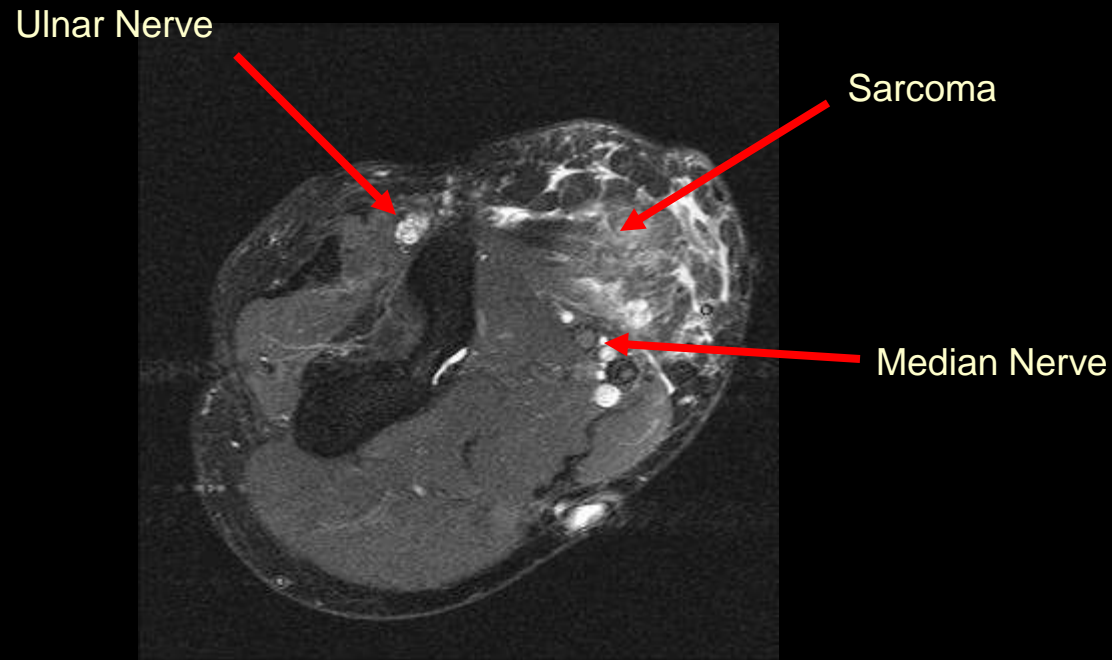
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

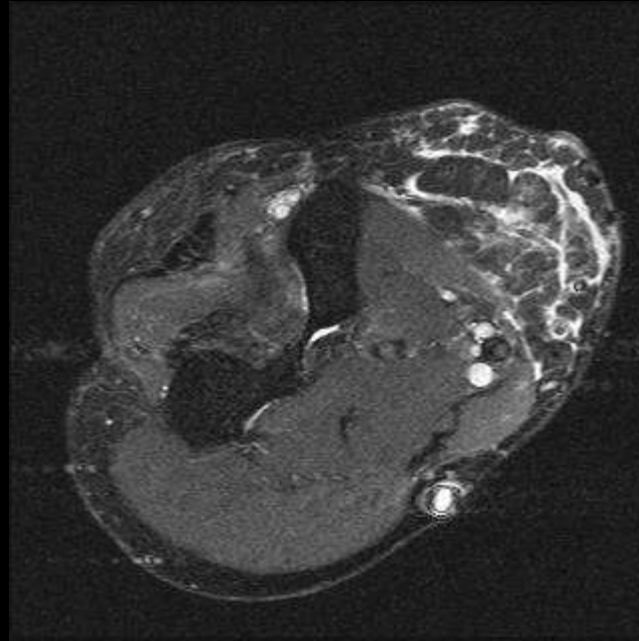
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

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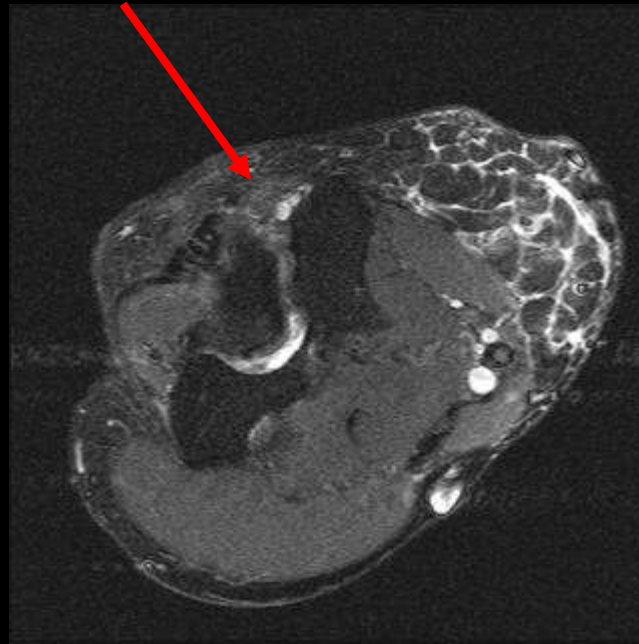


# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

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Anconeus Epitrochlearis

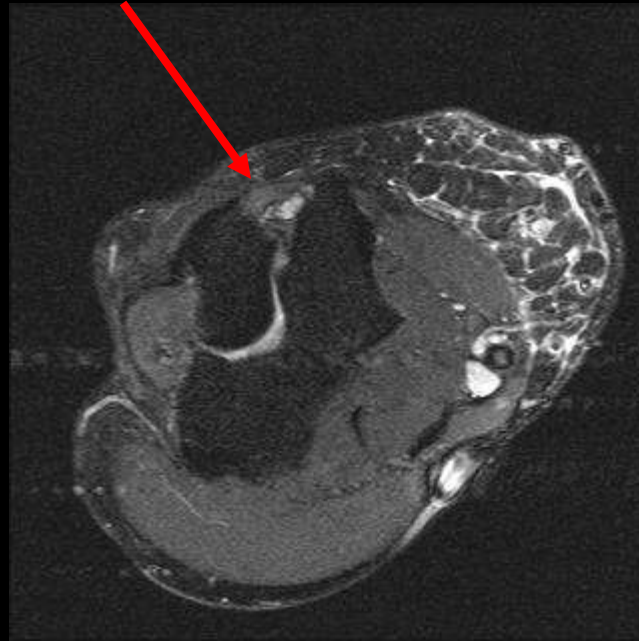


# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

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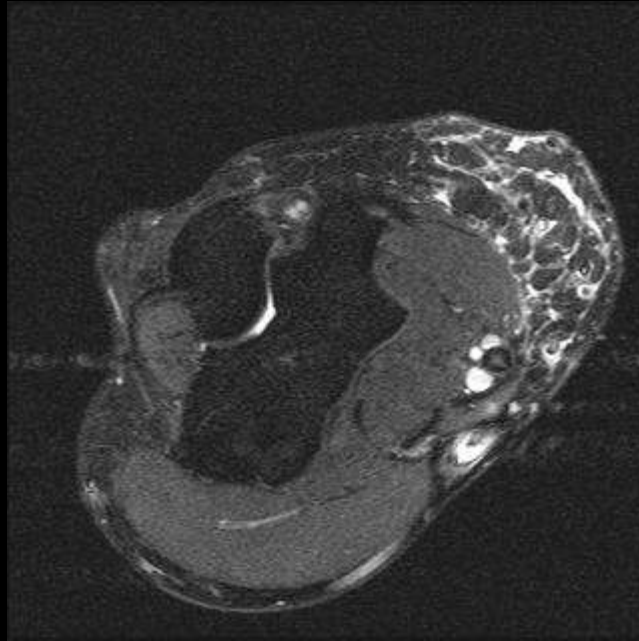
Anconeus Epitrochlearis



# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

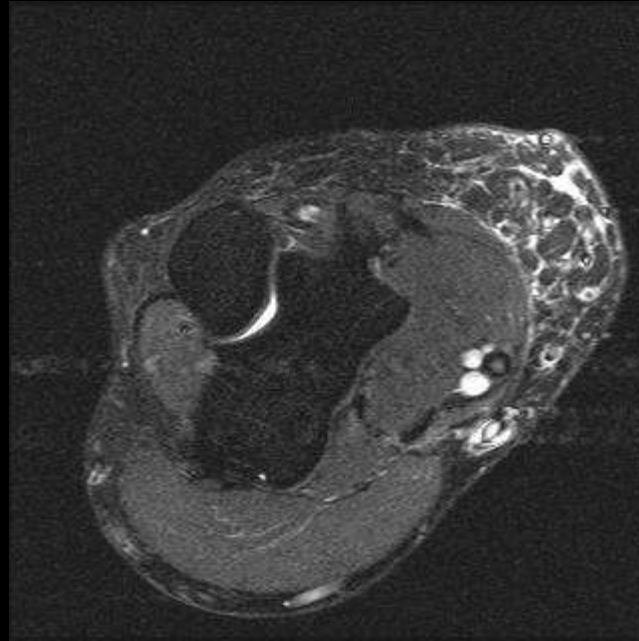
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

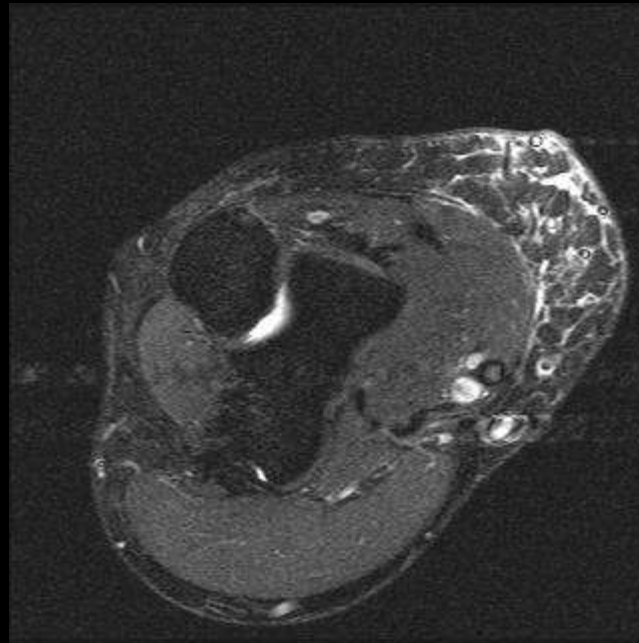
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

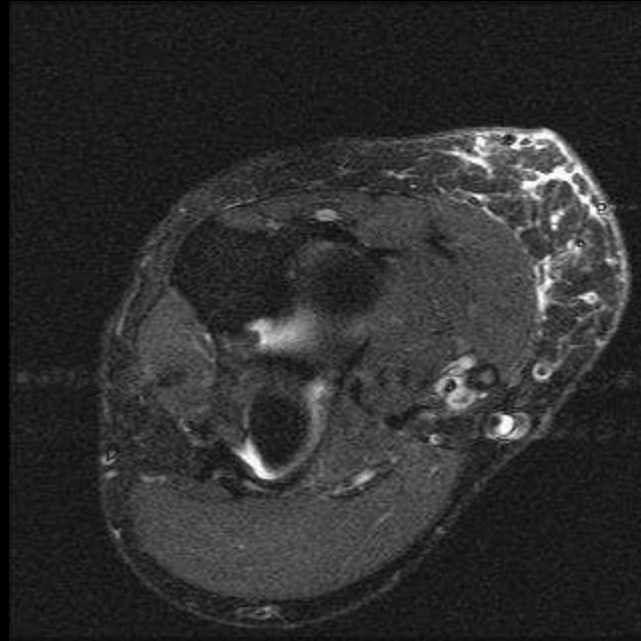
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

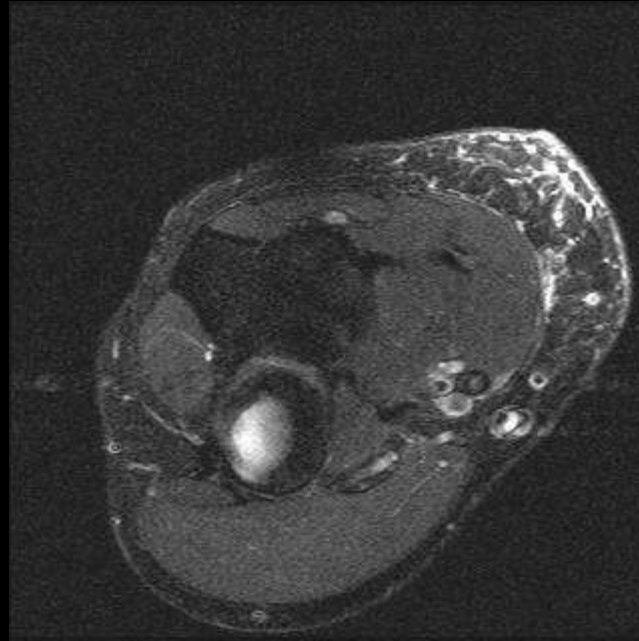
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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

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# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Ulna Mechanical Neuritis from Sarcoma

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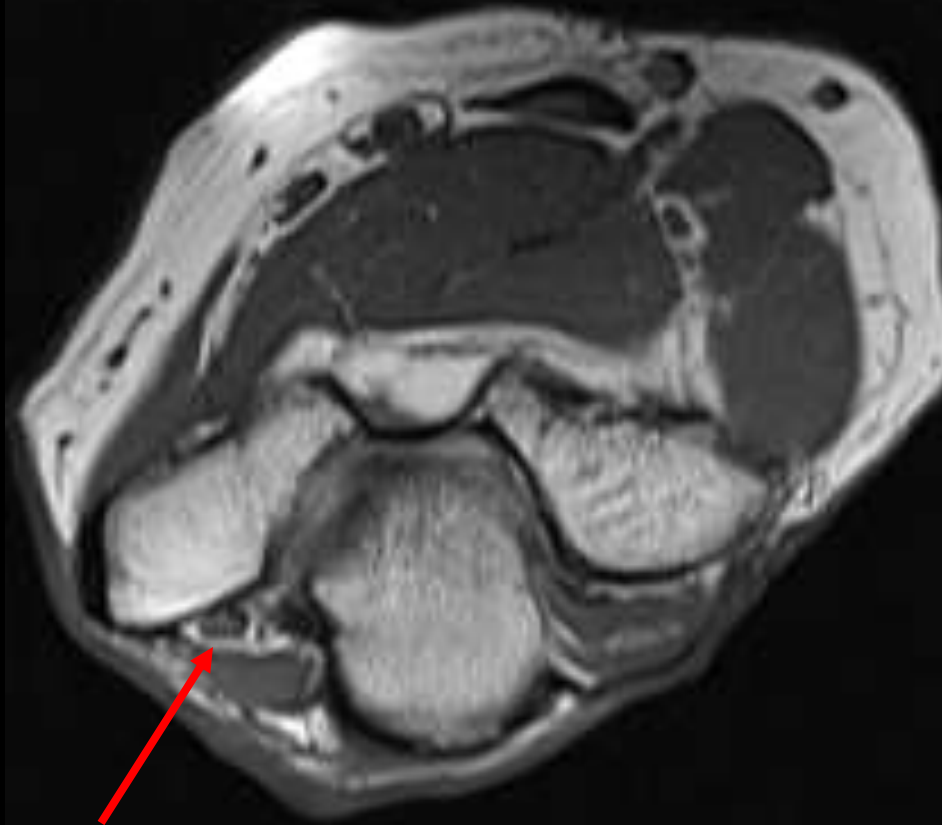




# Entrapment neuropathy - Ulna Nerve - Cubital TS

## Anconeus epitrochlearis muscle

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Ulnar Nerve



Ulnar Nerve

# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

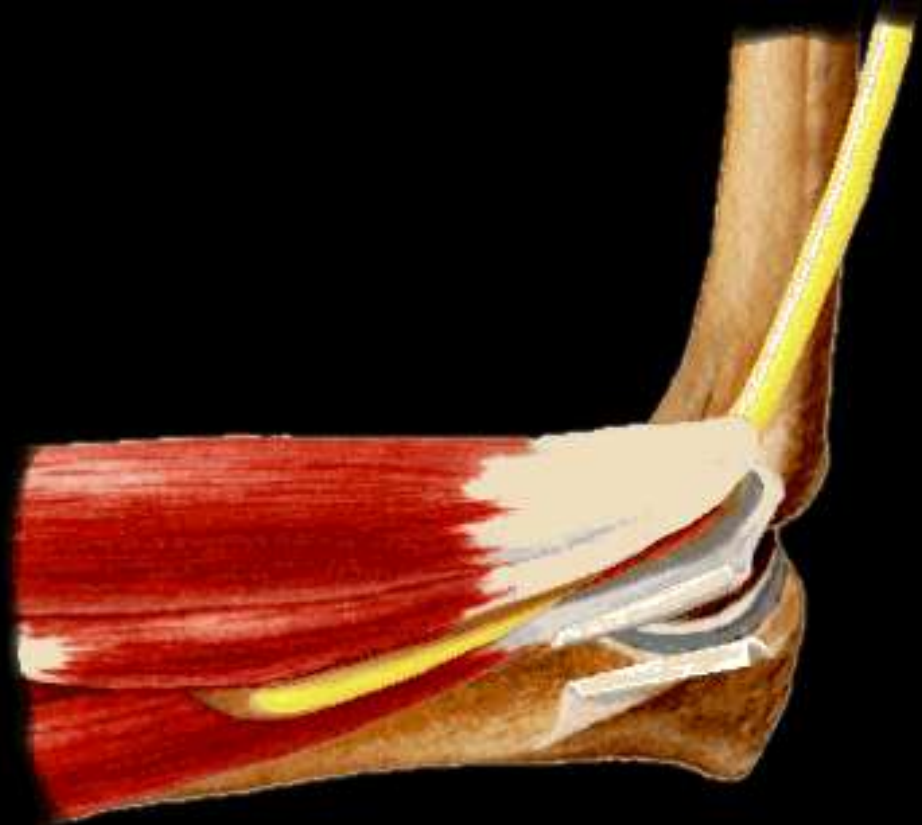
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- Decompression In Situ
- Medial Epicondylectomy, with or without decompression
- Anterior Transposition

# Ulnar nerve transposition

---

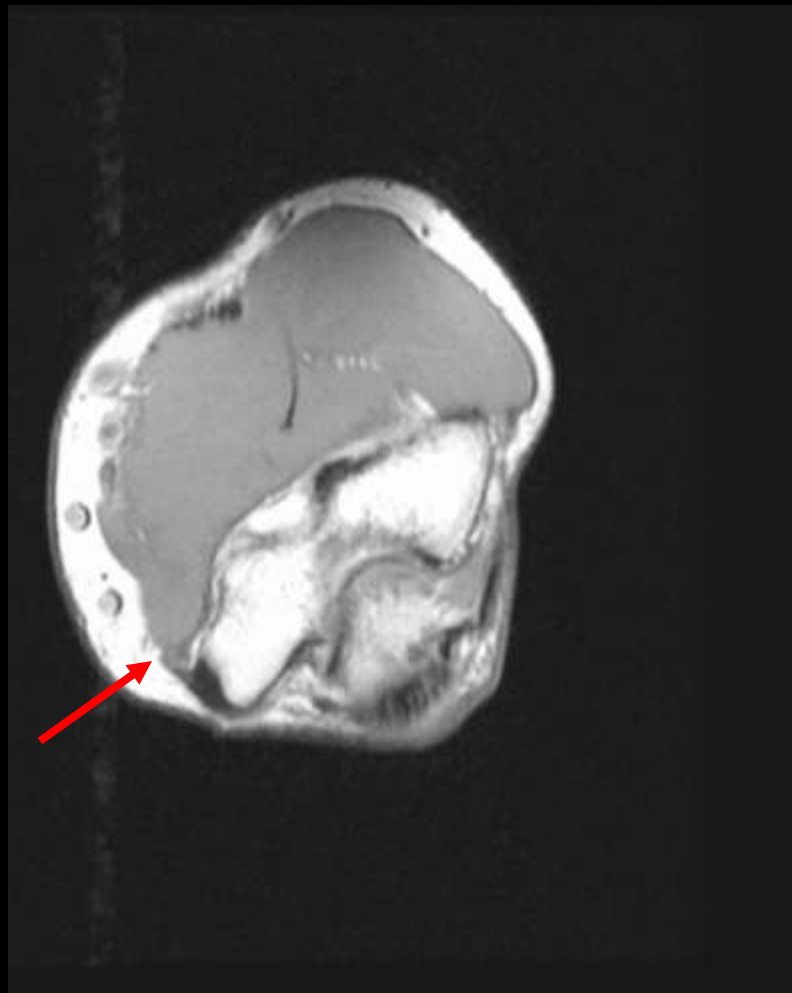
- Resection of retinaculum
- Detachment of common flexor tendon
- Division of medial intermuscular septum
- Creation of anterior tunnel for ulnar nerve



# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

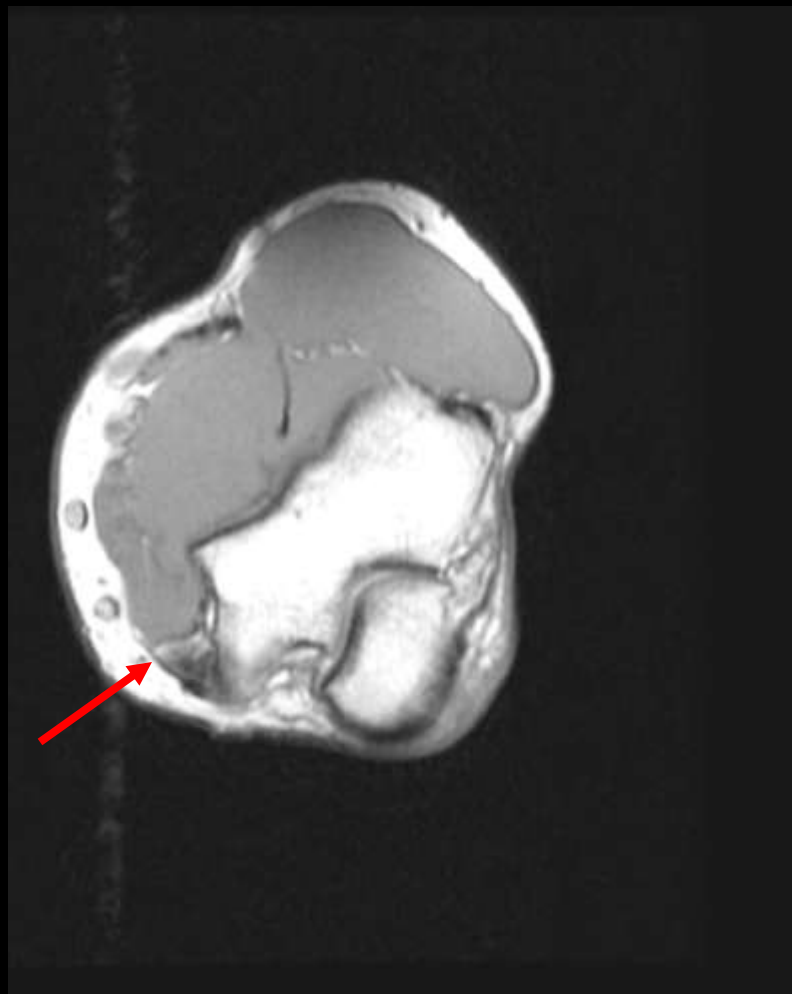
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# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

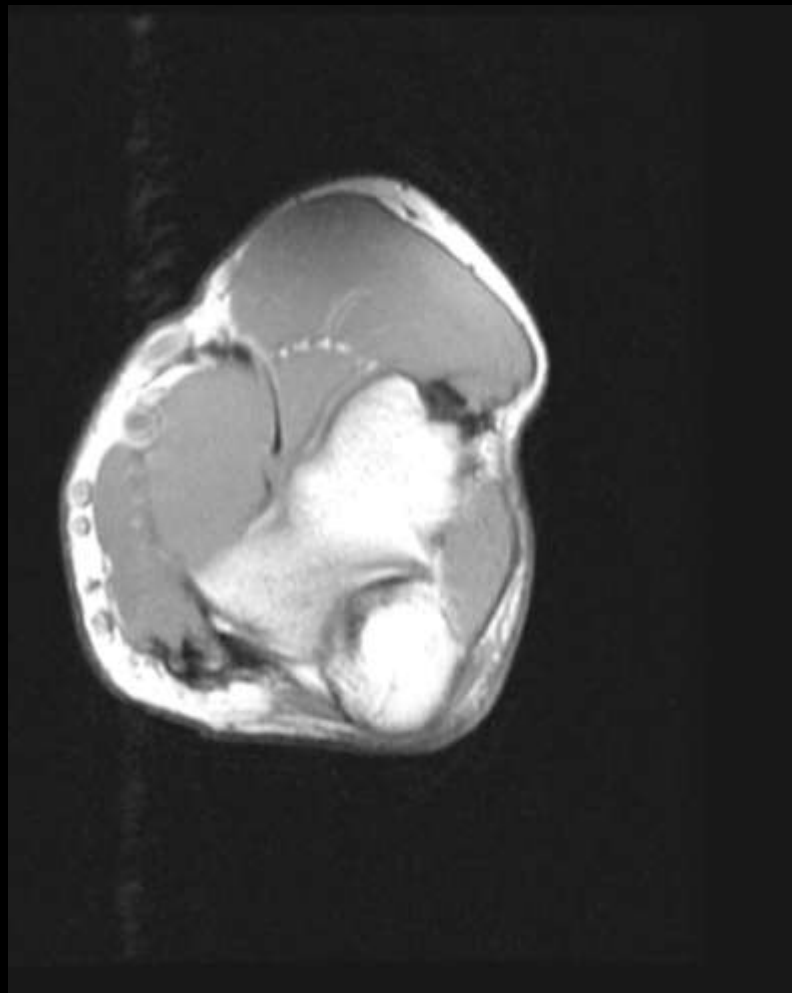
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# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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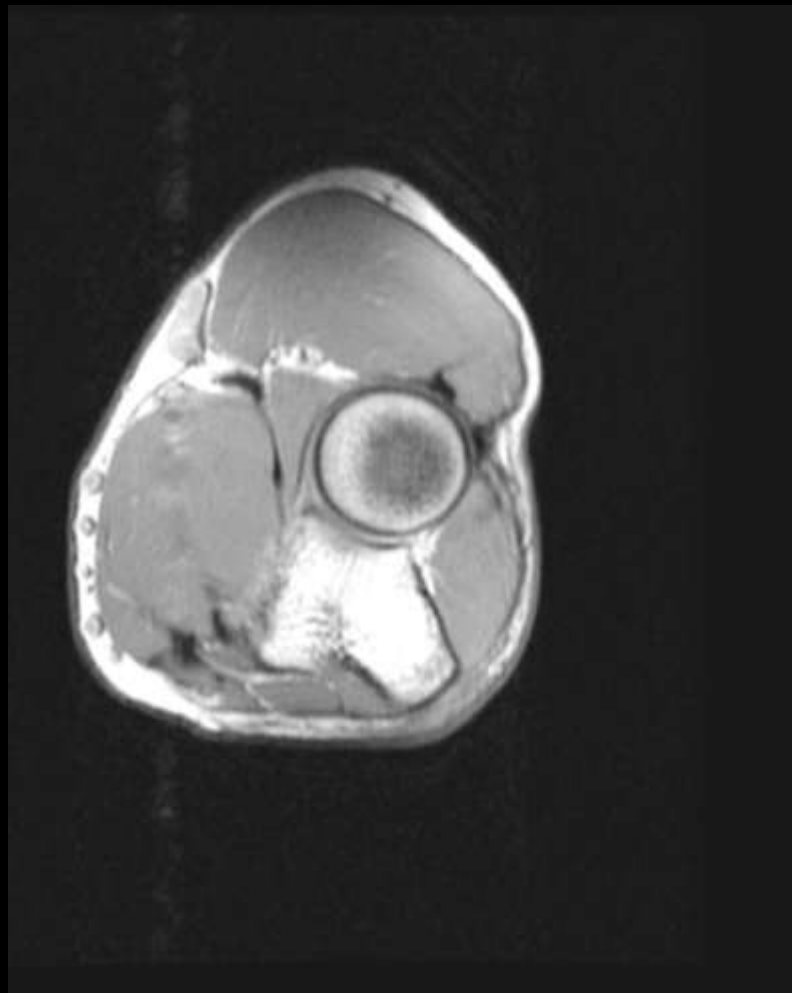




# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

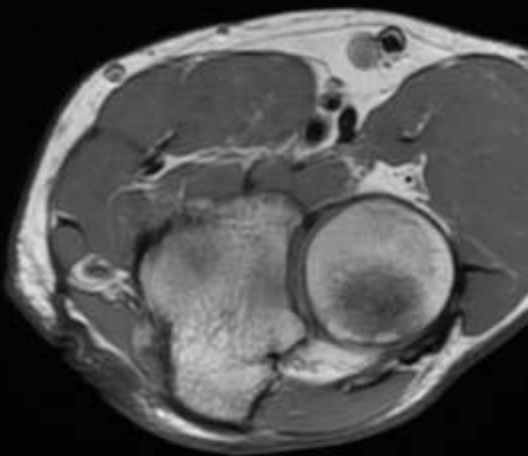
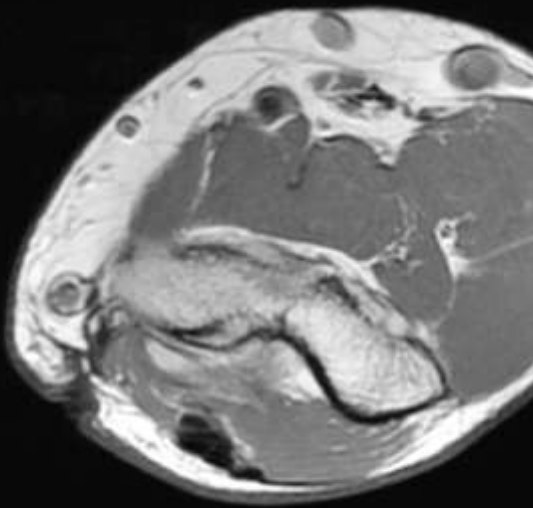
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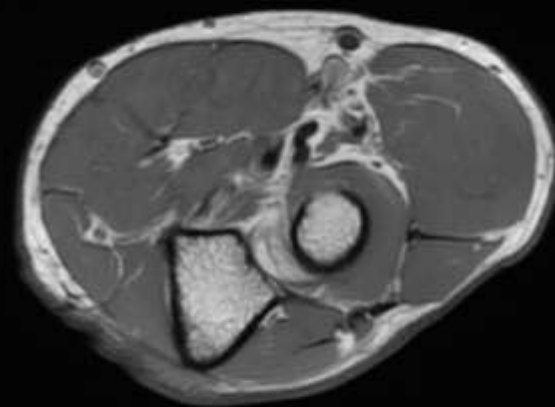
# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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Axial PD

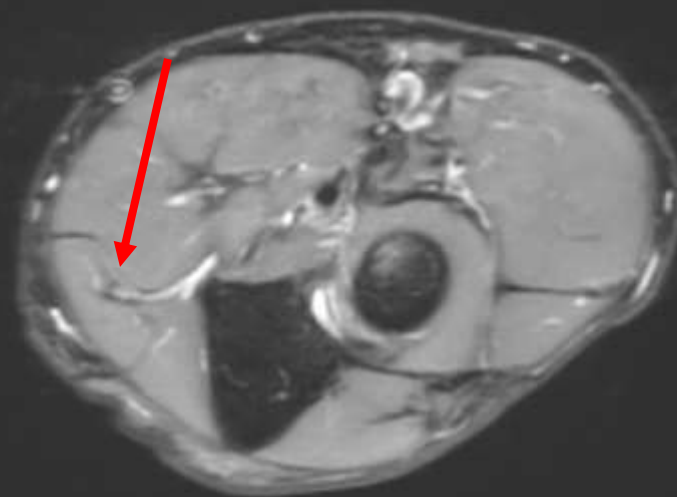
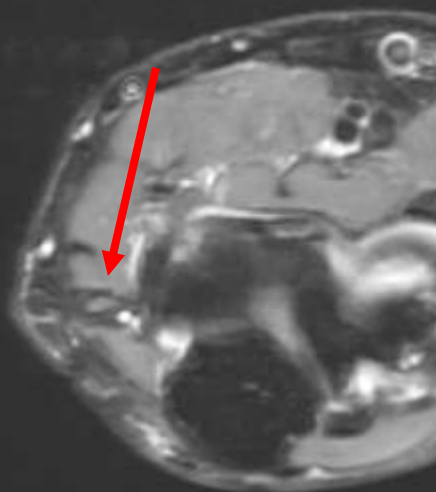
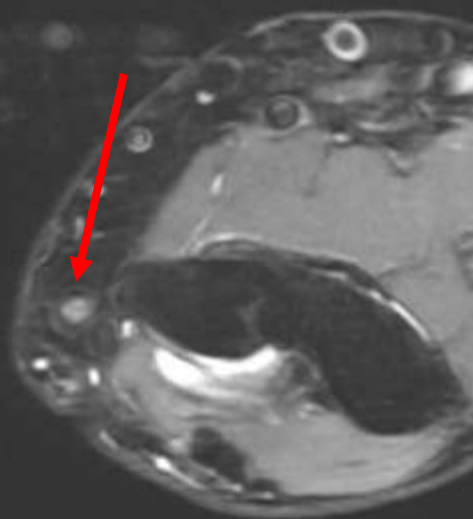


s/p ulnar nerve transposition with medial-sided pain

# Entrapment neuropathy - Ulnar Nerve - Cubital TS

## Ulnar Nerve Transposition

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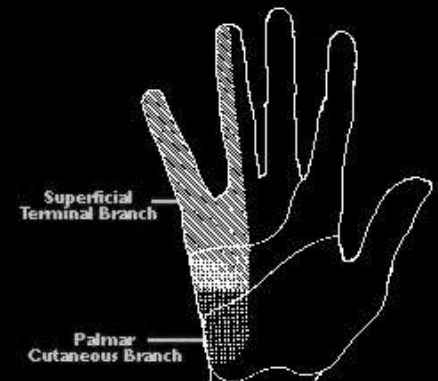
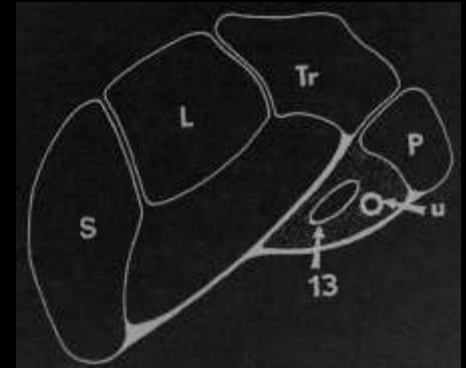
Axial PD FS

s/p ulnar nerve transposition with medial-sided pain

# Entrapment neuropathy - Ulna Nerve

## Ulnar Tunnel Syndrome

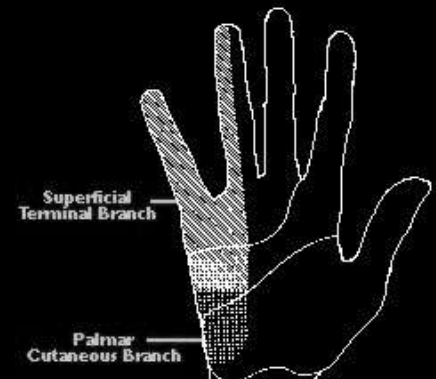
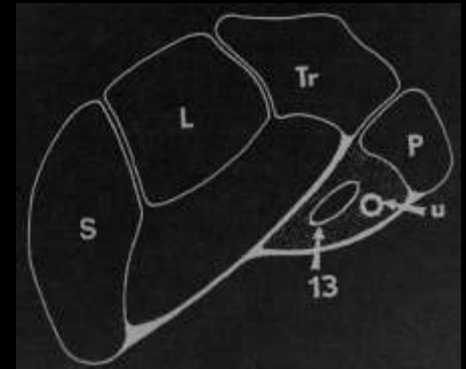
- **Guyon's canal syndrome**
  - Superficial to flexor retinaculum
  - Lateral to pisiform/flexor carpi ulnaris
  - Medial to ulnar artery
  - Roofed by transverse carpal lig
- **Superficial sensory hypothenar branch**
  - Proximal to canal 65% - silent paralysis
  - In canal 35% - additional pain and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



# Entrapment neuropathy - Ulna Nerve

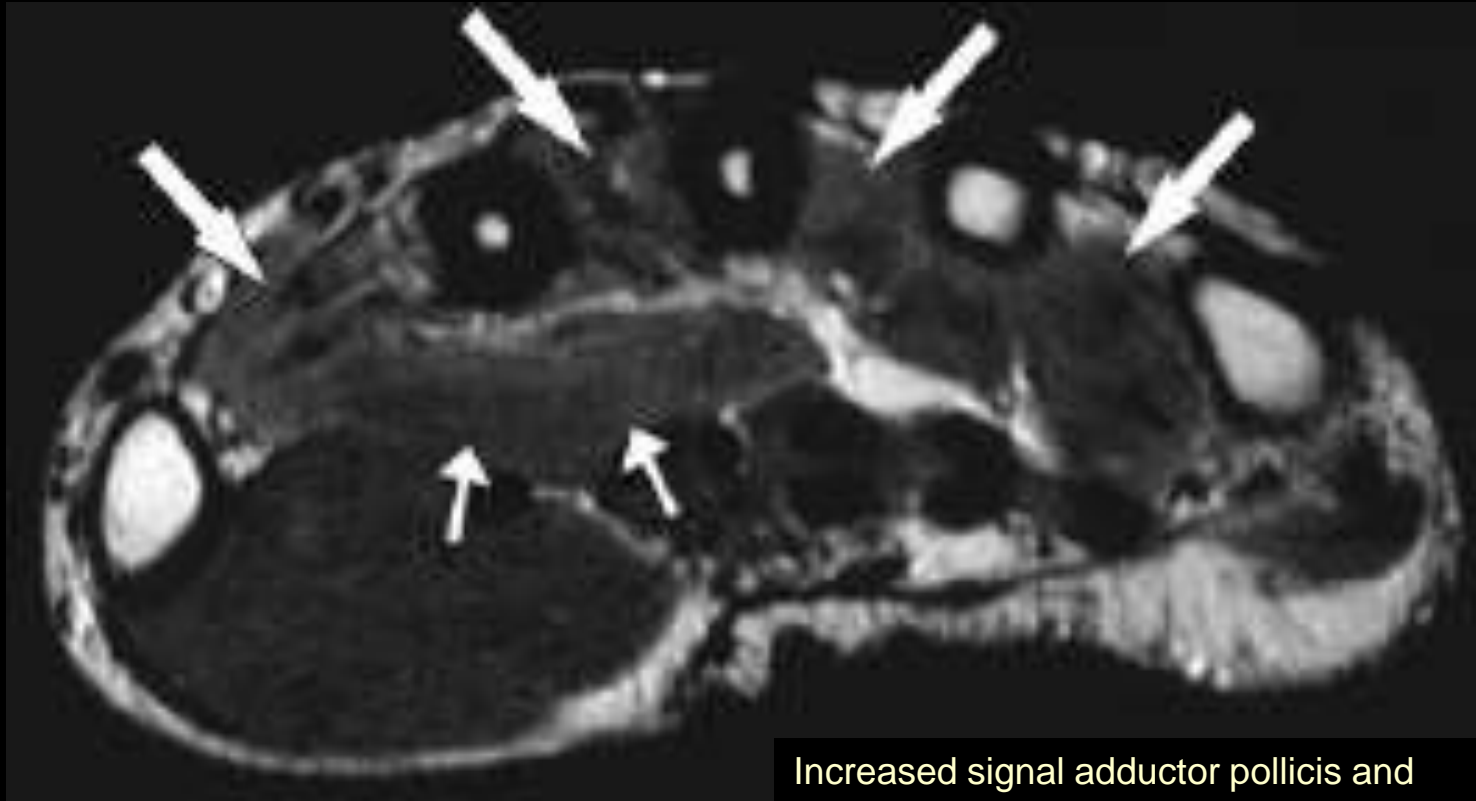
## Ulnar Tunnel Syndrome

- **Causes**
  - Pressure
    - Tools, Bicycle, Crutches
  - Fracture hook of Hamate
    - Baseball, Golf
- **Features**
  - Compression or enlargement of nerve
  - Inflamed and enhancing



# Muscle signal intensity with entrapment/denervation

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Increased signal adductor pollicis and interossei mm.

- Deep motor branch

- Paralysis – AddPol, Interossei, ulnar lumbricals

- OpDM > FDM > AbDM

Entrapment neuropathy - Ulna Nerve

# Ulnar Tunnel Syndrome

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# Entrapment neuropathy - Ulna Nerve

## Ulnar Tunnel Syndrome

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

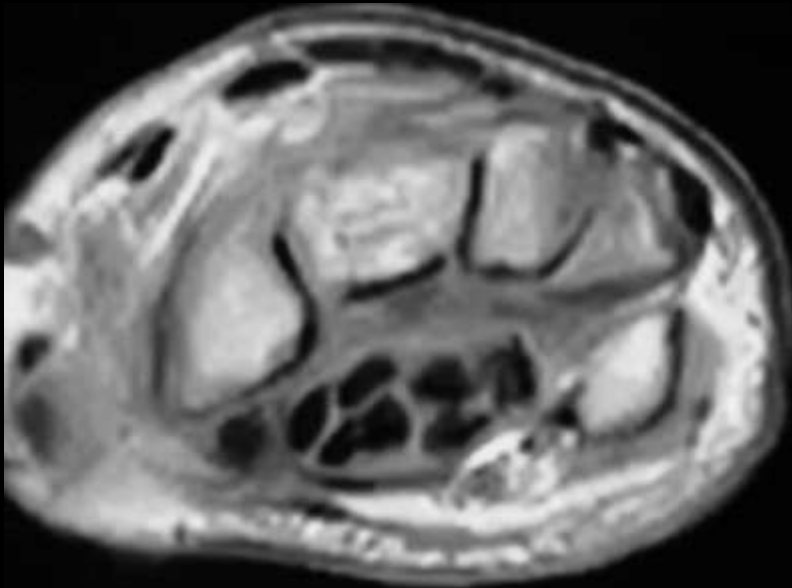


Ulnar Nerve

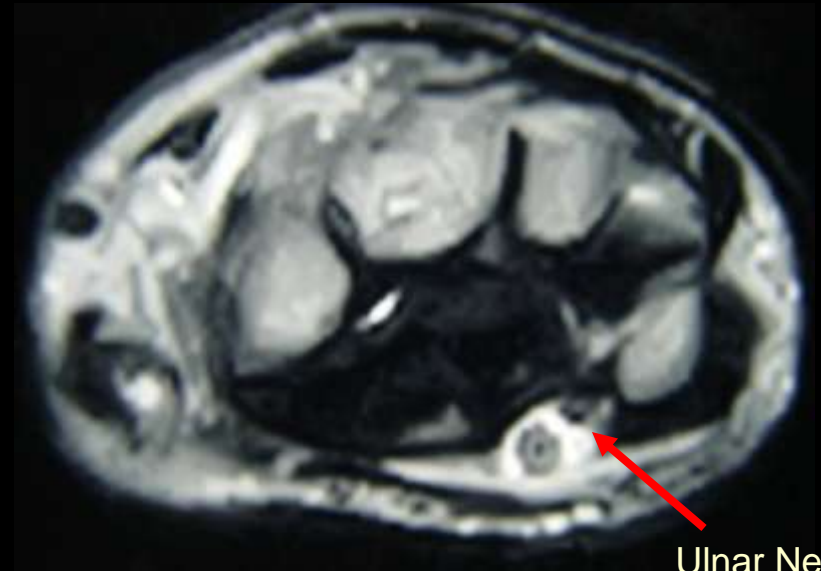
Entrapment neuropathy - Ulnar nerve

# Guyon's Canal Syndrome

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Ax T1



Ulnar Nerve

Ax T2

# Entrapment neuropathy - Ulna Nerve Plexiform Neurofibroma at Guyon's

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Plexiform neurofibroma

Ax T2

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

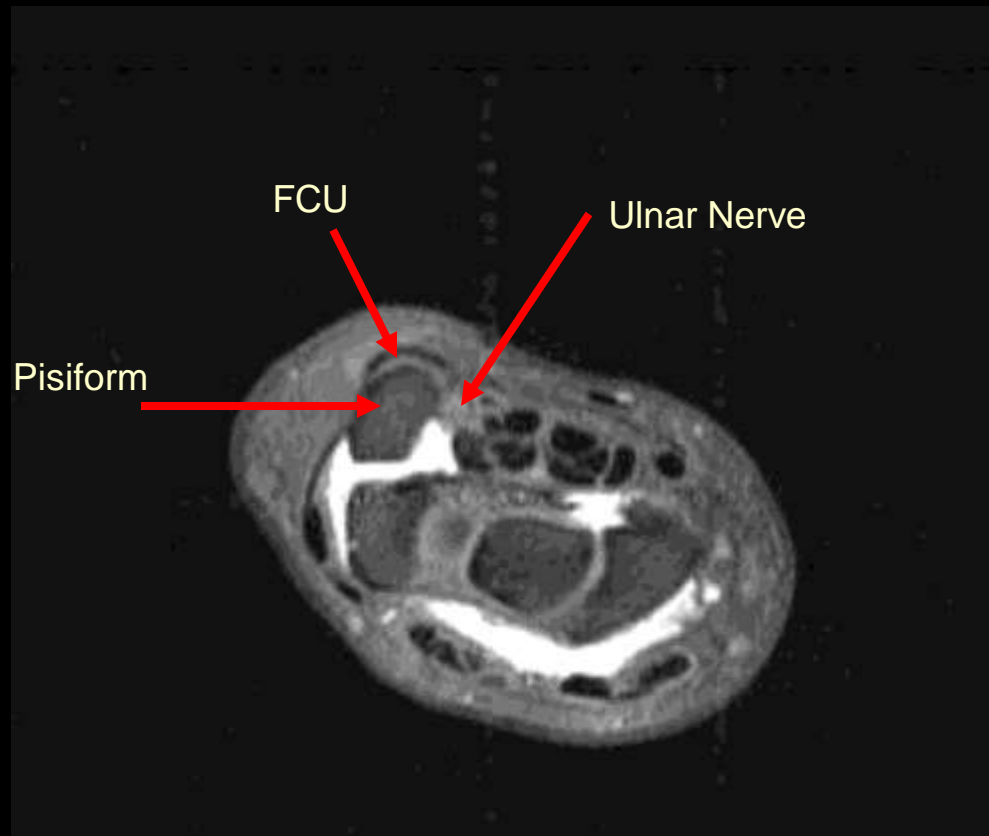
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# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

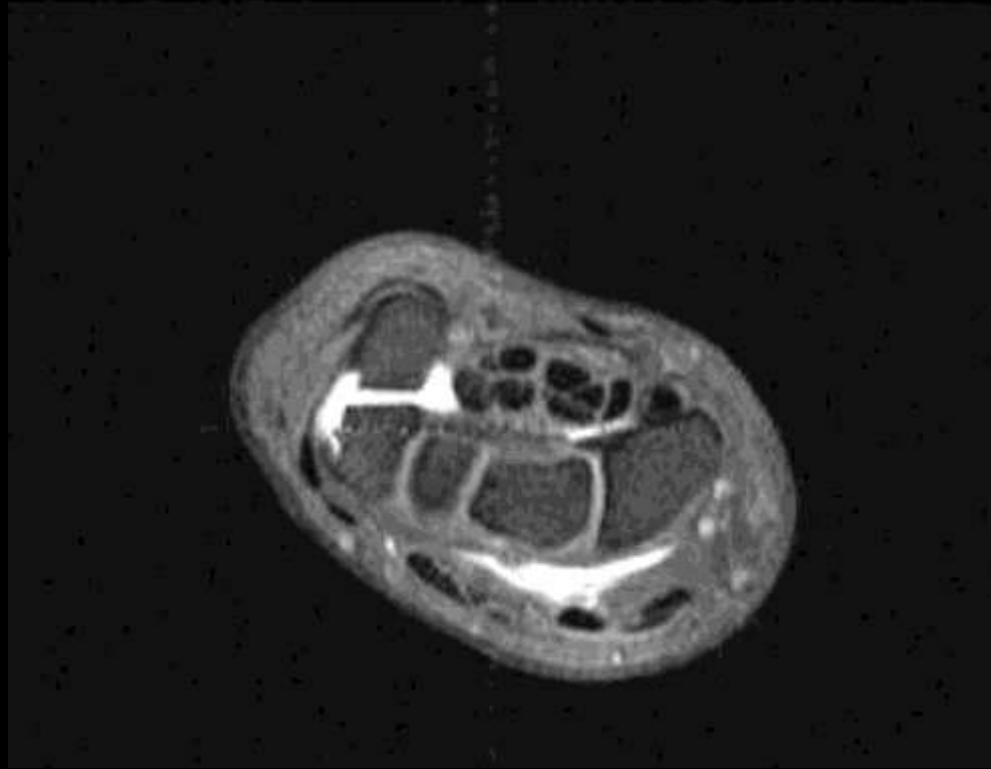
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Ax T1FS IAGd

# Entrapment neuropathy - Ulna Nerve Piso-Hamate Coalition

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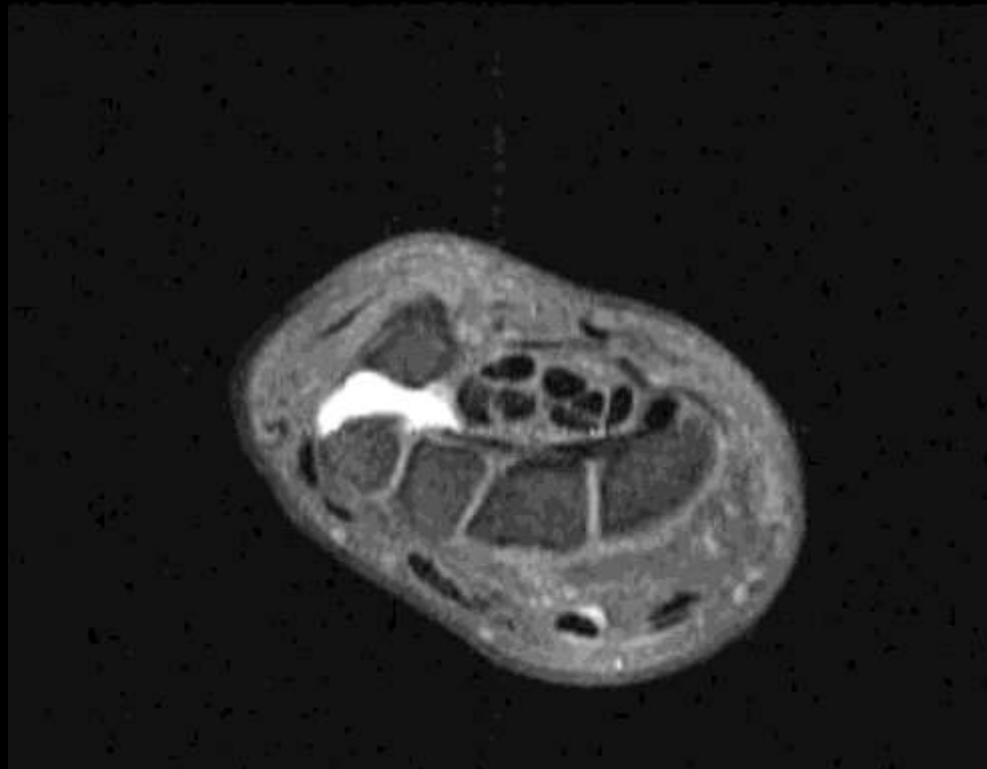


Ax T1FS IAGd

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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Ax T1FS IAGd

# Entrapment neuropathy - Ulna Nerve Piso-Hamate Coalition

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Ax T1FS IAGd



# Entrapment neuropathy - Ulna Nerve Piso-Hamate Coalition

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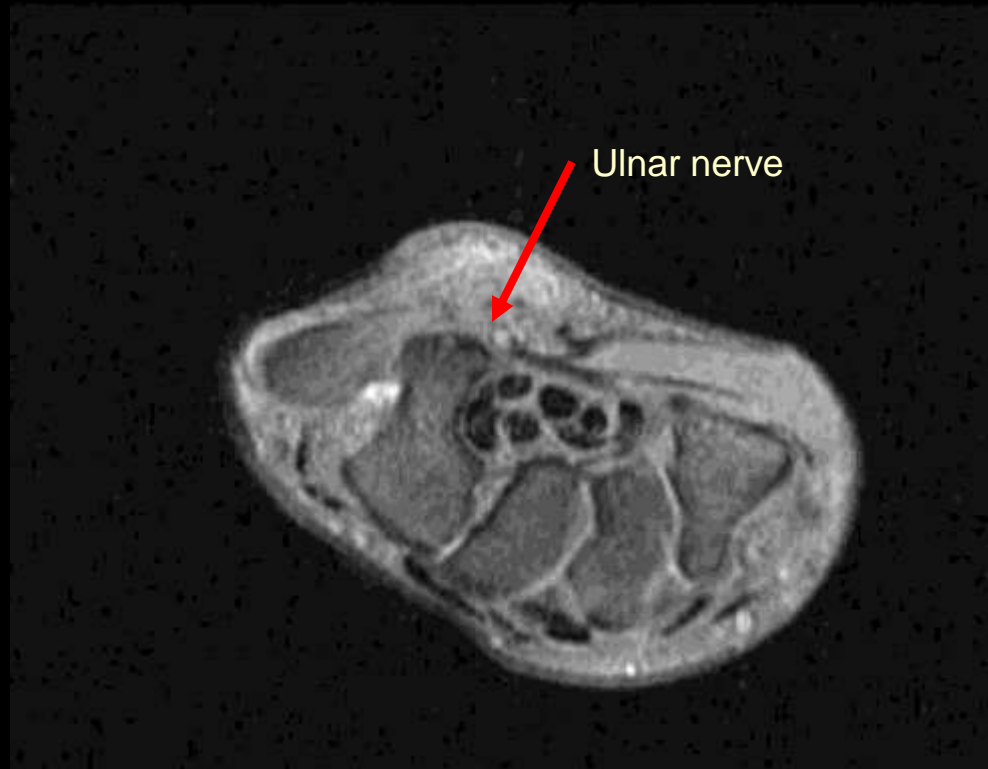


Ax T1FS IAGd

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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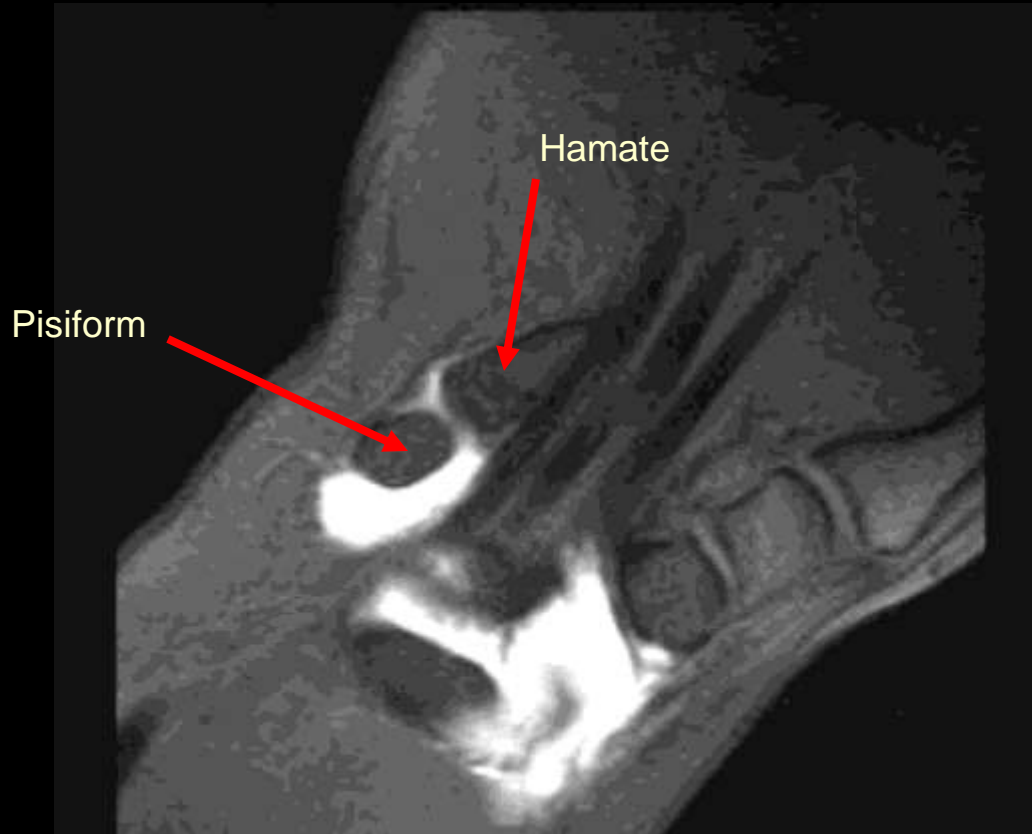


Ax T1FS IAGd

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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Cor T1FS IAGd

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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Cor T1FS IAGd

# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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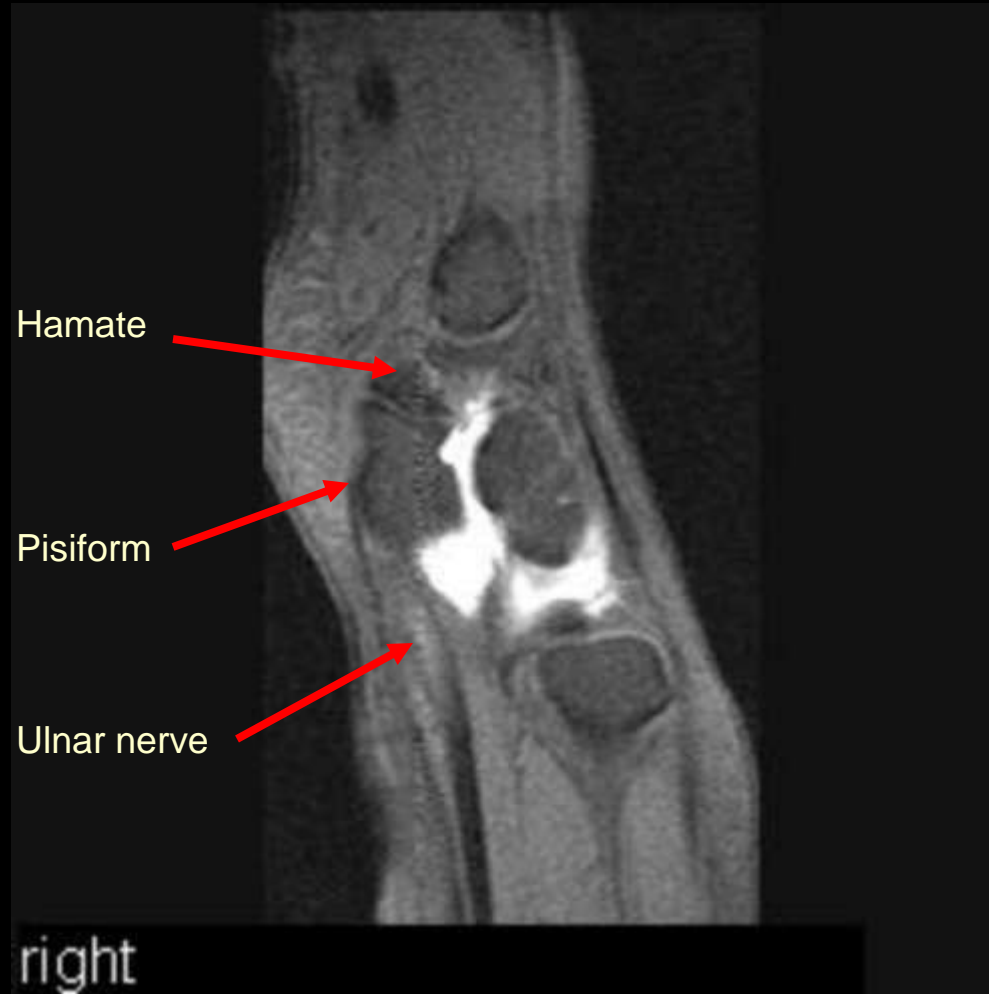


Ulna Nerve

Cor T1FS IAGd

# Entrapment neuropathy - Ulna Nerve Piso-Hamate Coalition

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# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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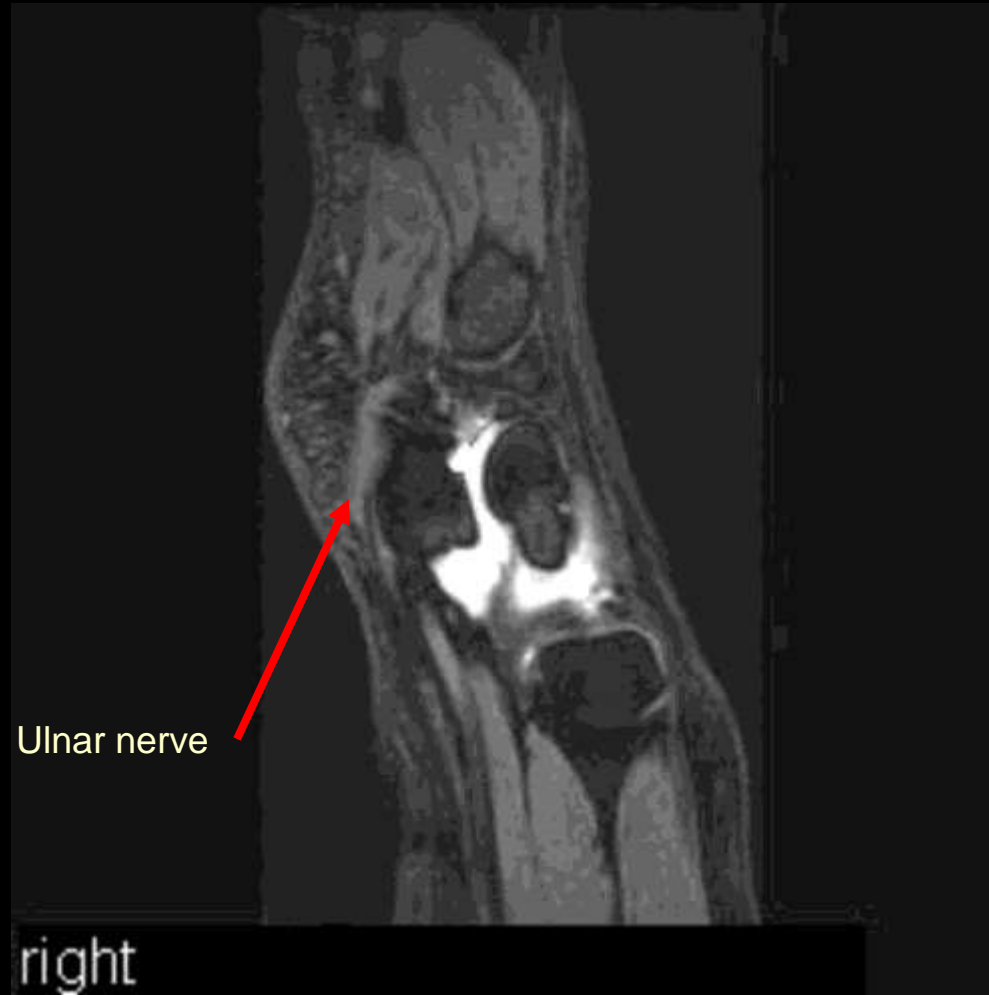




# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

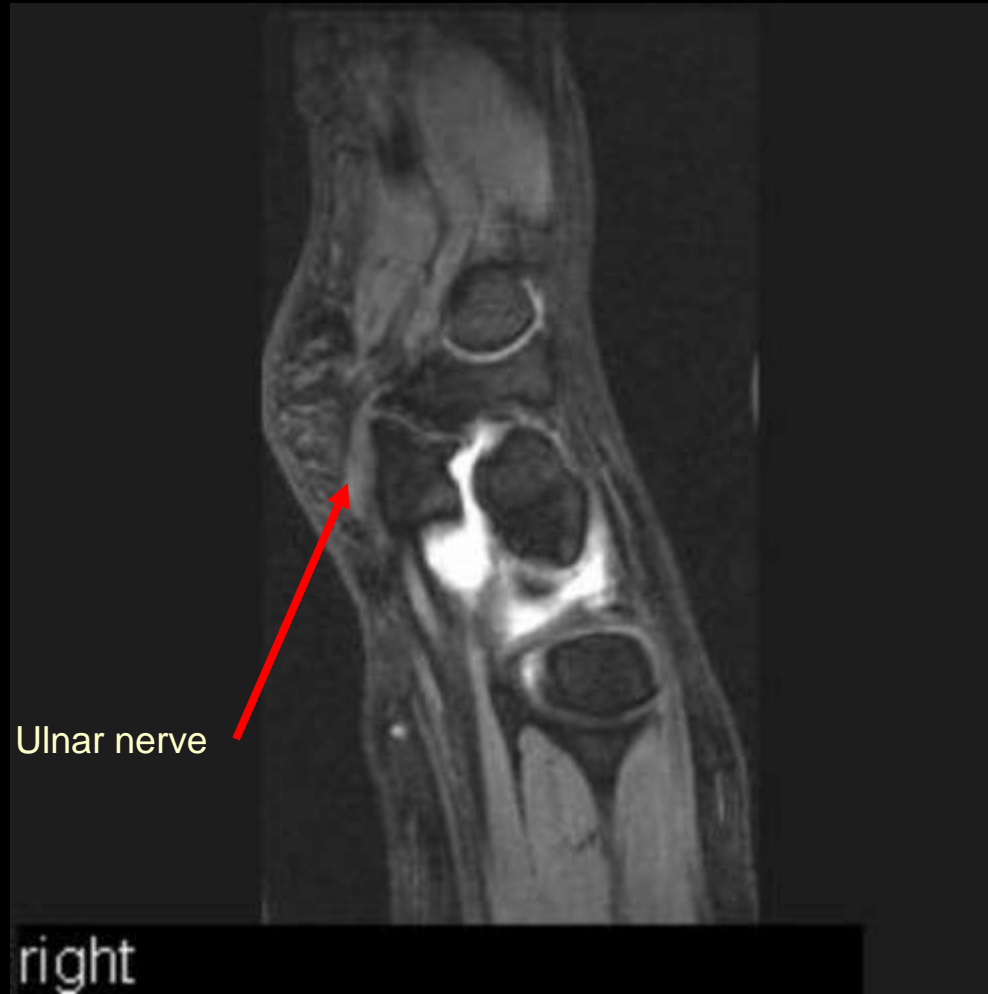
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# Entrapment neuropathy - Ulna Nerve

## Piso-Hamate Coalition

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# Entrapment neuropathy - Ulna Nerve

## Ulna nerve osteopenia

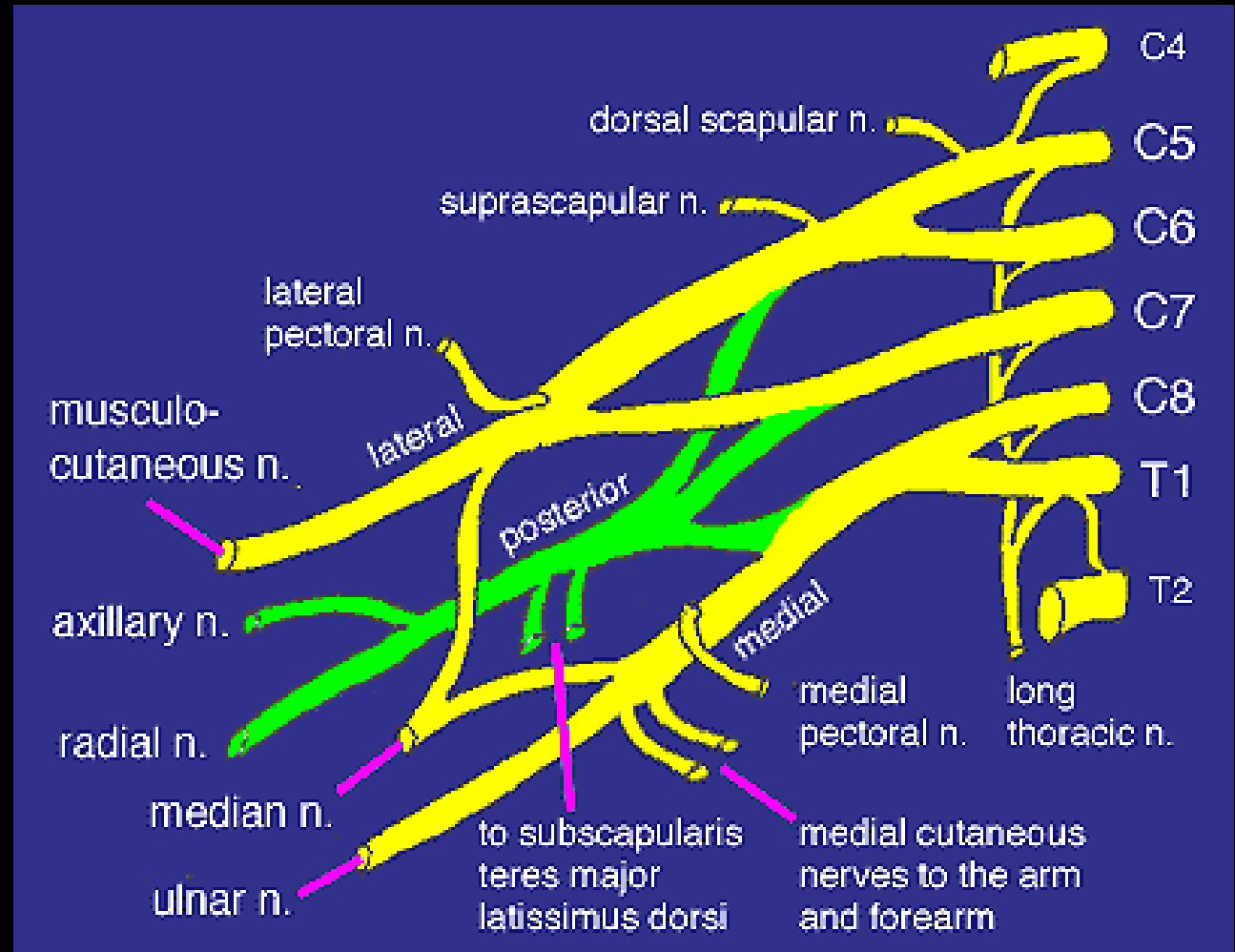
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# Entrapment neuropathy

## Radial Nerve

- C5-T1



# 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



# Innervations

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## Radial nerve:

- Triceps brachii
- Anconeus
- Brachioradialis
- ECRL

## PIN:

- ECRB
- ECU
- Supinator
- Ext dig
- Ext dig min
- Ext ind
- Ext poll brev
- Abd poll long
- Ext poll long

# Entrapment neuropathy - Radial Nerve

## Above elbow

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# Radial tunnel syndrome – PIN syndrome

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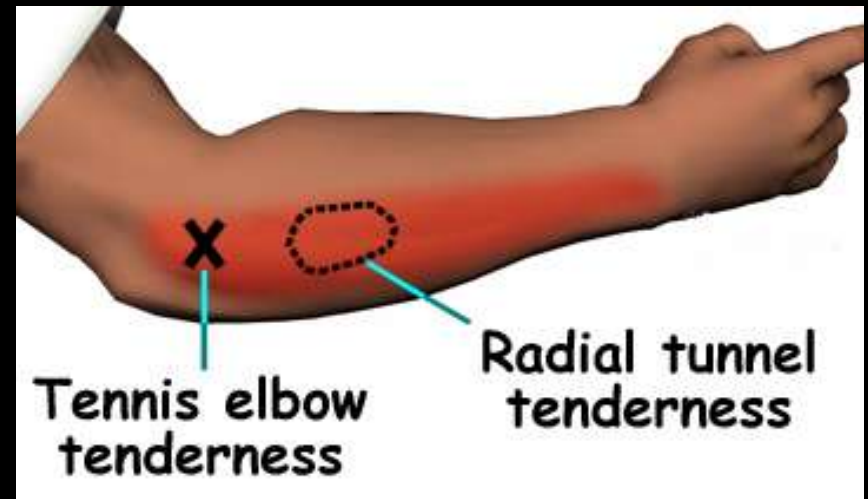
- Compression of the PIN within the radial tunnel yields two distinct clinical entities:
- **Posterior Interosseous Nerve syndrome** is characterized by **motor deficits** and +EMG of denervation.
- **Radial tunnel syndrome** manifests as **pain** over the proximal lateral forearm as the sole complaint. Motor deficits and EMG findings are typically absent. Delays diagnosis.
- How? Perhaps different nerve fibers are affected. Perhaps radial tunnel is an early manifestation of PIN.



# Radial tunnel syndrome?

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- Radial tunnel syndrome can also present with inflammation of the posterior interosseous nerve.



# Entrapment Syndromes - Radial Nerve - PIN

## Resistant Tennis Elbow

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- DDx for lateral epicondylitis
  - Radial collateral ligament rupture.
  - Radial tunnel syndrome
    - Lateral elbow pain from nervi nervorum



Radial neuritis

# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Syndrome

---

- Motor nerve
- Occ. Dull ache lateral 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 – ECRL
  - Origin proximal to radial tunnel



# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Syndrome

---

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- Occ. Dull ache lateral elbow
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# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Syndrome

---

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- Occ. Dull ache lateral elbow
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## Entrapment Syndromes - Radial Nerve

# Posterior Interosseous Syndrome - Causes

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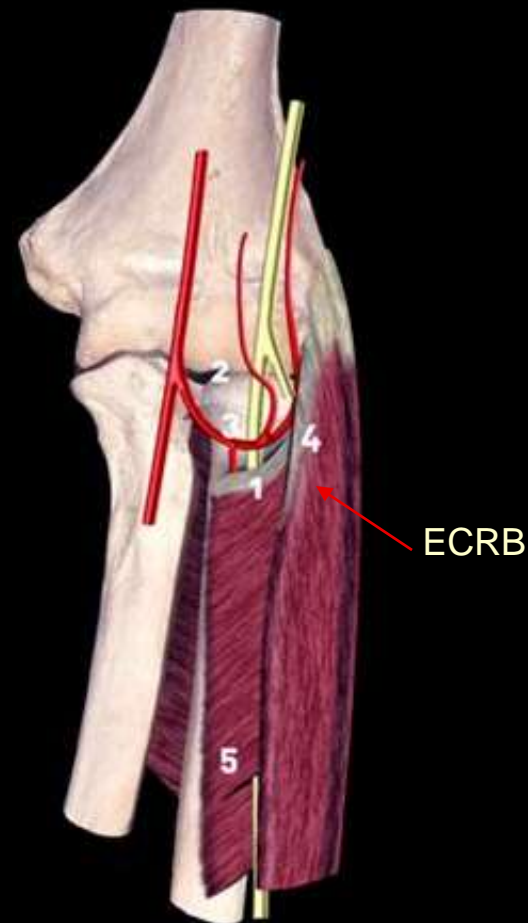


- Arcade of Froese
  - it is the most common site for entrapment of the nerve
  - fibrotendinous structure at proximal origin of supinator.
  - Variant present in 30-50% of population
- Leash of Henry
  - small recurrent vessels that cross the PIN

# Posterior Interosseous Syndrome - Causes

---

- Ganglions, synovitis and bursitis
  - at the radiocapitellar joint (#2) Often in annular peri-radial recess encircling neck/head
- Fibrous bands, thick tendons (commonly ECRB) – (#4)
- Radial head fx.
- Overuse (athletes or violinists)
- External compression (crutches)



# Posterior Interosseous Syndrome - Causes

---

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- Radial head fx
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- External compression (crutches)





# Entrapment Neuropathy - Radial Nerve

## Posterior Interosseous Nerve Syndrome

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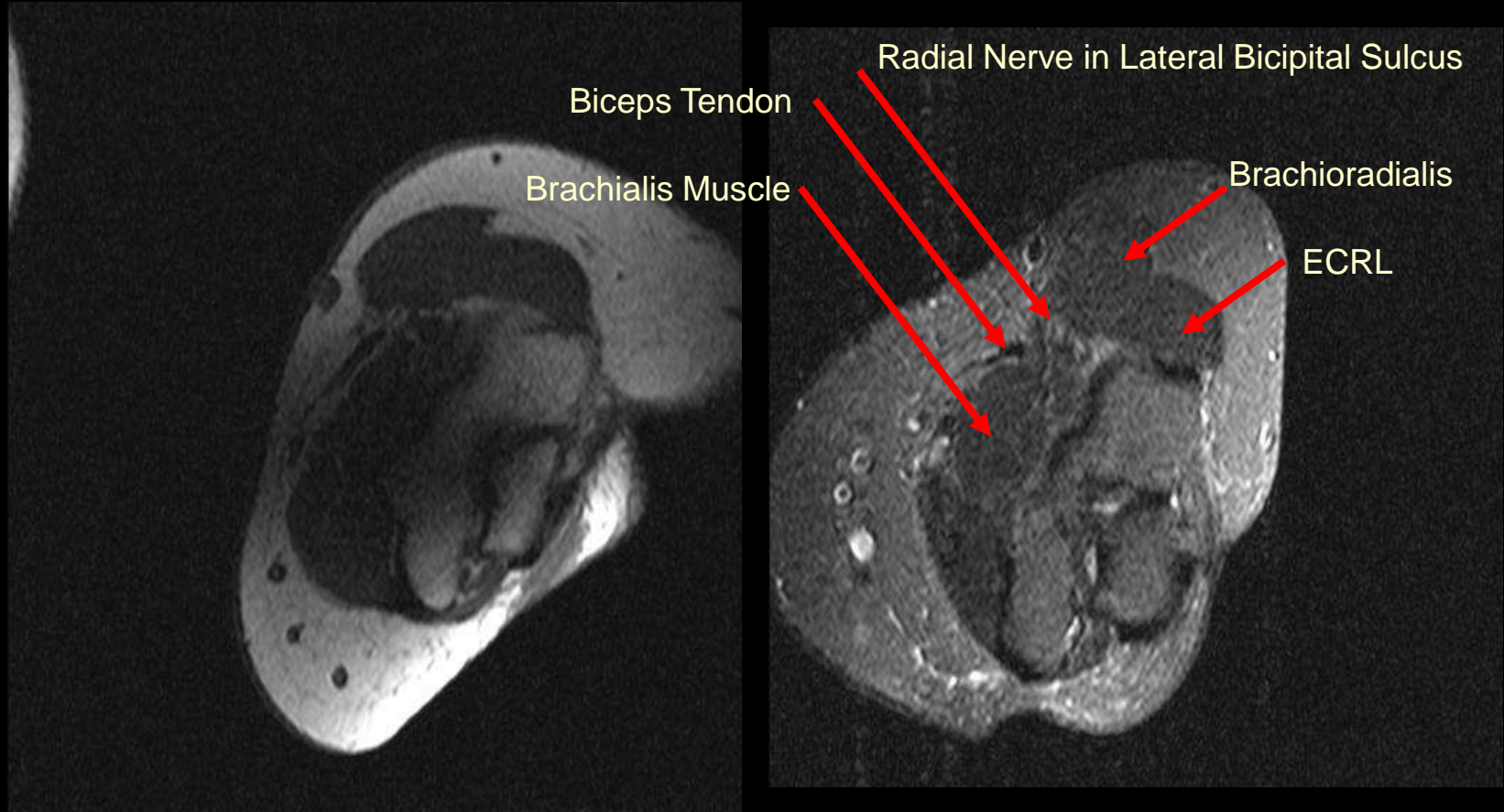
- 51 y.o. female with weakness of right hand extensors and radial deviated wrist



# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

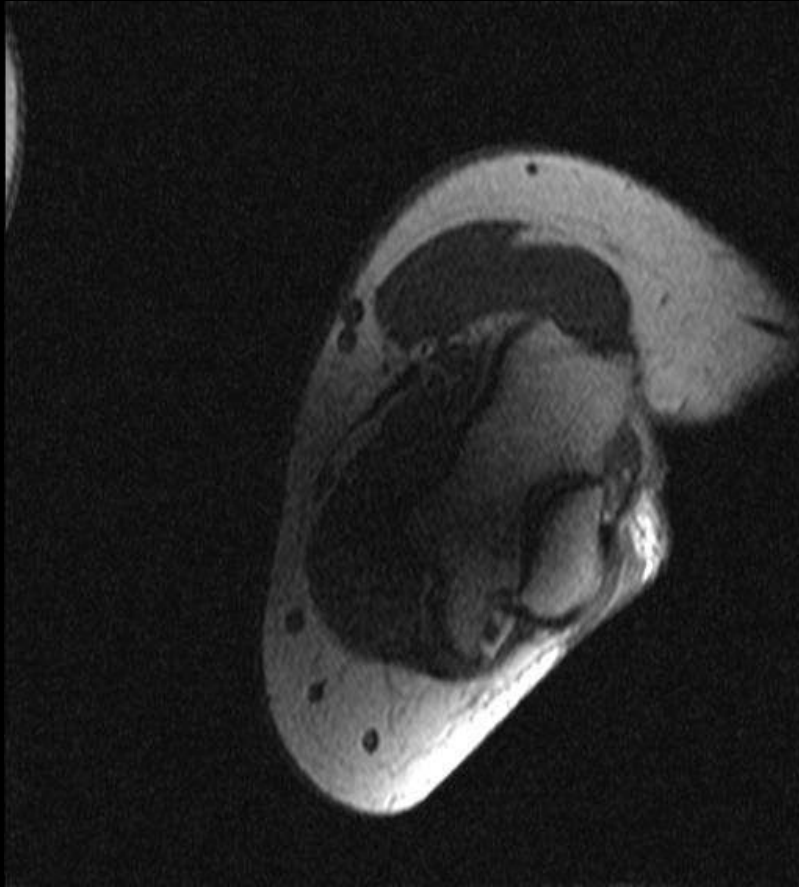
Ax PDFS

Proximal

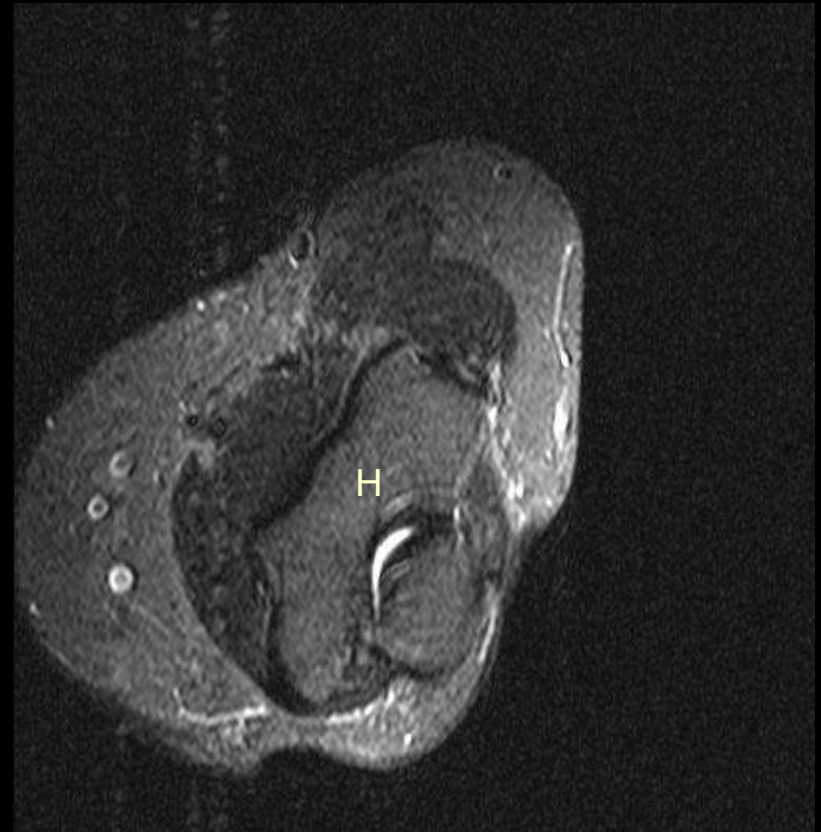
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

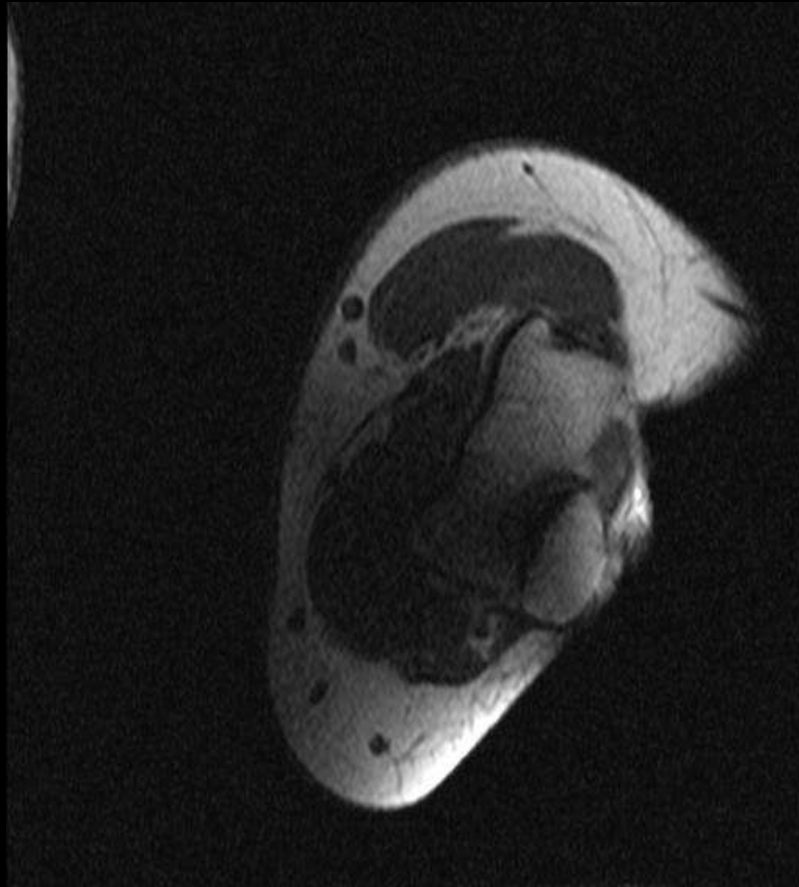


Ax PDFS

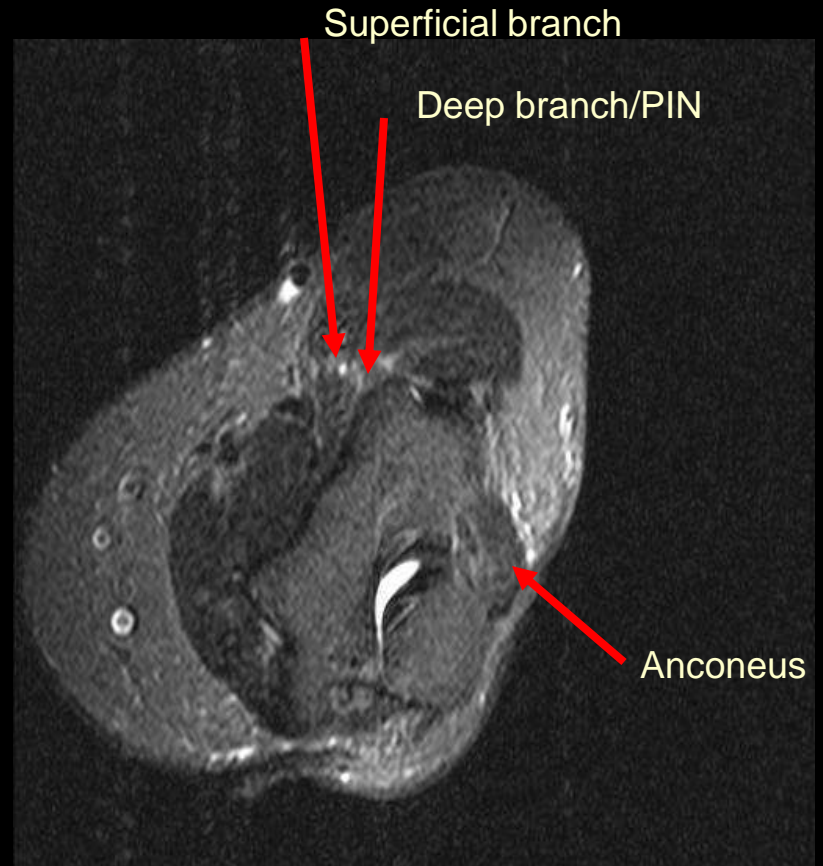
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



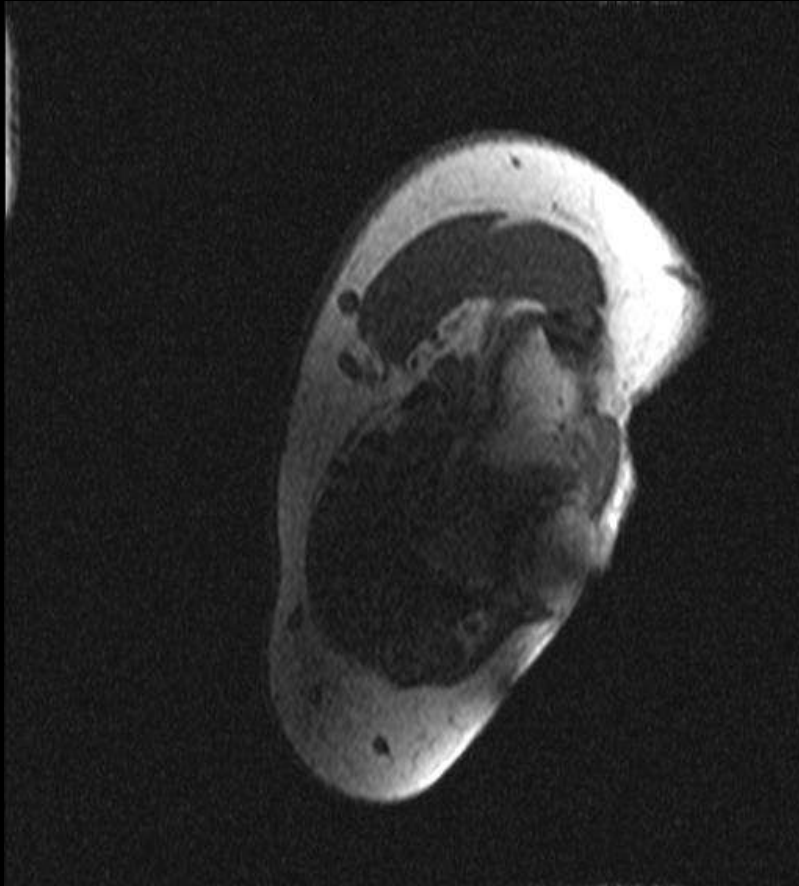
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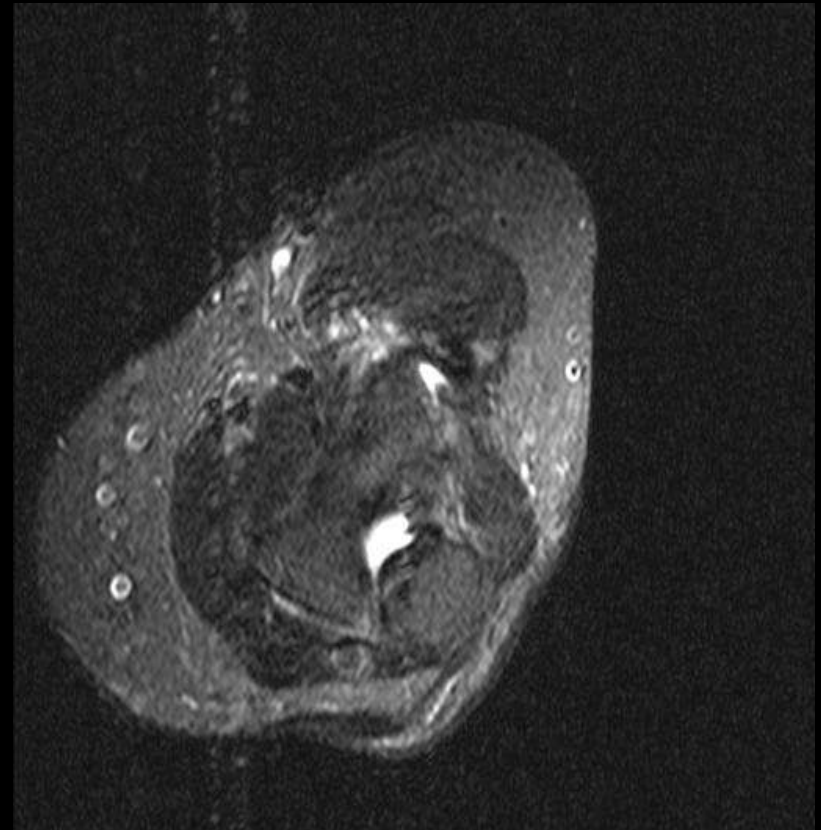
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

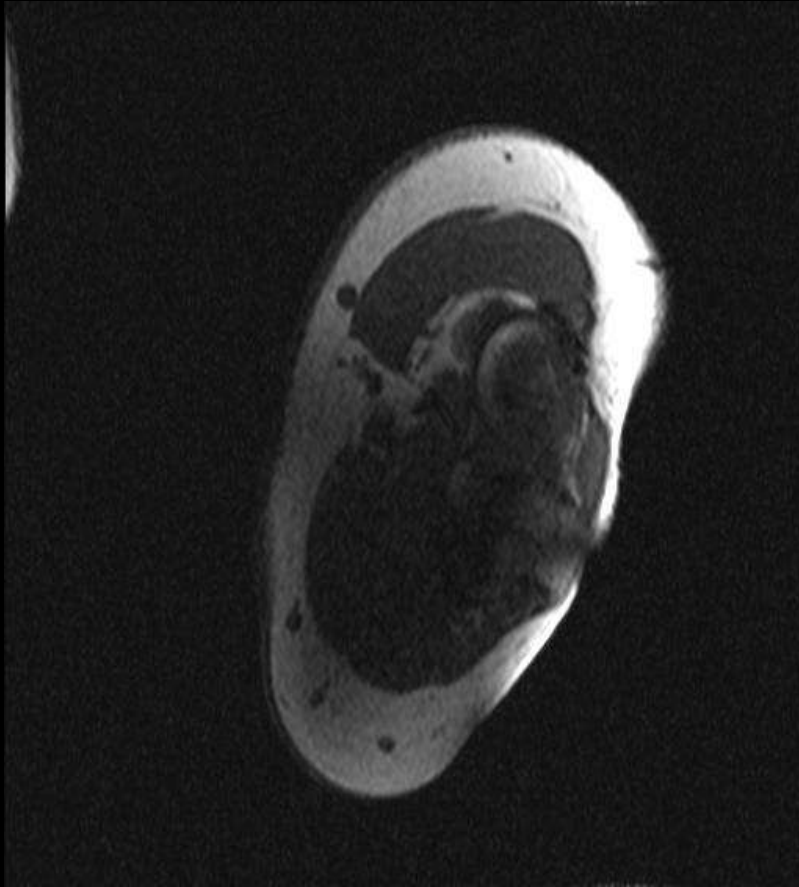


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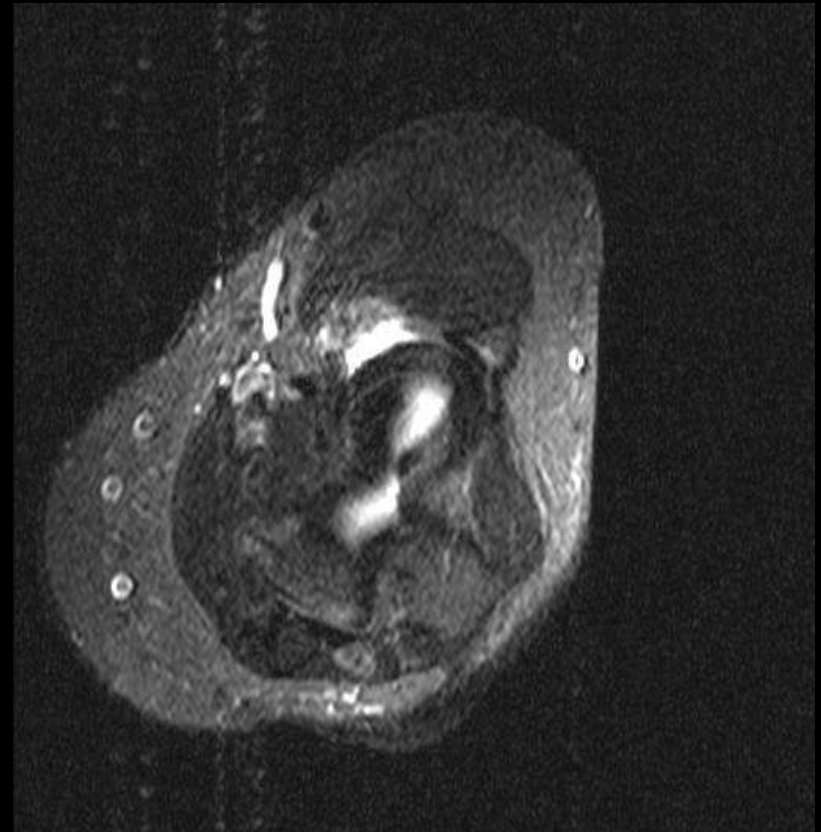
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

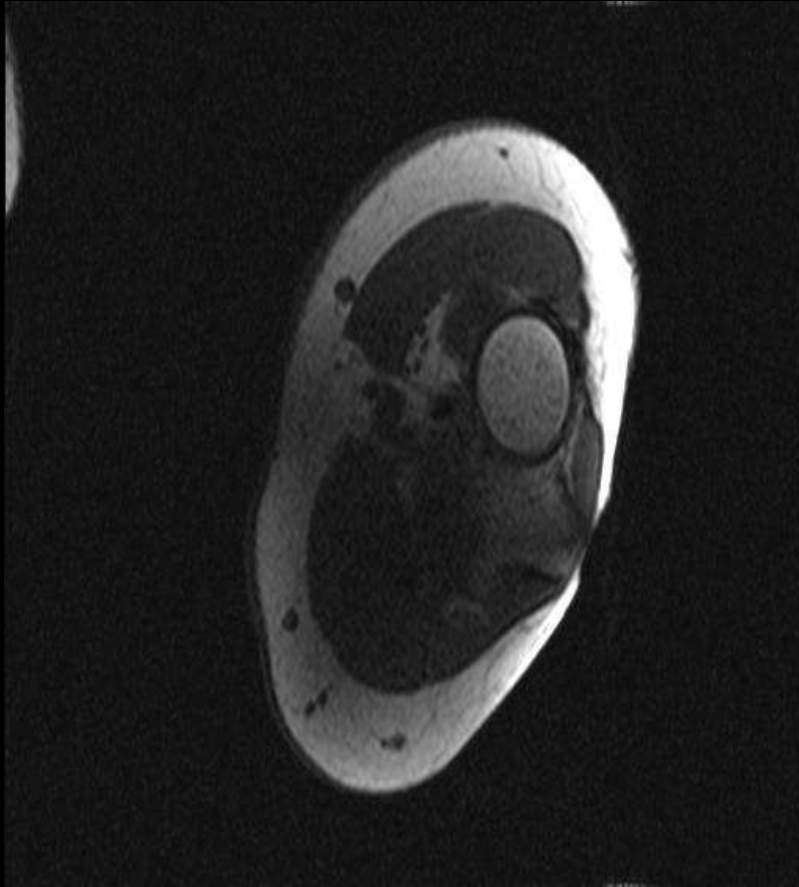


Ax PDFS

# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

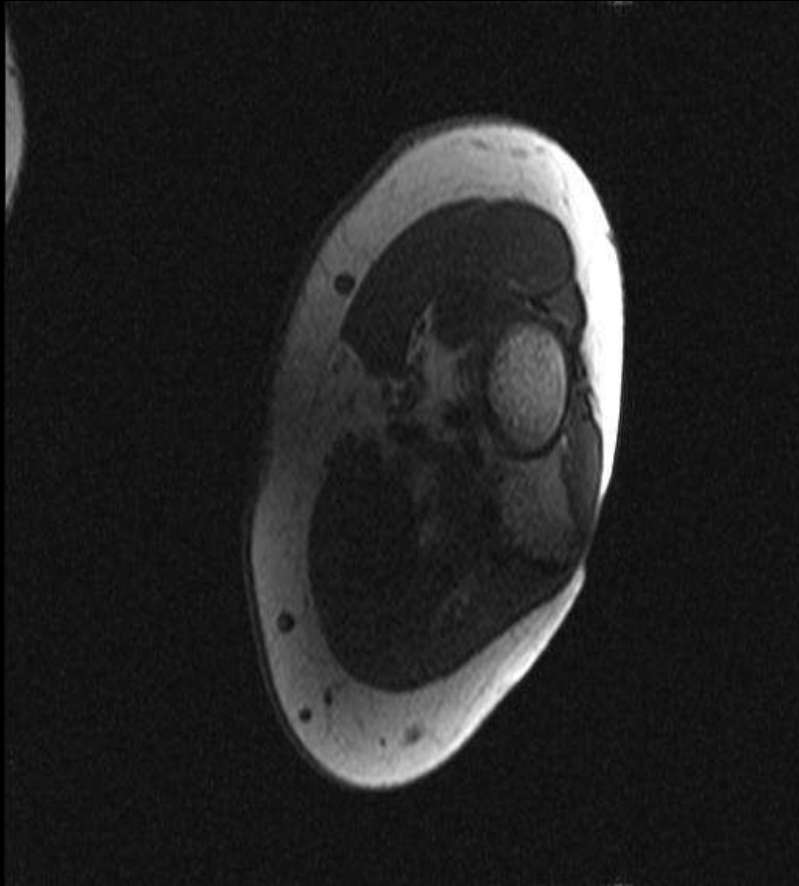


Ax PDFS

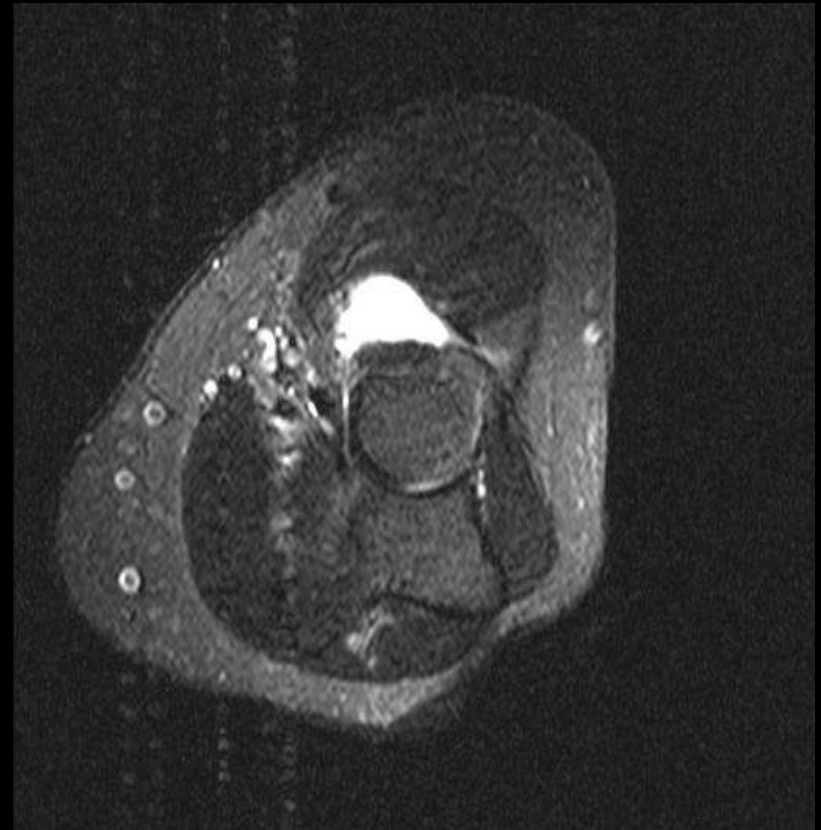
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



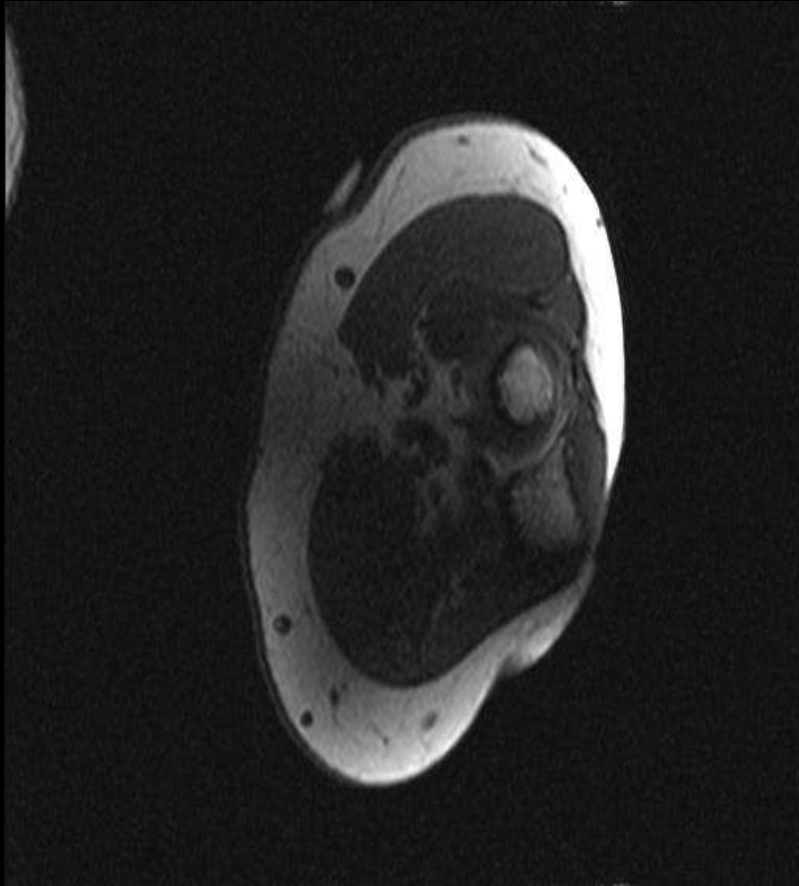
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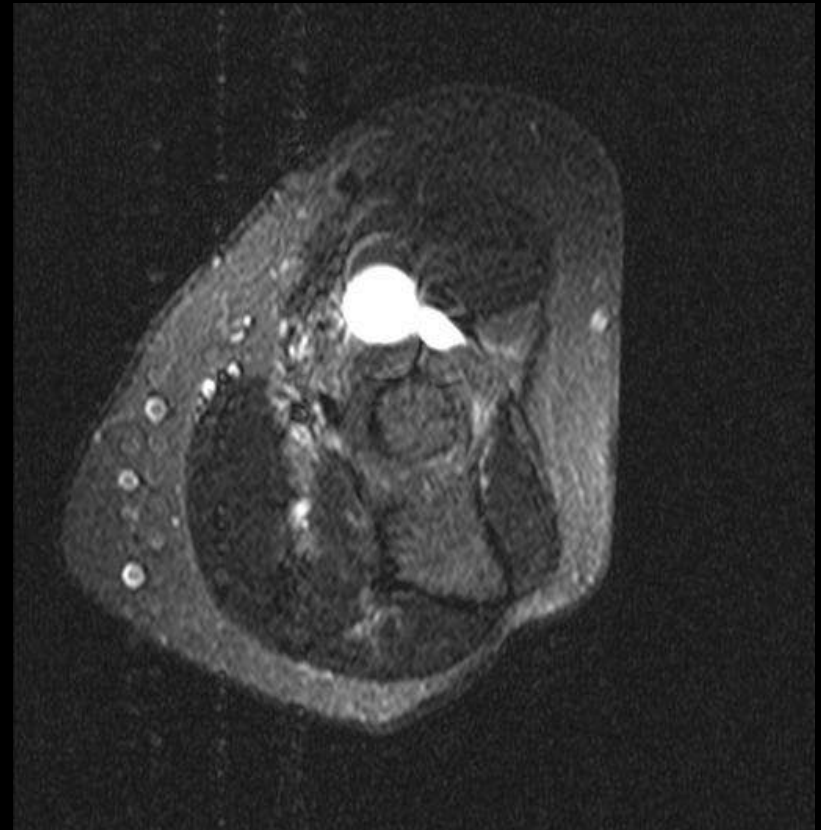
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

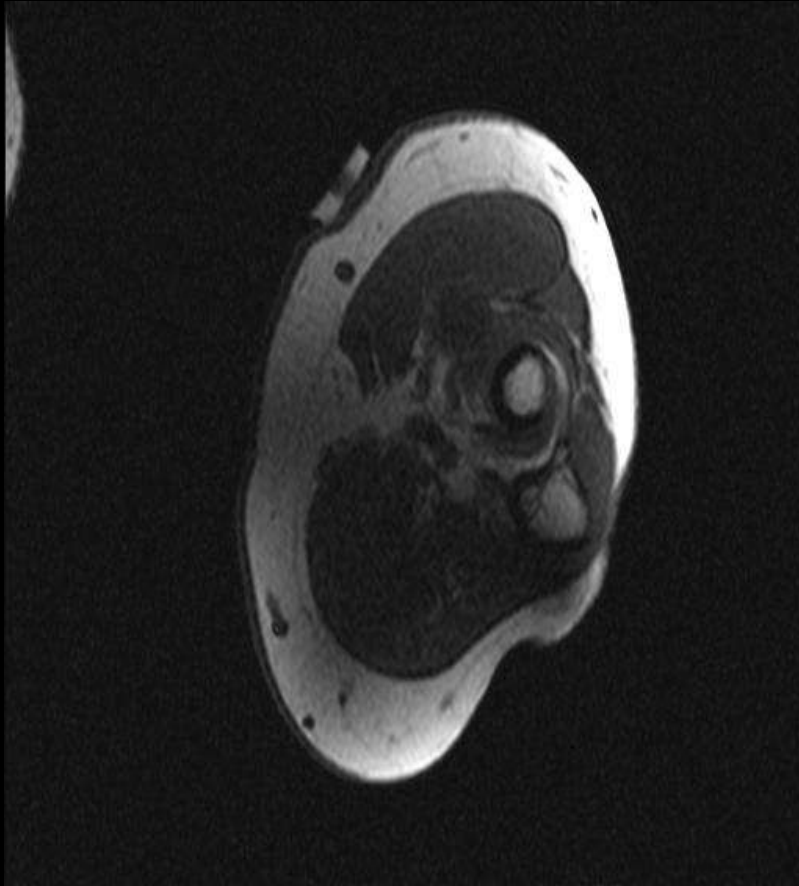


Ax PDFS

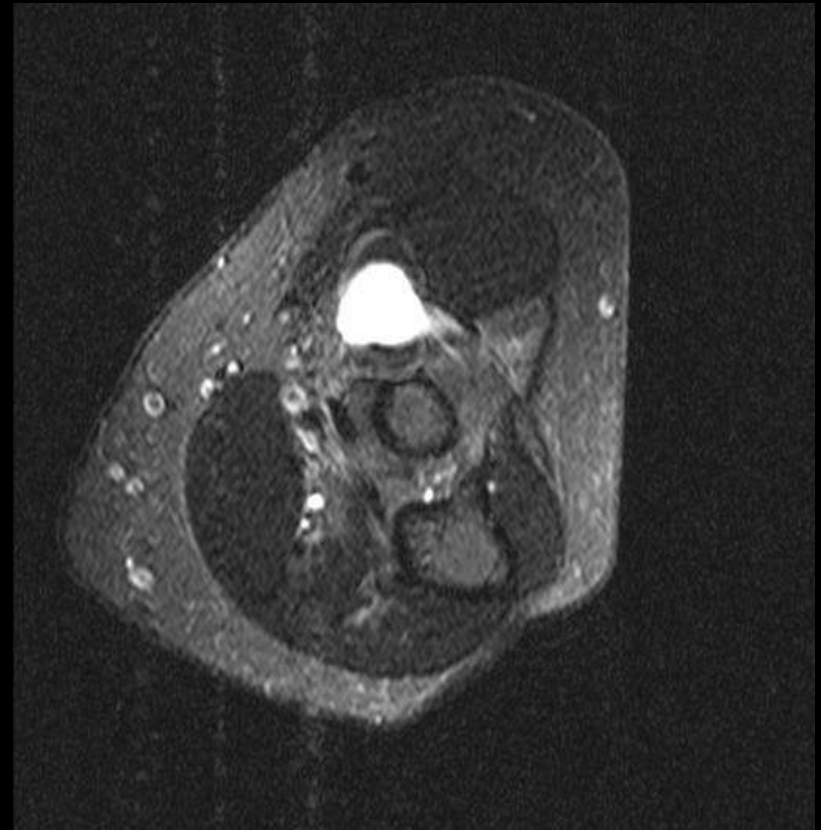
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

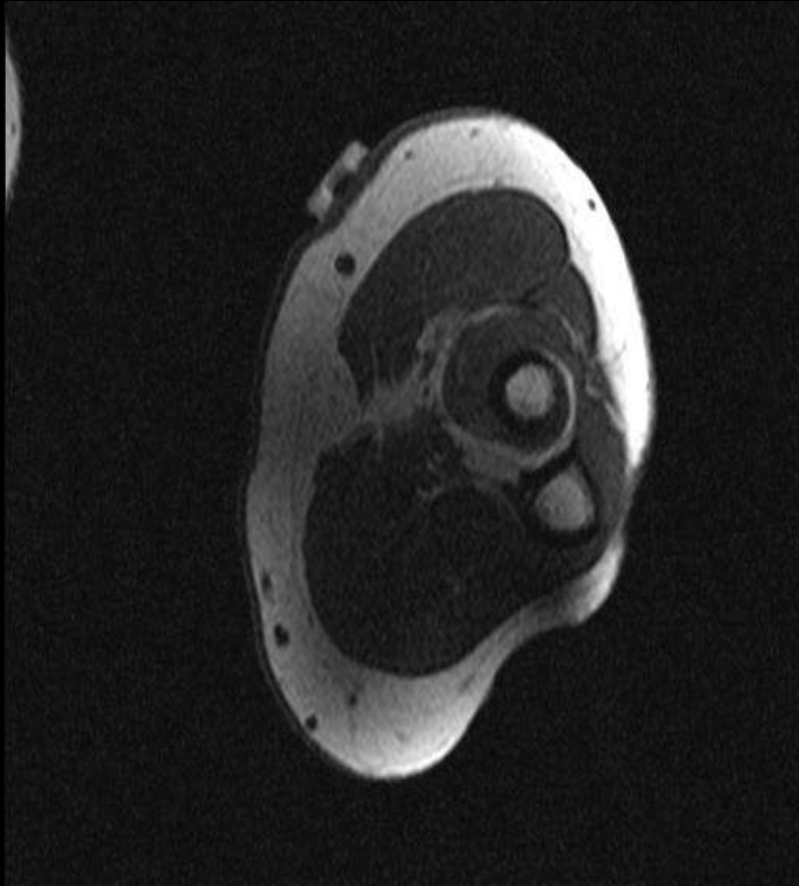


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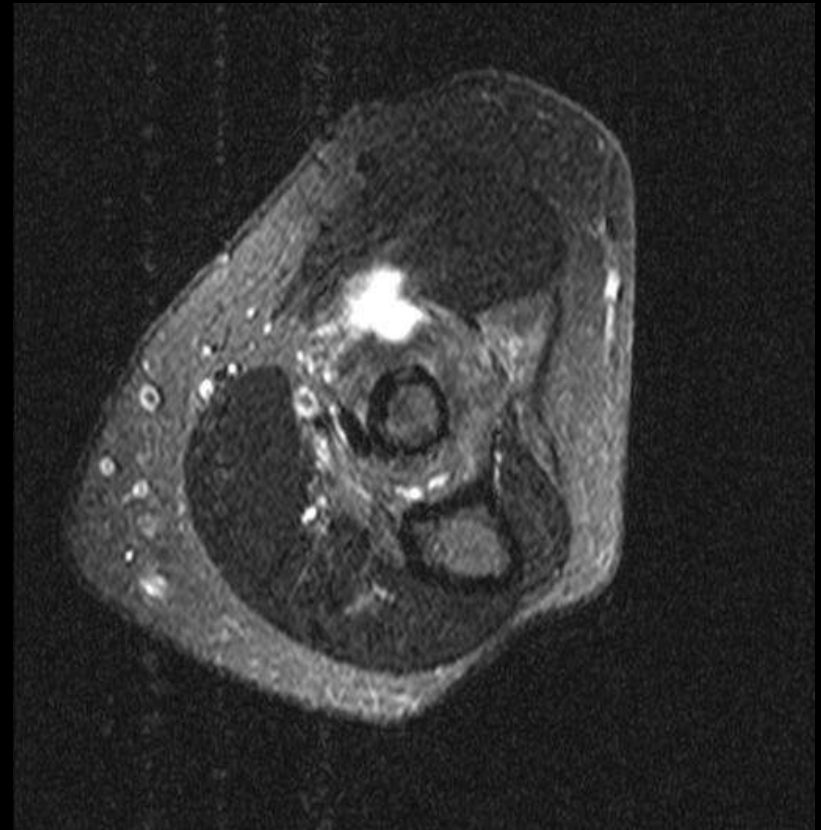
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

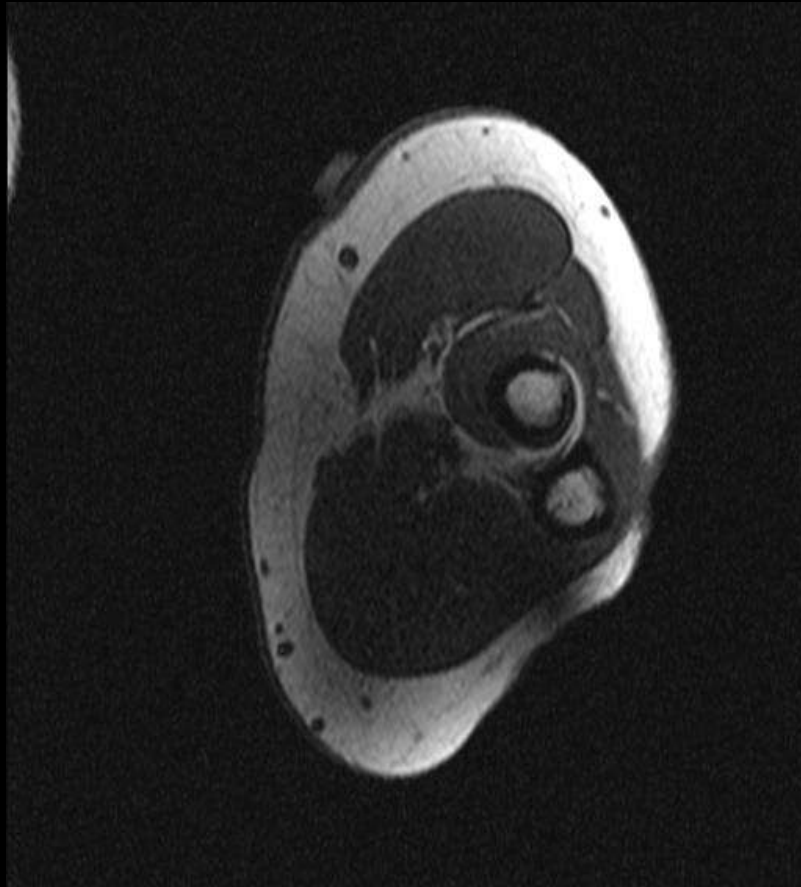


Ax PDFS

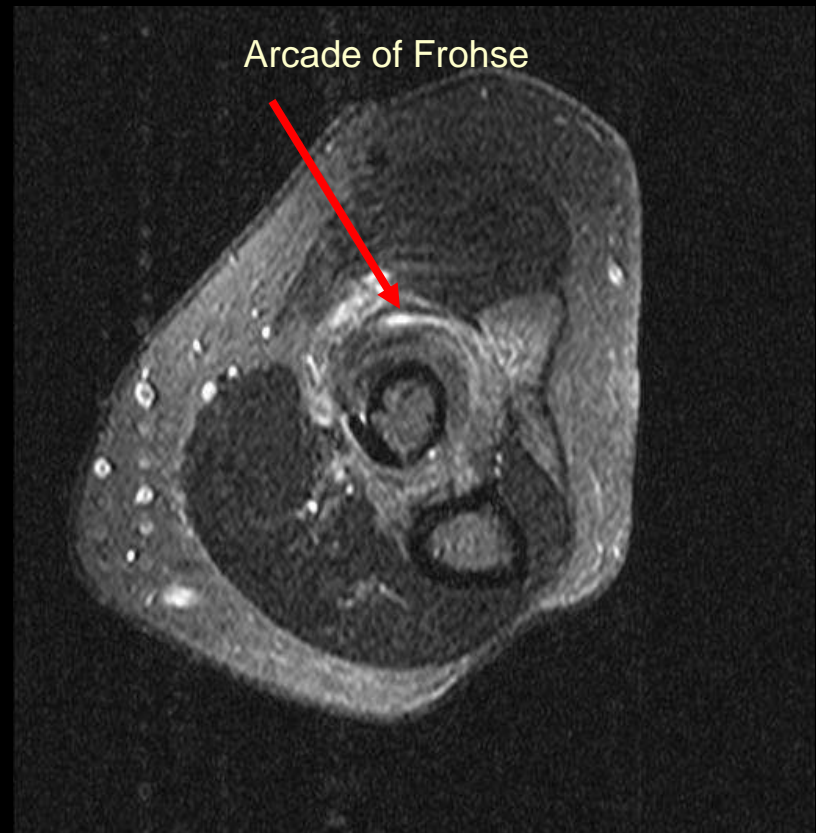
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



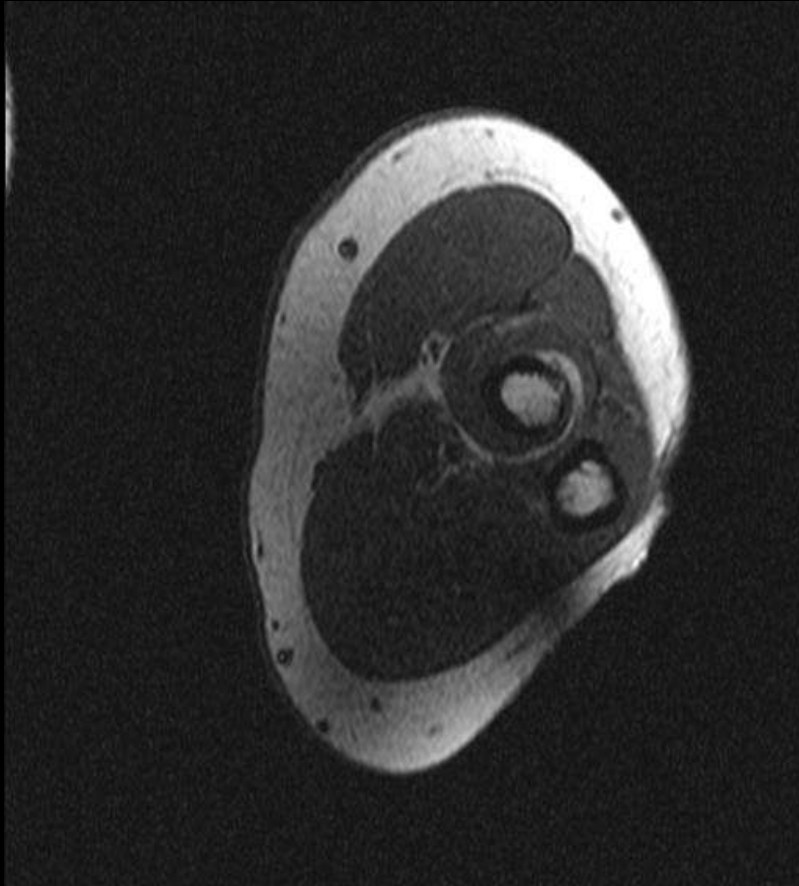
Ax PDFS



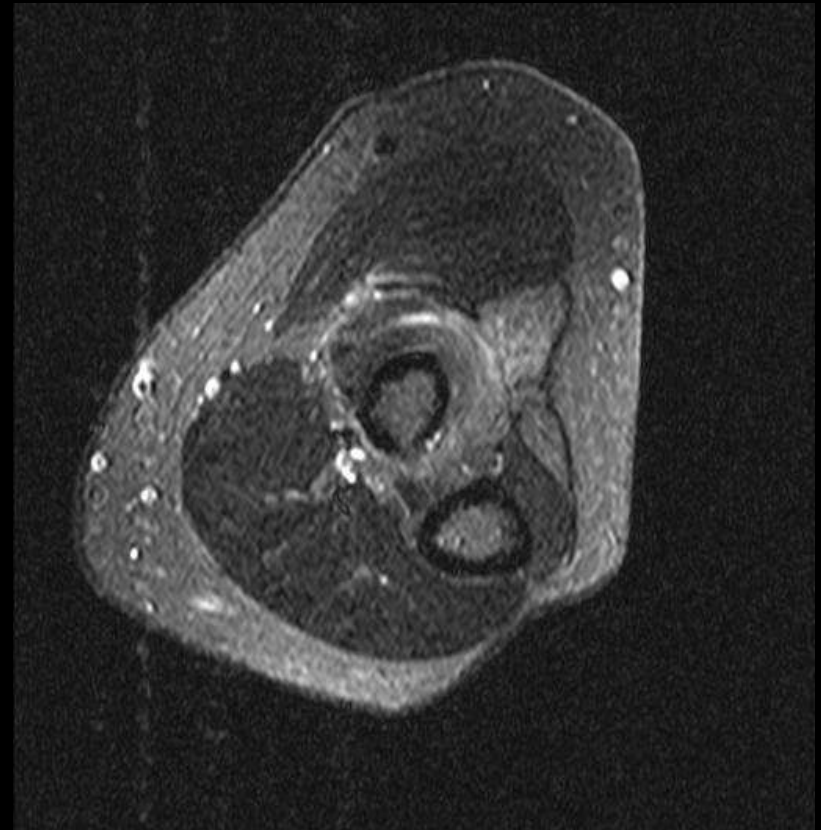
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

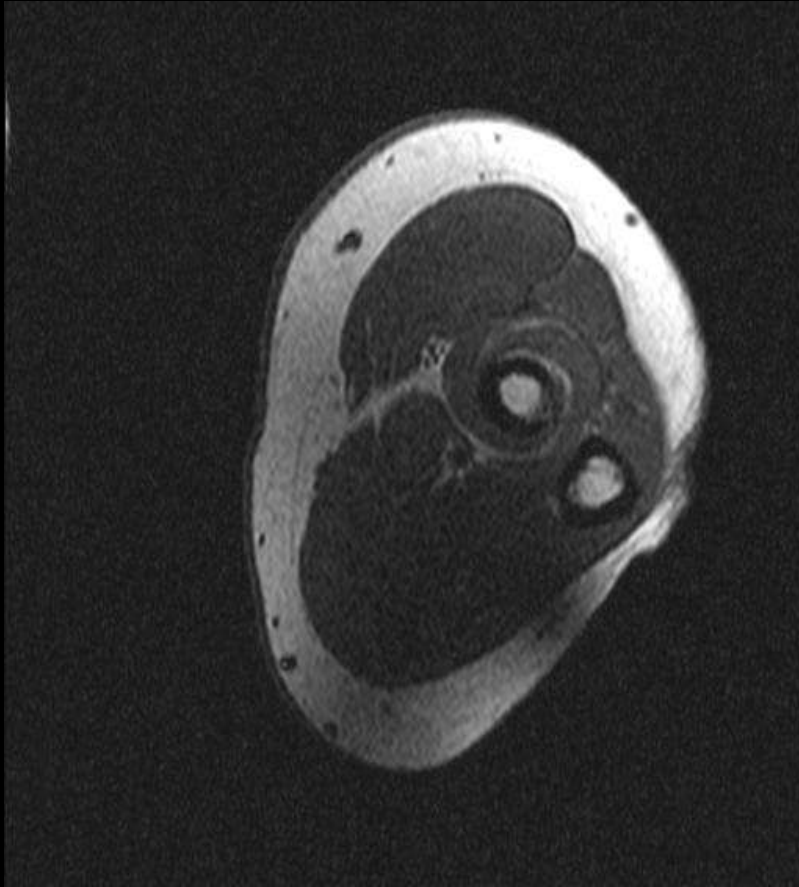


Ax PDFS

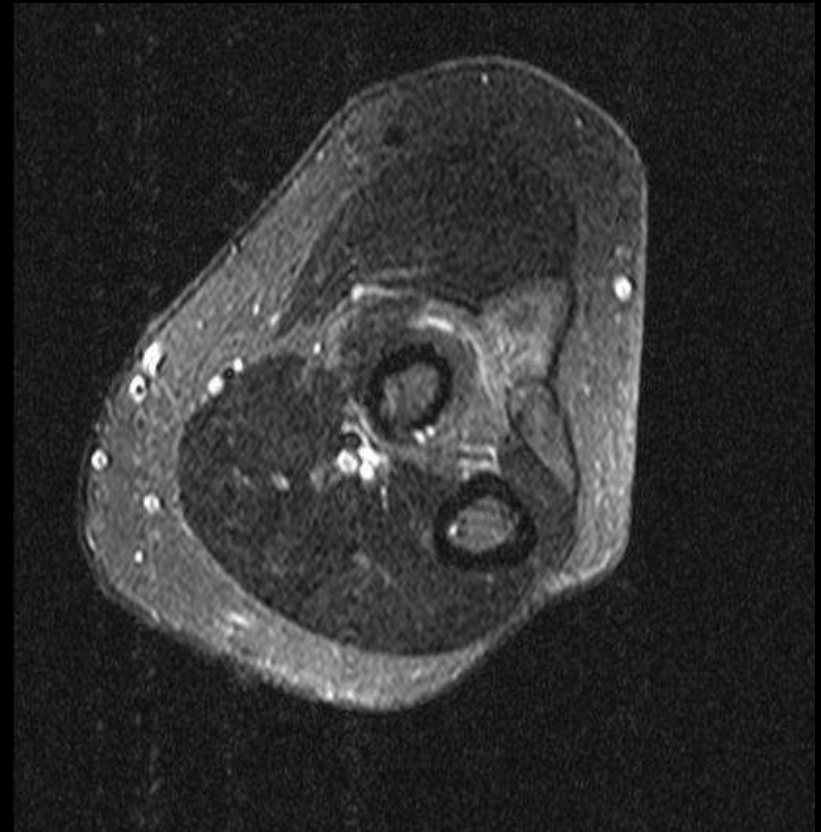
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1

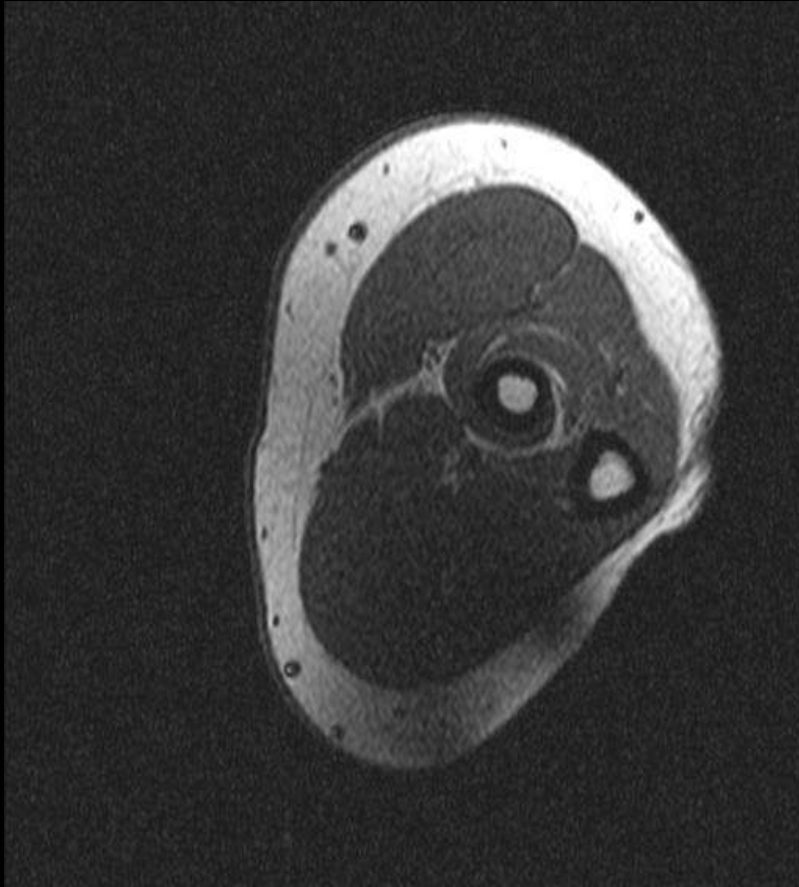


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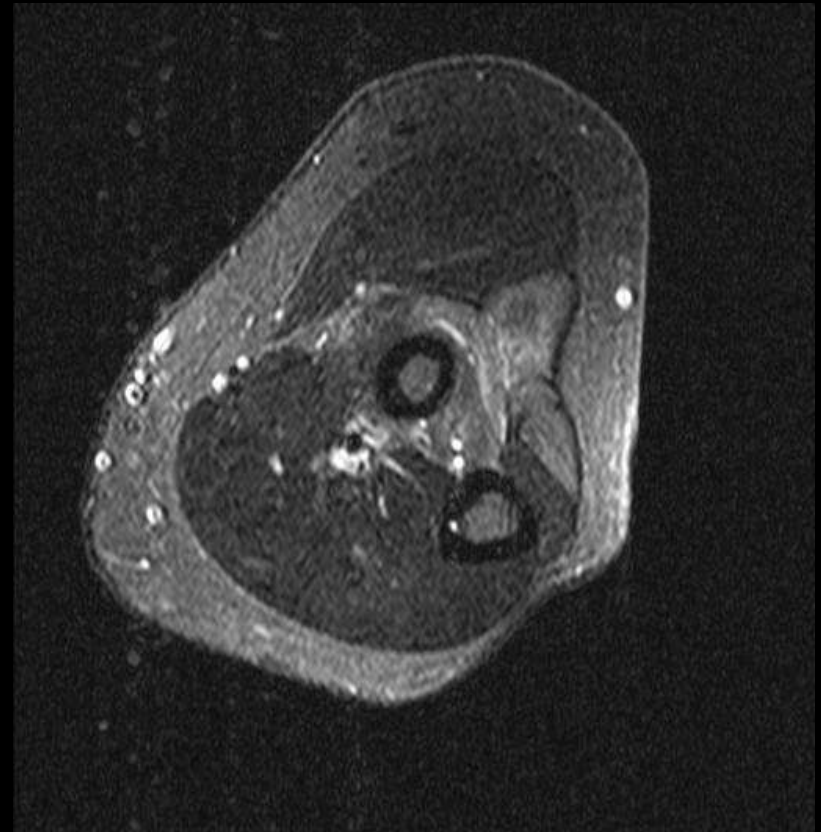
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



Ax PDFS

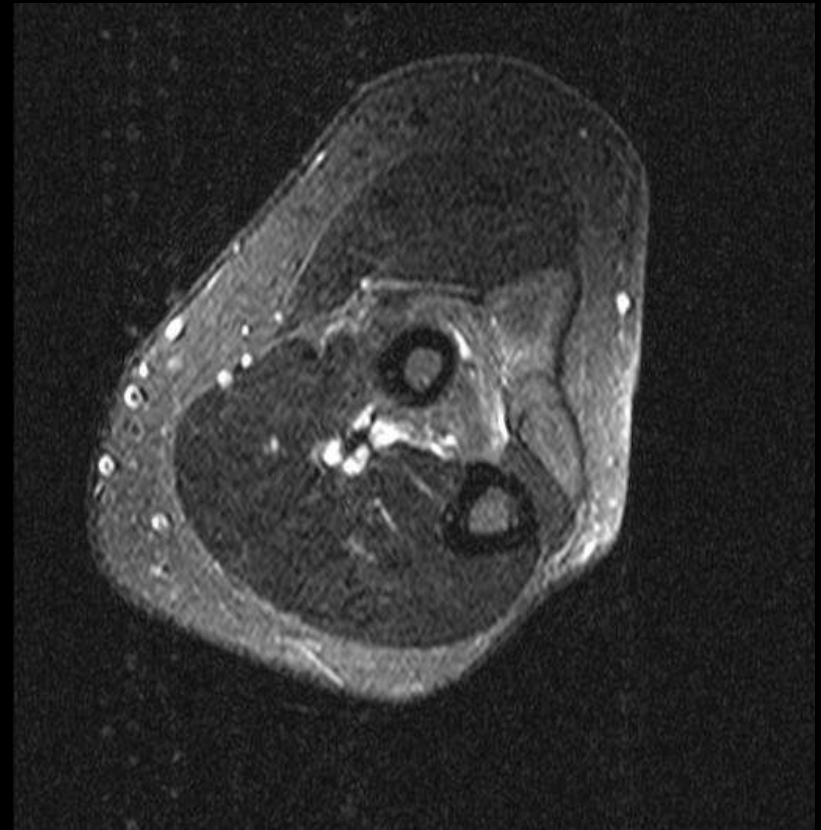
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



Ax PDFS



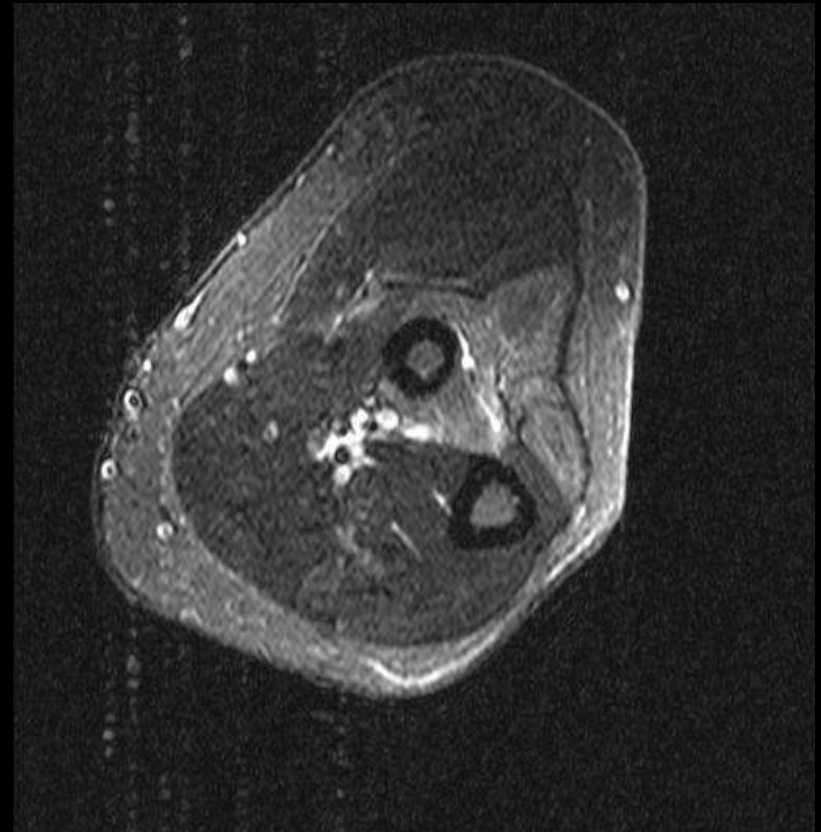
# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve

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Ax T1



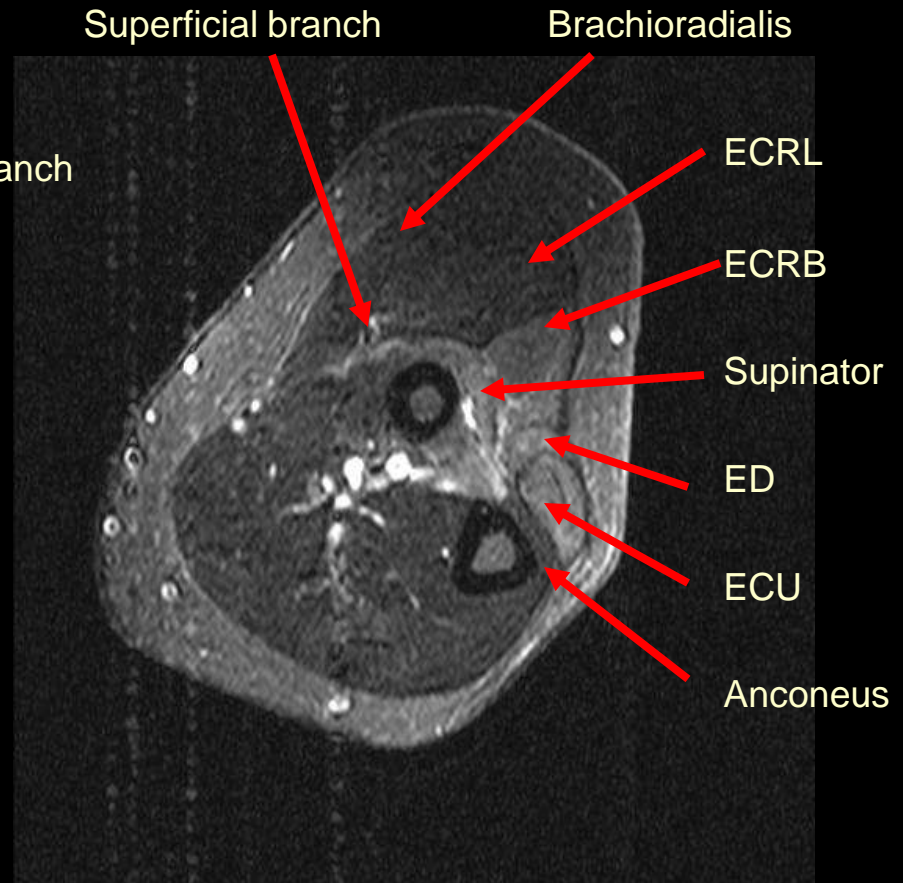
Ax PDFS

# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve



Ax T1



Ax PDFS

Distal

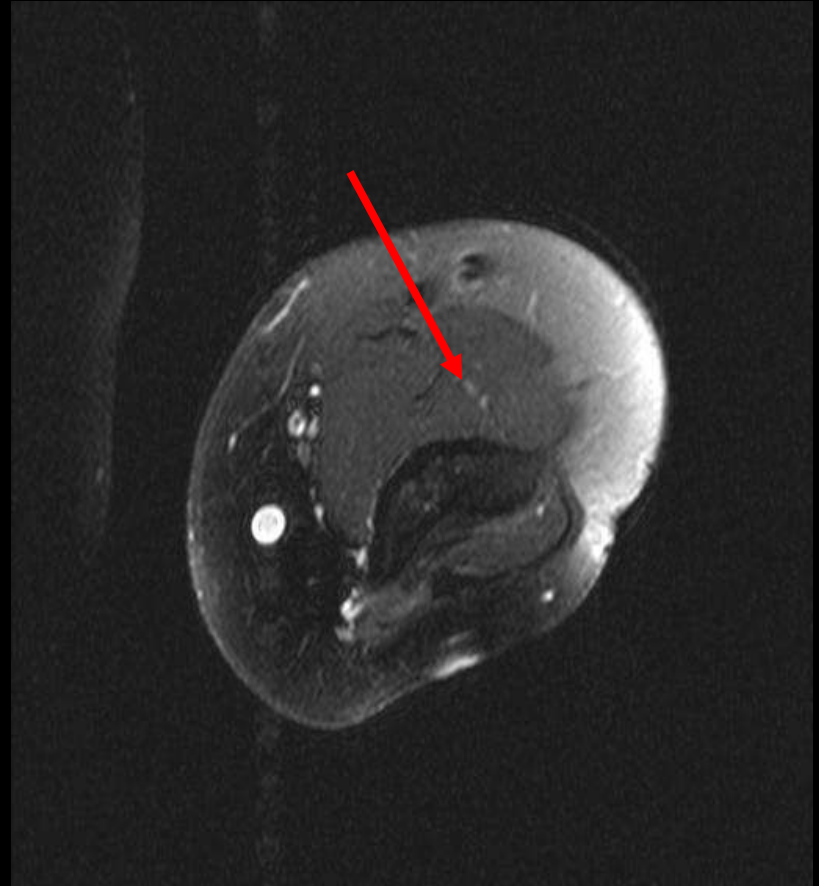
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

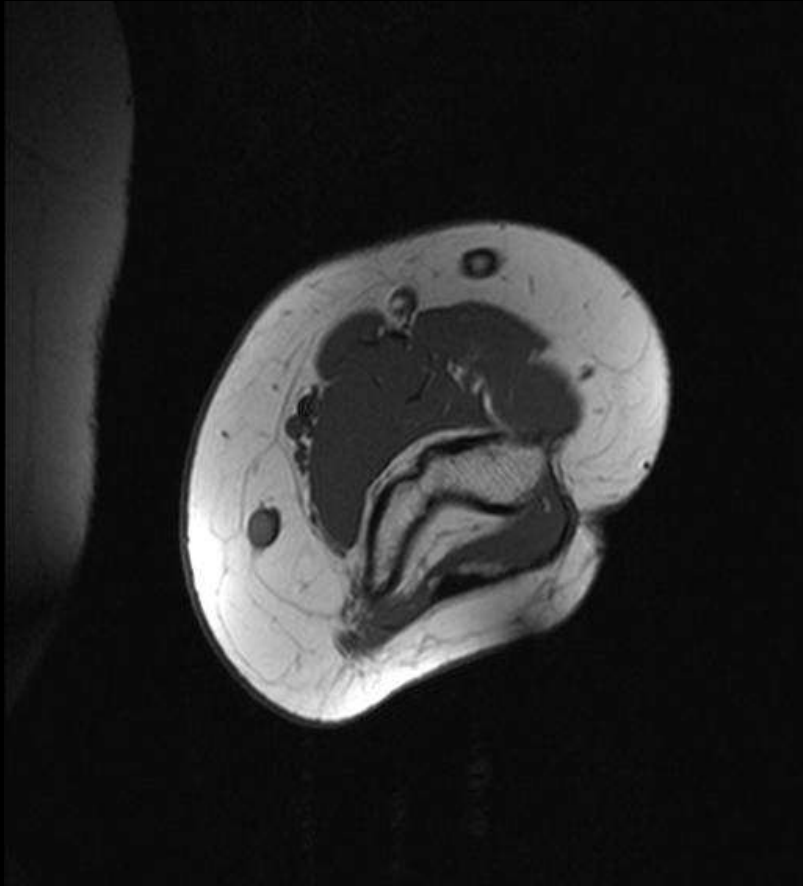


Ax PDFS

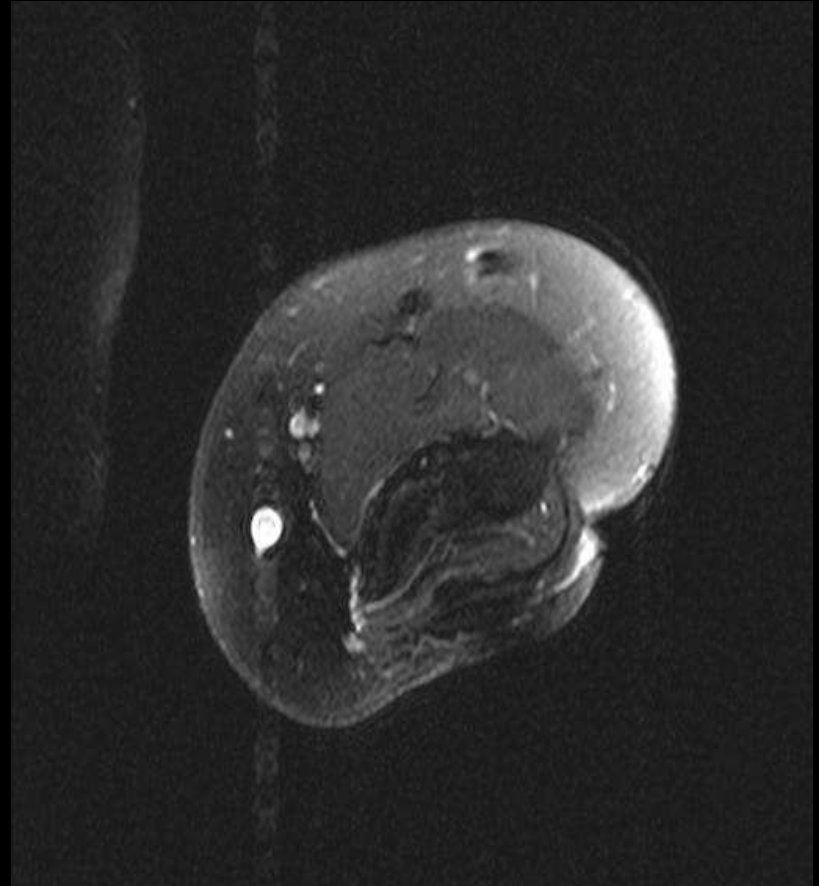
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

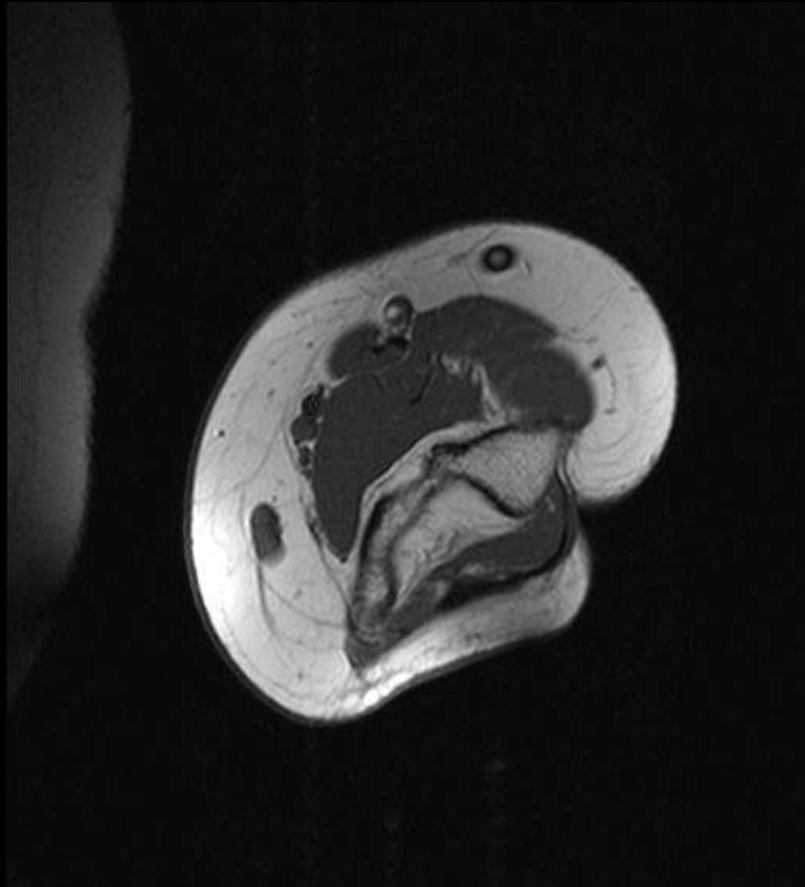


Ax PDFS

# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



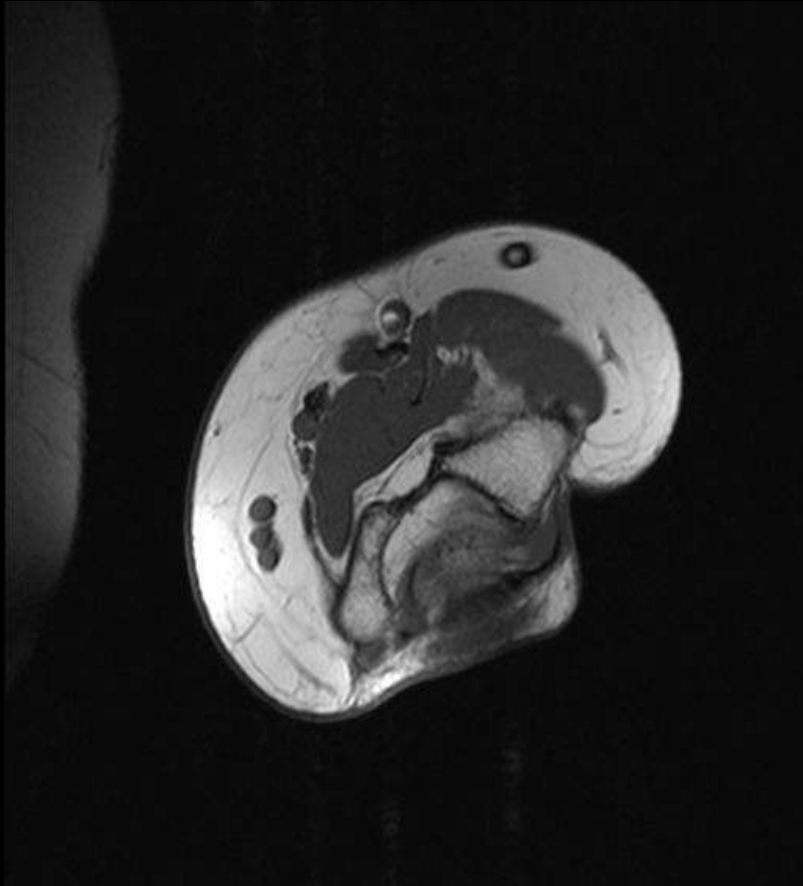
Ax PDFS



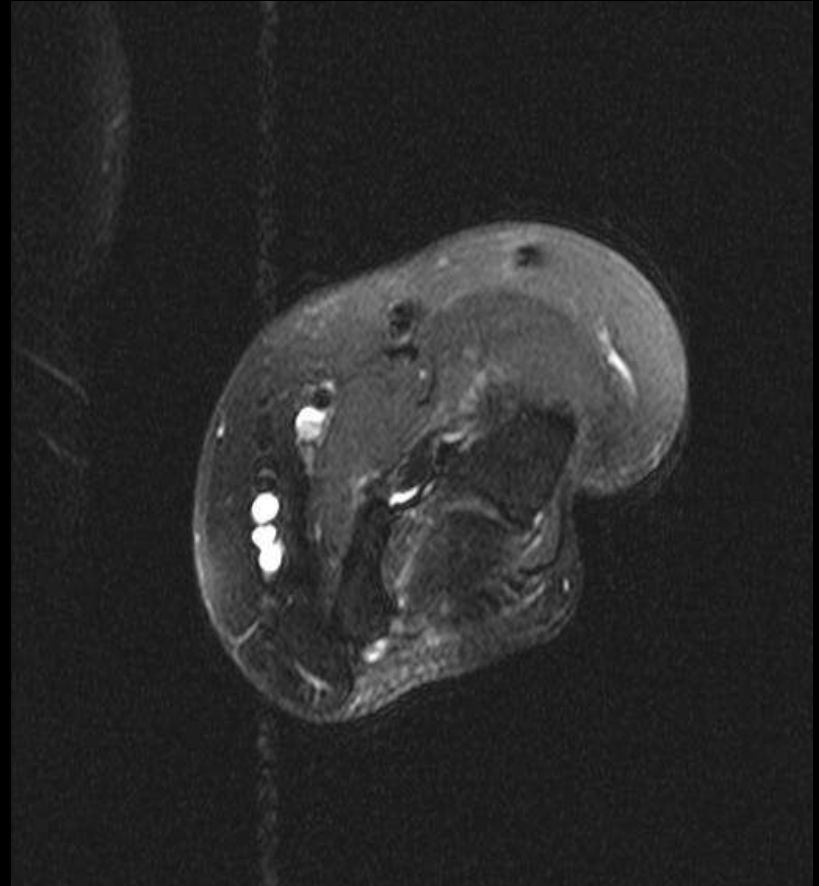
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



Ax PDFS

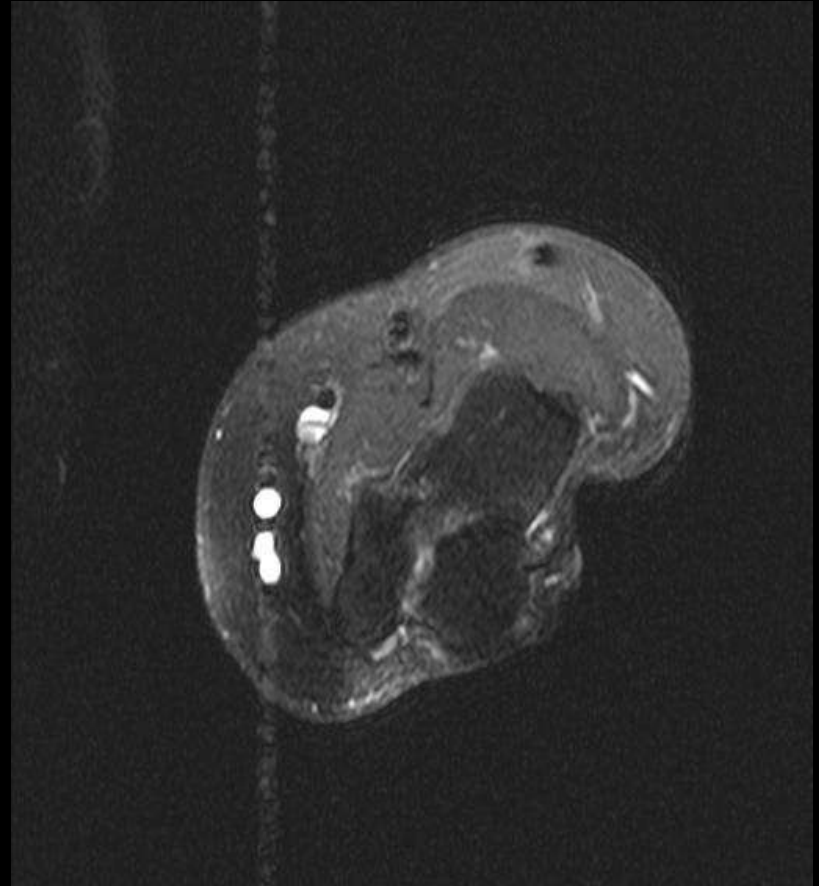
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

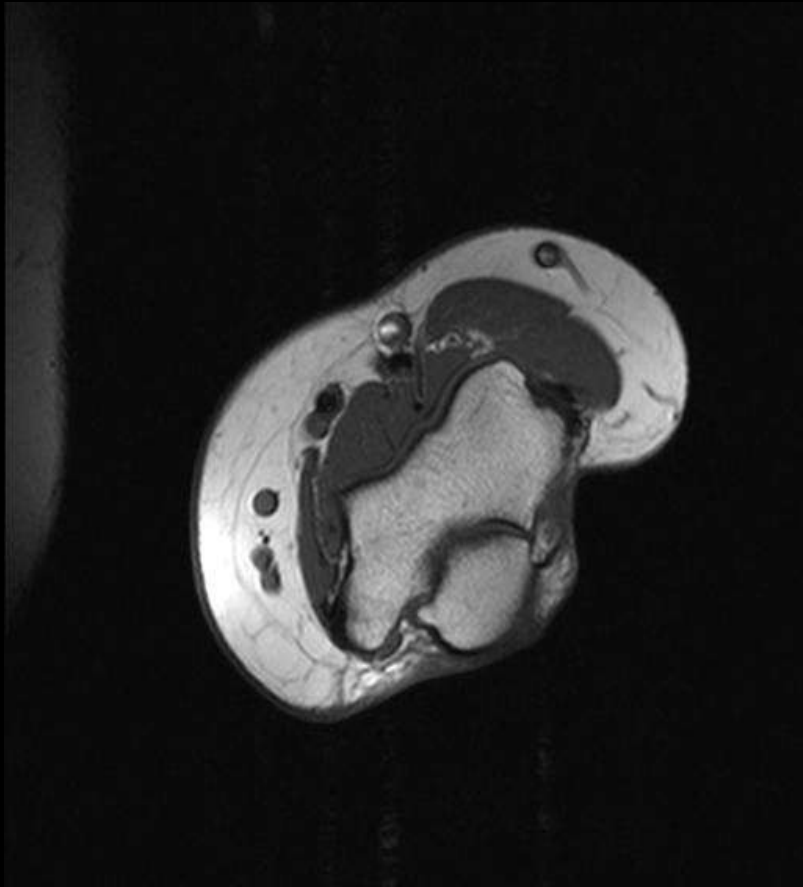


Ax PDFS

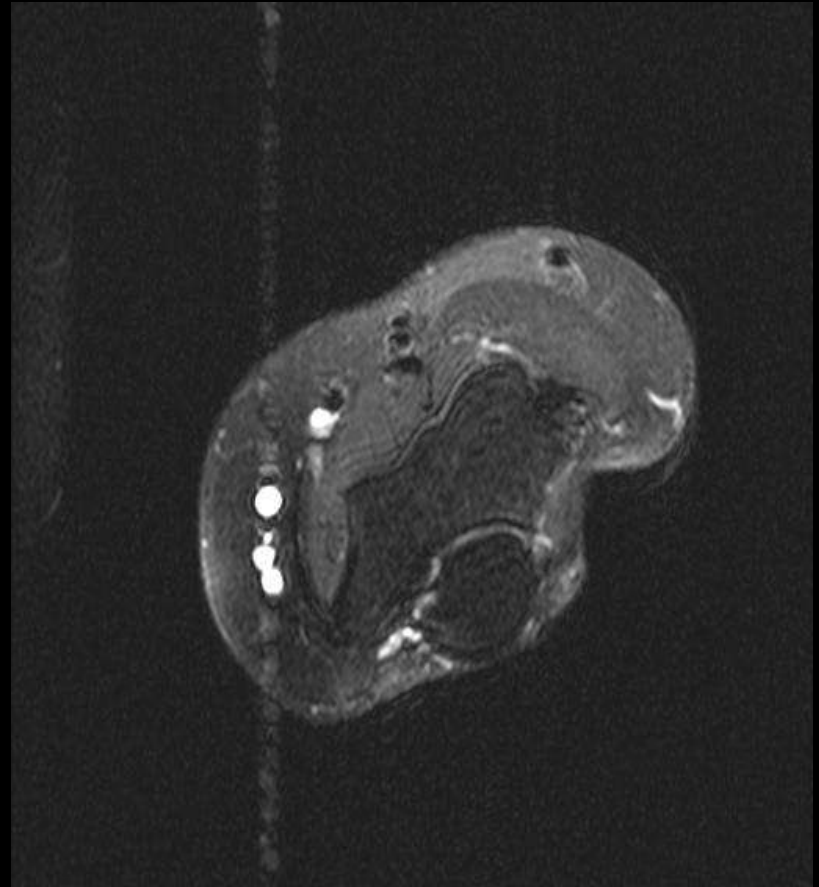
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



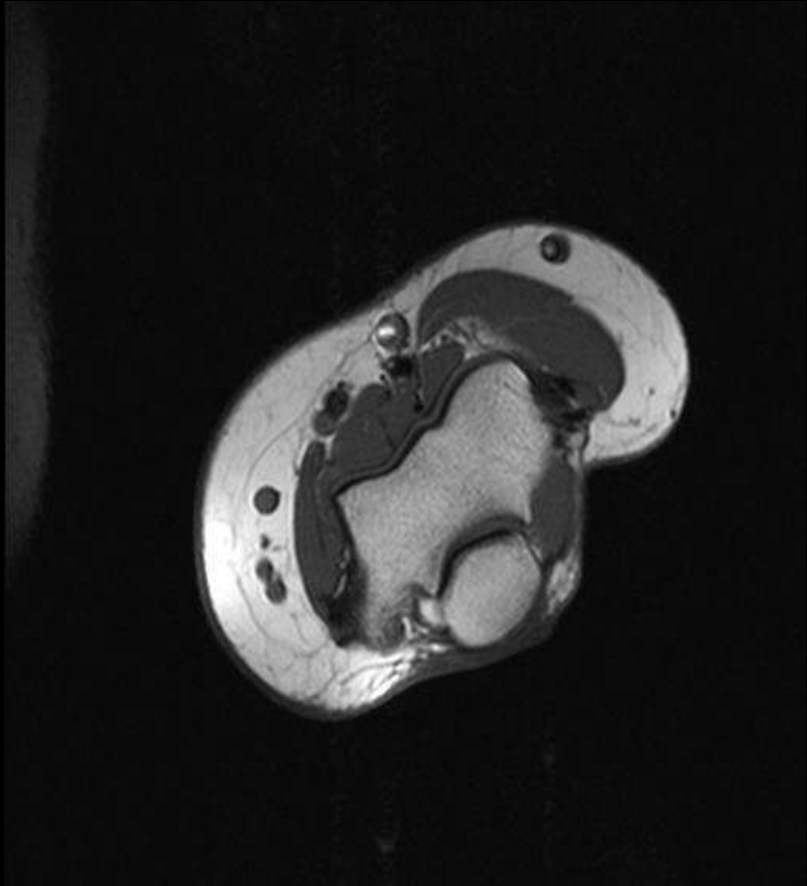
Ax PDFS



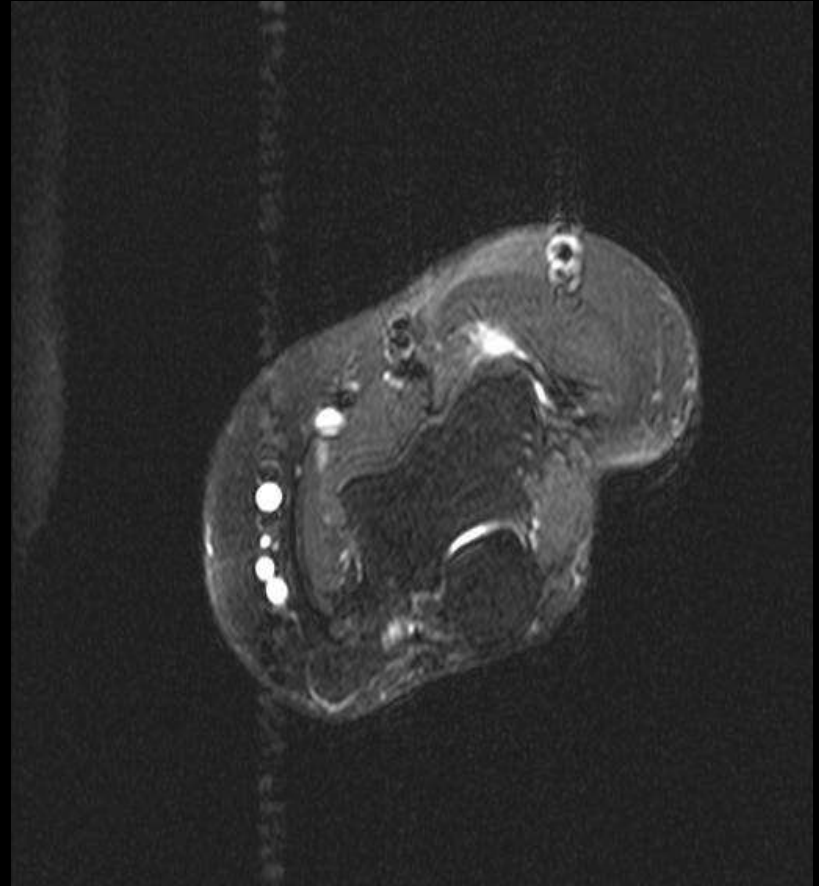
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

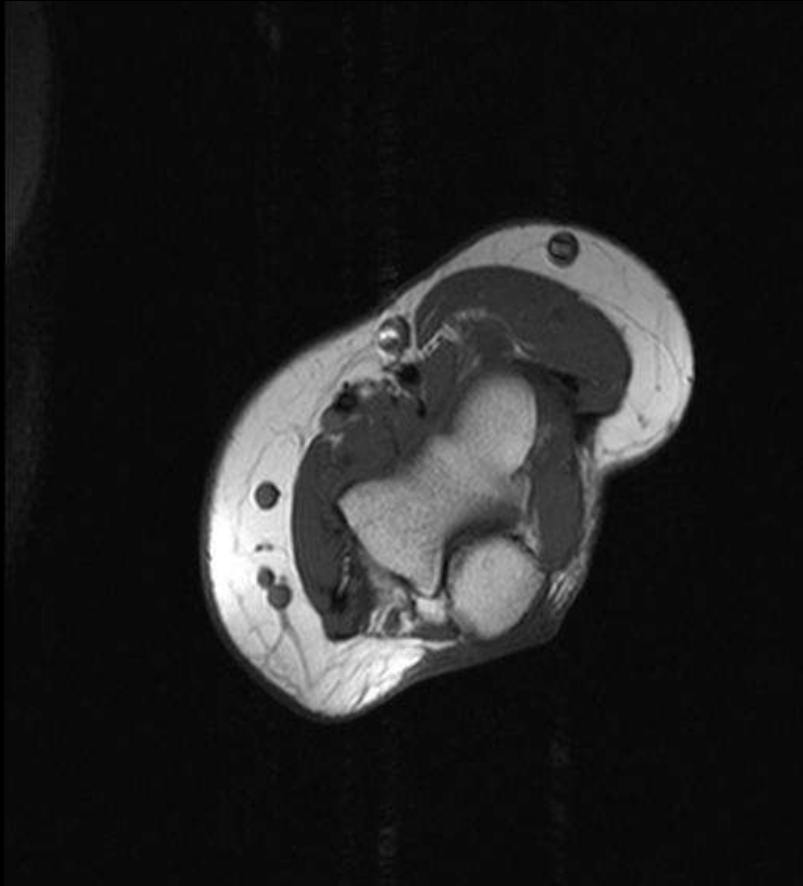


Ax PDFS

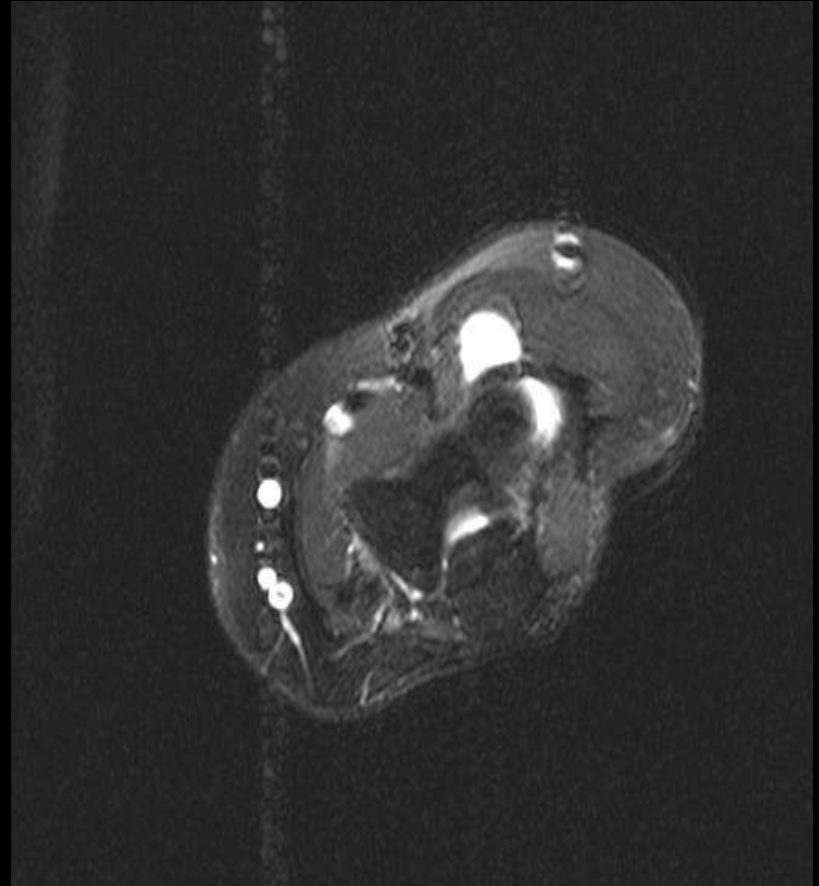
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

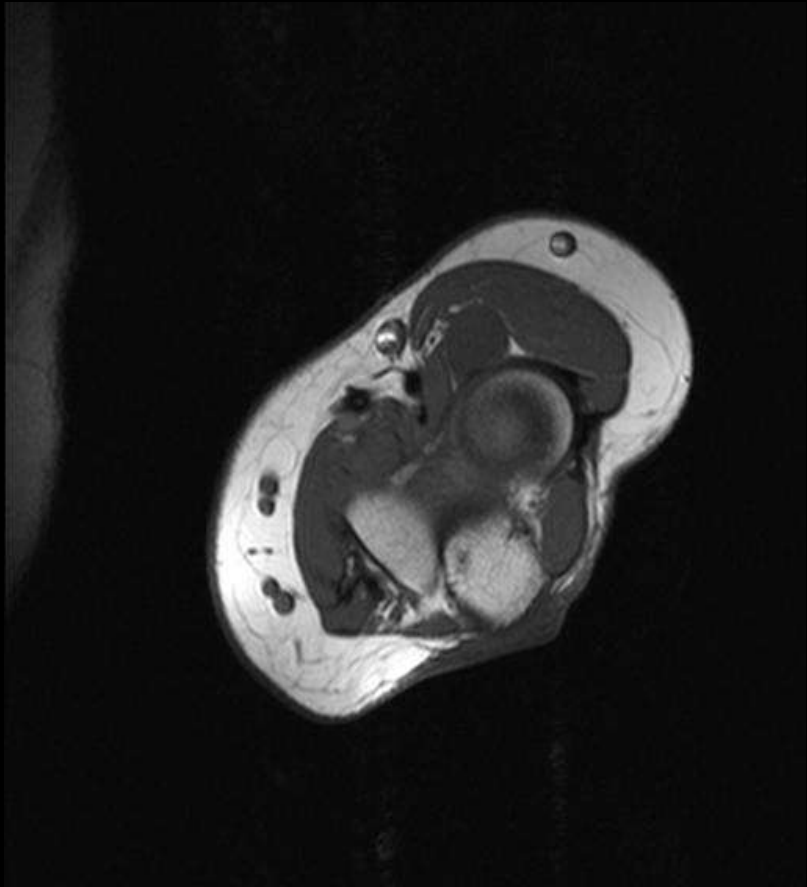


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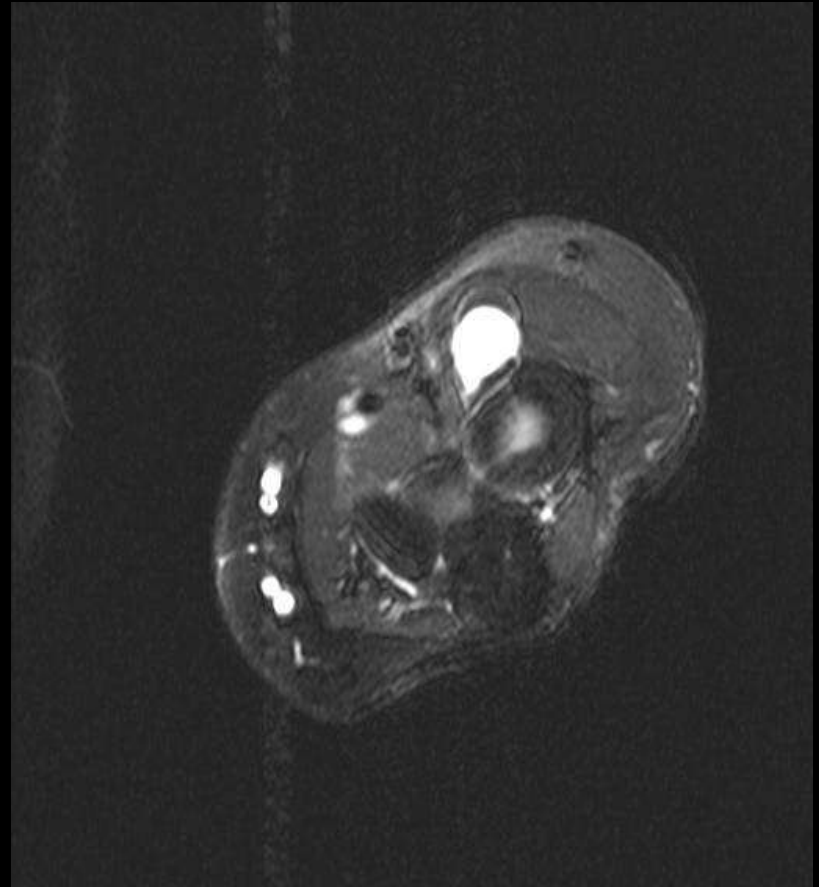
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

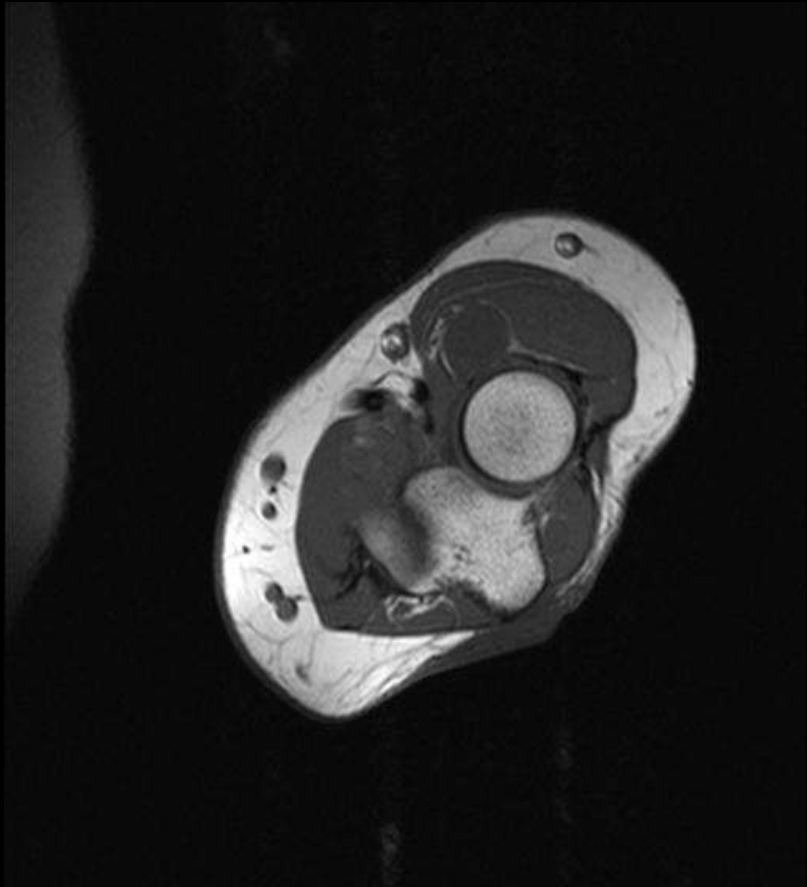


Ax PDFS

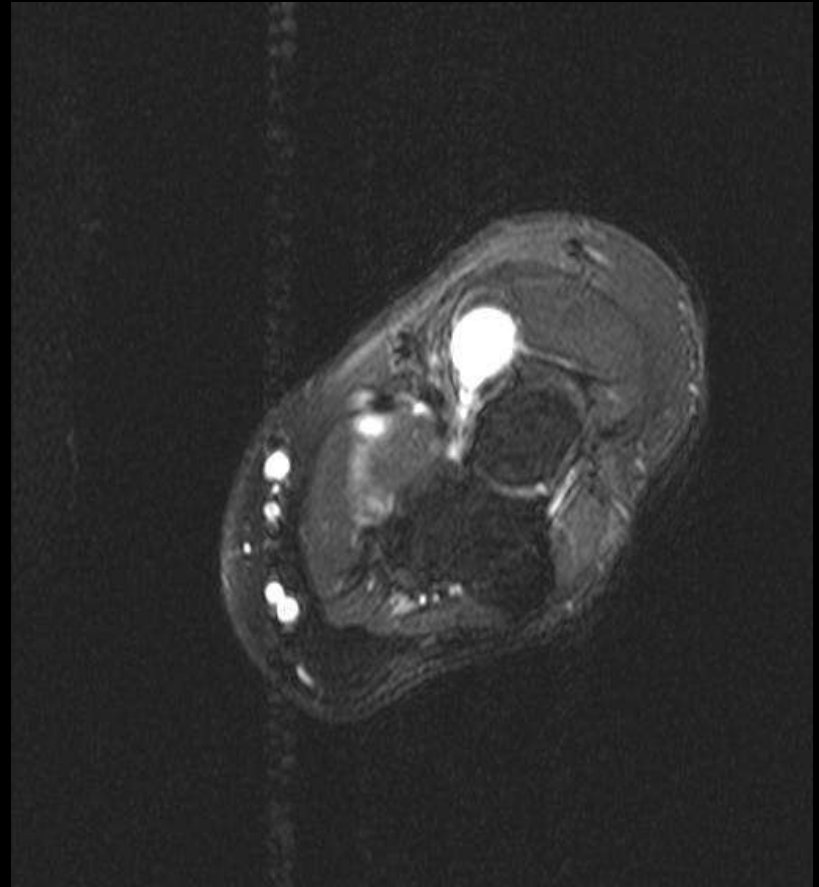
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

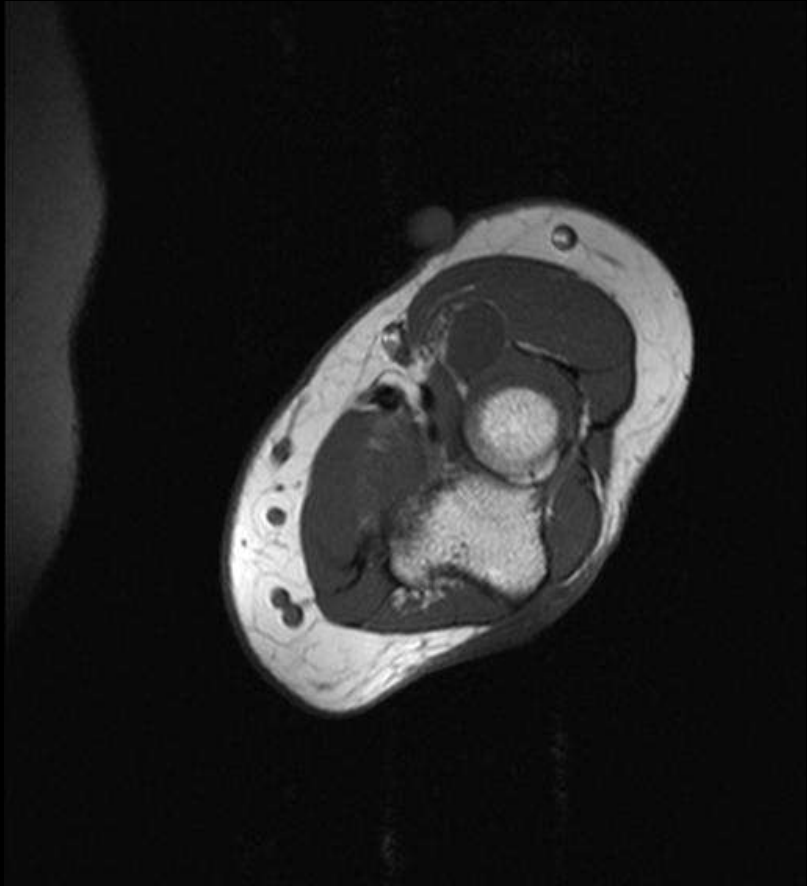


Ax PDFS

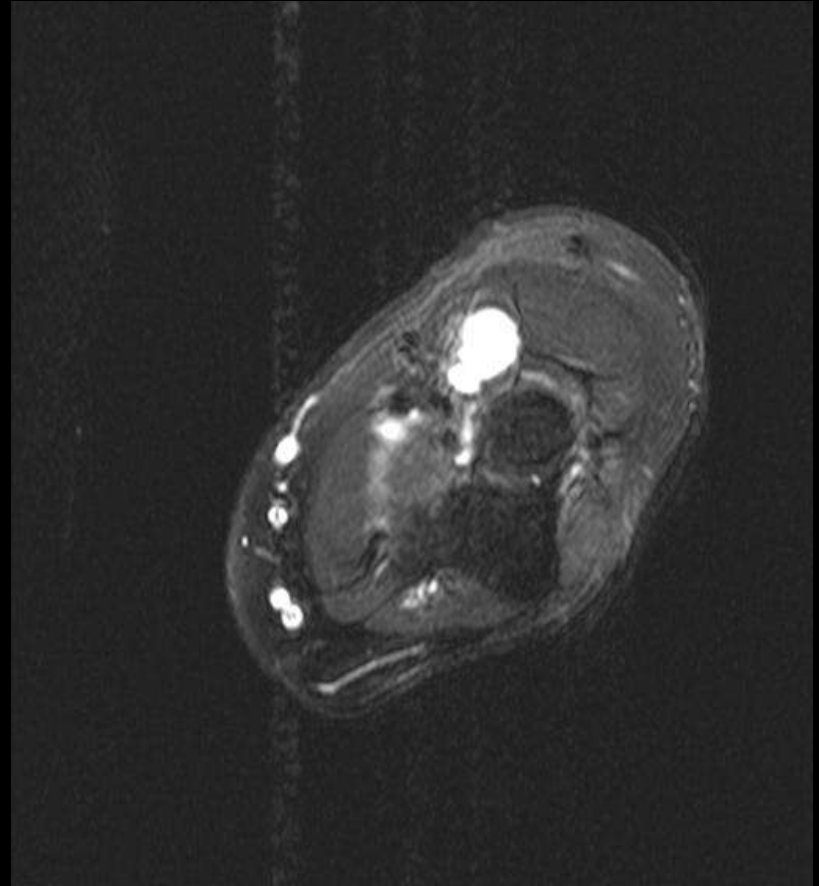
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

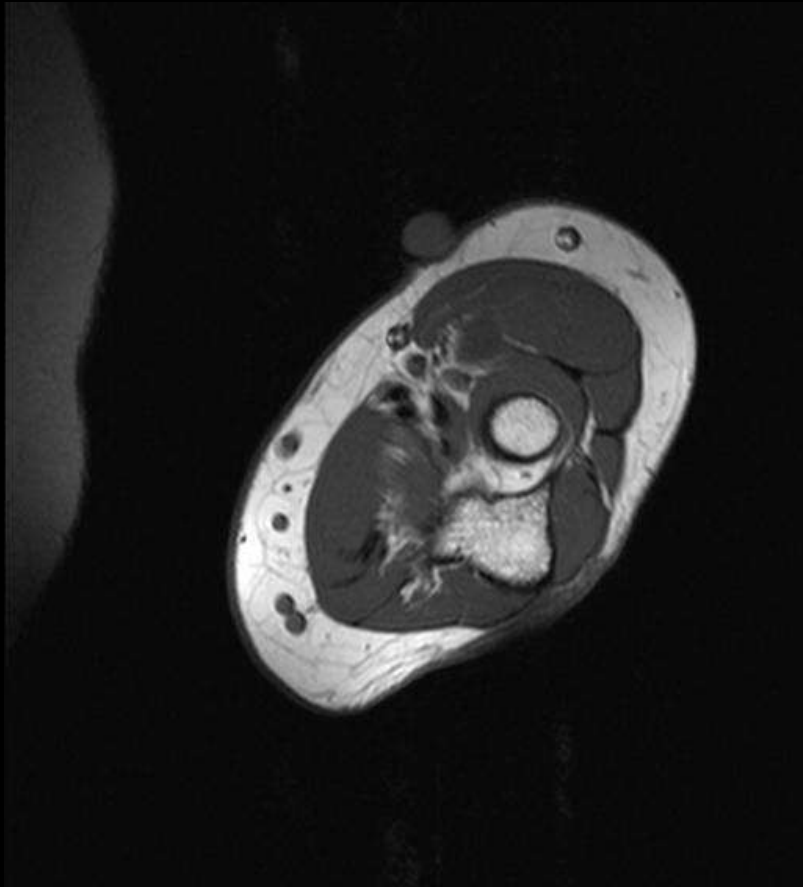


Ax PDFS

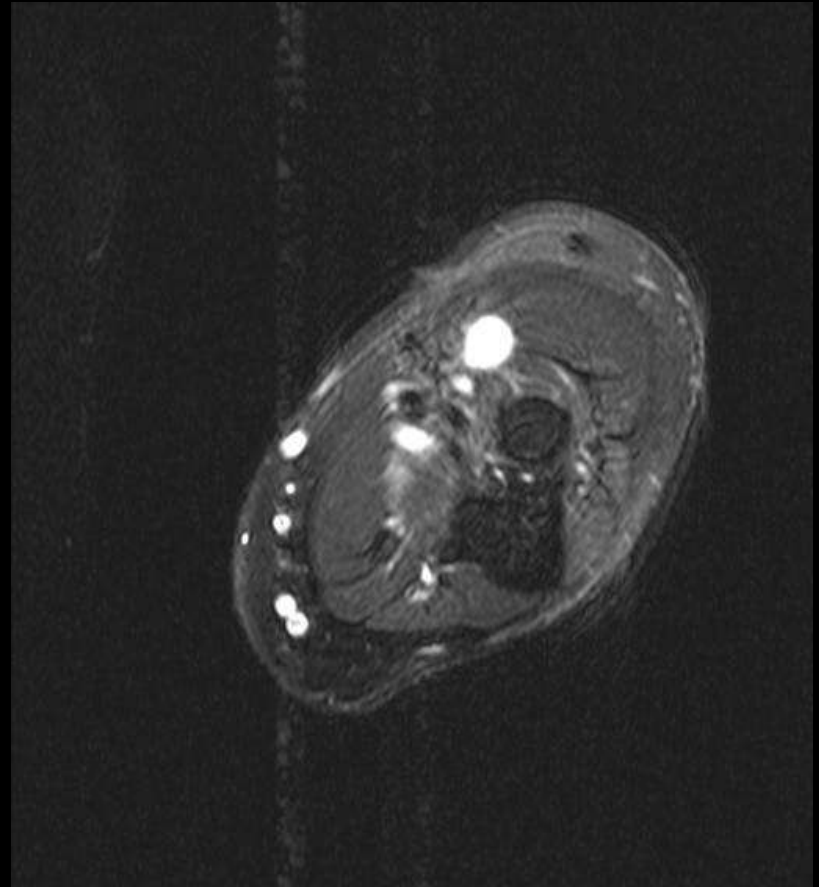
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



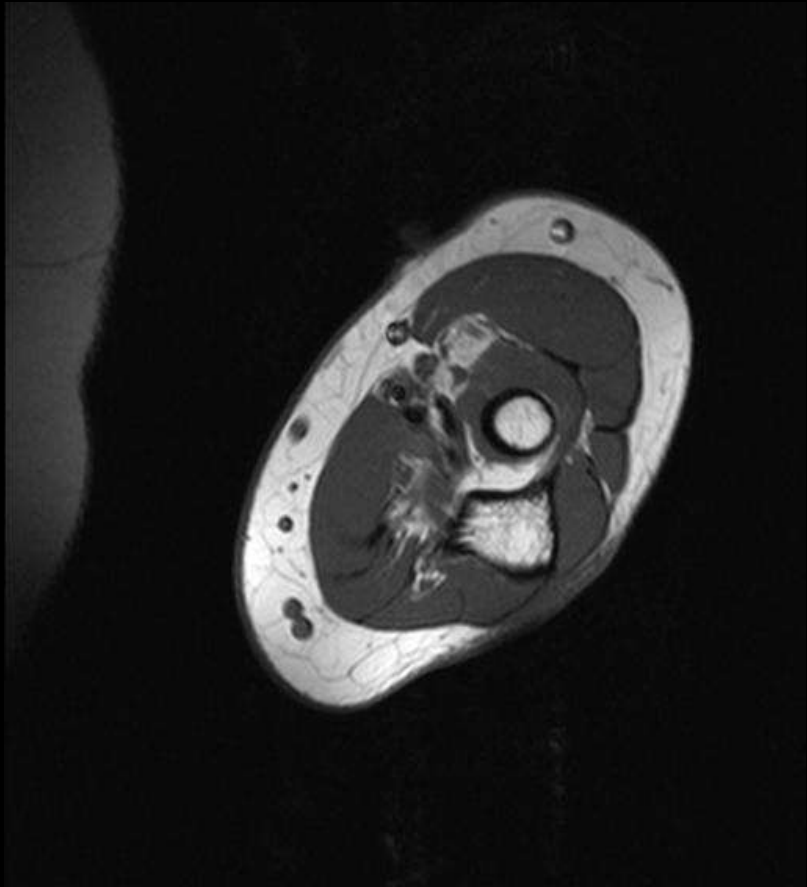
Ax PDFS



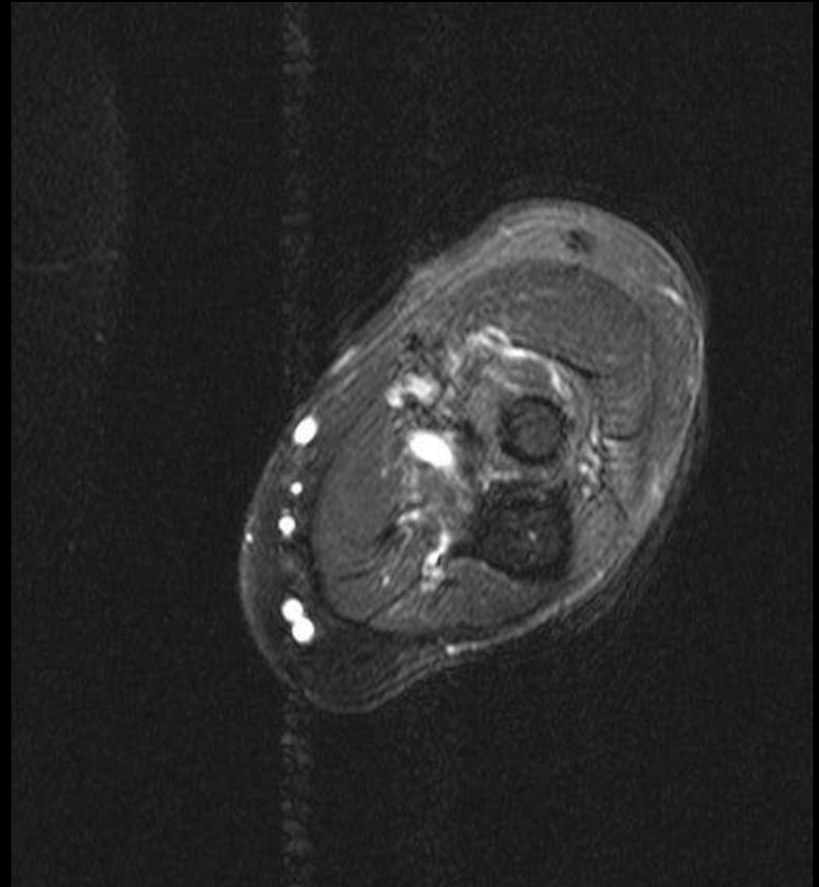
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

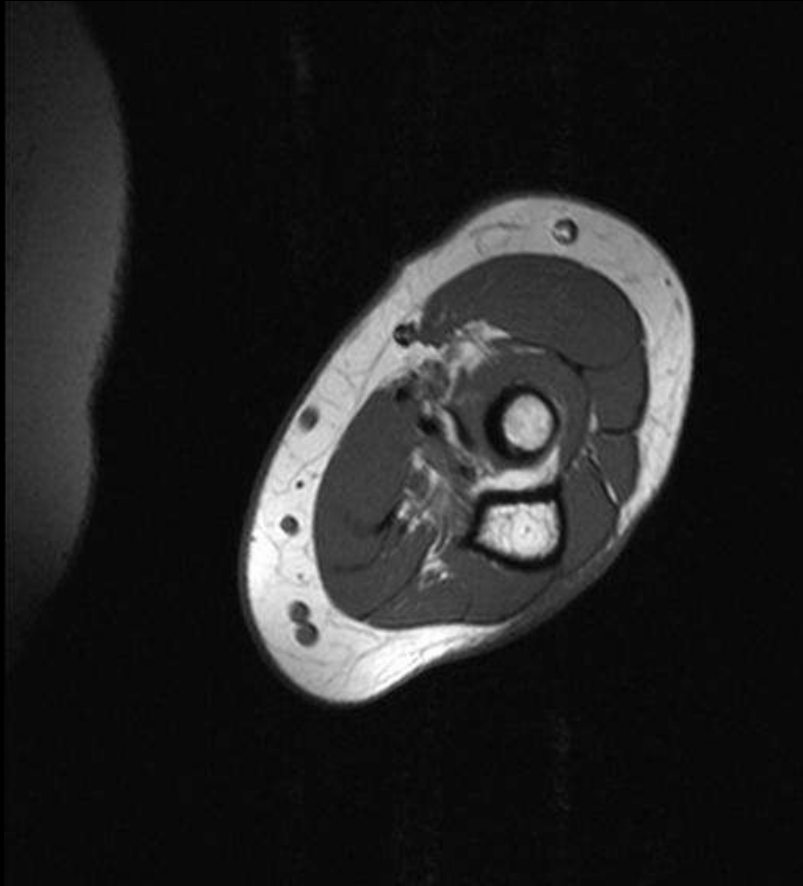


Ax PDFS

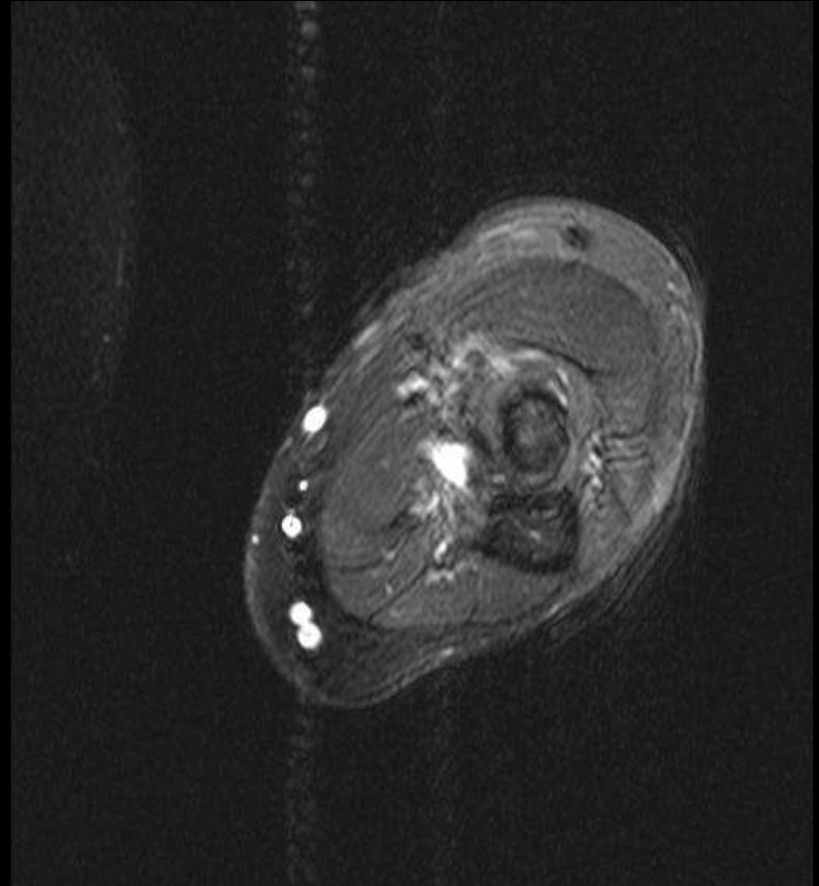
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



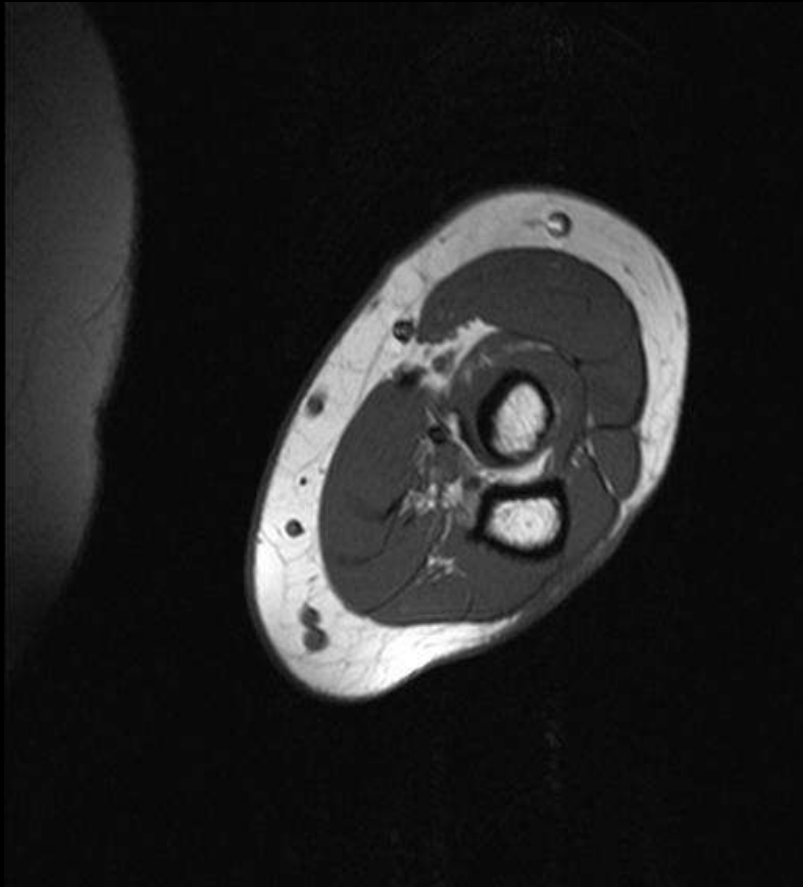
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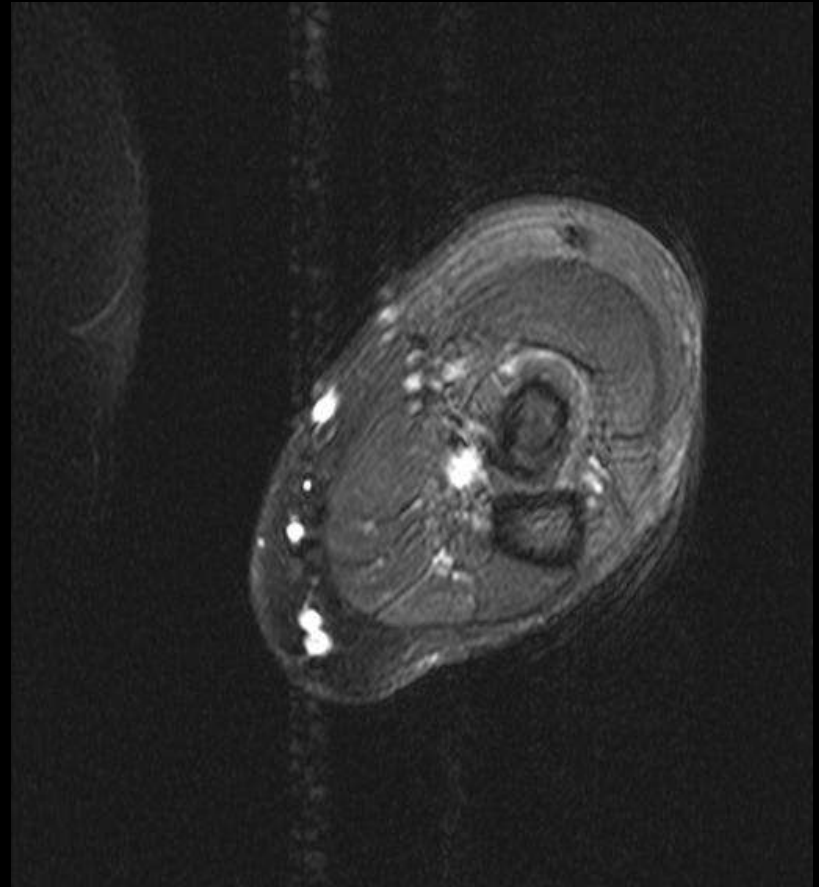
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

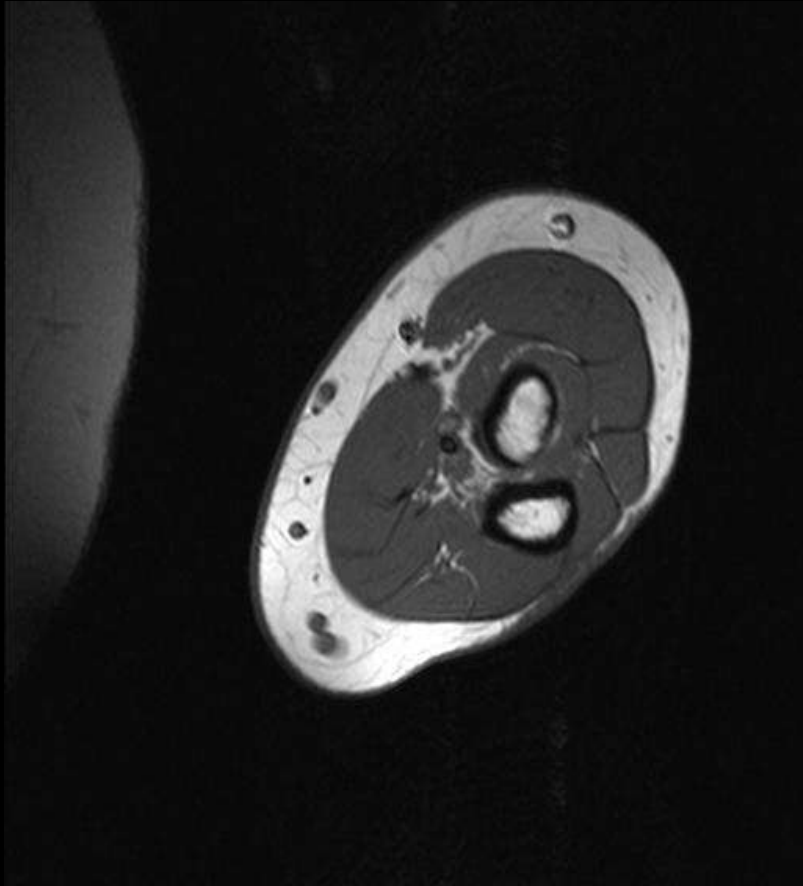


Ax PDFS

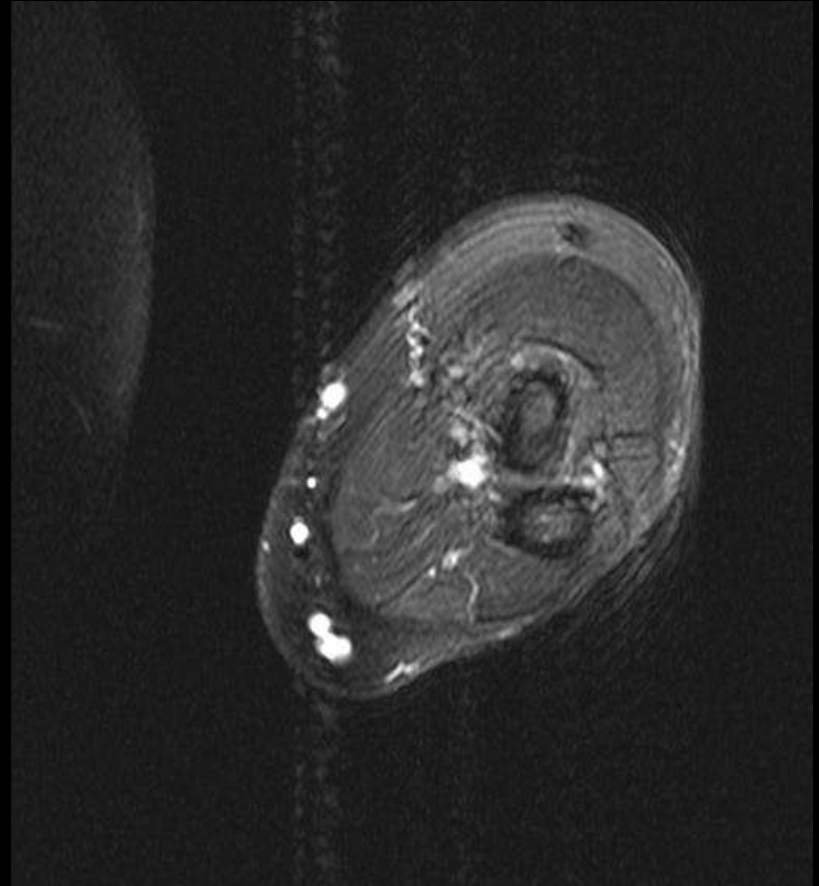
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

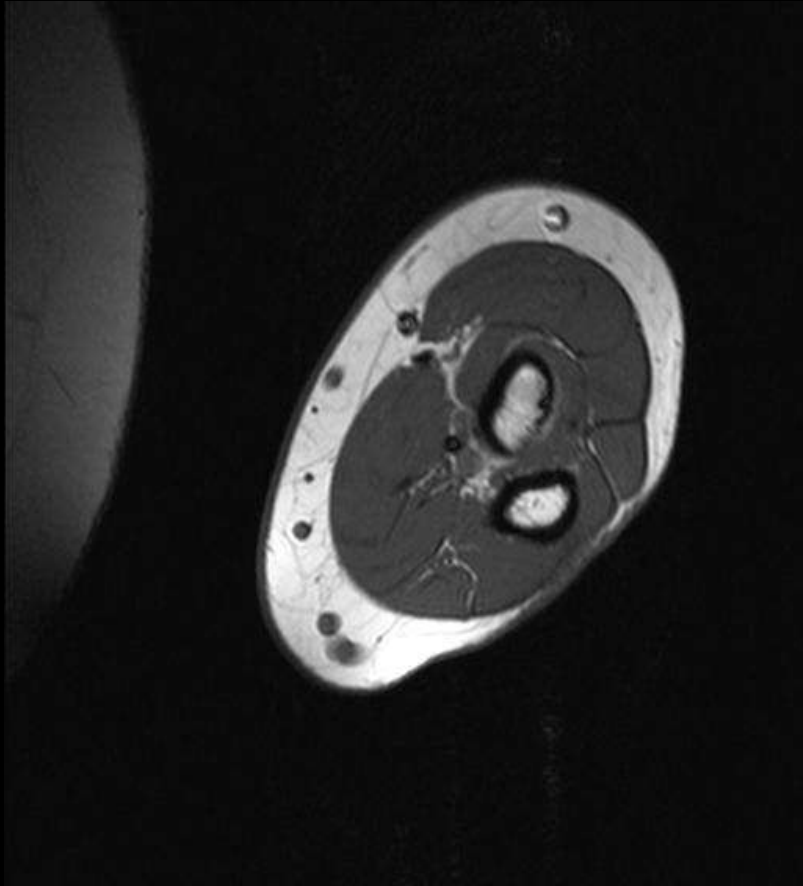


Ax PDFS

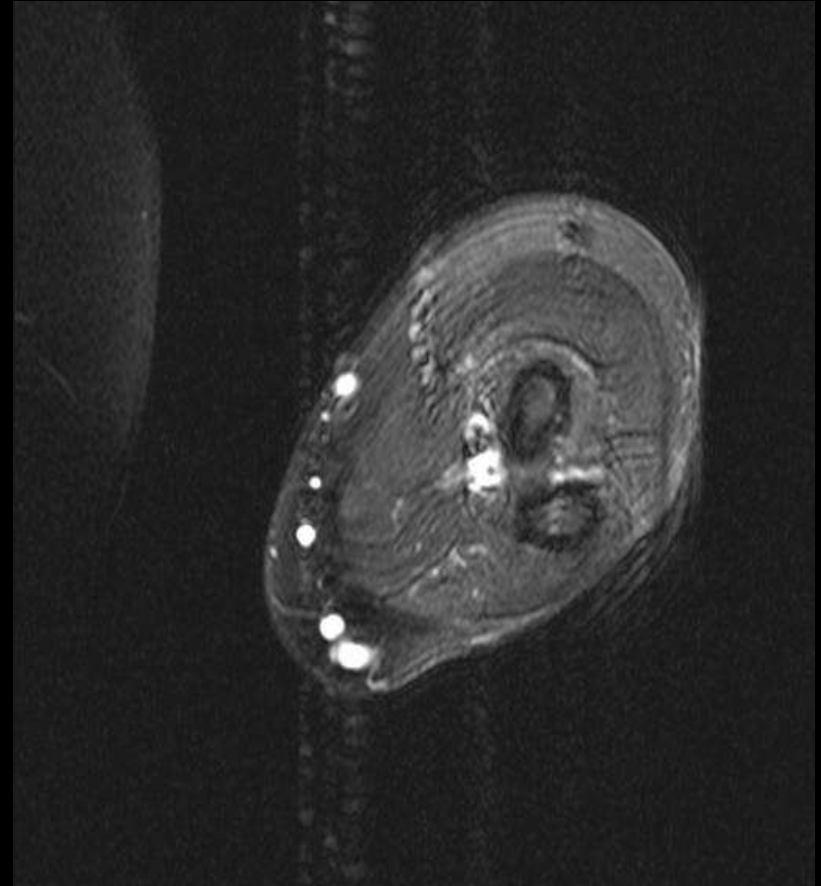
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

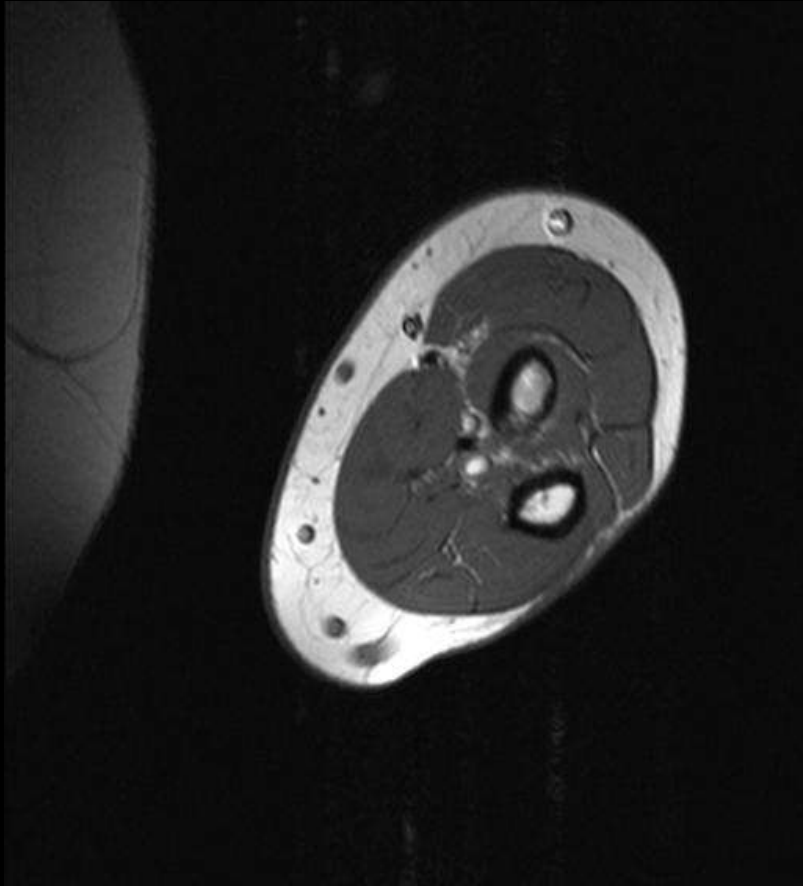


Ax PDFS

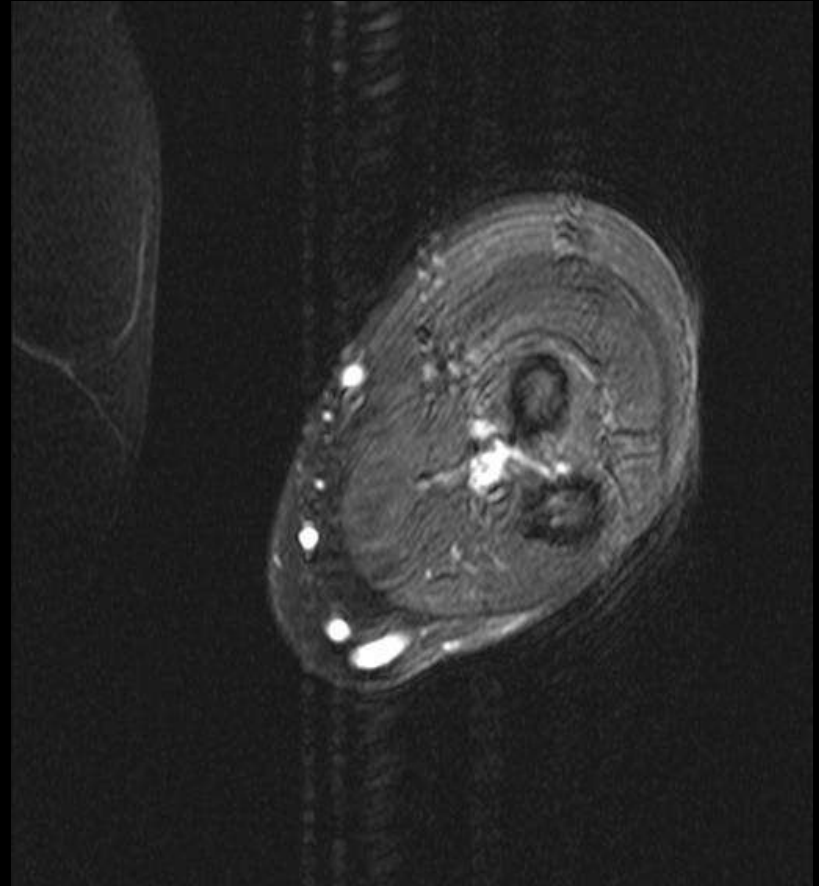
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1

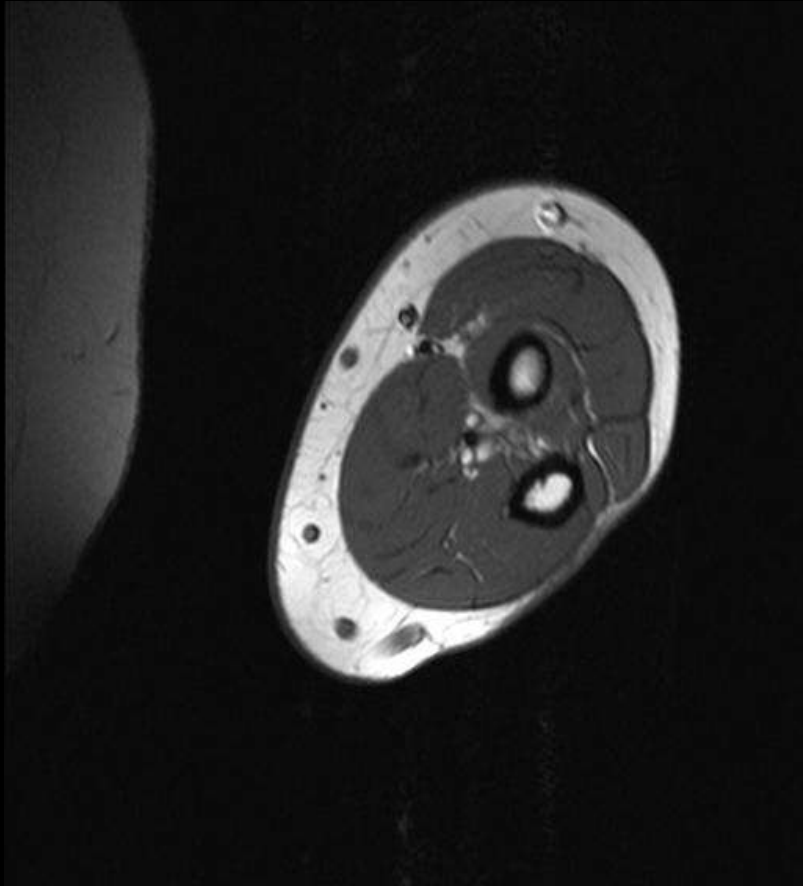


Ax PDFS

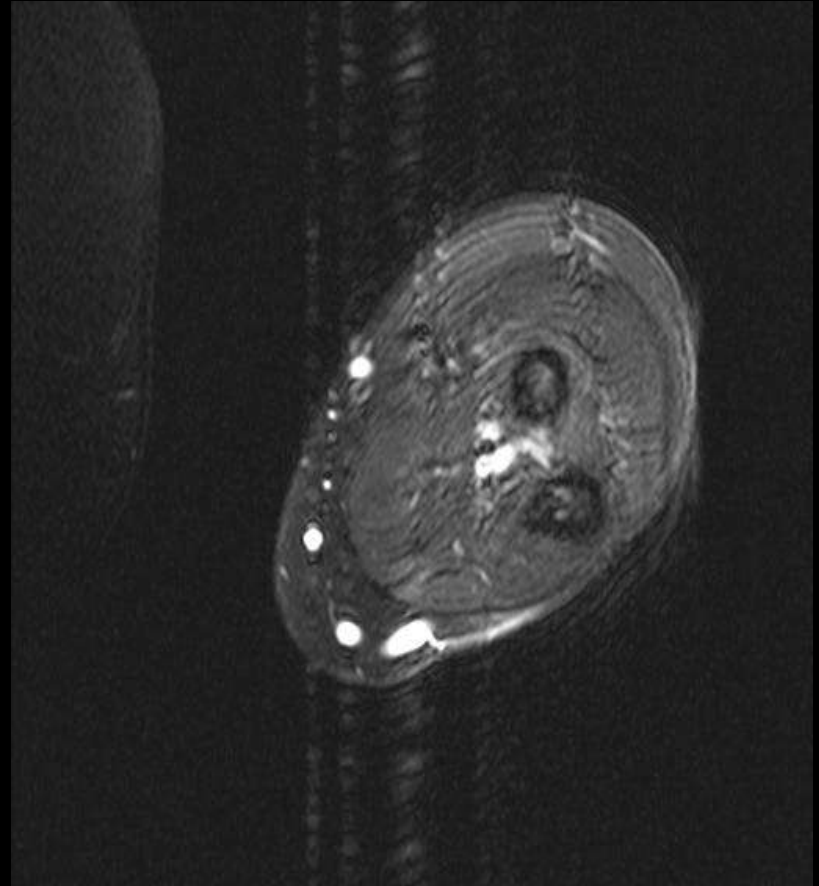
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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AxT1



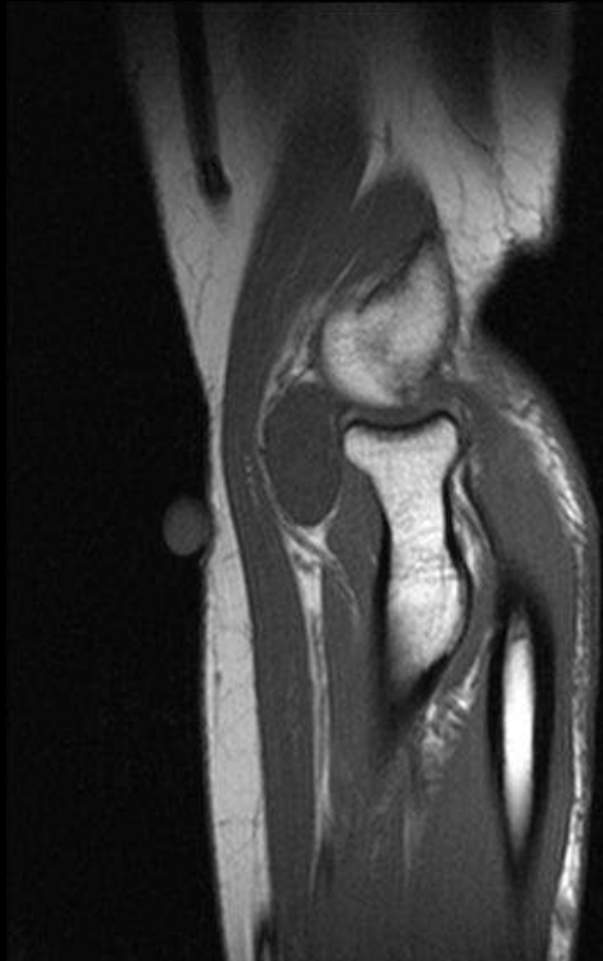
Ax PDFS



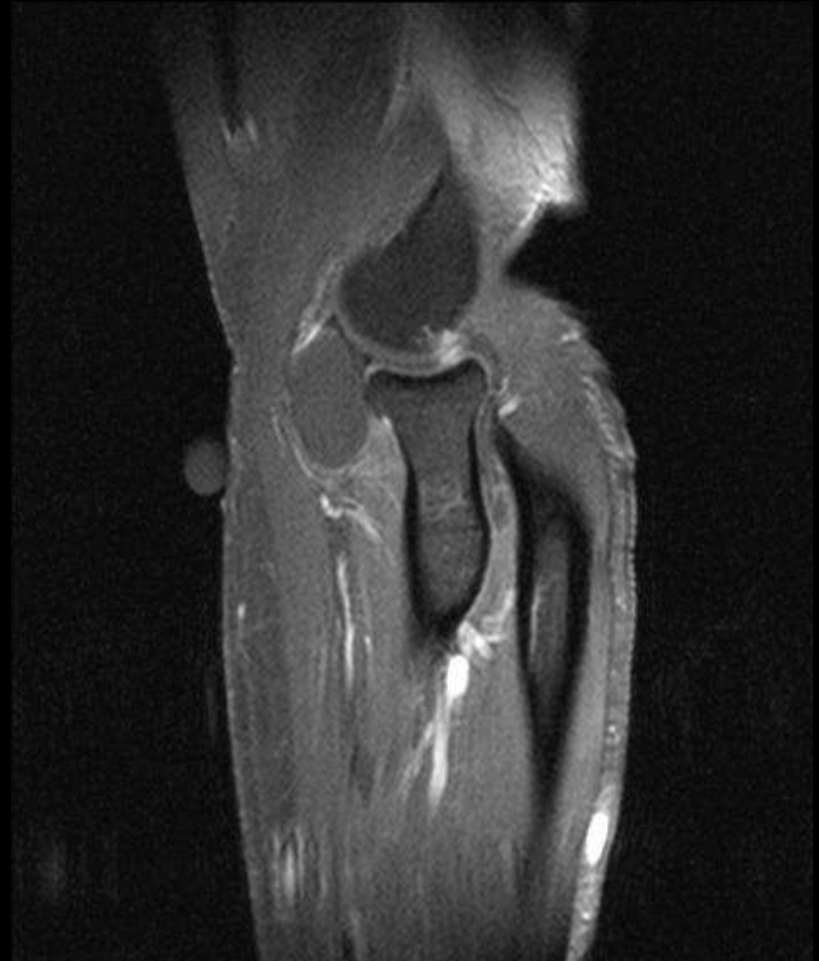
# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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SagT1

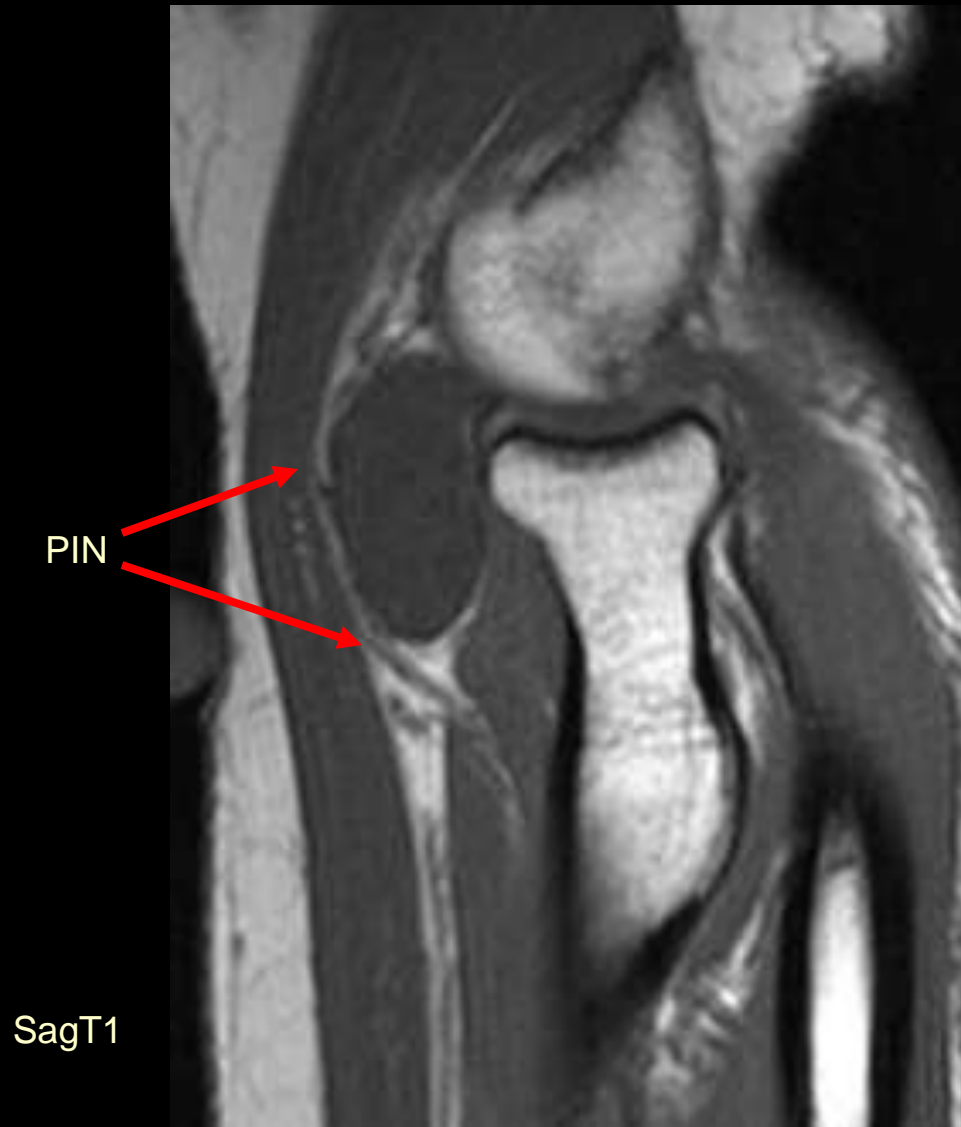


Sag T1FSGd

# Entrapment Syndromes - Radial Nerve

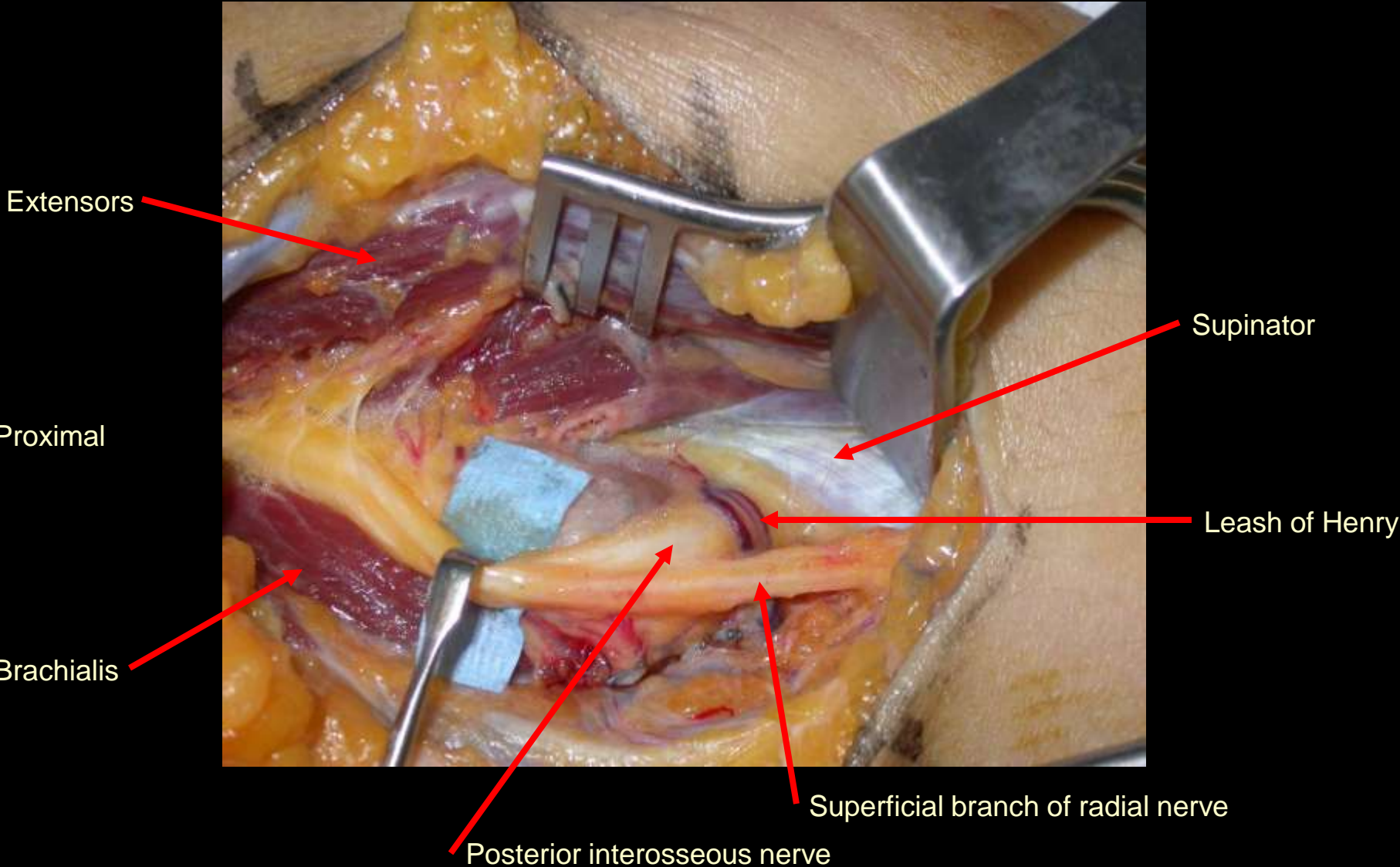
## Anterior Elbow Ganglion

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# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

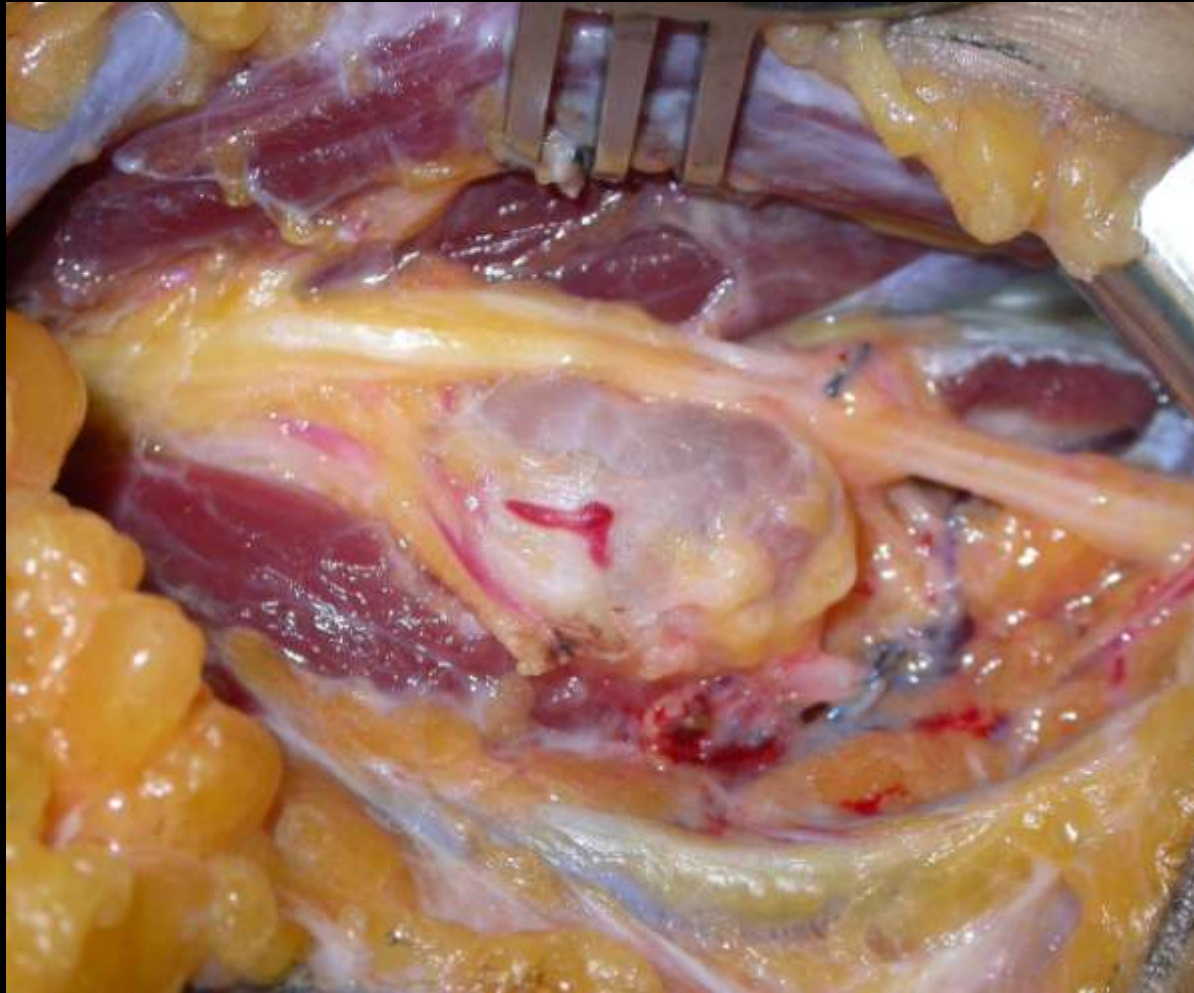




# Entrapment Syndromes - Radial Nerve

## Anterior Elbow Ganglion

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# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve Syndrome

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# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve Syndrome

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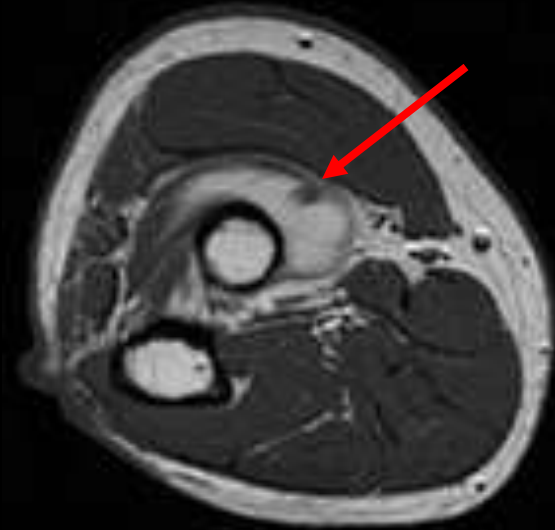
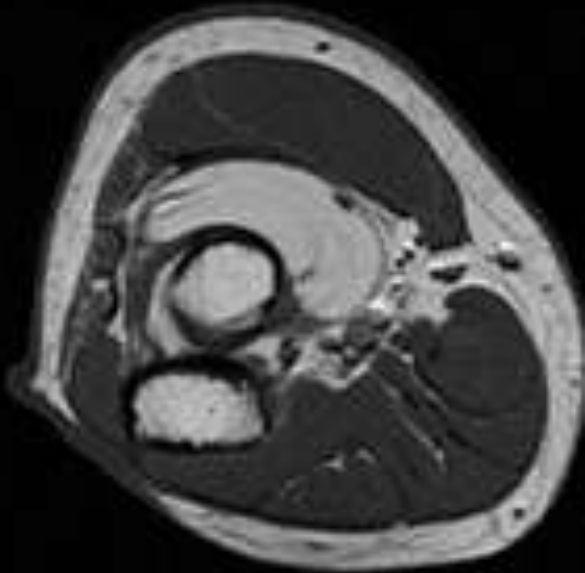
Coronal T1w

50 year old women with dull ache of the elbow, treated for tennis elbow

# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve Syndrome

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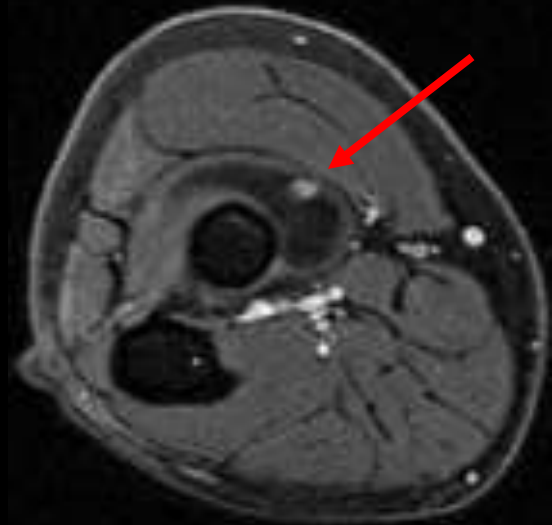
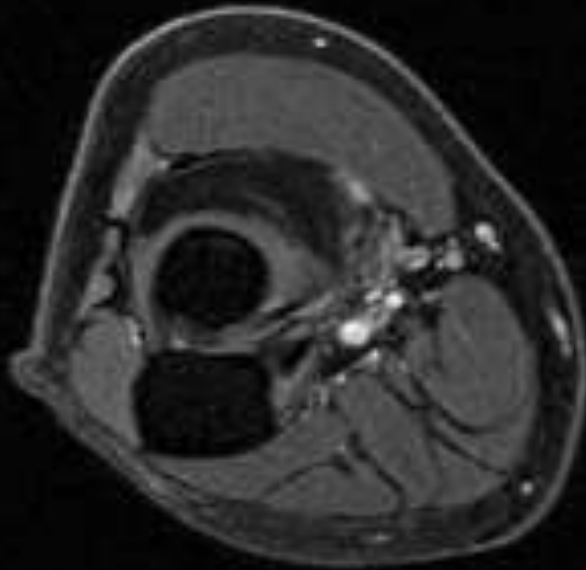


Axial T1w

# Entrapment Syndromes - Radial Nerve

## Posterior Interosseous Nerve Syndrome

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Axial T2 FS

# Entrapment Syndromes – Superficial Radial Nerve

## Wartenberg's Syndrome

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- AKA Cheiralgia paresthetica
- Sensory (superficial) branch of radial nerve
- Lies beneath brachioradialis until wrist
- Usually affected at level of wrist
- “Handcuff neuropathy”
- Numbness dorsal aspect radial hand

# Entrapment Syndromes – Superficial Radial Nerve

## Wartenberg's Syndrome

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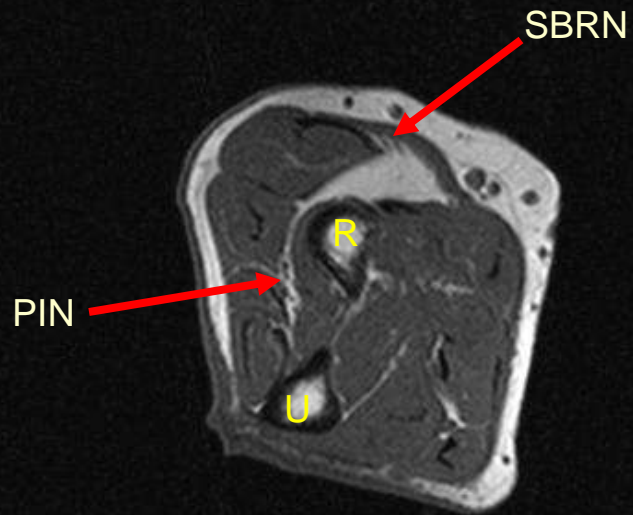




# Entrapment Syndromes – Superficial Radial Nerve

## Wartenberg's Syndrome

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Ax T1



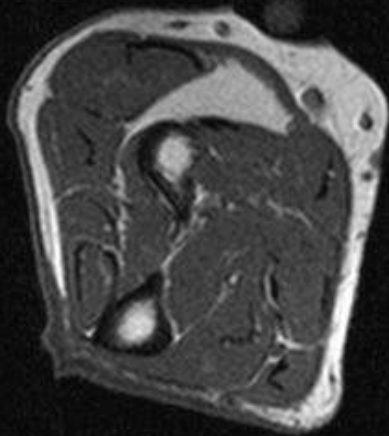
Ax T1FSGd

Lipoma beneath brachioradialis

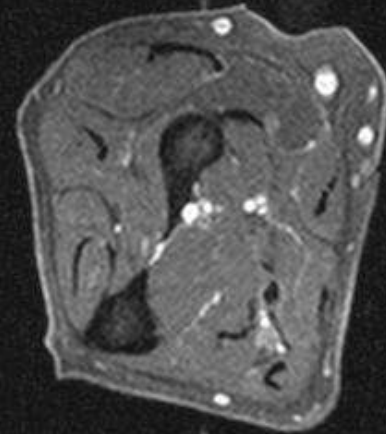


# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1

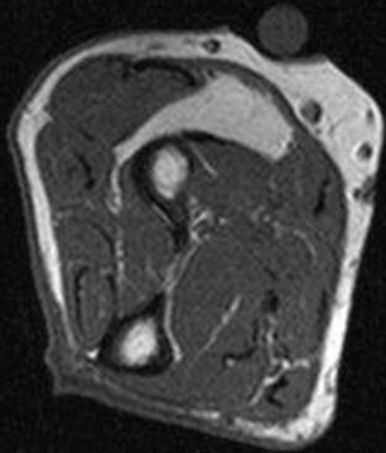


Ax T1FSGd

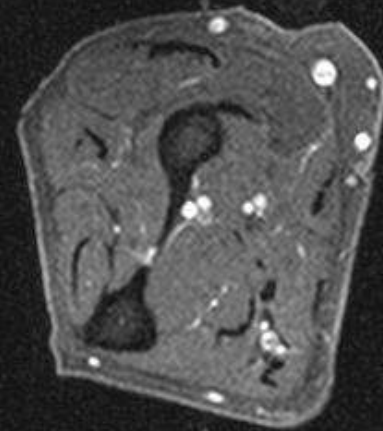
Lipoma beneath brachioradialis

# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1

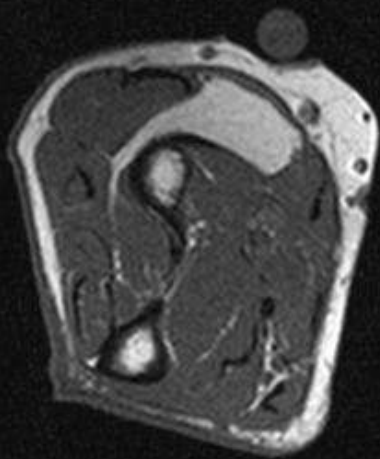


Ax T1FSGd

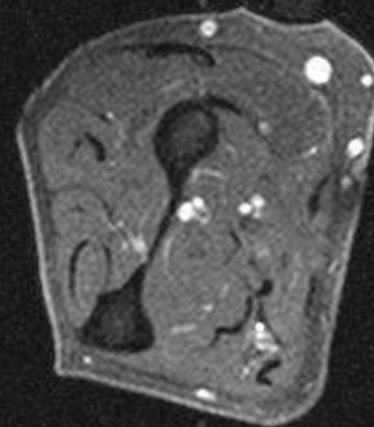
Lipoma beneath brachioradialis

# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1



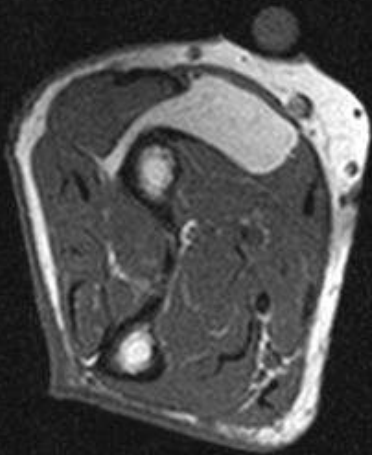
Ax T1FSGd

Lipoma beneath brachioradialis

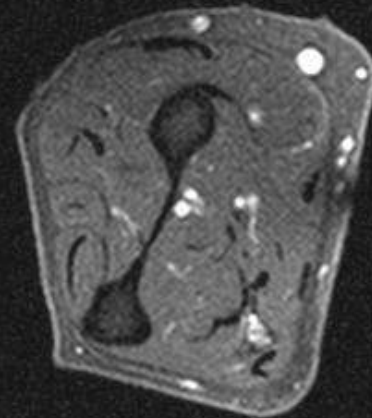


# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1

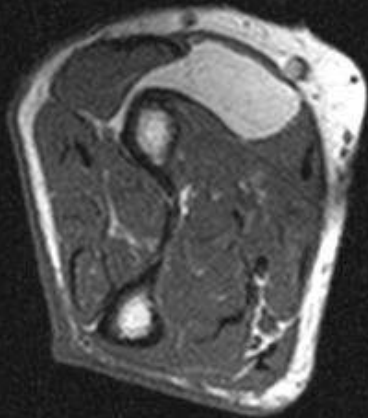


Ax T1FSGd

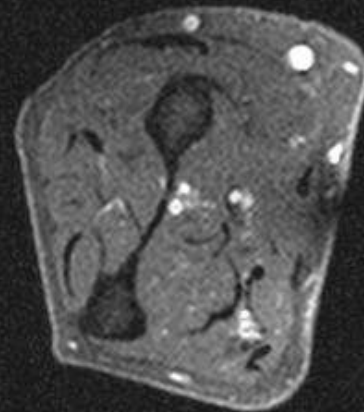
Lipoma beneath brachioradialis

# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1

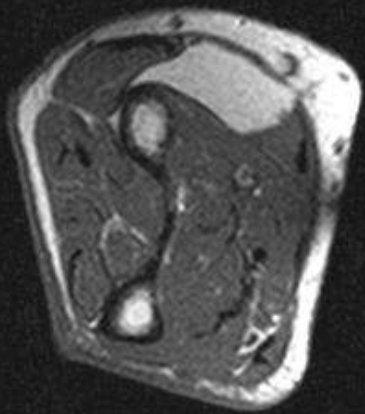


Ax T1FSGd

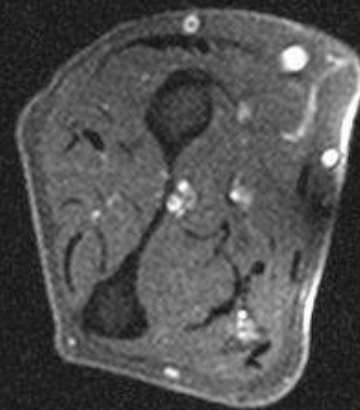
Lipoma beneath brachioradialis

# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1



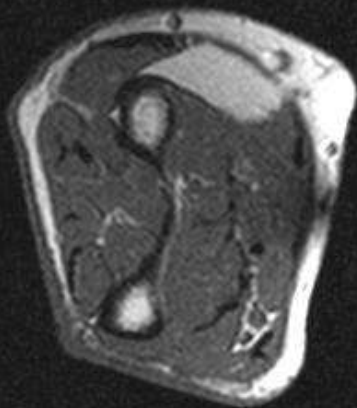
Ax T1FSGd

Lipoma beneath brachioradialis

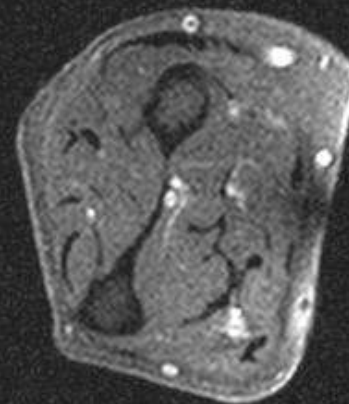


# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1

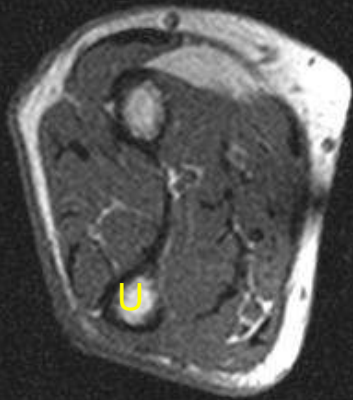


Ax T1FSGd

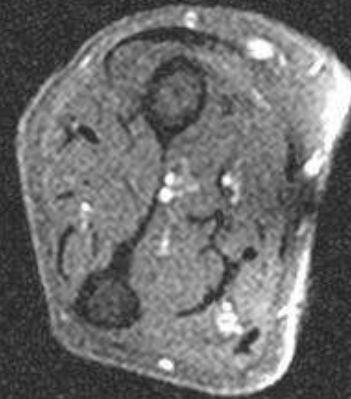
Lipoma beneath brachioradialis

# Entrapment Syndromes – Superficial Radial Nerve Wartenberg's Syndrome

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Ax T1



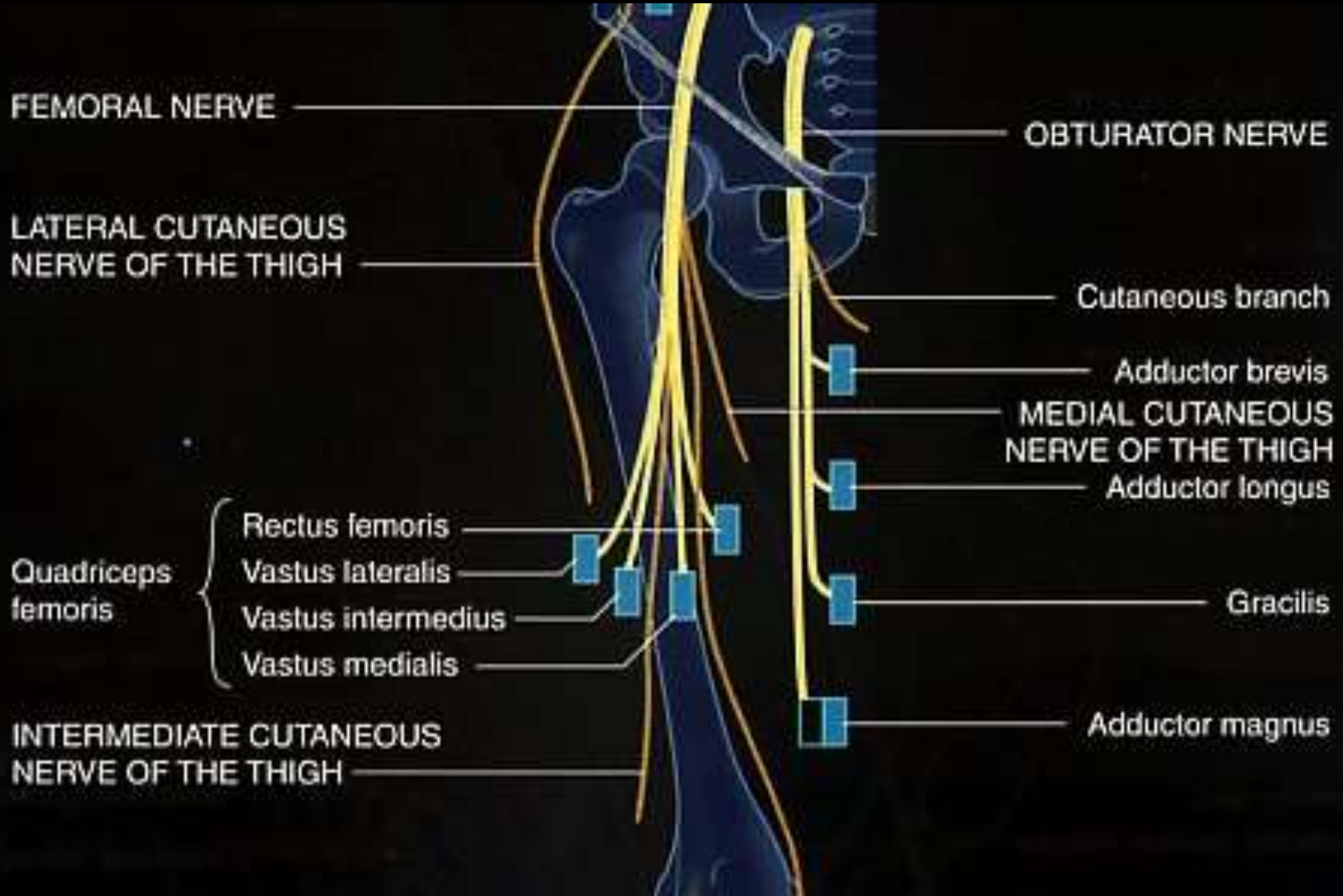
Ax T1FSGd

Lipoma beneath brachioradialis



# Entrapment neuropathy

## Anterior Thigh Nerves-Obturator



# Entrapment neuropathy Obturator Nerve

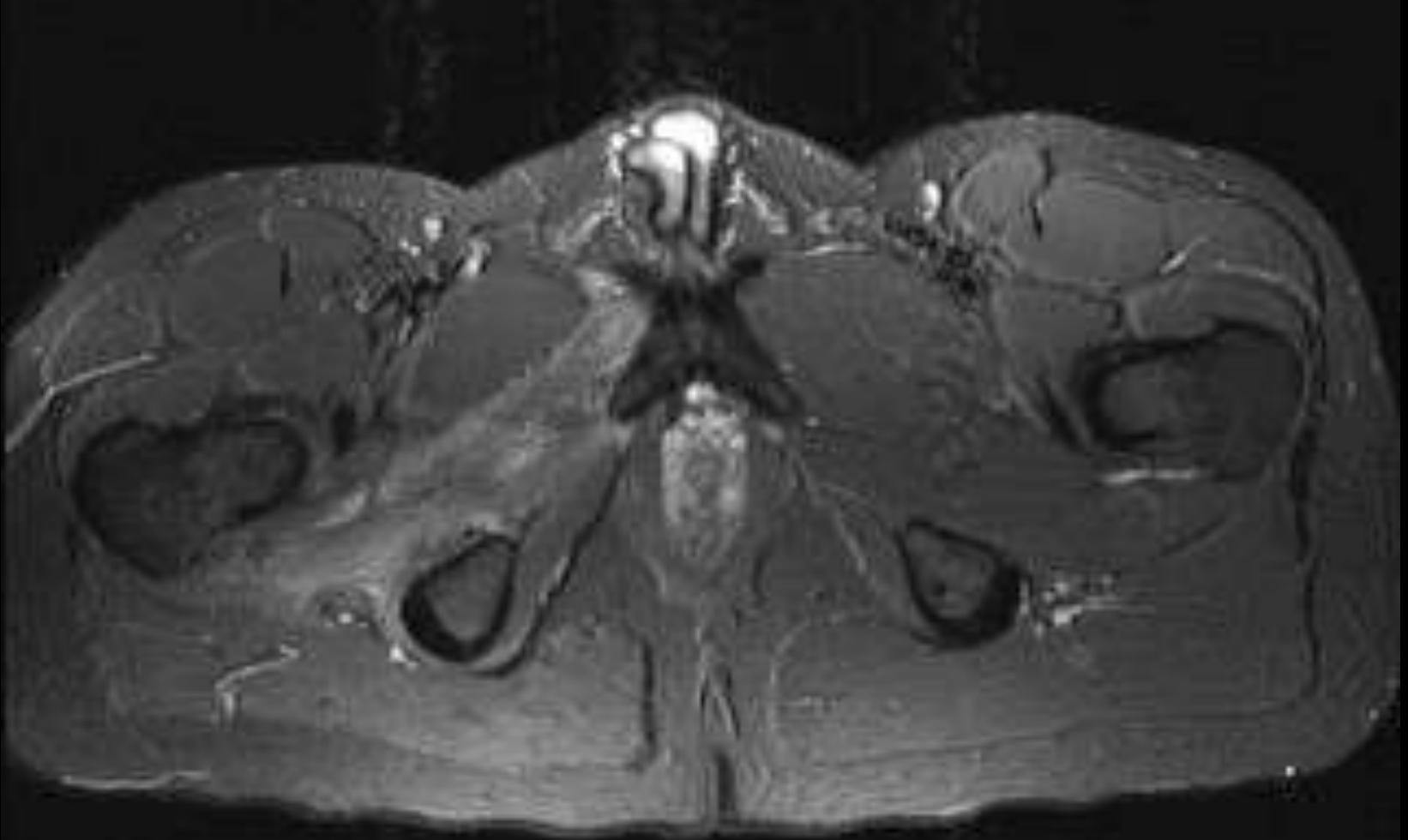
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

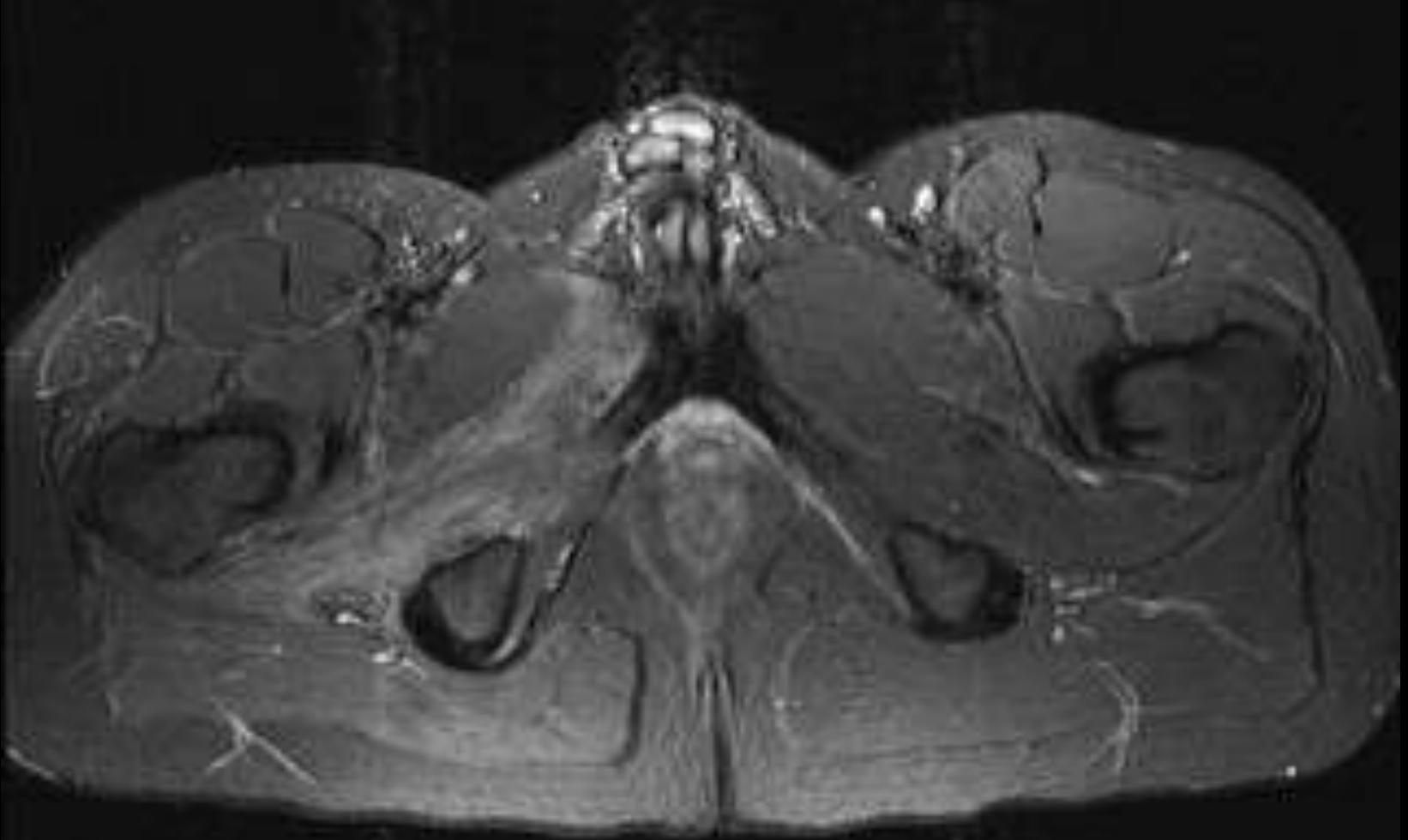
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

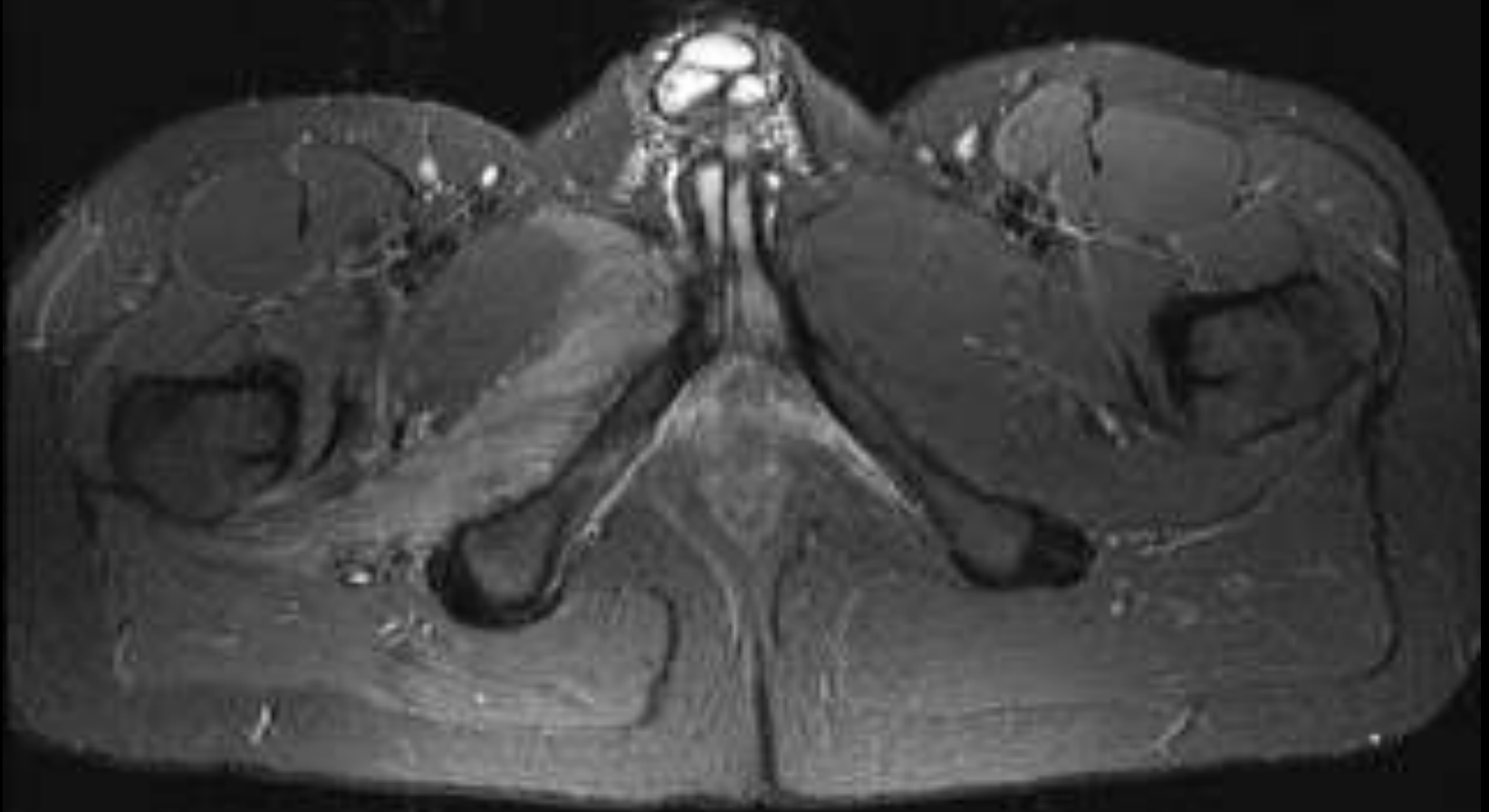
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

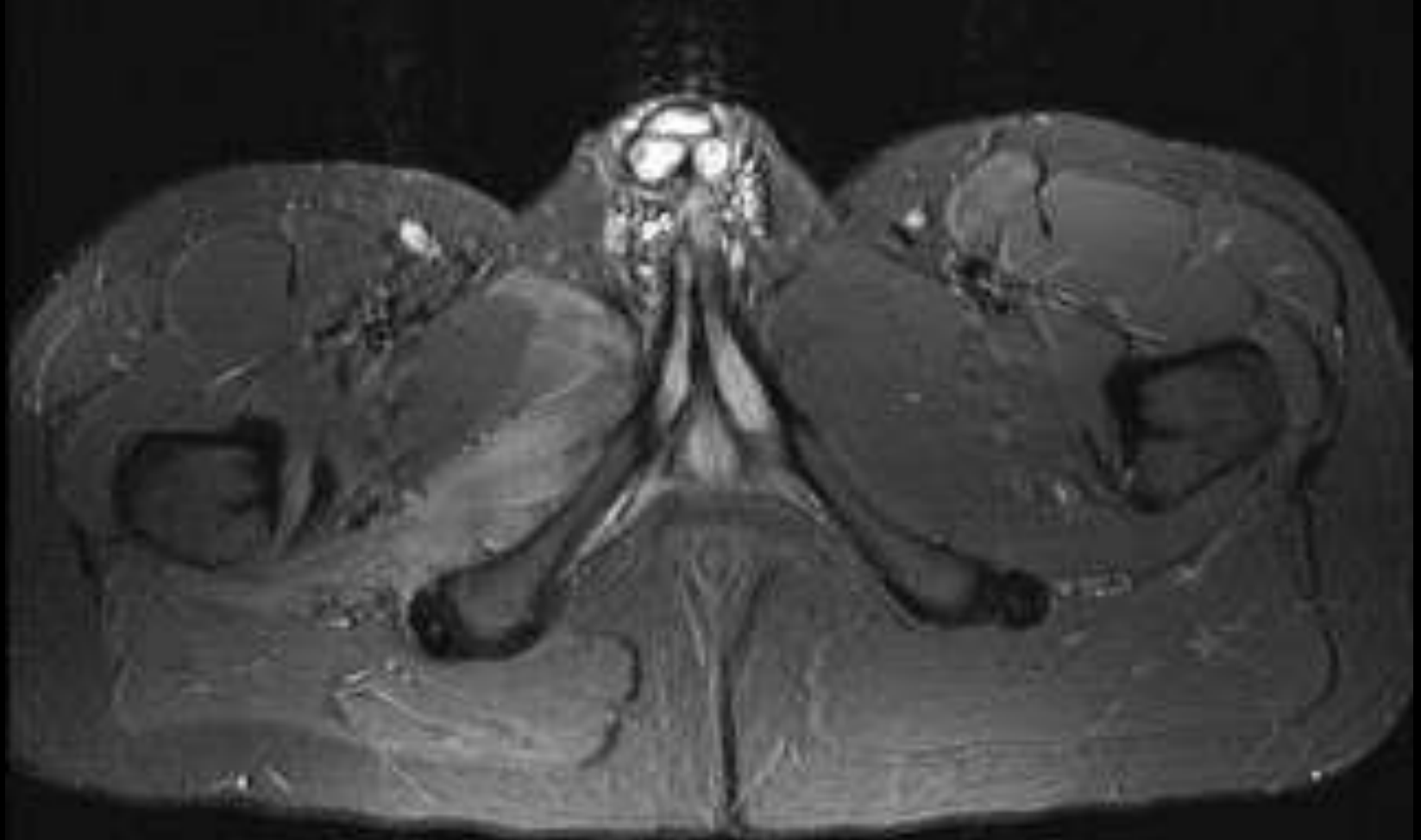
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

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R hip dislocation with injury to the anterior branch obturator nerve



# Entrapment neuropathy Obturator Nerve

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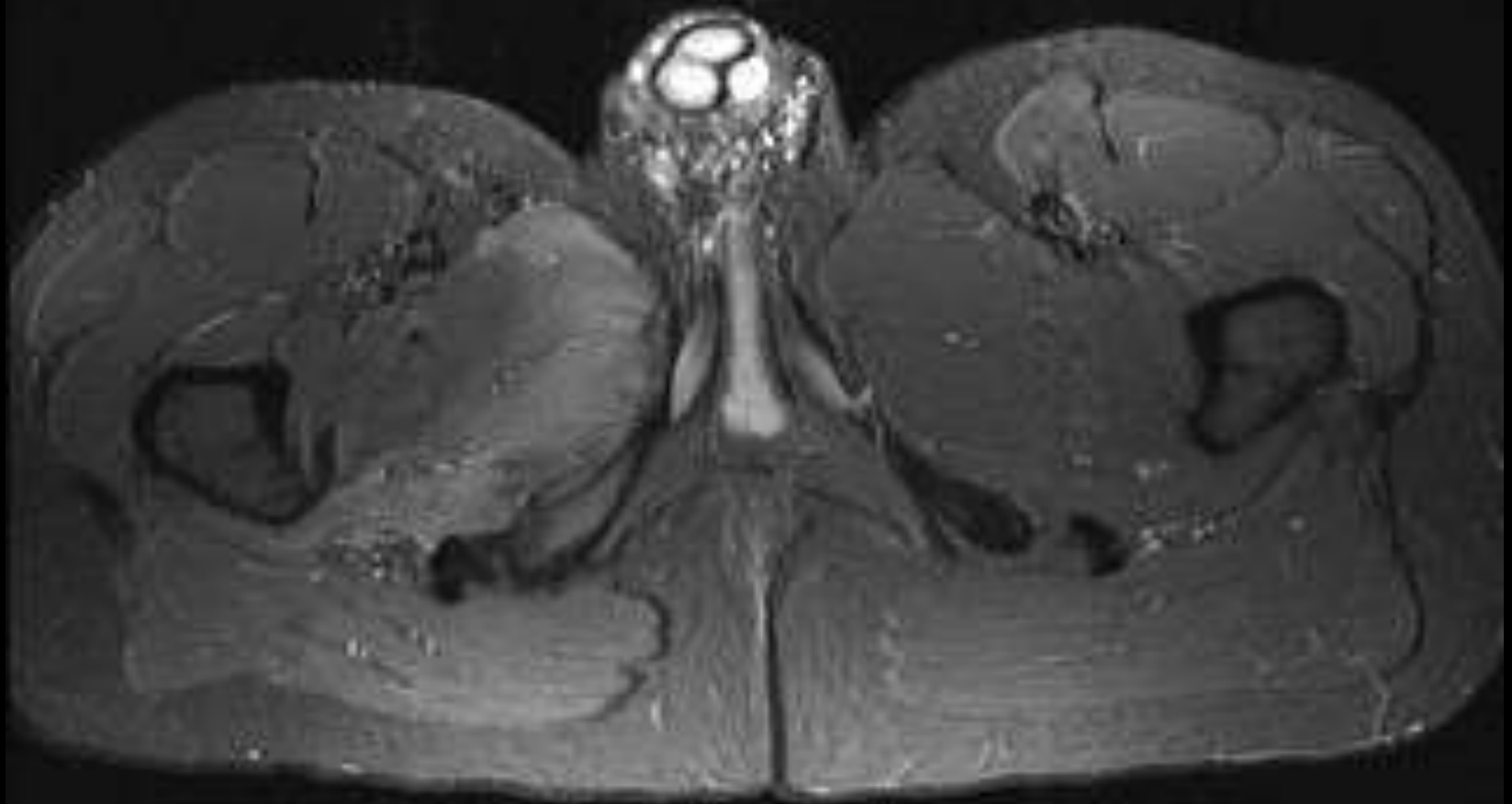


R hip dislocation with injury to the anterior branch obturator nerve



# Entrapment neuropathy Obturator Nerve

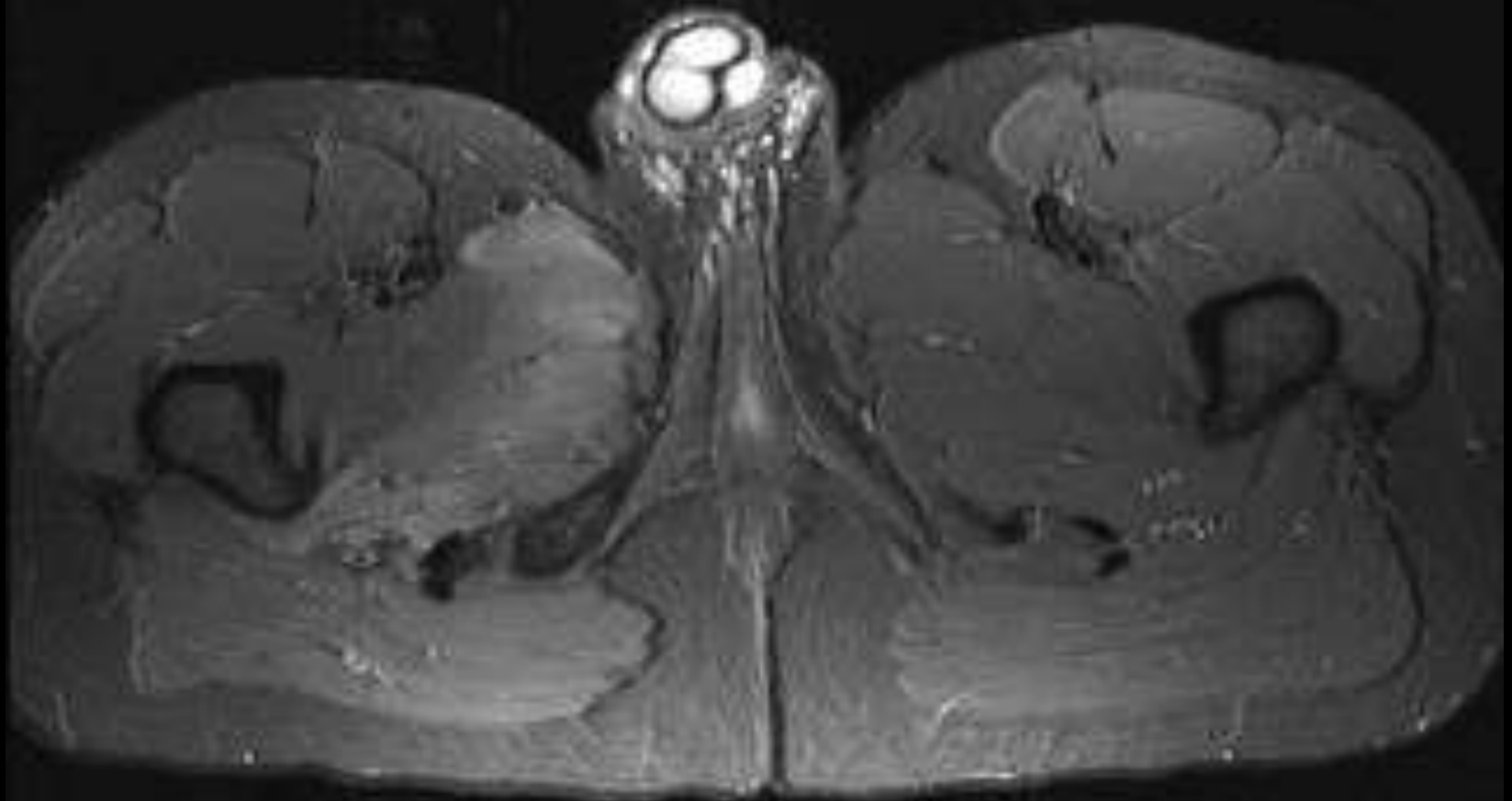
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

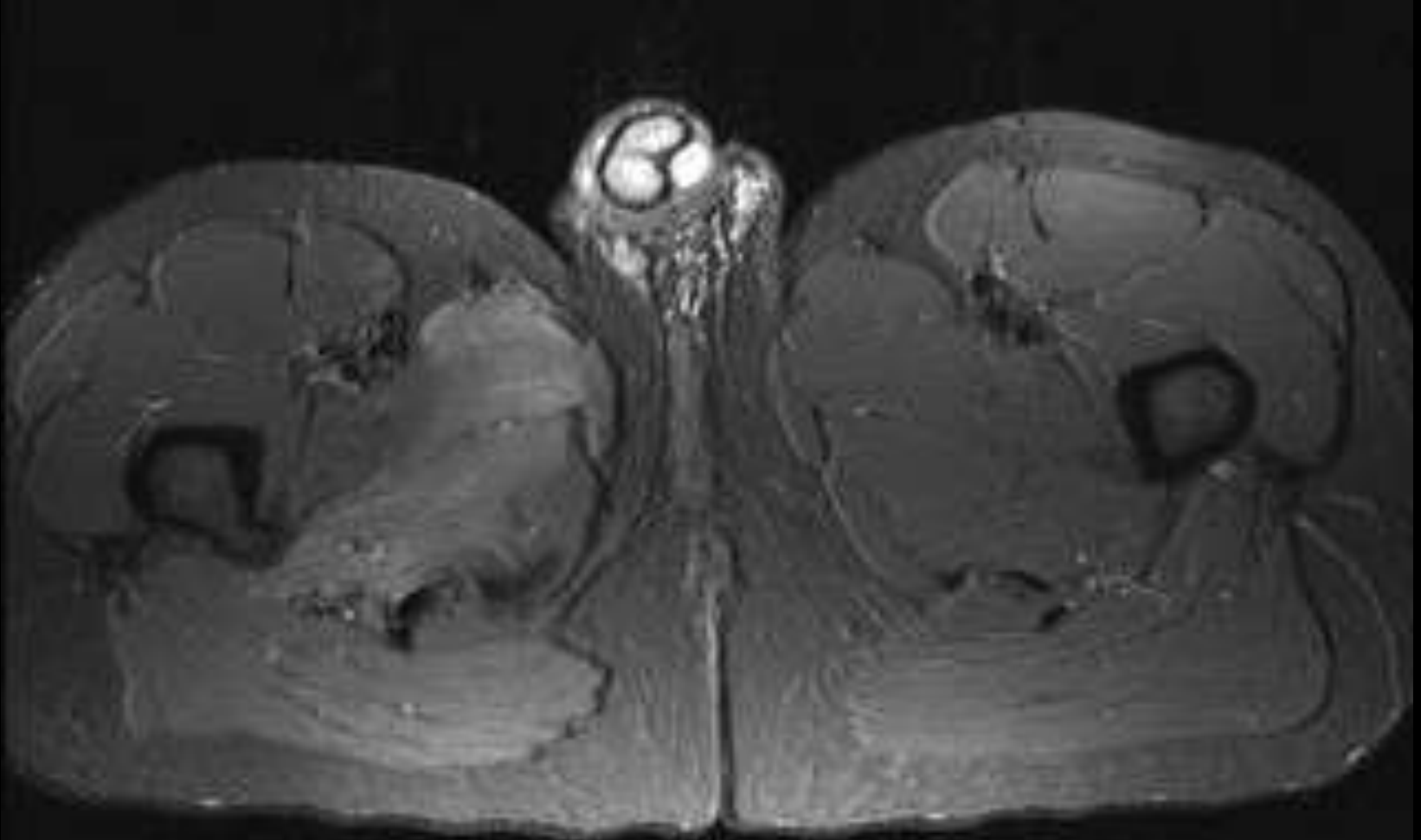
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

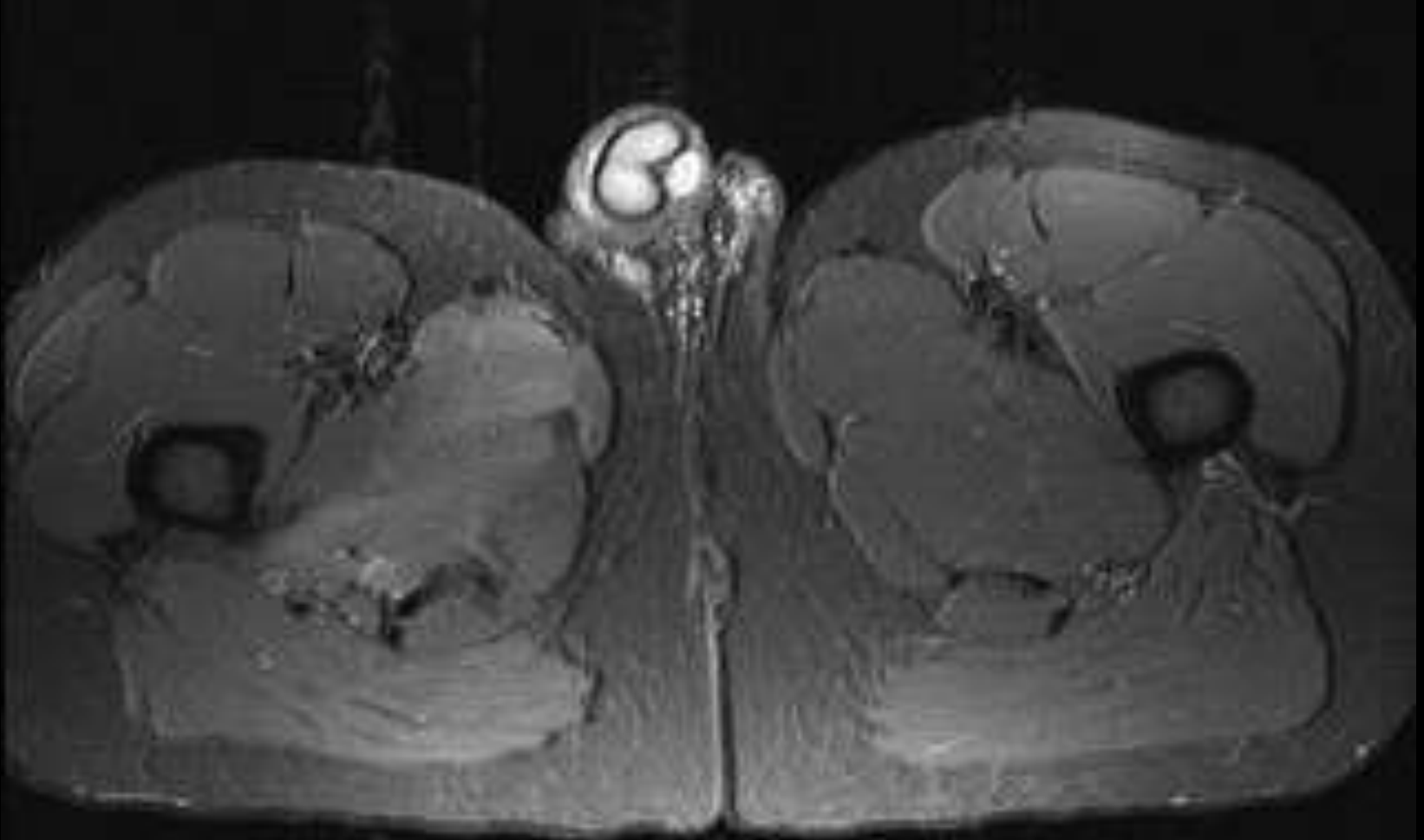
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

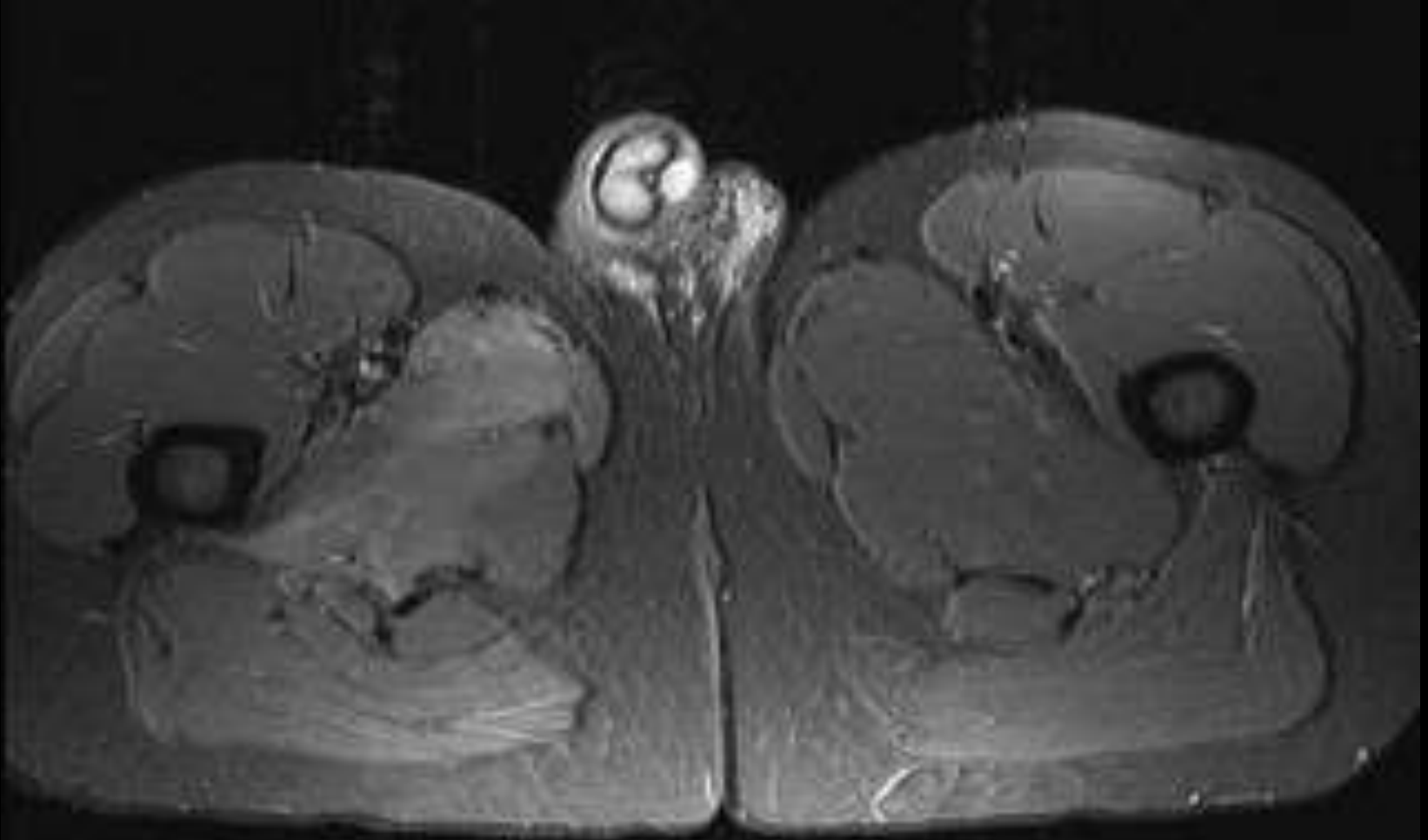
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy Obturator Nerve

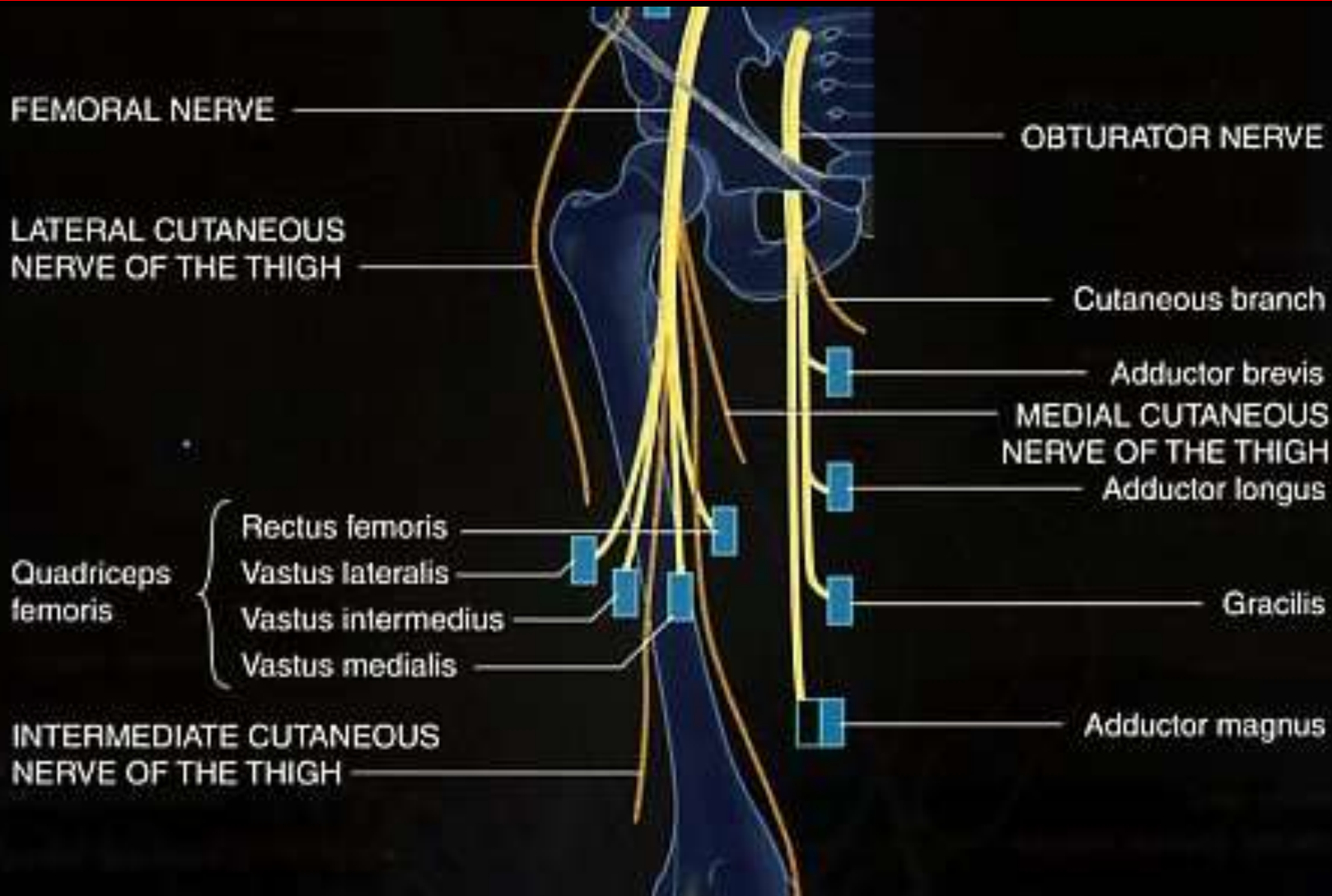
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R hip dislocation with injury to the anterior branch obturator nerve

# Entrapment neuropathy

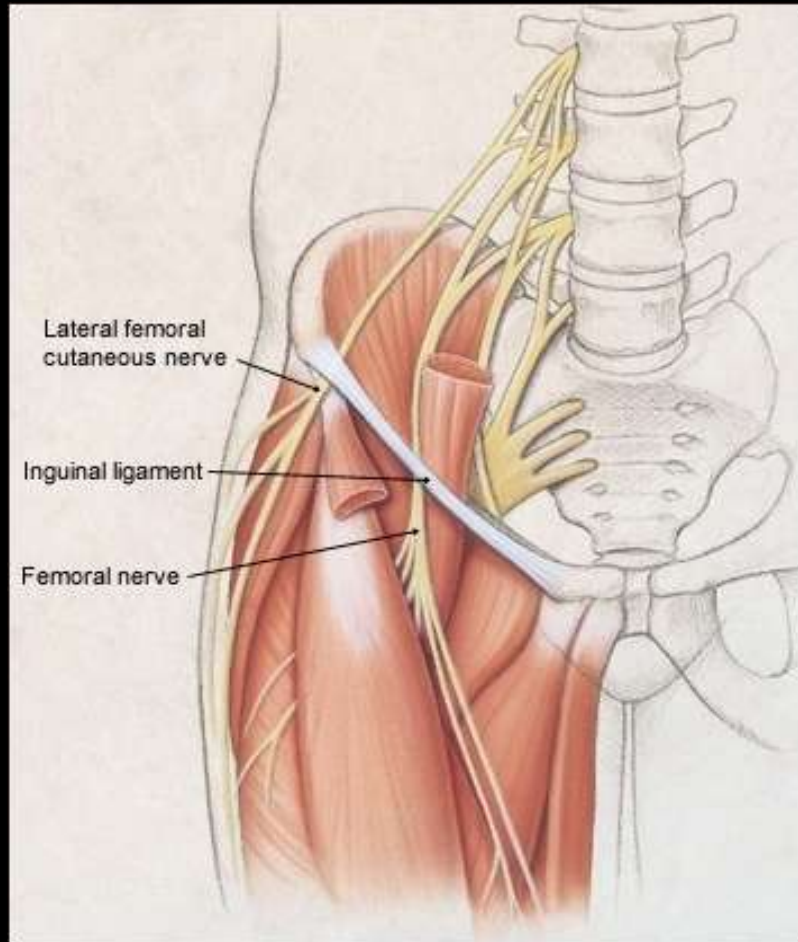
## Anterior Thigh Nerves-Femoral





# Entrapment neuropathy

## Femoral Nerve

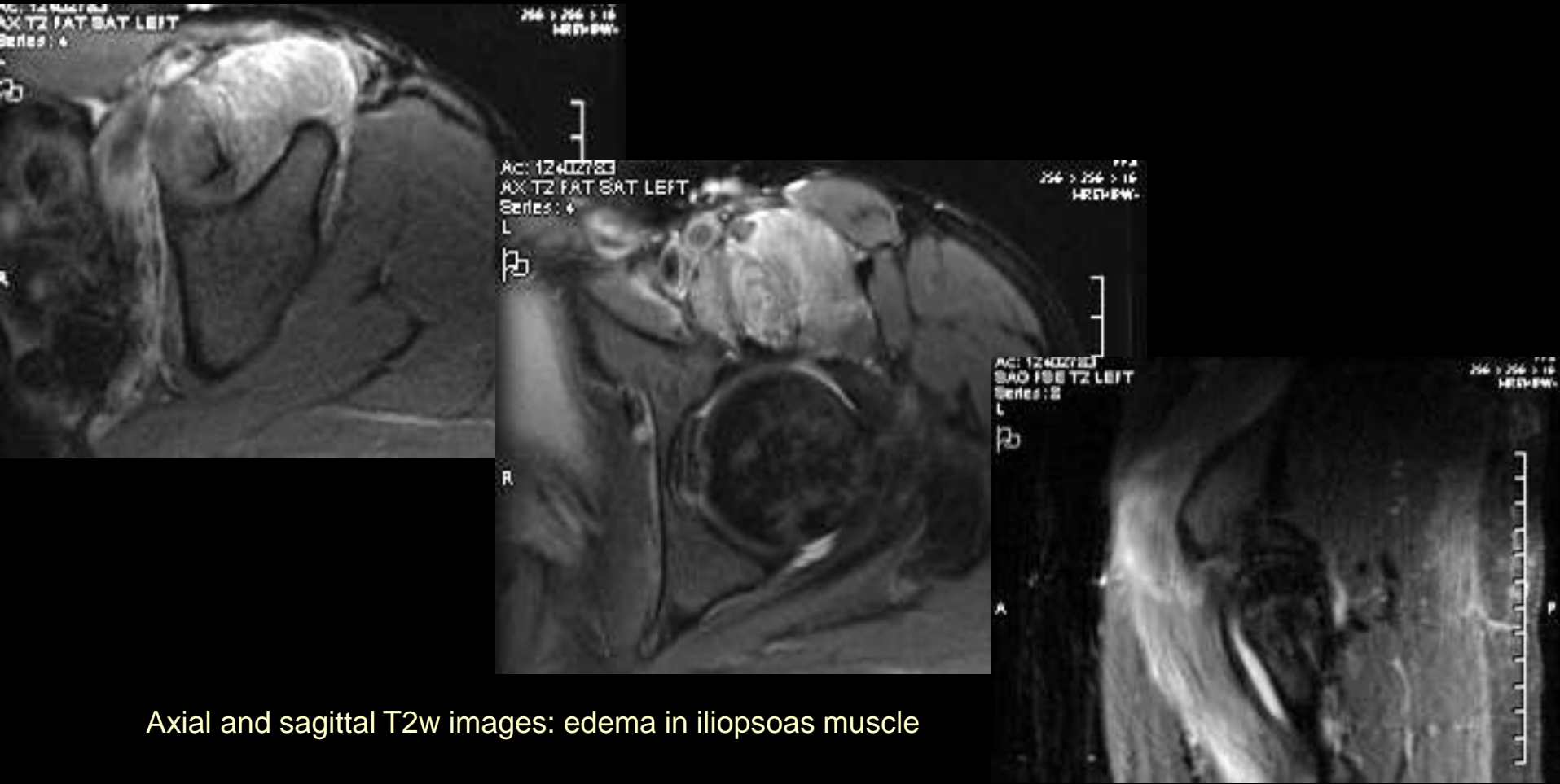


- Causes of femoral nerve injury:
  - Following iliopsoas hematoma
  - Fracture of the acetabulum
  - Surgery



# Entrapment neuropathy Femoral Nerve

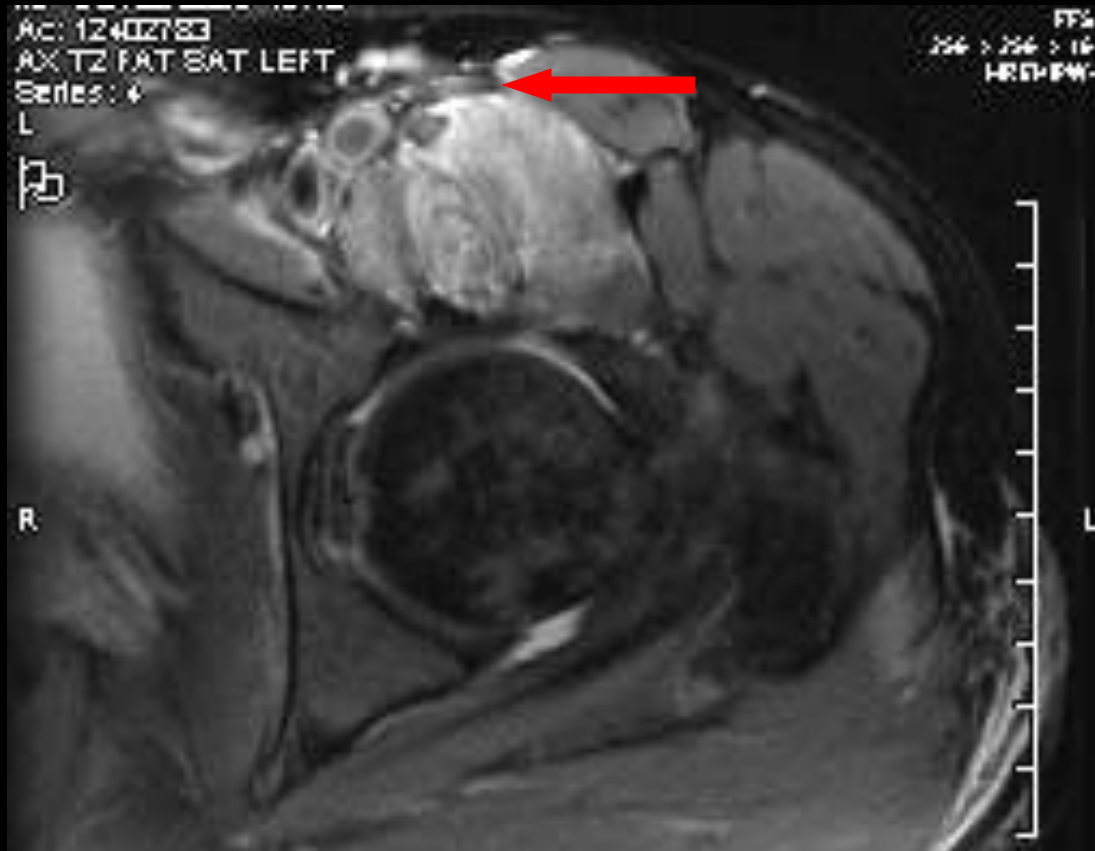
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Axial and sagittal T2w images: edema in iliopsoas muscle

34 yo male, hip pain following a fall down stairs. MRI done to rule out a fracture.

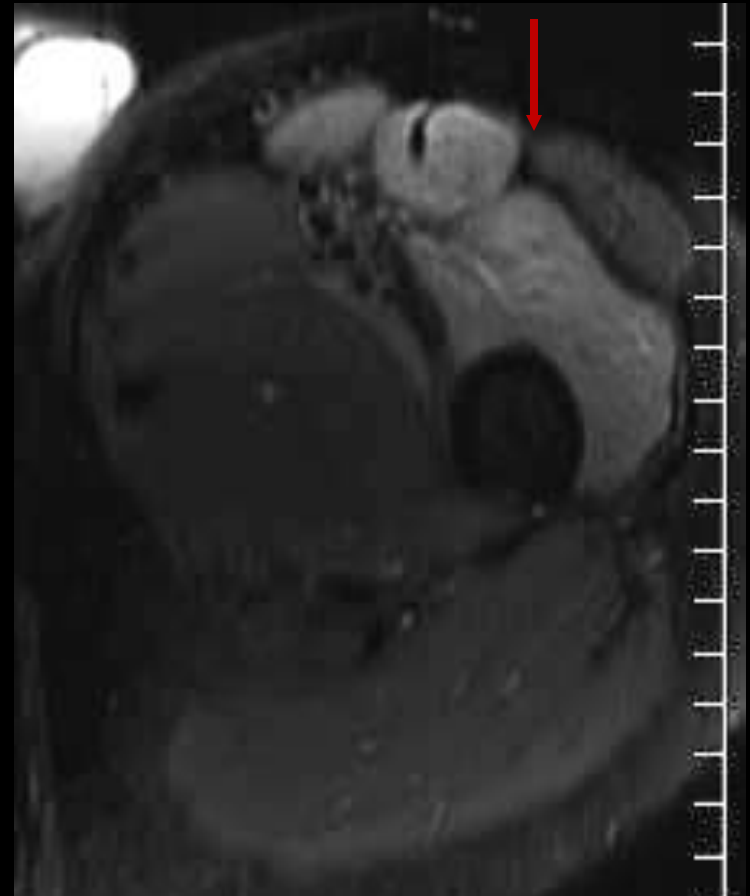
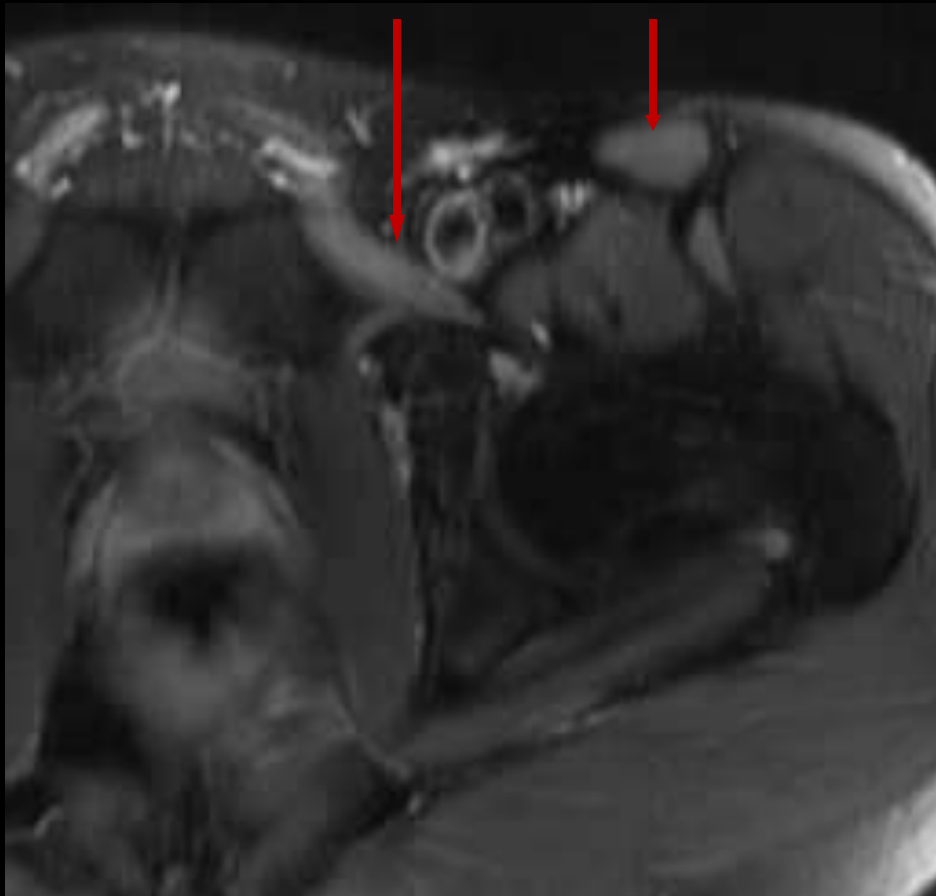
# Entrapment neuropathy Femoral Nerve



Axial T2FS image

34 yo male, hip pain following a fall down stairs. MRI done to rule out a fracture.

# Entrapment neuropathy Femoral Nerve

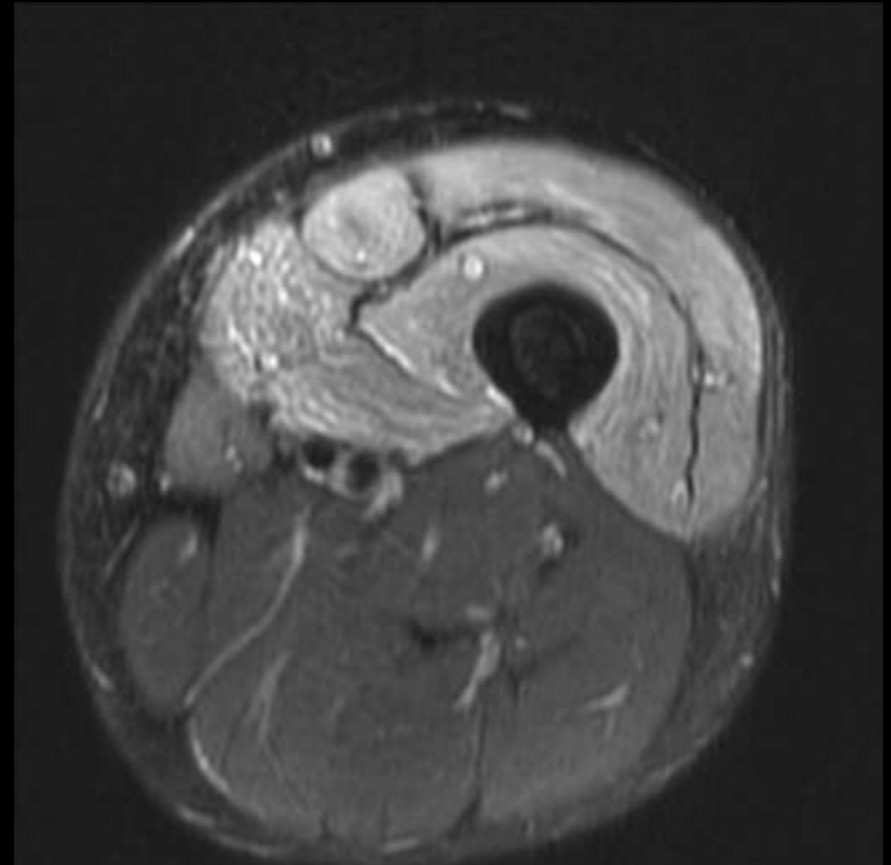
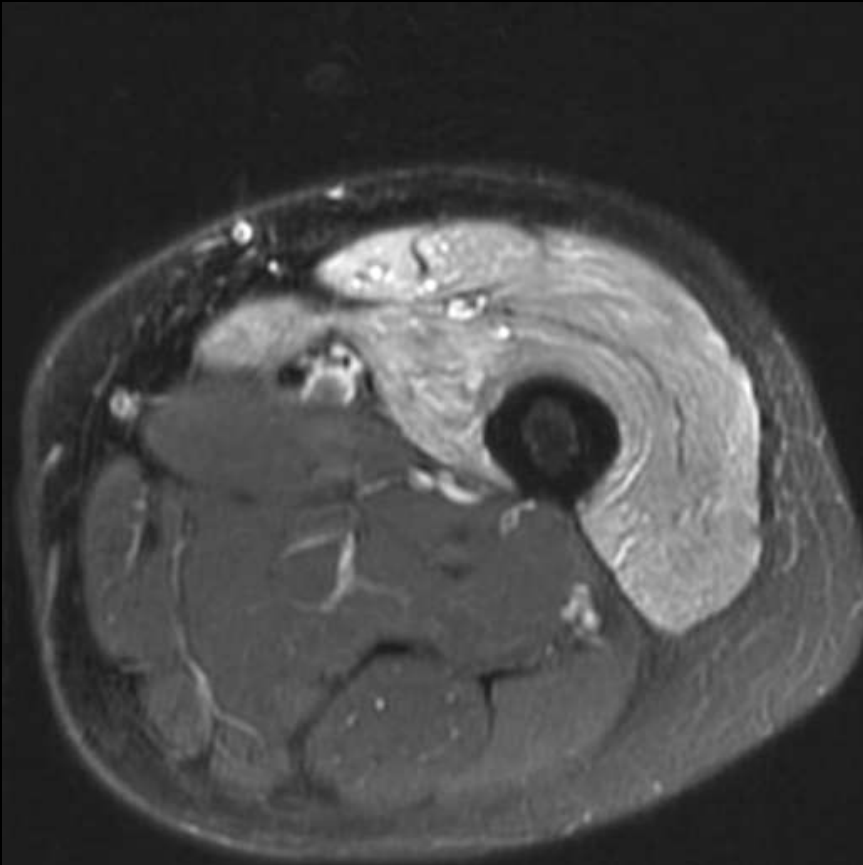


Axial T2FS images: muscle edema in pectineus, sartorius and quadriceps

8 weeks following trauma, repeat MRI because of severe weakness in quadriceps muscle.  
34 yo male, hip pain following a fall down stairs. MRI done to rule out a fracture.

# Entrapment neuropathy Femoral Nerve

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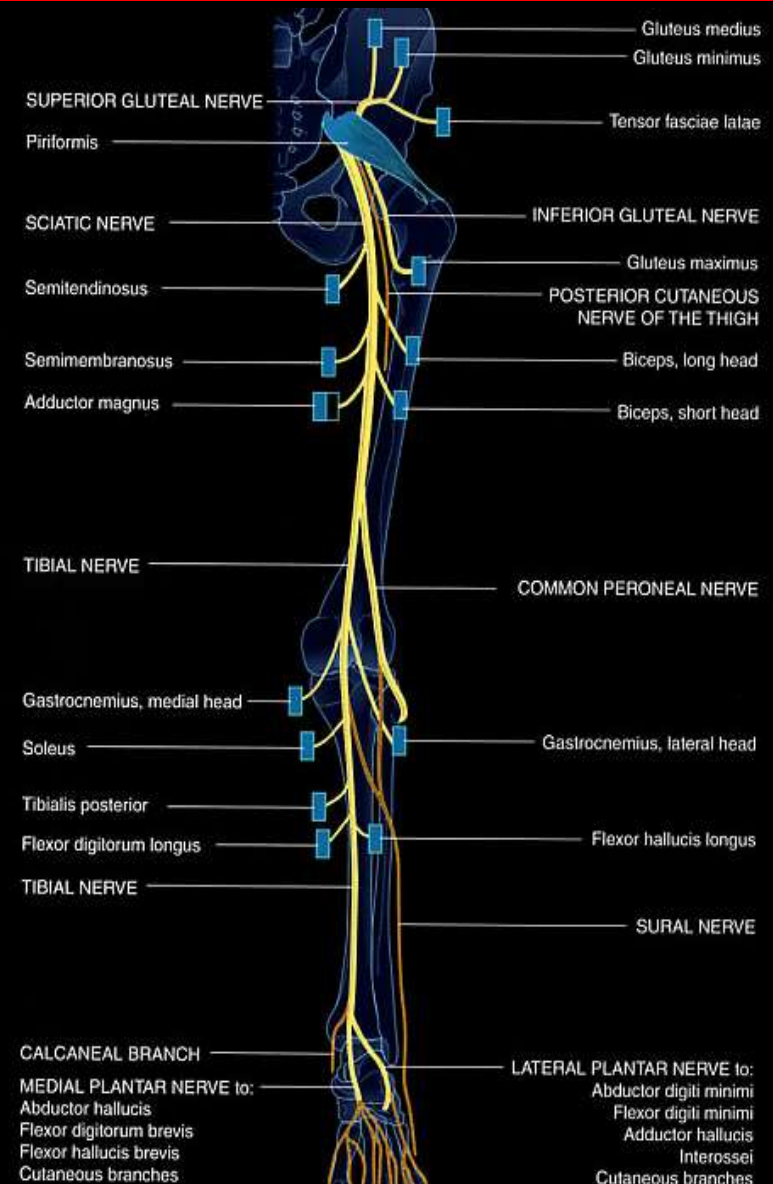
8 weeks following trauma, severe weakness in quadriceps: Axial T2w FS

8 weeks following trauma, repeat MRI because of severe weakness in quadriceps muscle.  
34 yo male, hip pain following a fall down stairs. MRI done to rule out a fracture.

# Entrapment neuropathy

## Sciatic nerve

- Sciatic Nerve L4-S3
  - Piriformis Syndrome
  - Tumor
- Tibial nerve
  - Tarsal tunnel syndrome
- Common peroneal nerve
  - Fibula tunnel

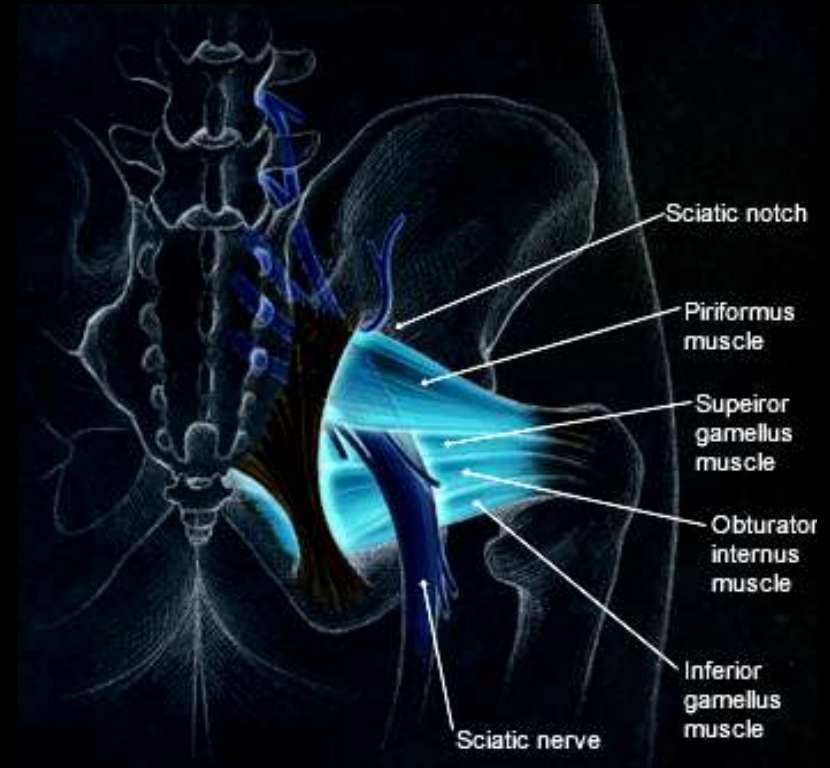


# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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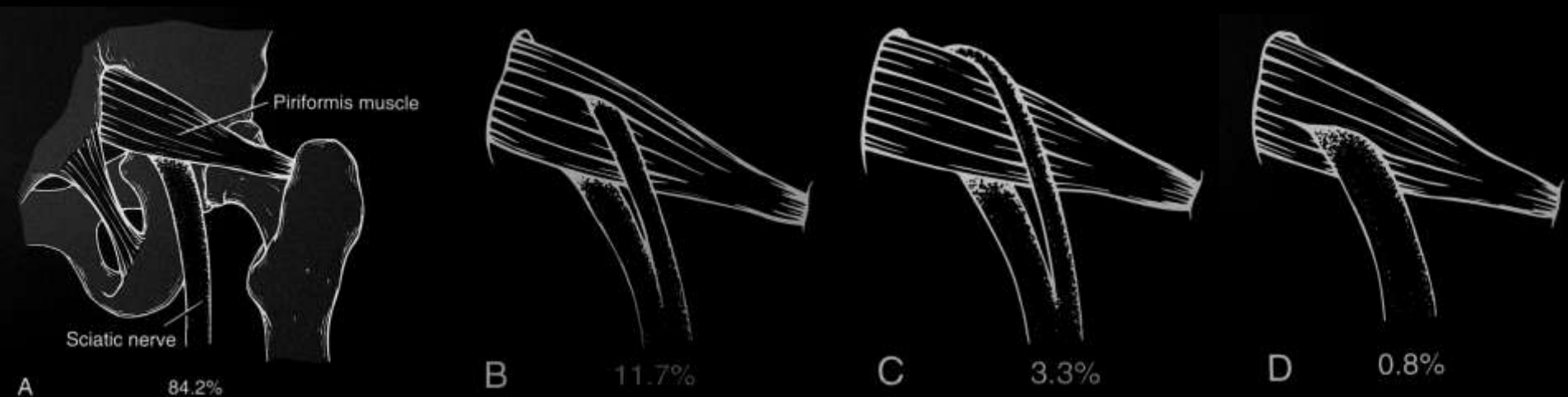
- Pyramidal shaped muscle
- Sacrum to greater trochanter
- Through greater sciatic notch
- Osseoligamentous channel
- May be split by peroneal portion



# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

- Sciatic nerve compression below the sciatic foramen which clinically resembles disc extrusion.
- Pain without weakness
- Due to enlargement, inflammation or anatomical variations of the piriformis muscle and sciatic nerve relationship.

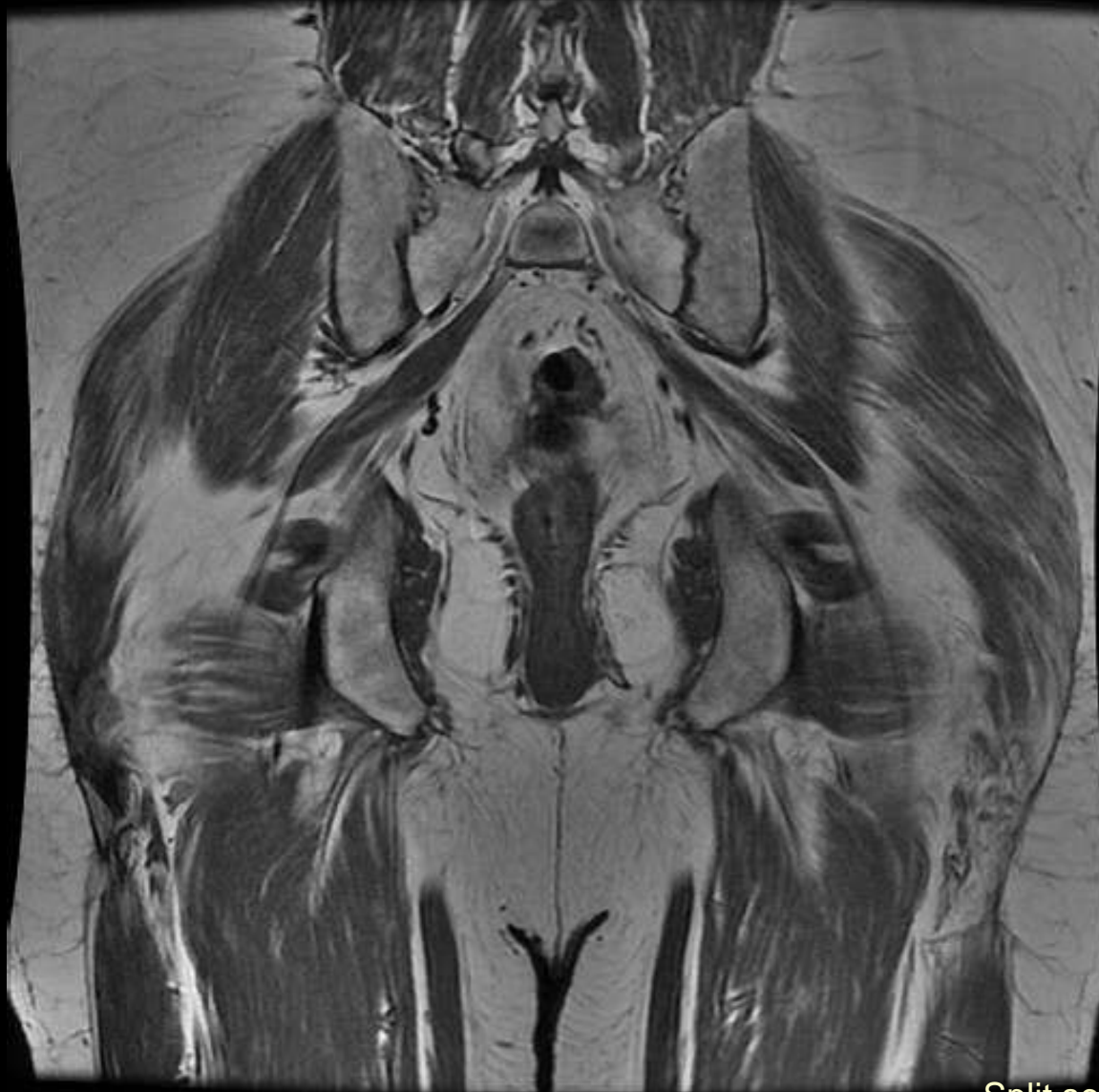




# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Split sciatic at Piriformis 44M

# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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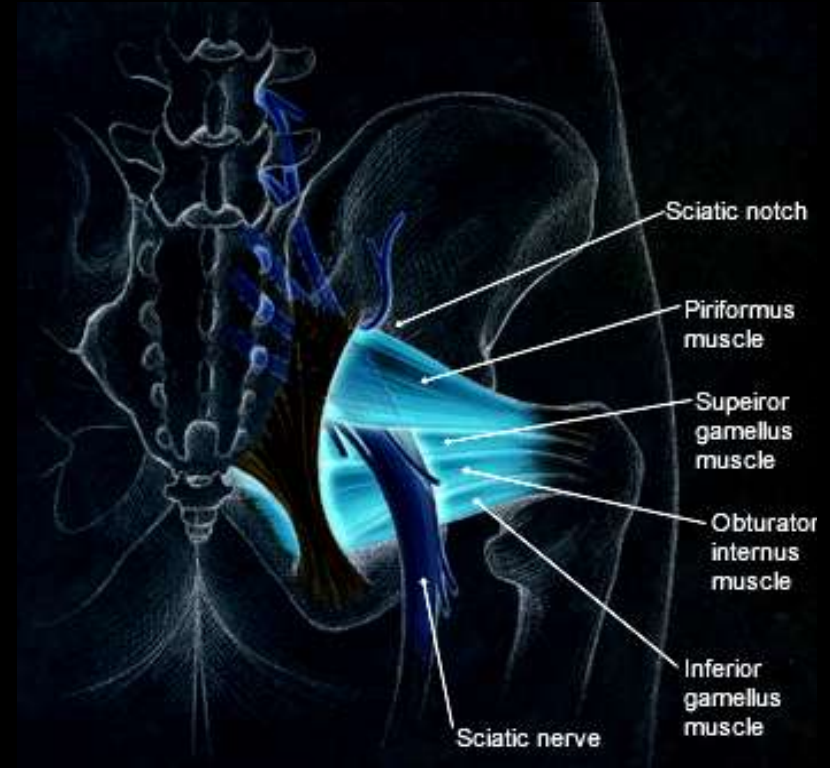
Split sciatic at Piriformis 44M

# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome - Causes

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- Blunt injury – hematoma
- Prolonged pressure
- Nerve anomalies
- Morton foot
- Hyperlordosis

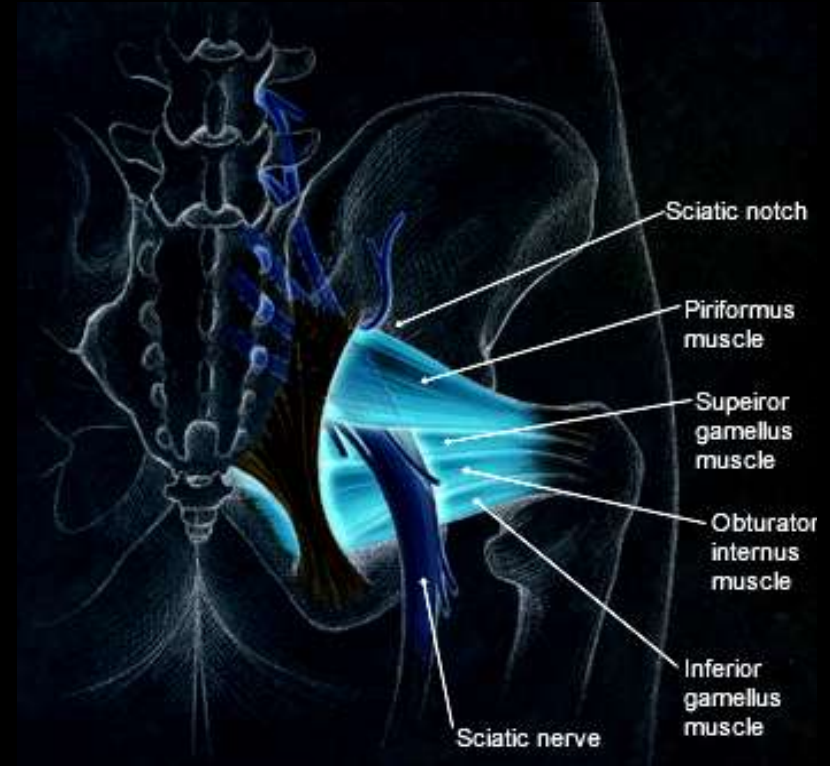


# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome - Imaging

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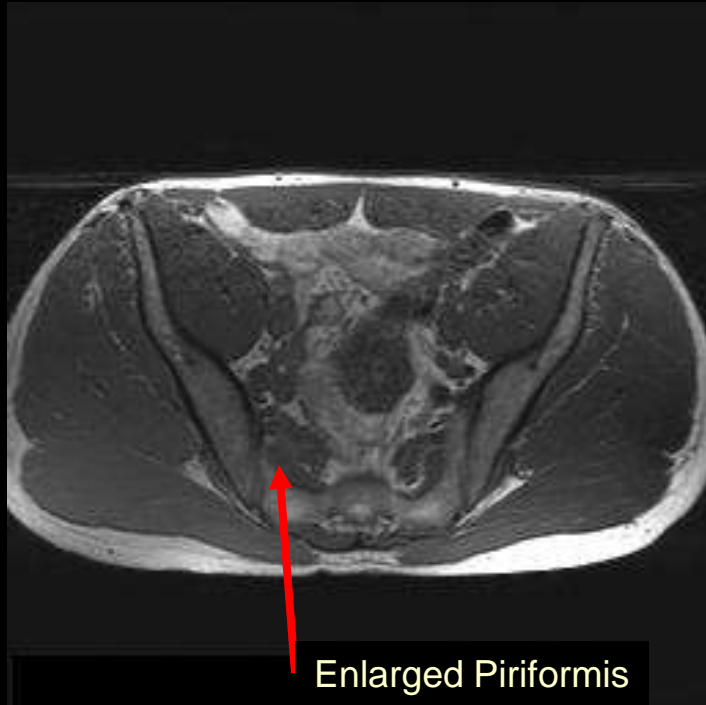
- Enlarged ipsilateral muscle
- Exclude disc disease



# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

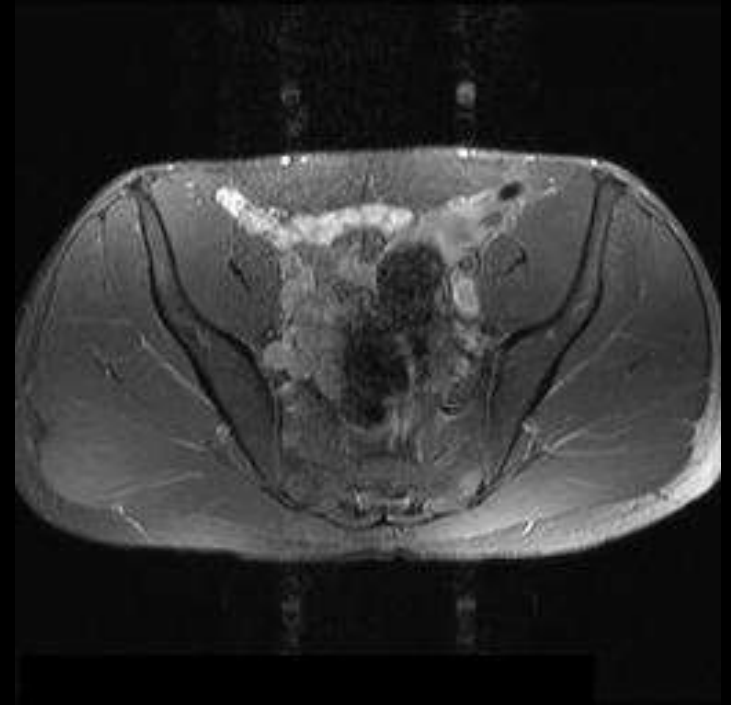
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Enlarged Piriformis

Ax T1

Superior

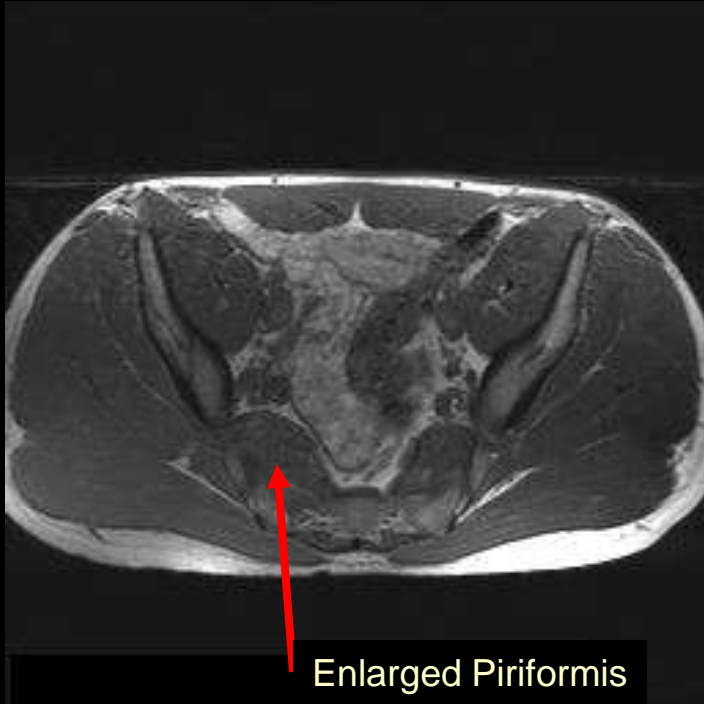


Ax PDFS

# Entrapment neuropathy - Sciatic nerve

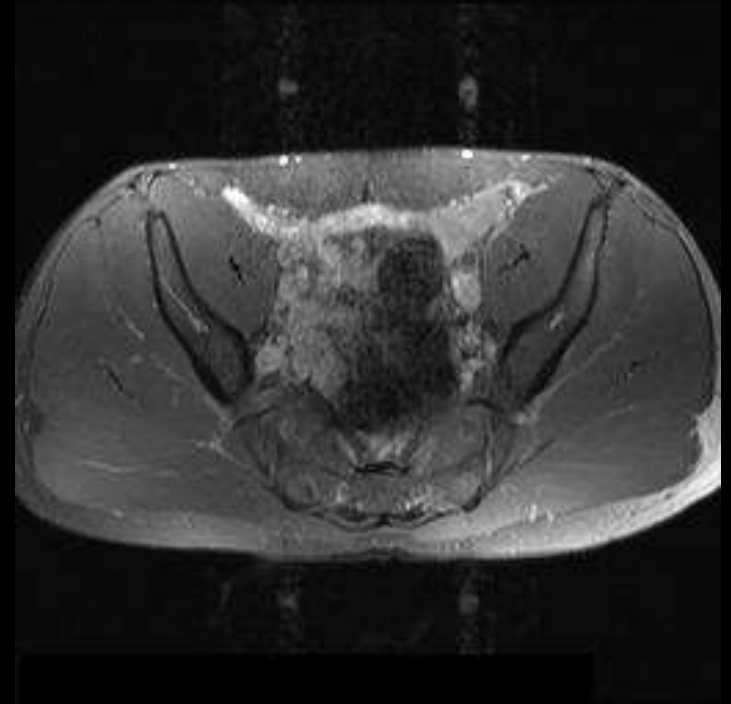
## Piriformis Syndrome

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Enlarged Piriformis

Ax T1



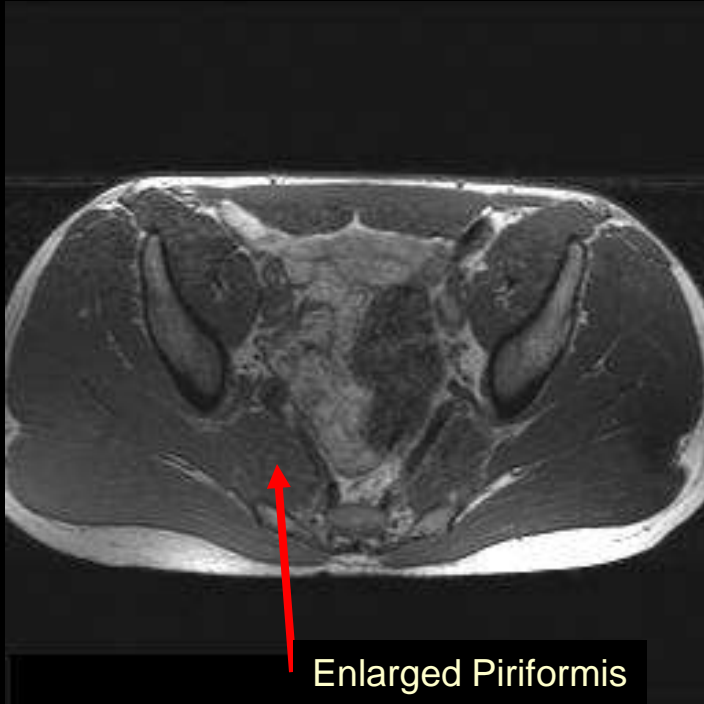
Ax PDFS



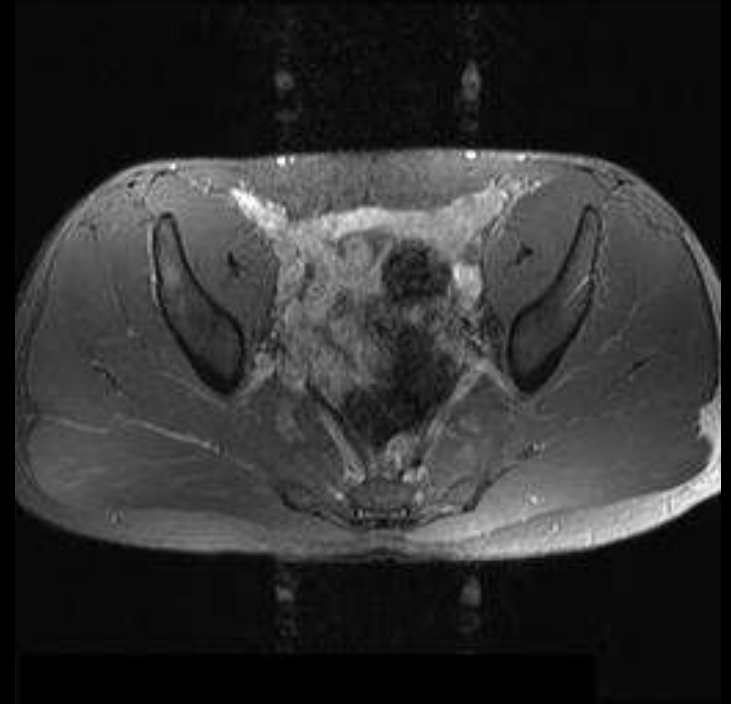
# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Ax T1



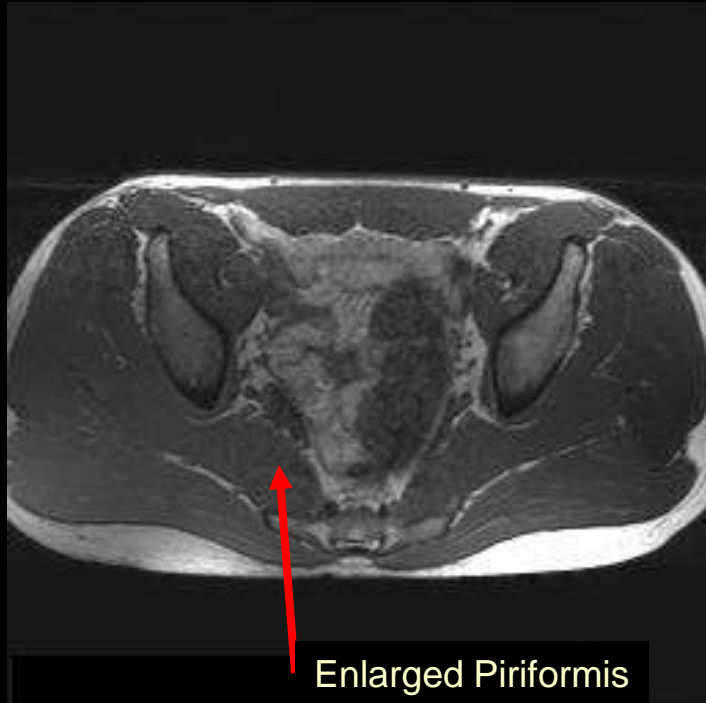
Ax PDFS



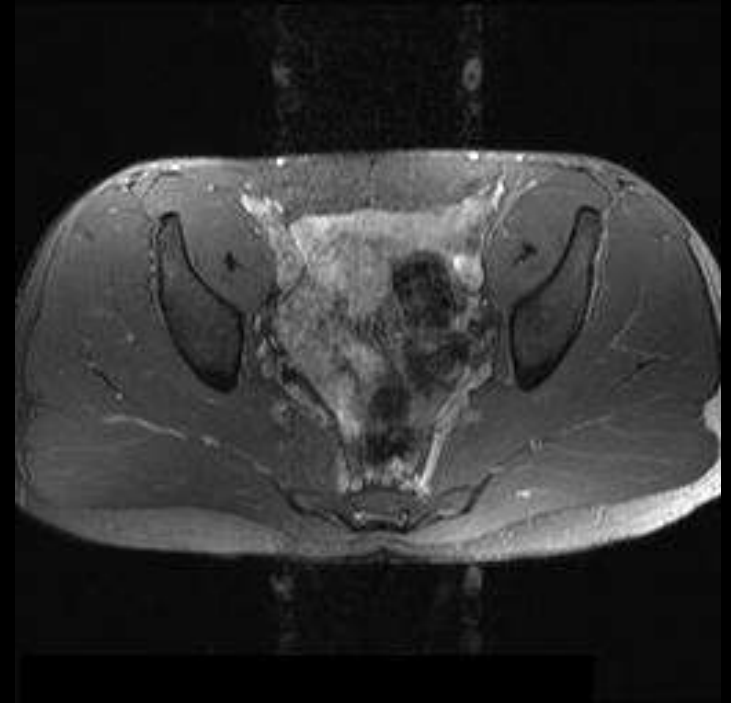
# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Ax T1

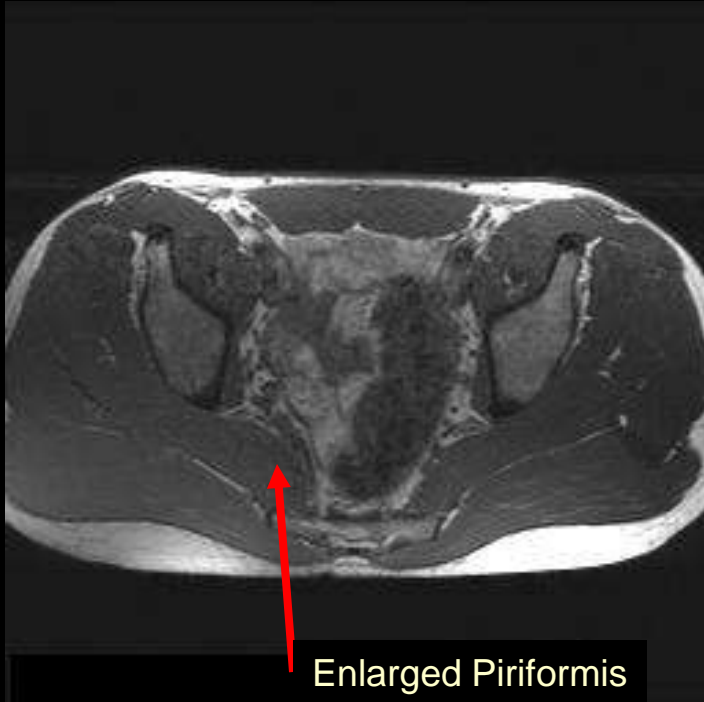


Ax PDFS

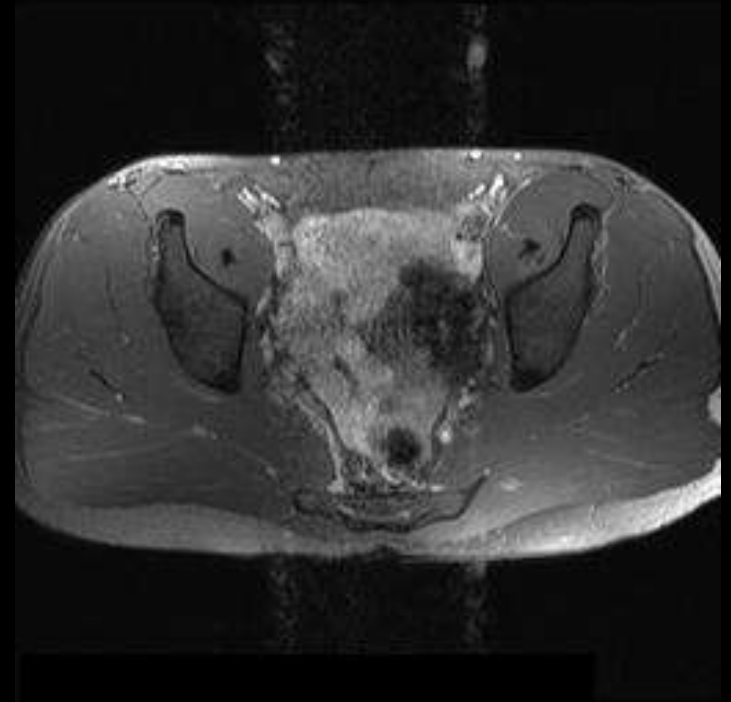
# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Ax T1

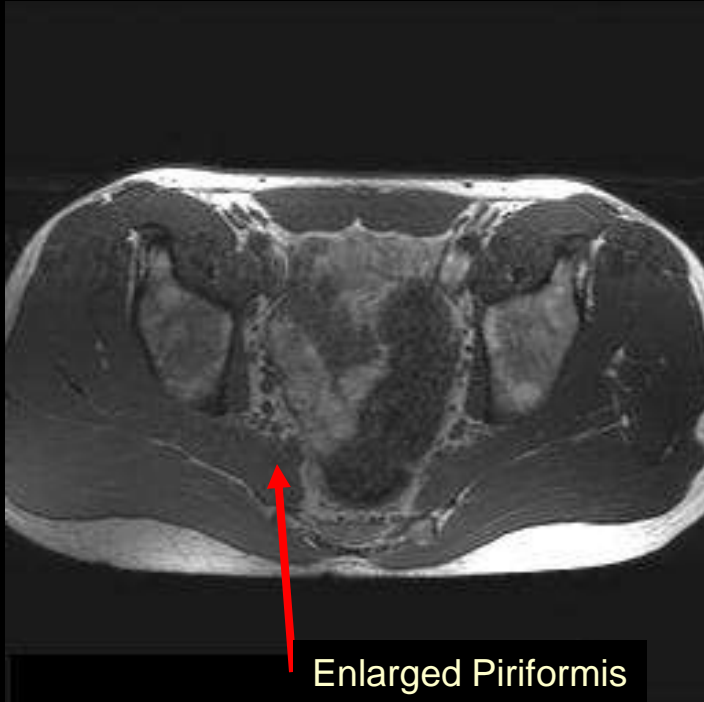


Ax PDFS

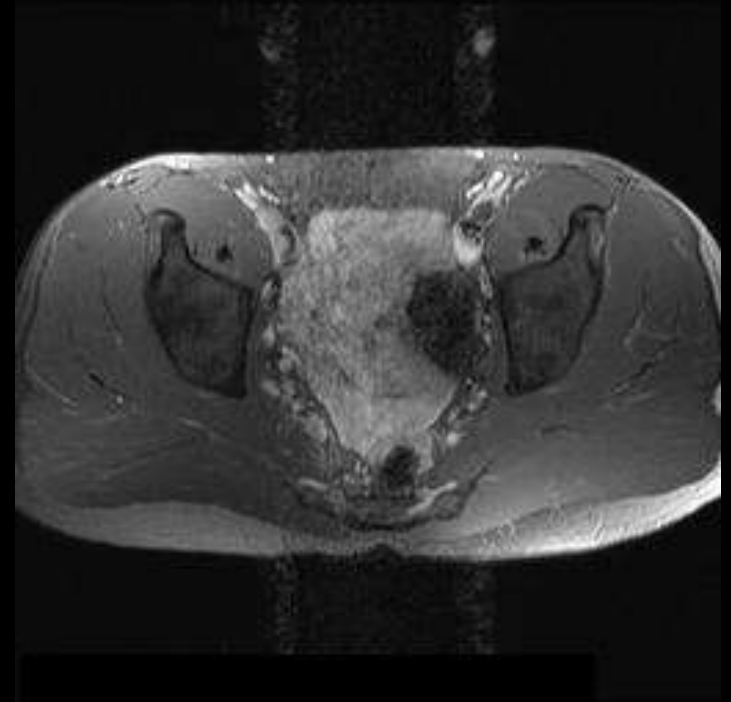
# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Ax T1

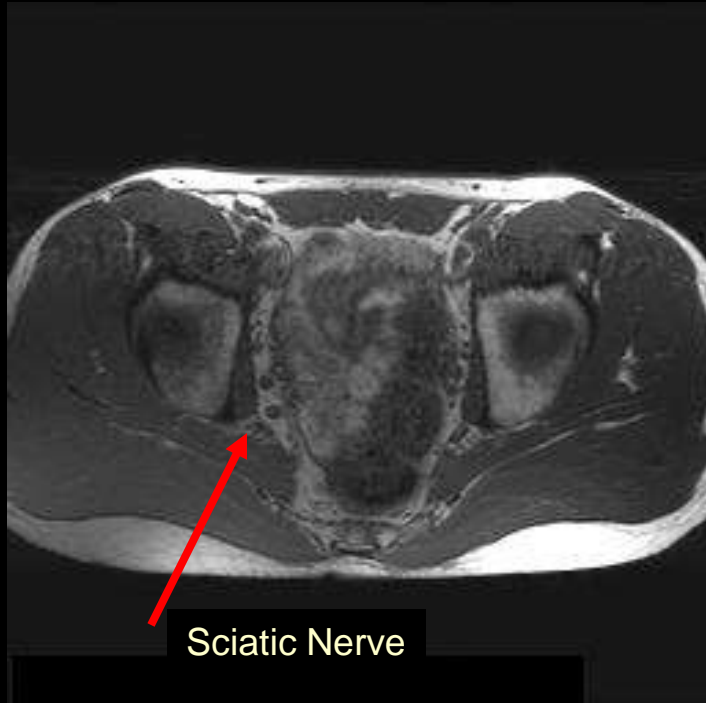


Ax PDFS

# Entrapment neuropathy - Sciatic nerve

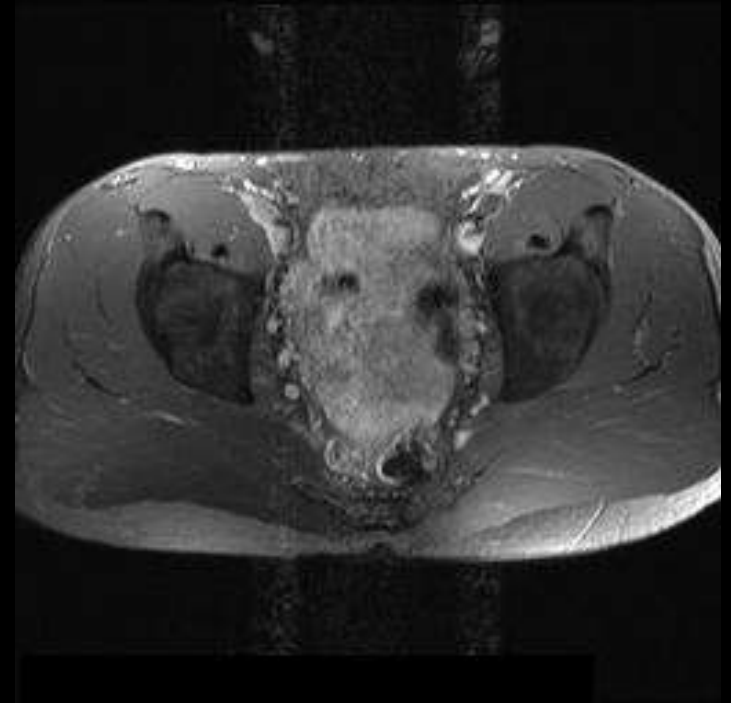
## Piriformis Syndrome

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Sciatic Nerve

Ax T1

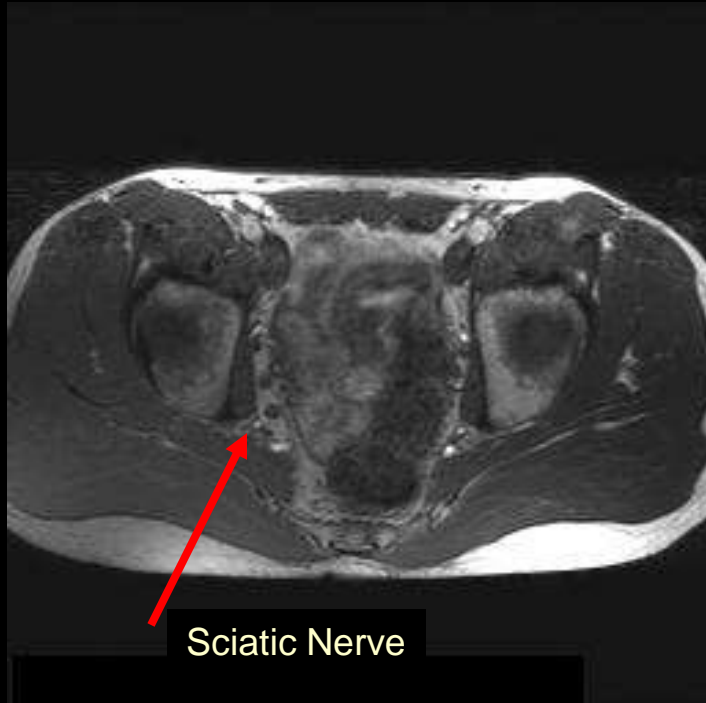


Ax PDFS

# Entrapment neuropathy - Sciatic nerve

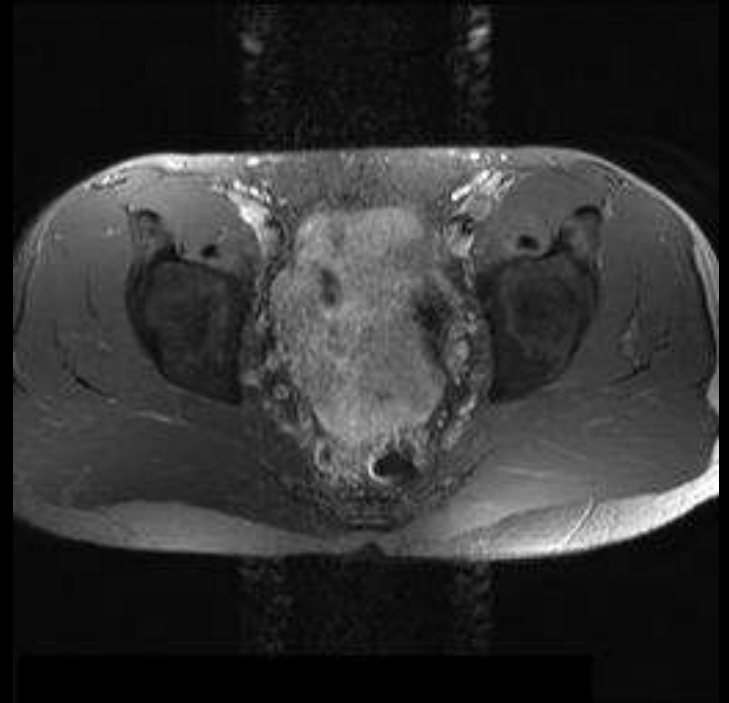
## Piriformis Syndrome

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Sciatic Nerve

Ax T1

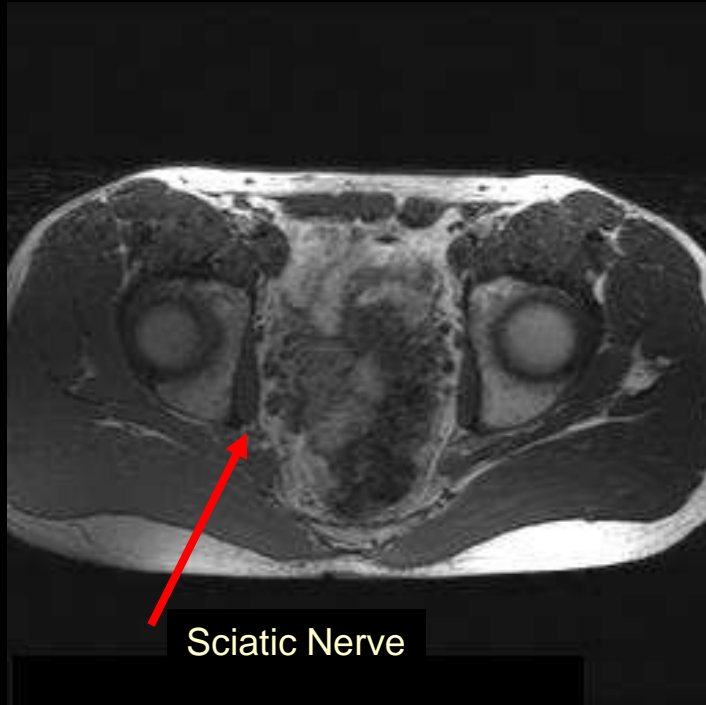


Ax PDFS

# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

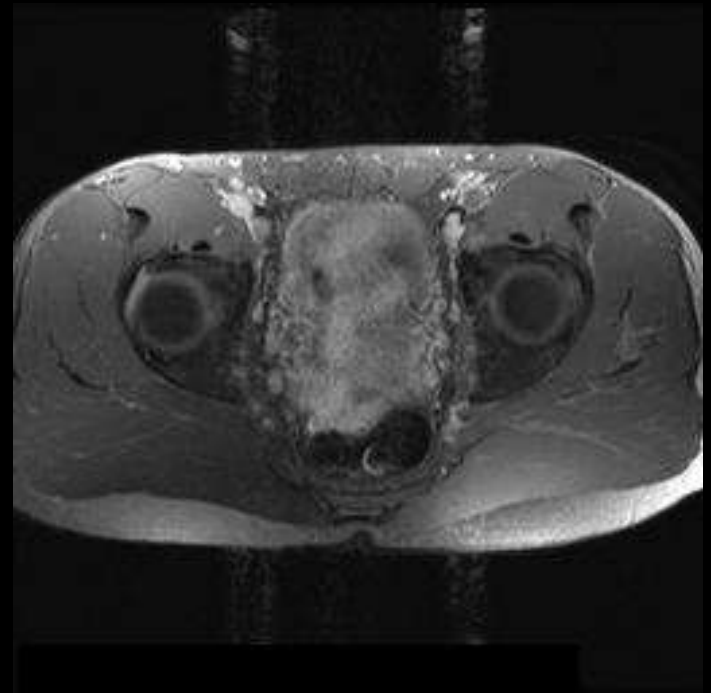
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Sciatic Nerve

Ax T1

Inferior

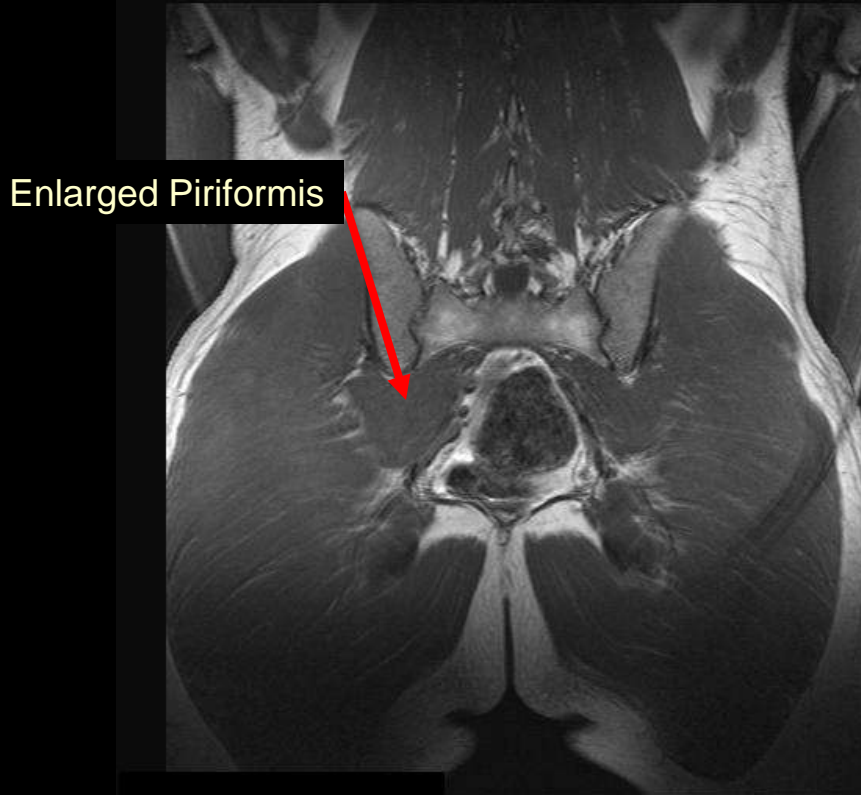


Ax PDFS

# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Cor T1



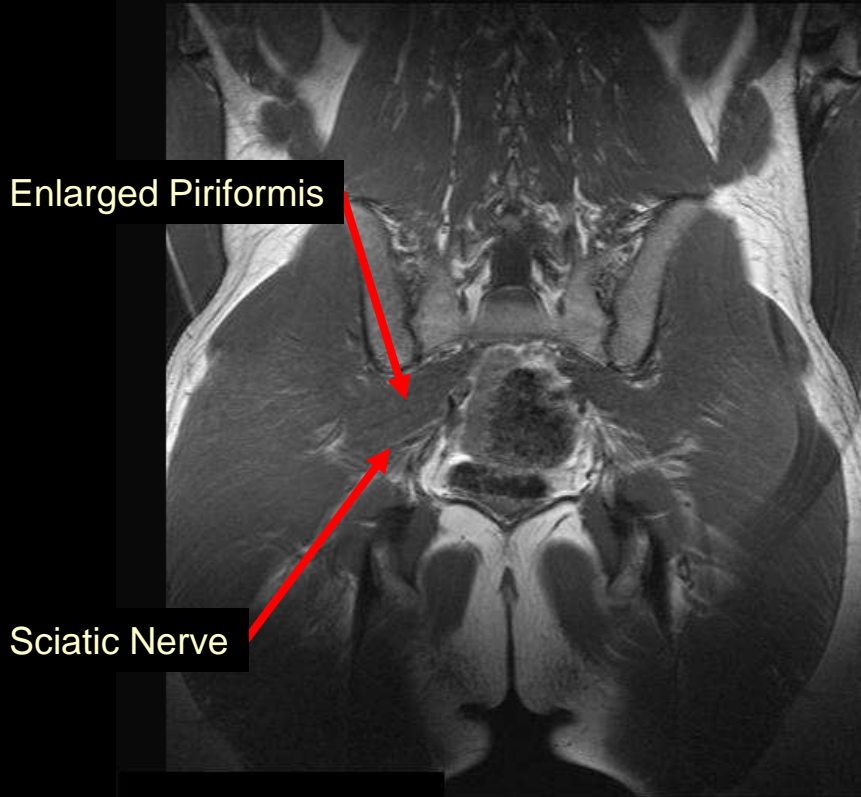
Cor PDFS



# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Cor T1

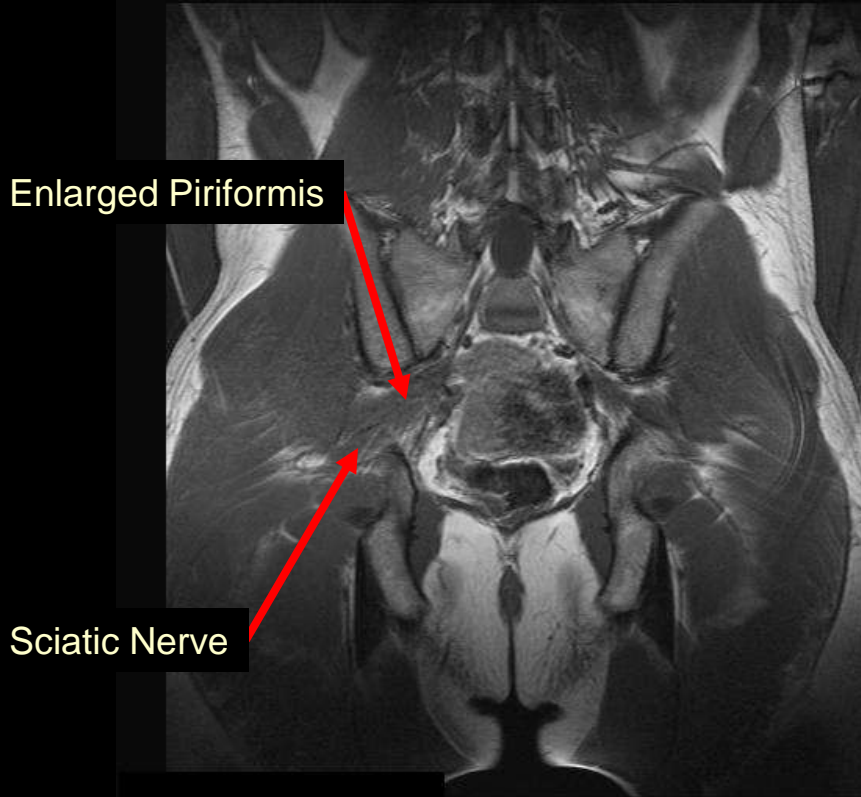


Cor PDFS

# Entrapment neuropathy - Sciatic nerve

## Piriformis Syndrome

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Cor T1

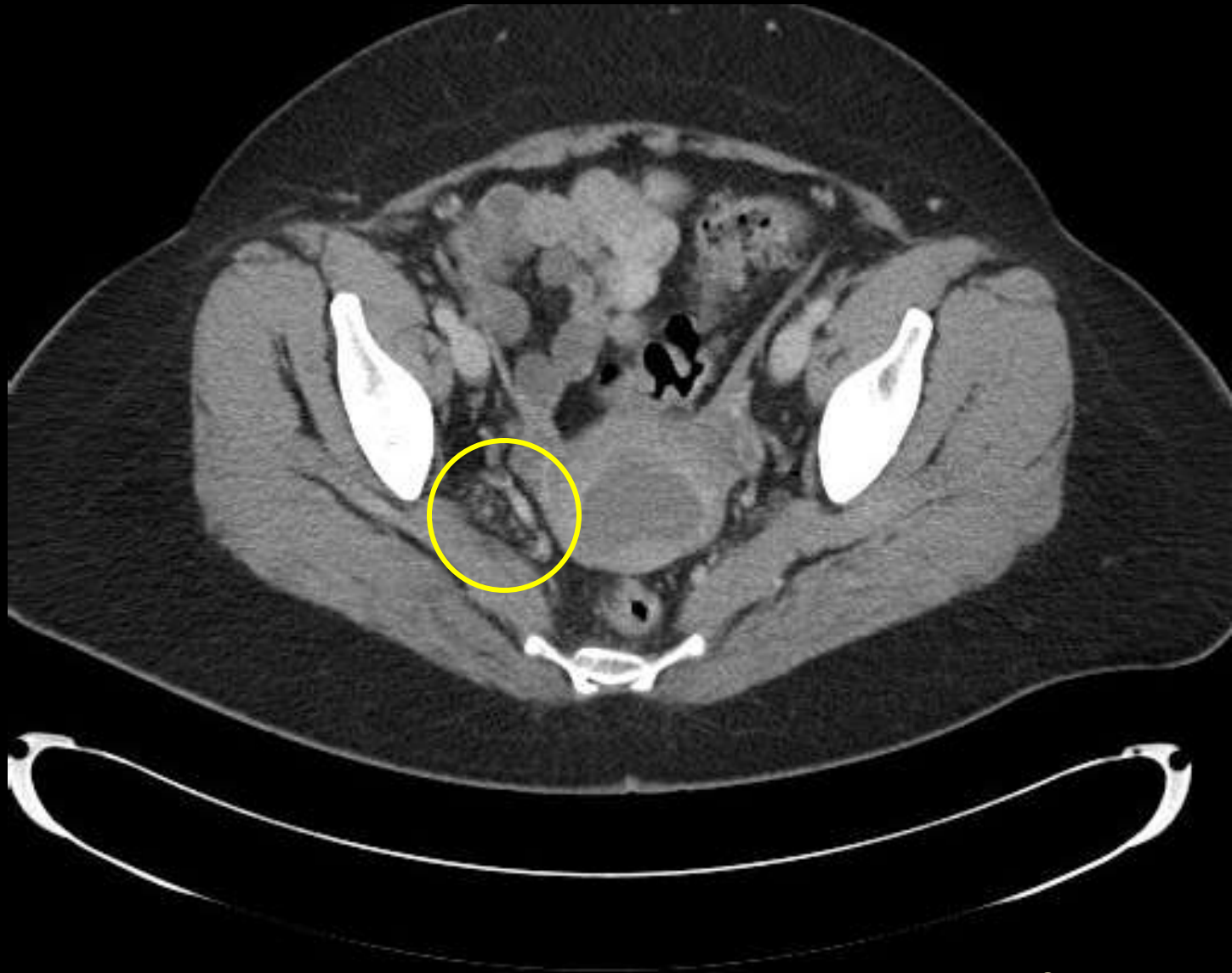


Cor PDFS

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

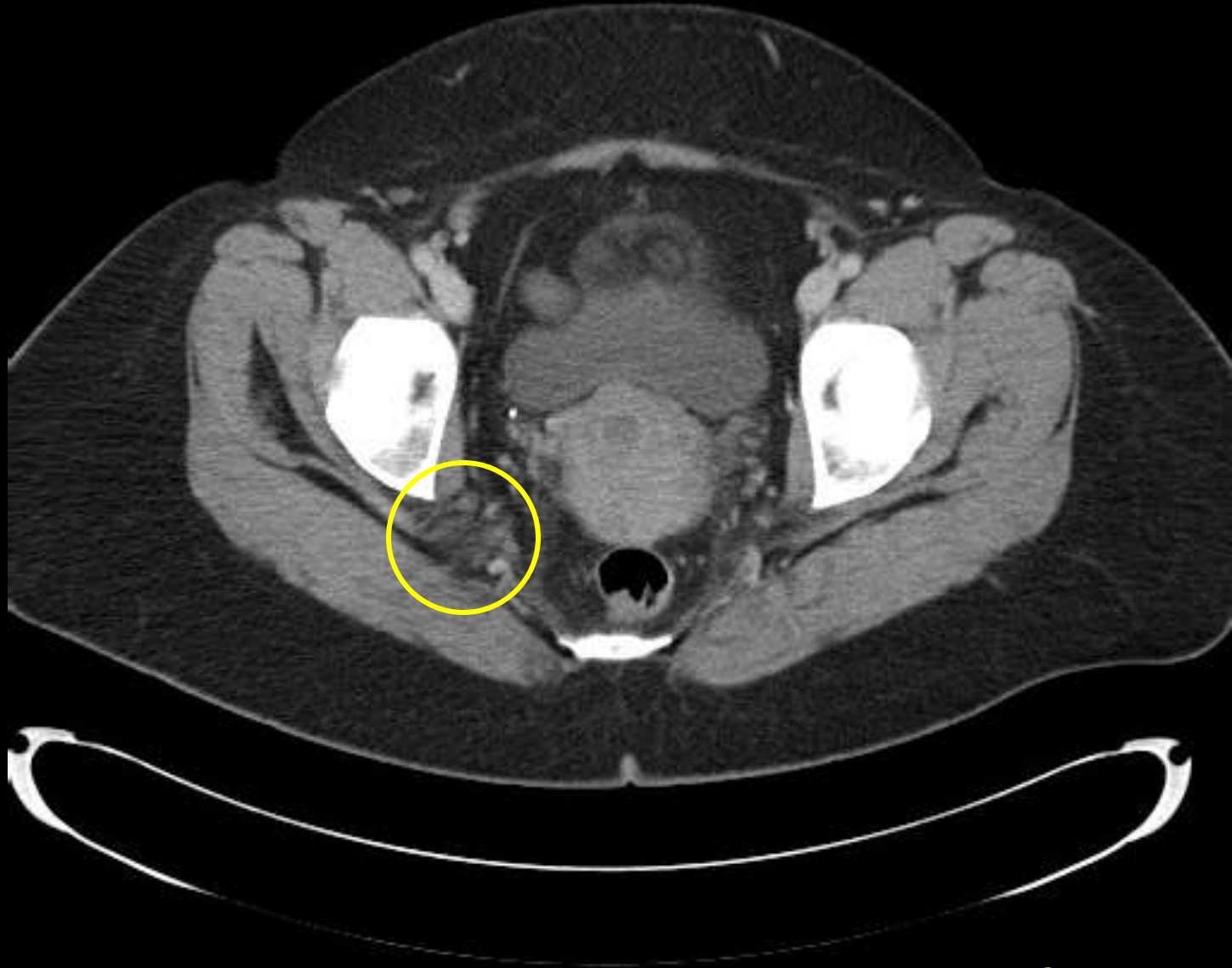
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# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

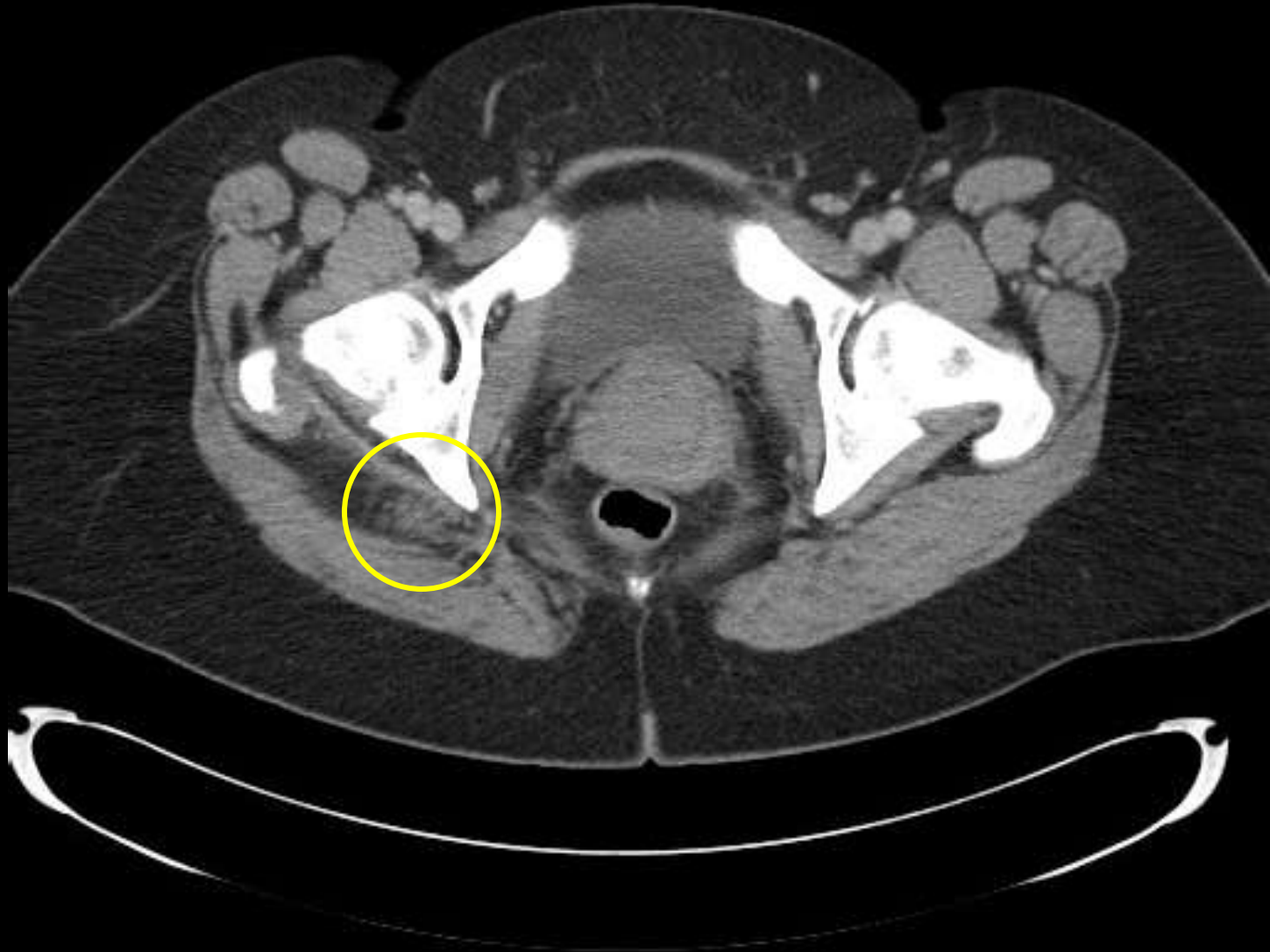
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# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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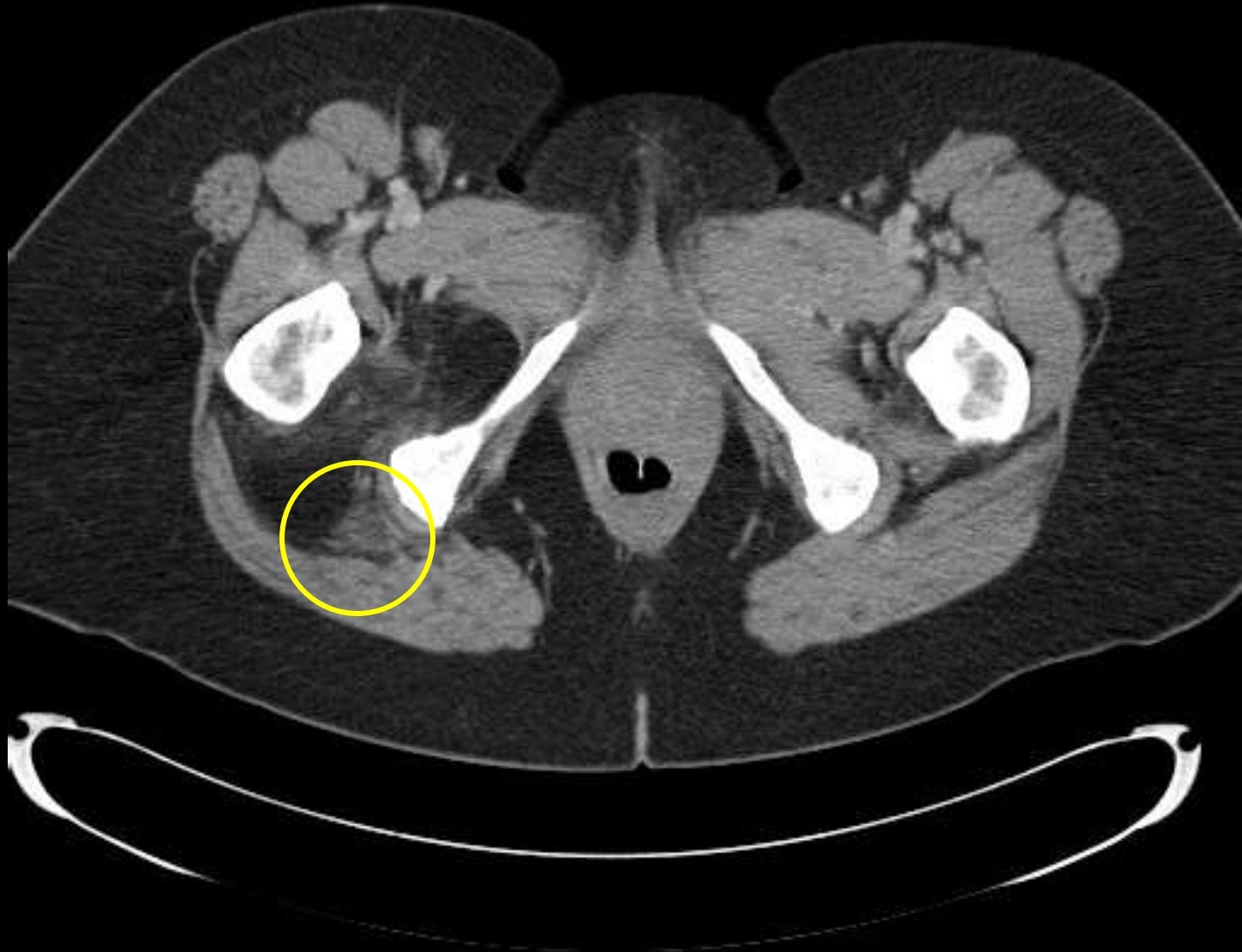




# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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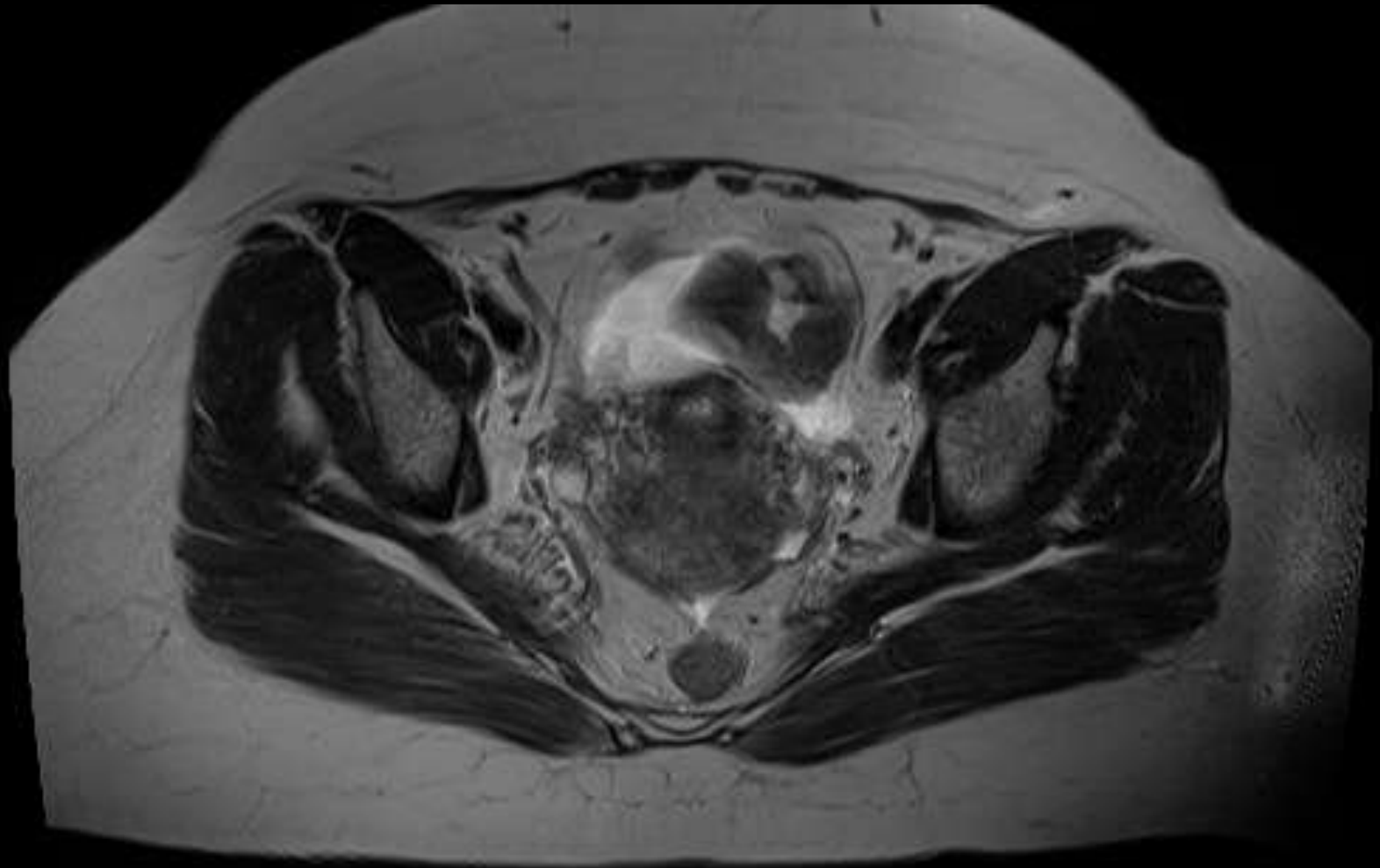




# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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Ax FSE T2

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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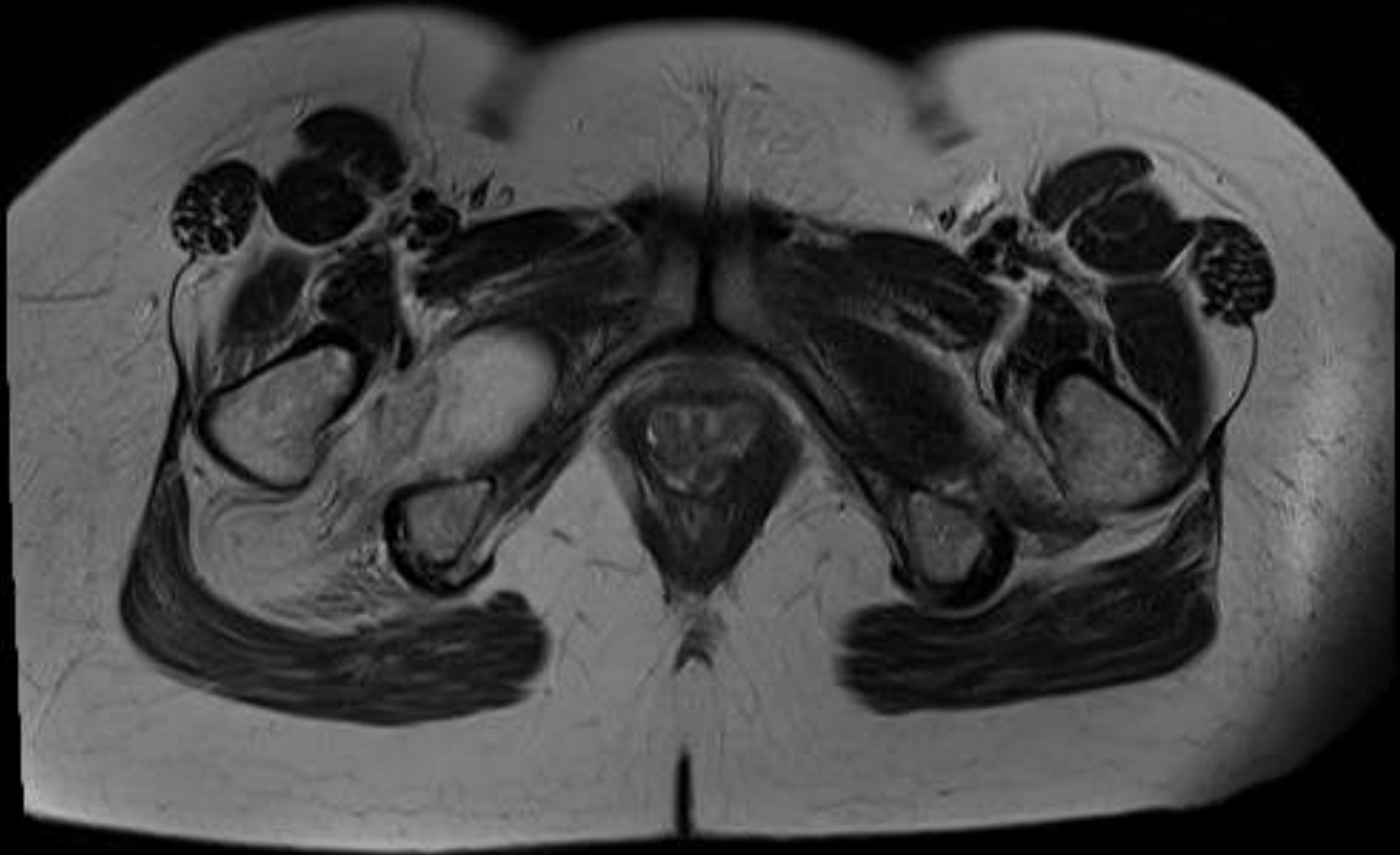


Ax FSE T2

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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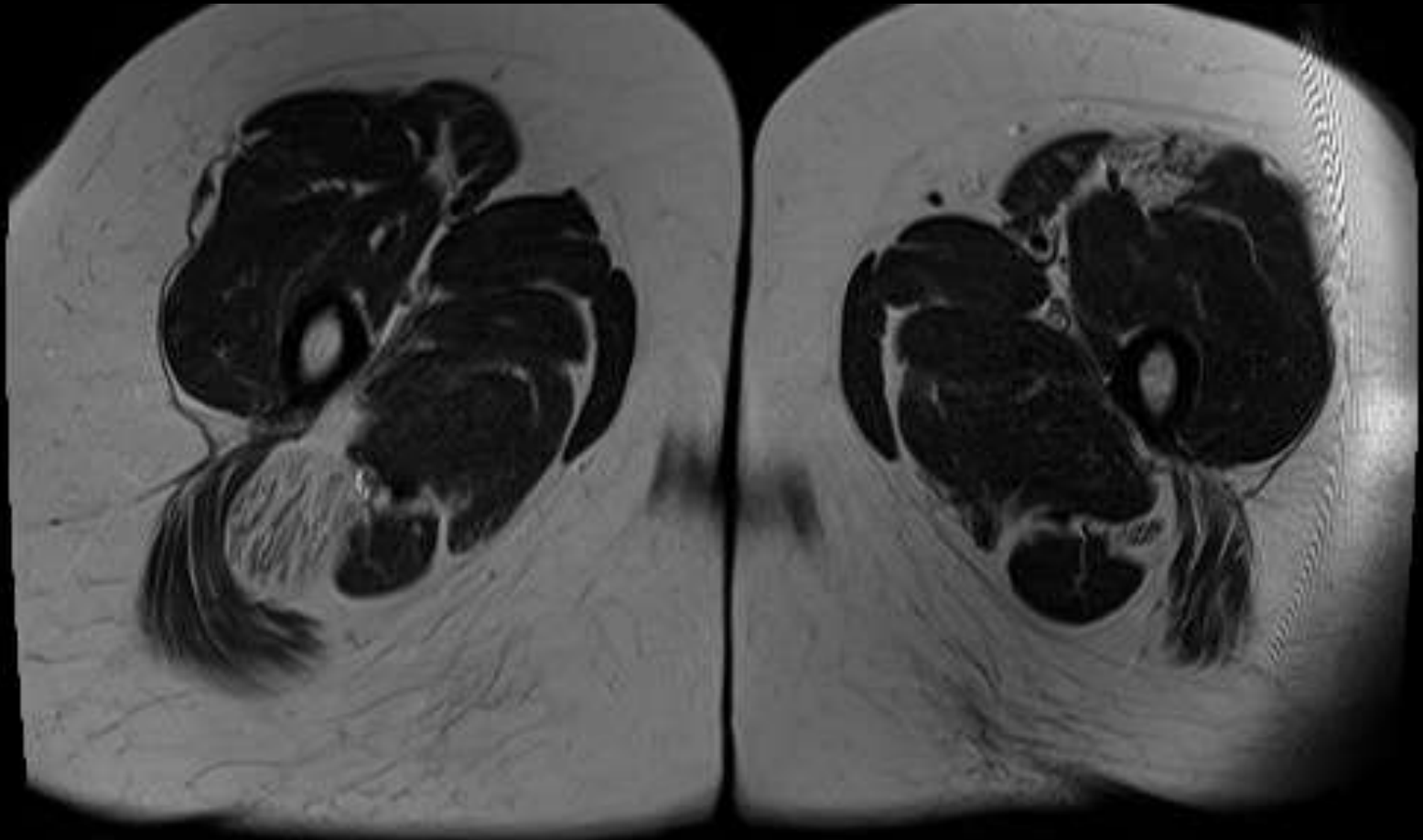


Ax FSE T2

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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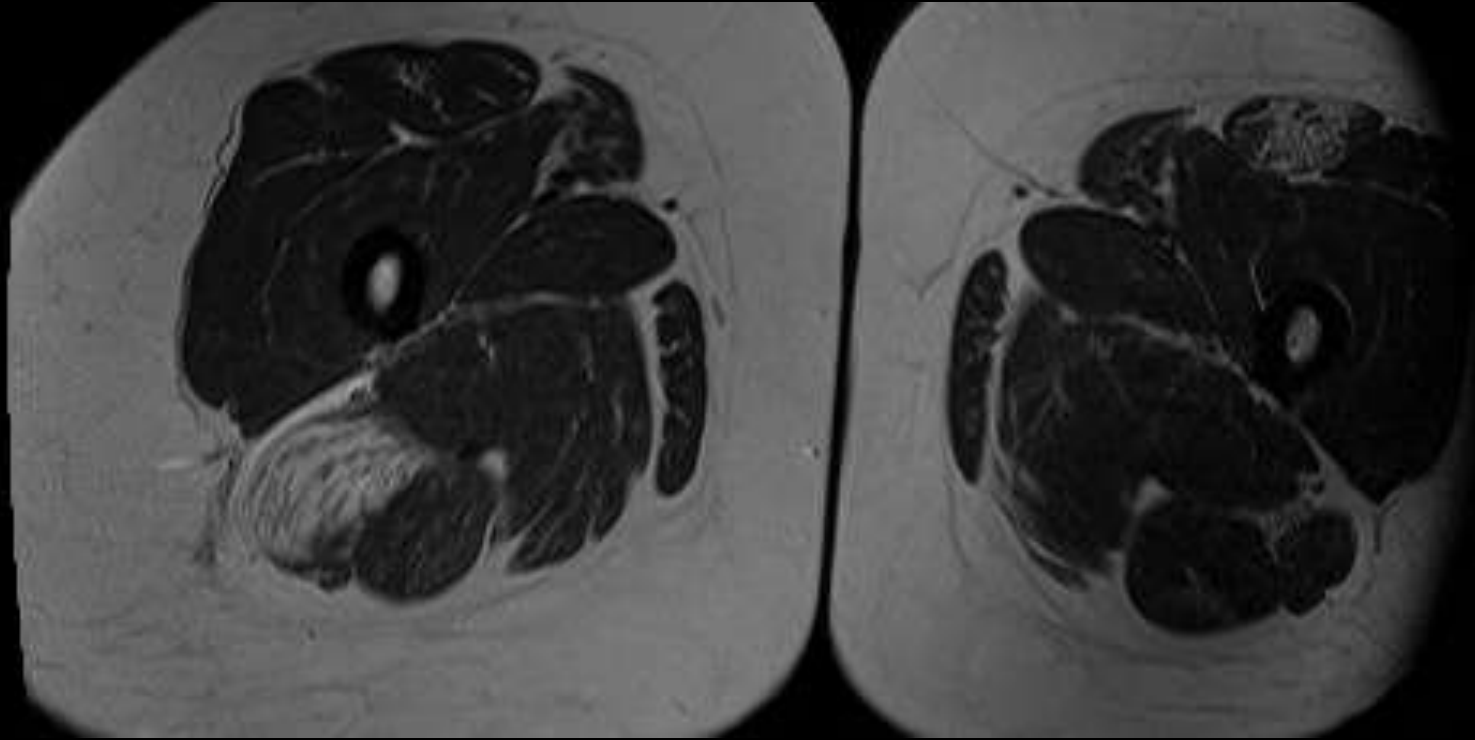


Ax FSE T2

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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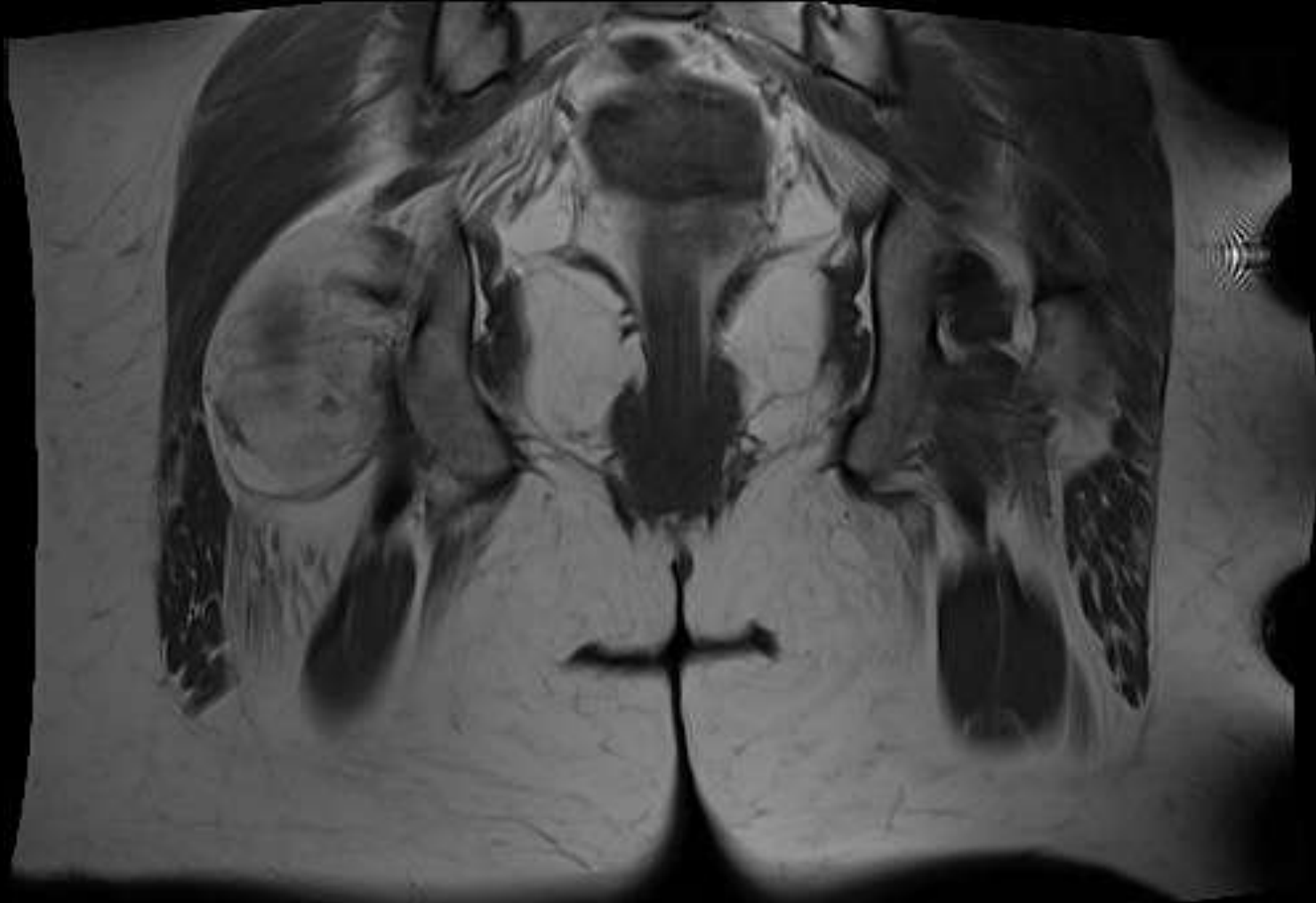
Ax FSE T2

FLHSN 48F 2-4 toe numbness

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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Cor T1

# Entrapment neuropathy - Sciatic nerve

## Sciatic Neural Fibrolipoma

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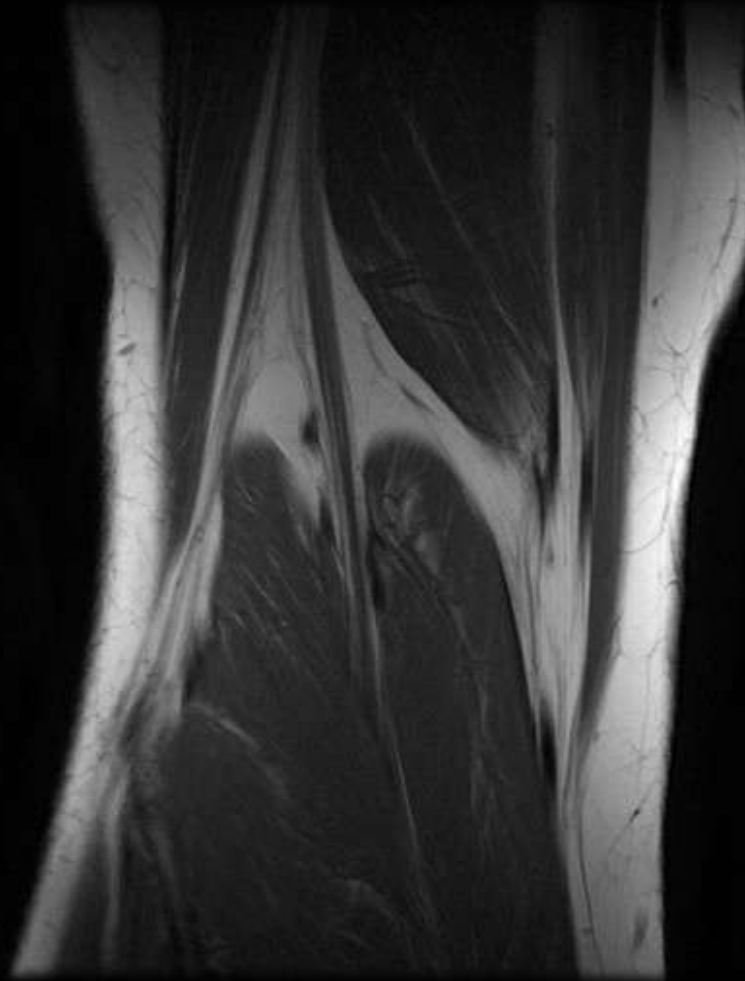
Cor T1



Entrapment neuropathy - Sciatic nerve

# Bifurcation Tibial and Common peroneal

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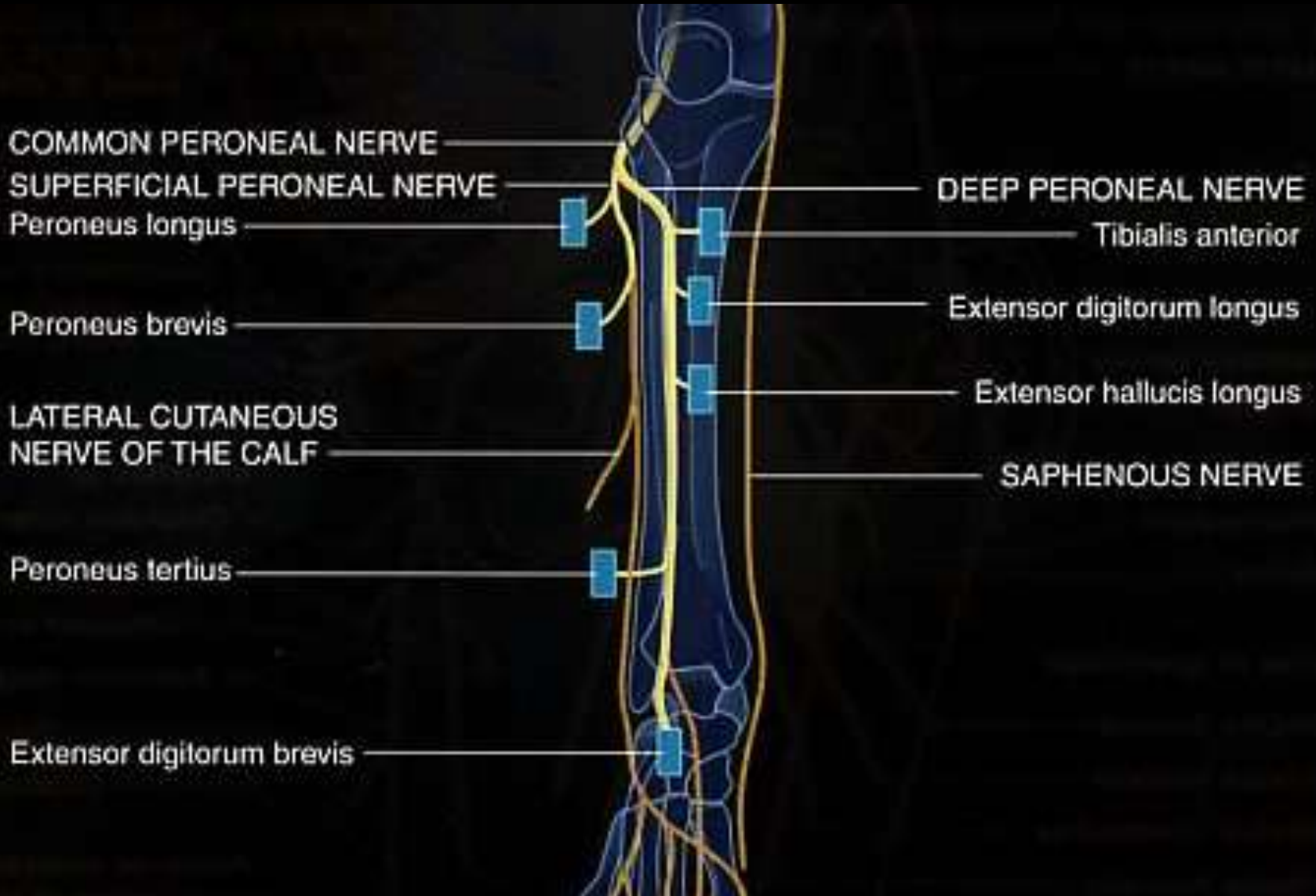


Nice division of sciatic nerve

# Entrapment syndromes

## Common Peroneal Nerve

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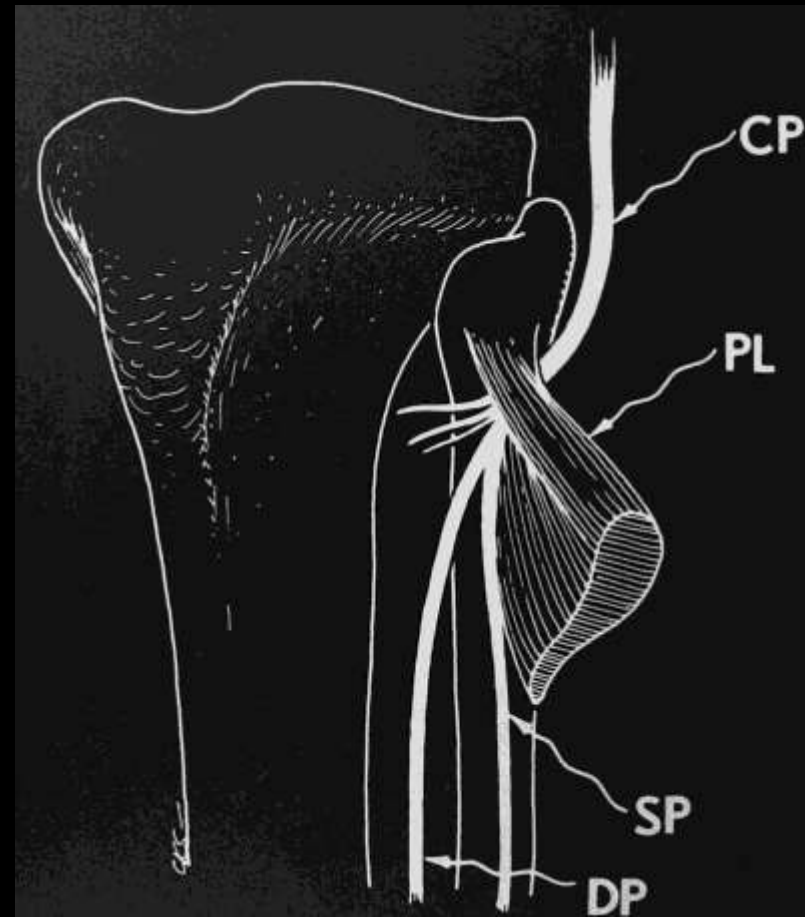


# Entrapment syndromes

## Common Peroneal Nerve

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- L4-S2
  - Popliteal fossa
  - Fibular tunnel

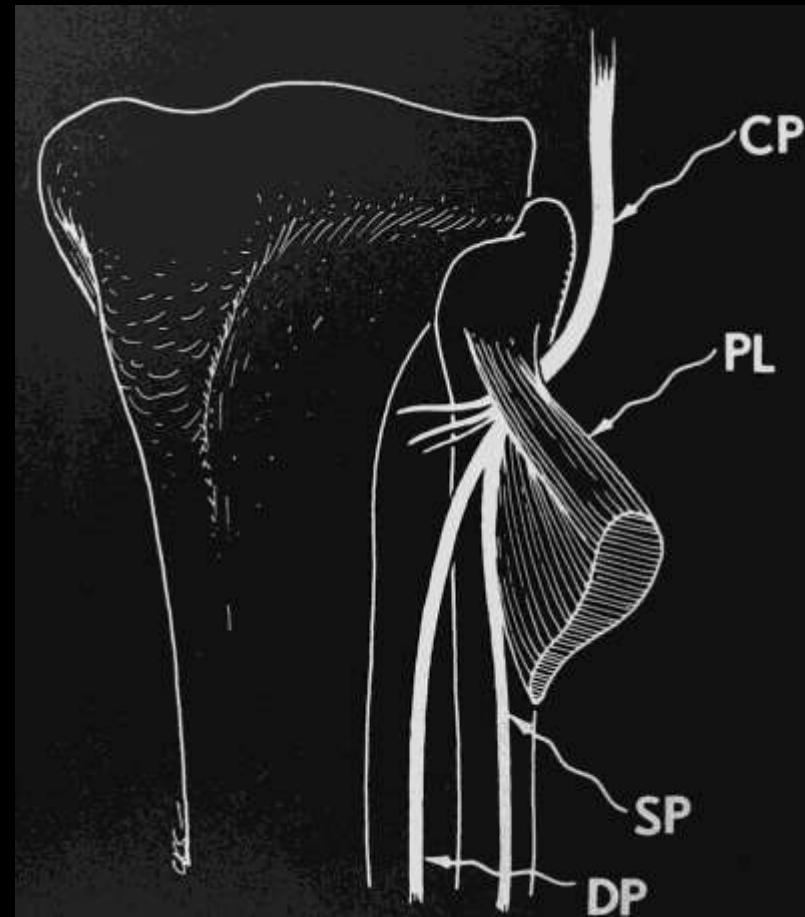


## Entrapment syndromes

# Common Peroneal Nerve - Causes

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- Habitual leg crossing
- Masses
  - Ganglia
- Fx
- Tight cast



## Entrapment syndromes

# Common Peroneal Nerve - Quick-Draw Leg

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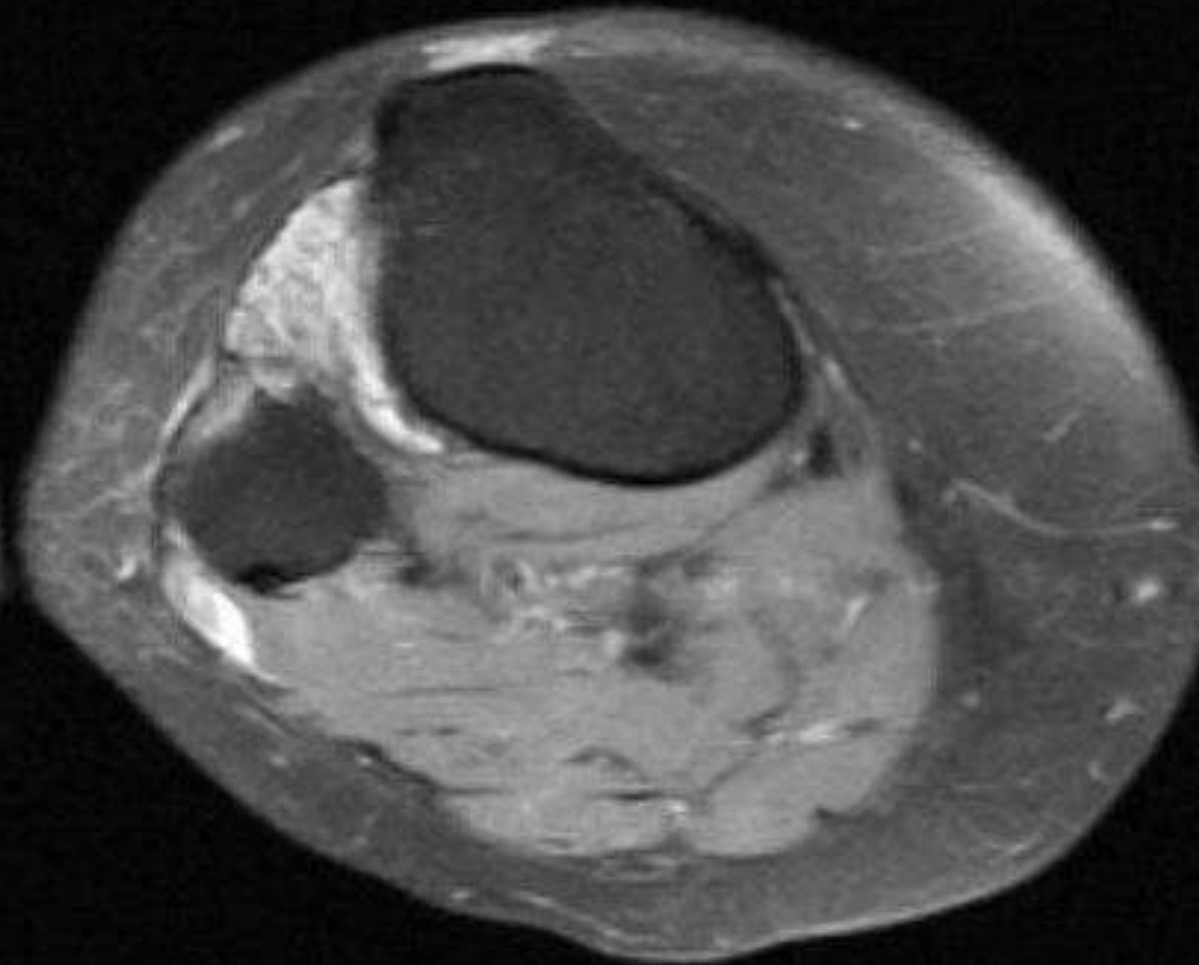
- Bullet wound in leg from practicing fast draw from gun in belt holster



# Entrapment syndromes

## Common Peroneal Nerve

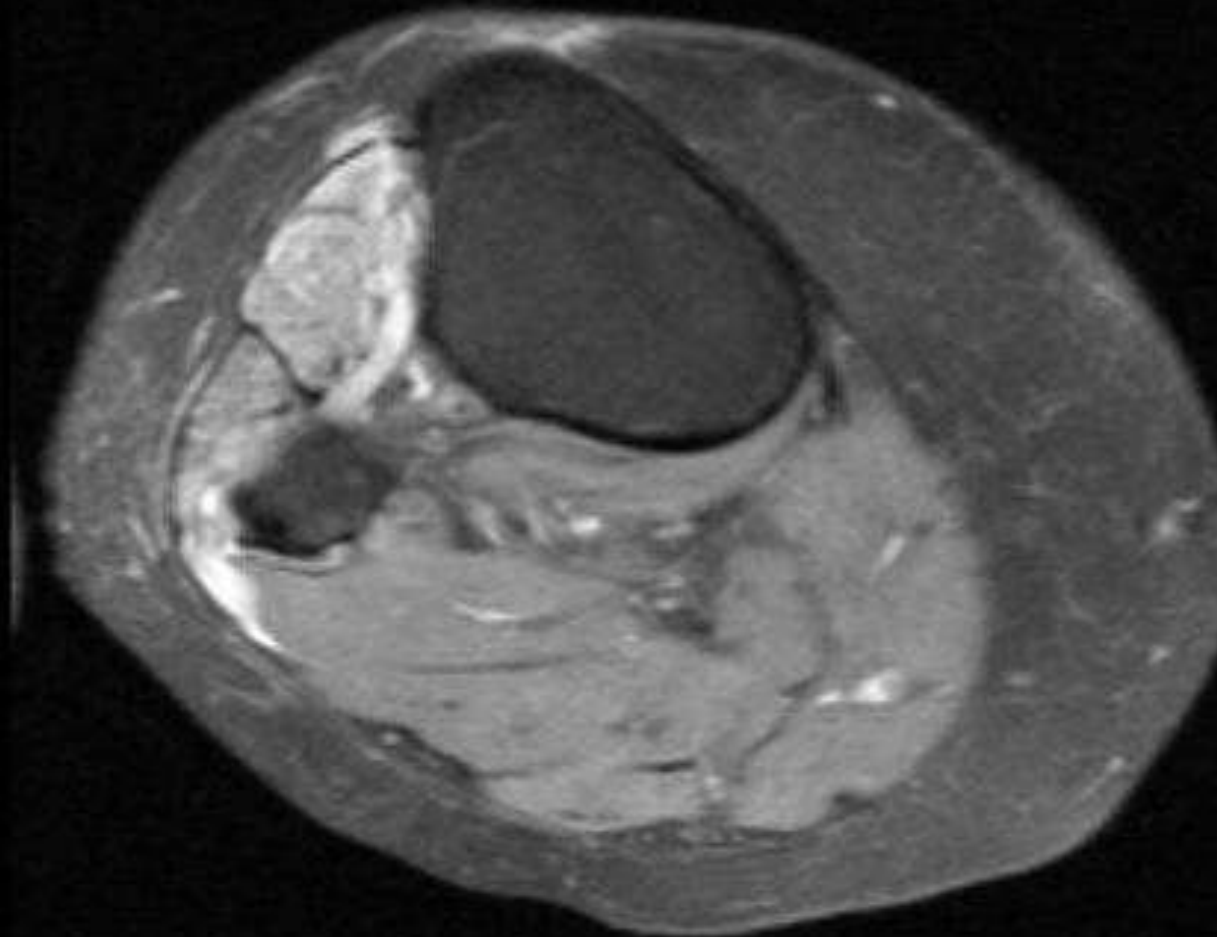
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# Entrapment syndromes

## Common Peroneal Nerve

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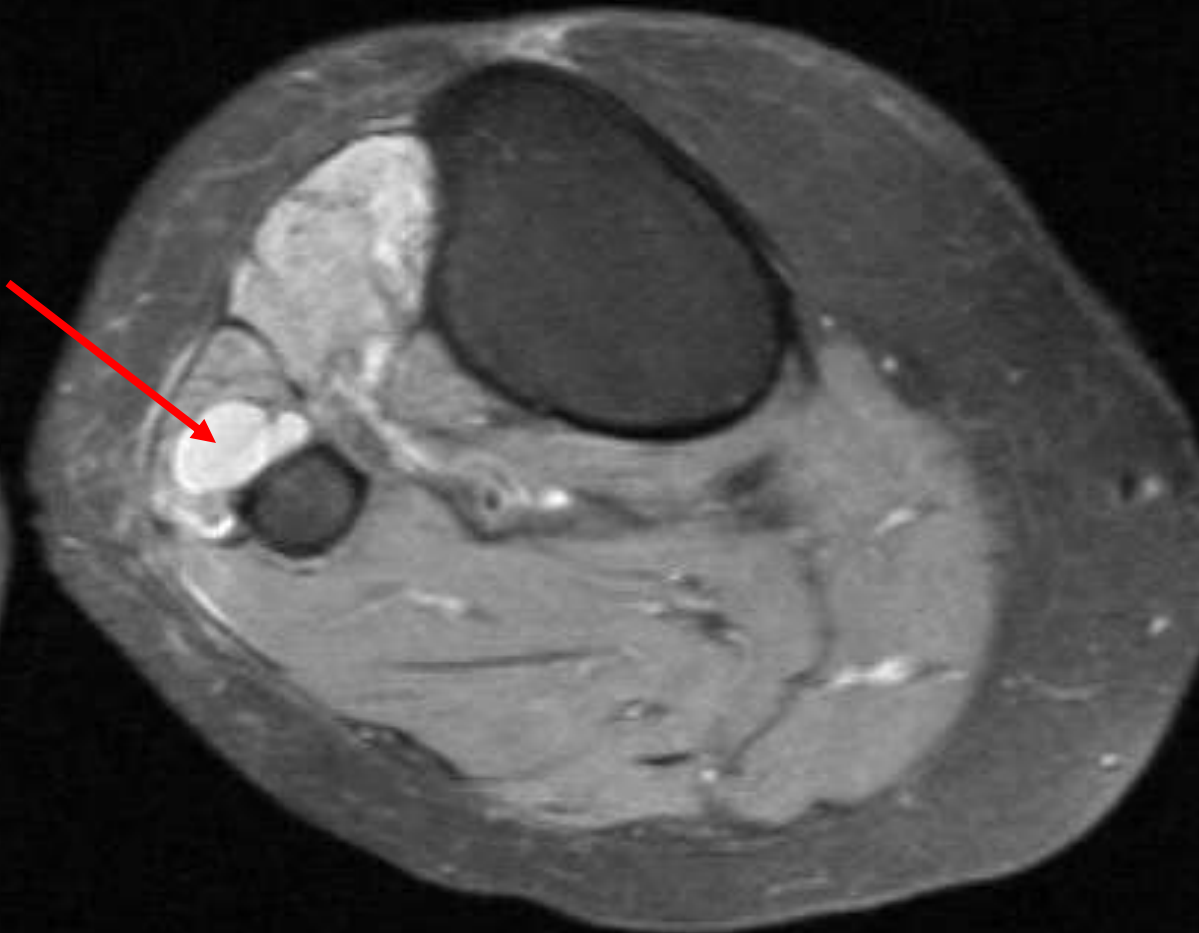


# Entrapment syndromes

## Common Peroneal Nerve

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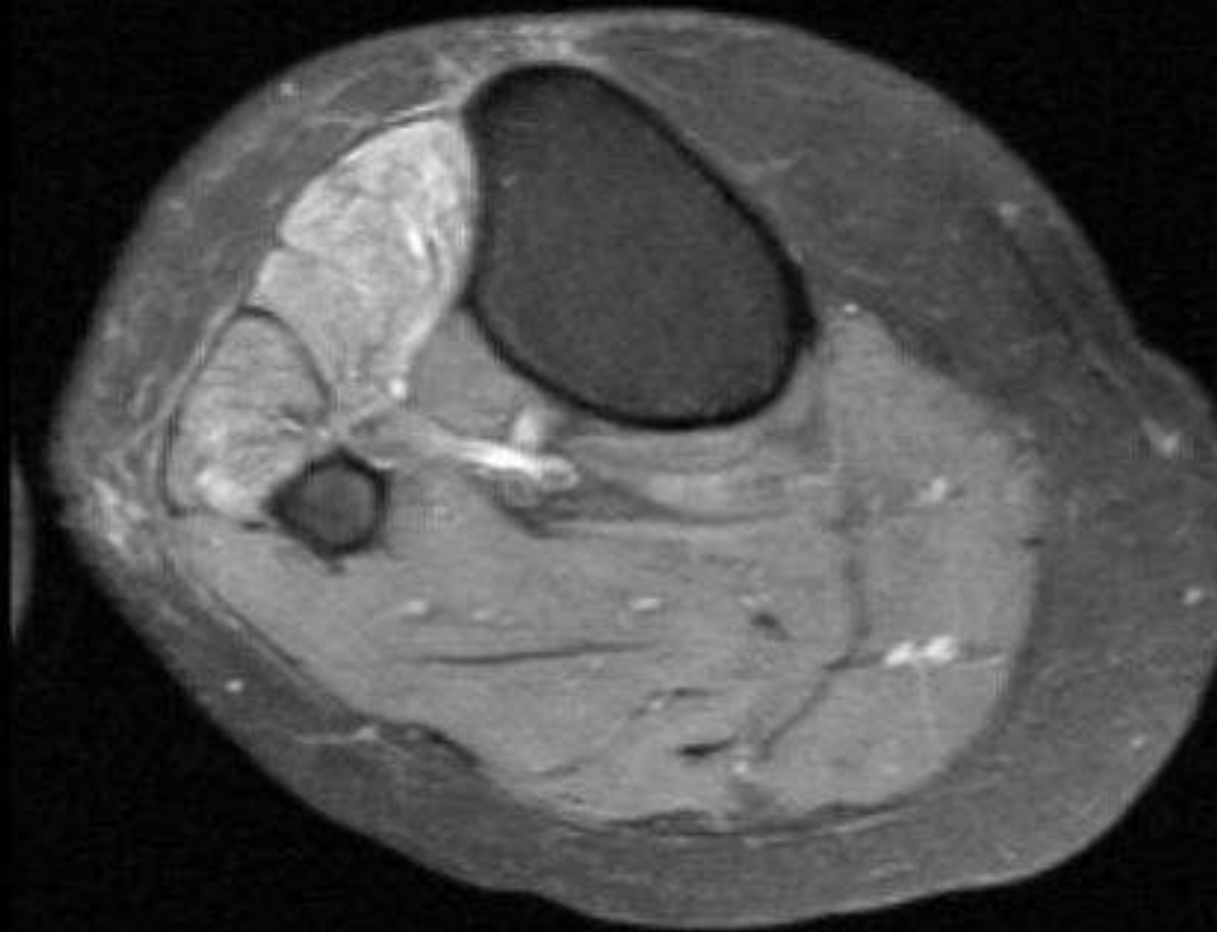
Ganglion Cyst



# Entrapment syndromes

## Common Peroneal Nerve

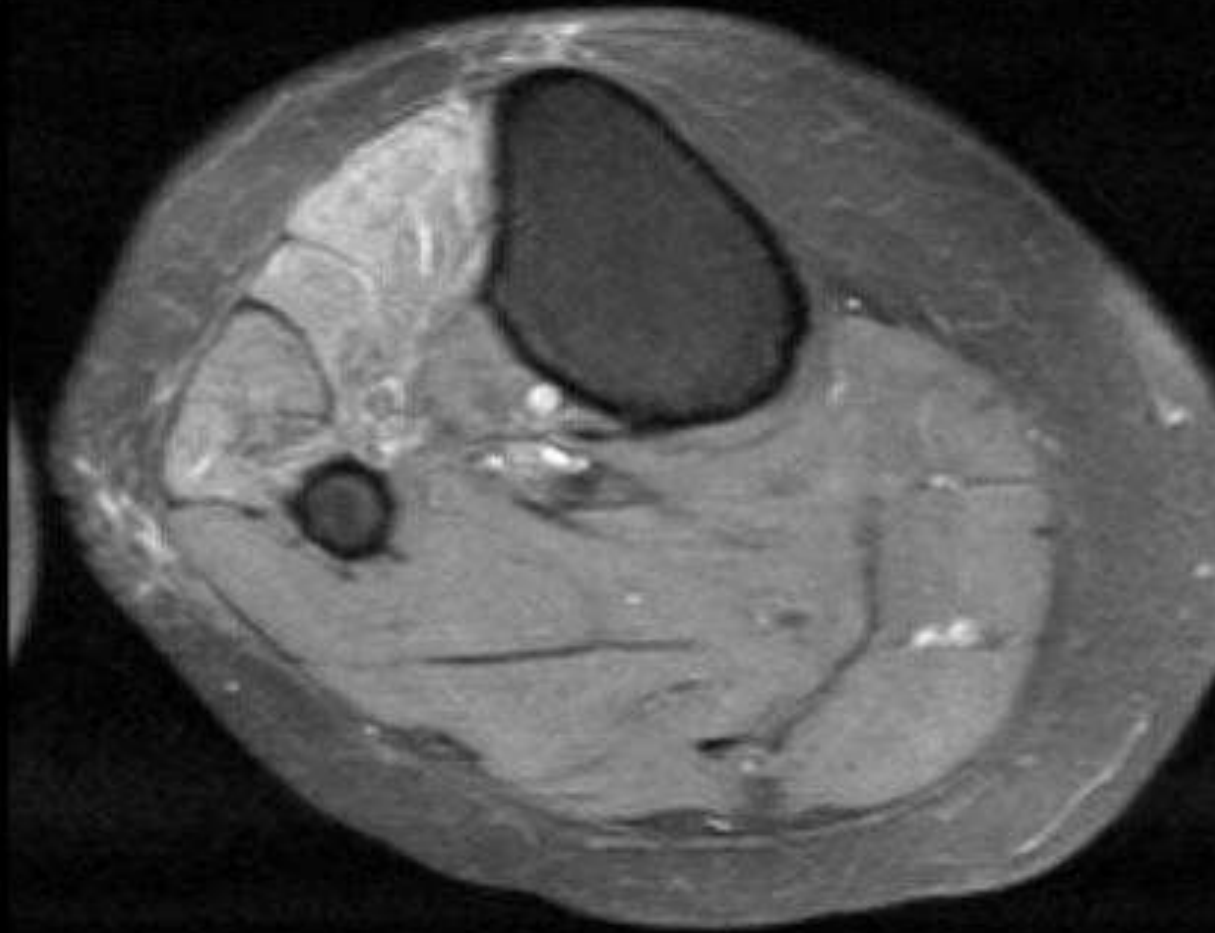
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# Entrapment syndromes

## Common Peroneal Nerve

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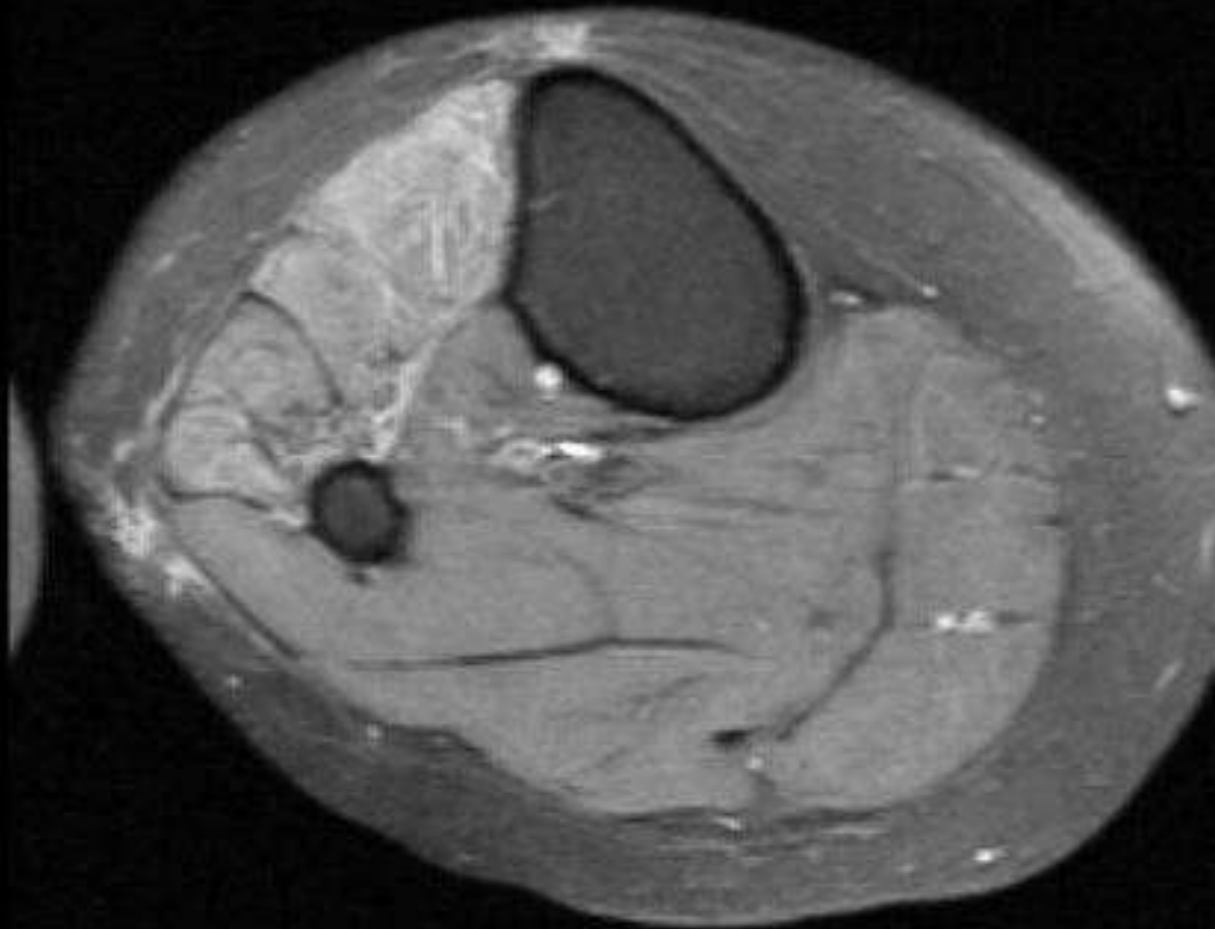
Ax PDFS

55F

# Entrapment syndromes

## Common Peroneal Nerve

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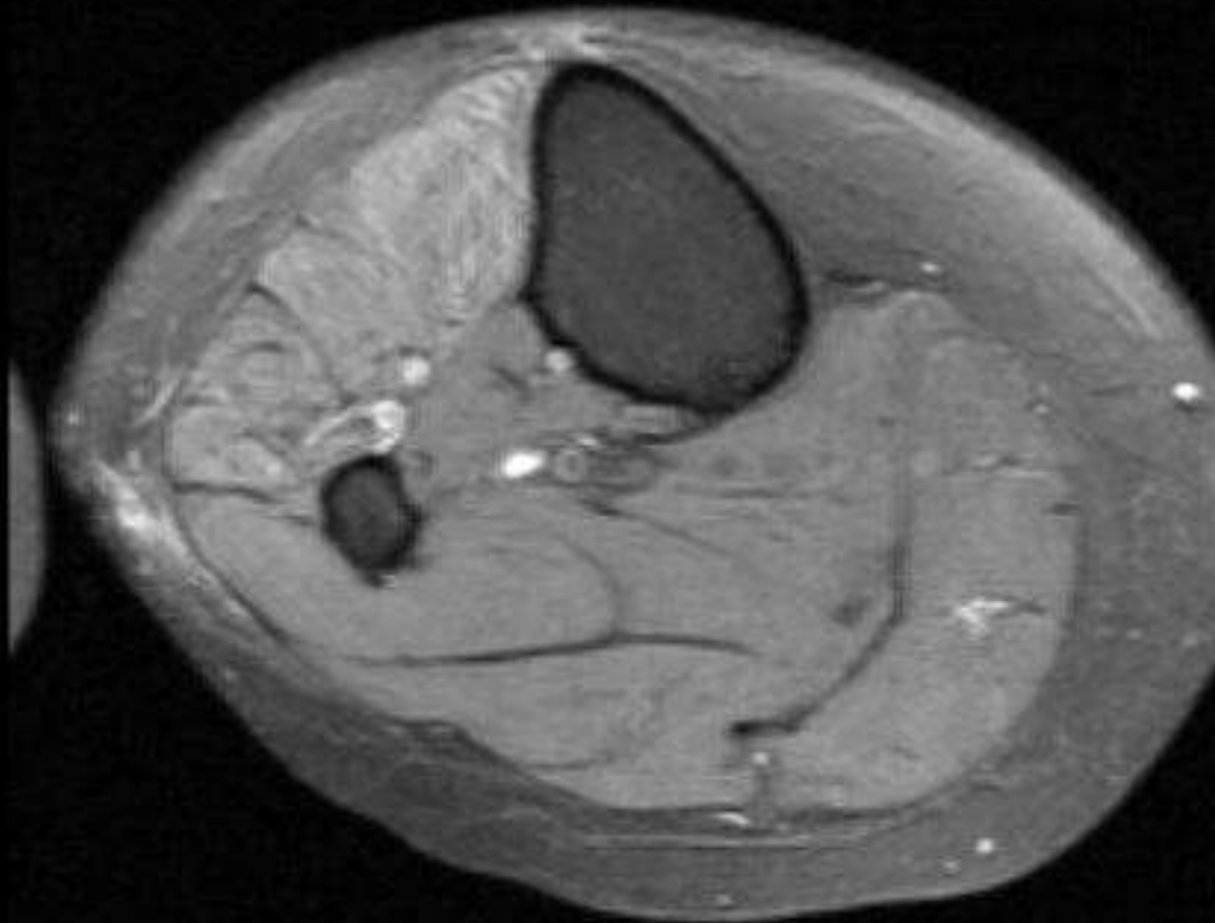


Ax PDFS

# Entrapment syndromes

## Common Peroneal Nerve

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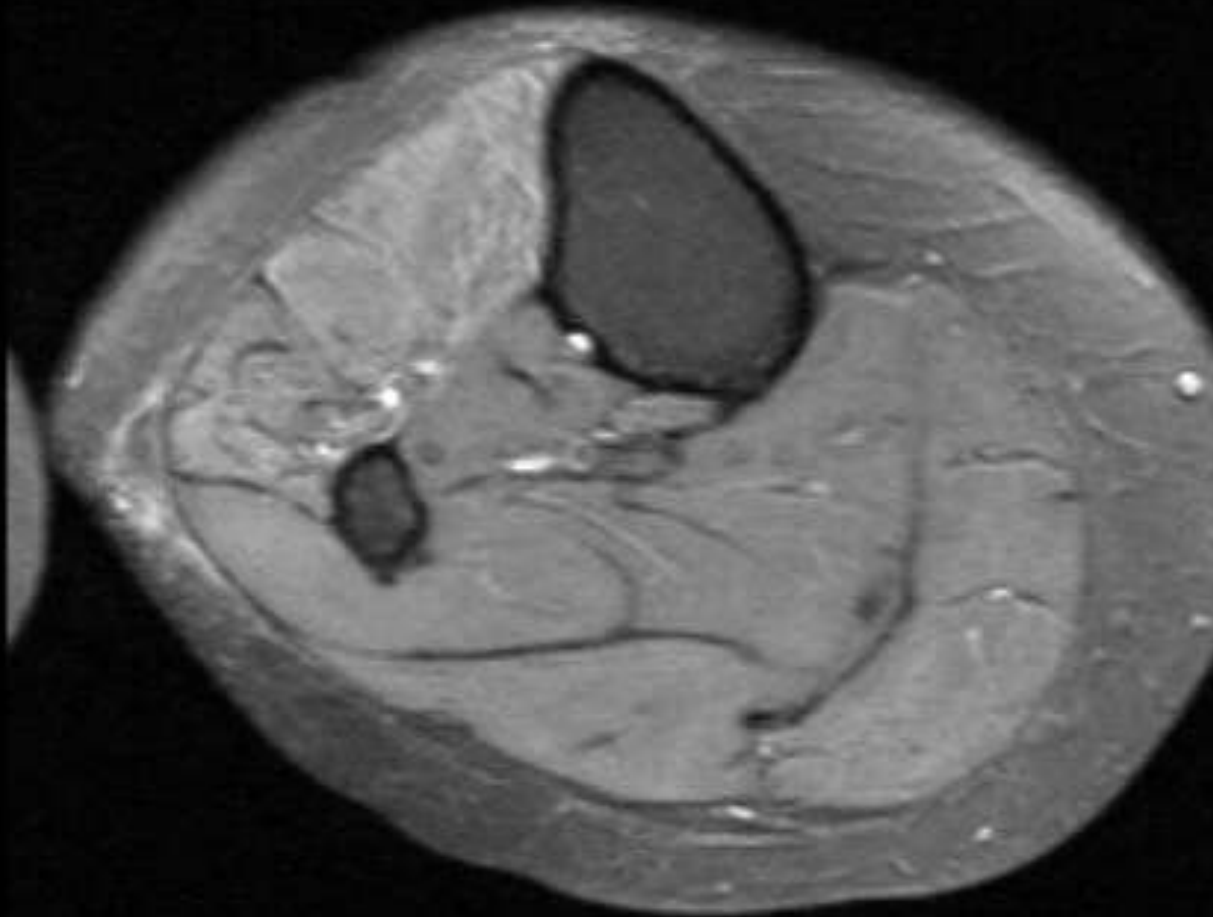
Ax PDFS

55F

# Entrapment syndromes

## Common Peroneal Nerve

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Ax PDFS

55F

1

# Entrapment syndromes

## Common Peroneal Nerve

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Tibialis anterior

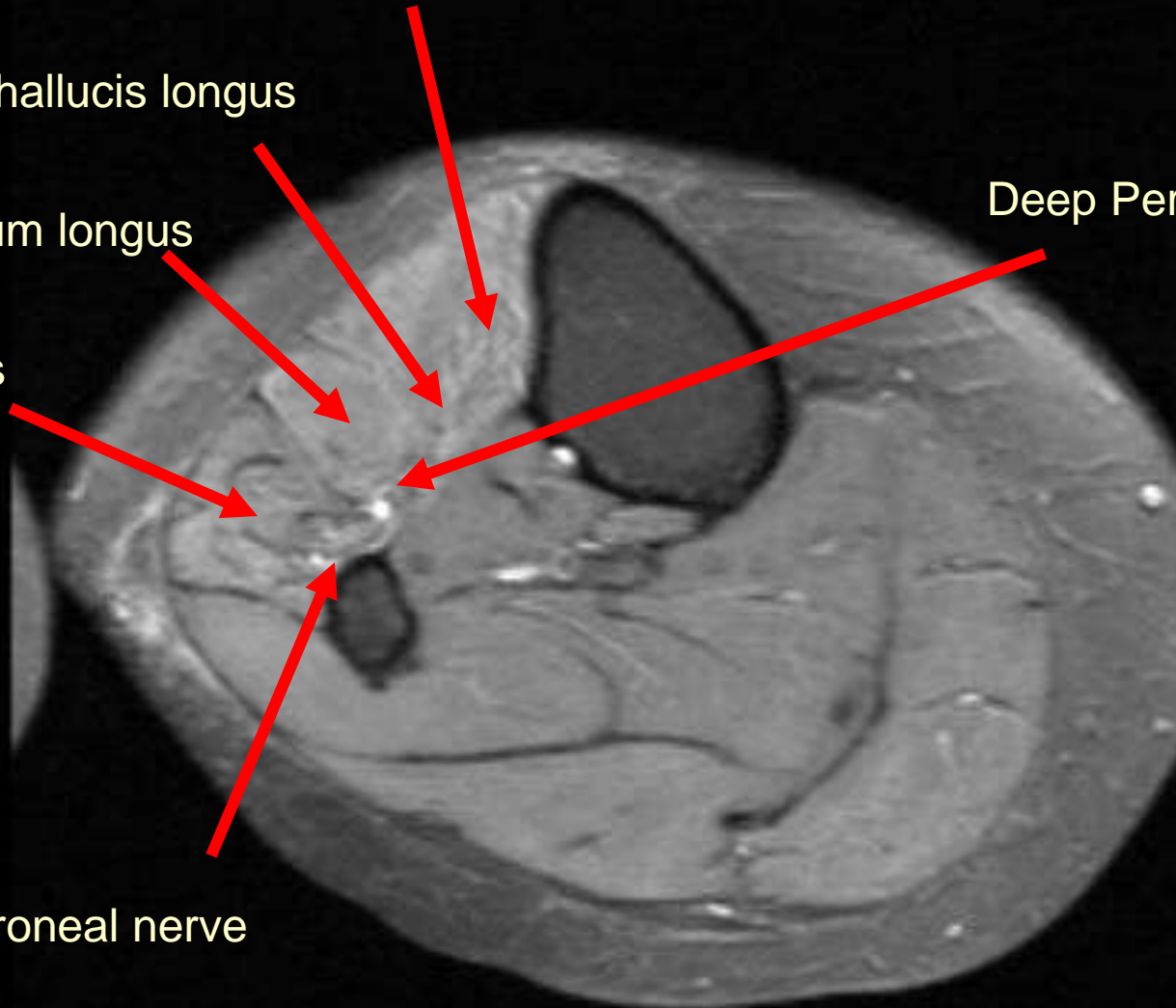
Extensor hallucis longus

Extensor digitorum longus

Peroneus longus

Deep Peroneal nerve

Superficial Peroneal nerve





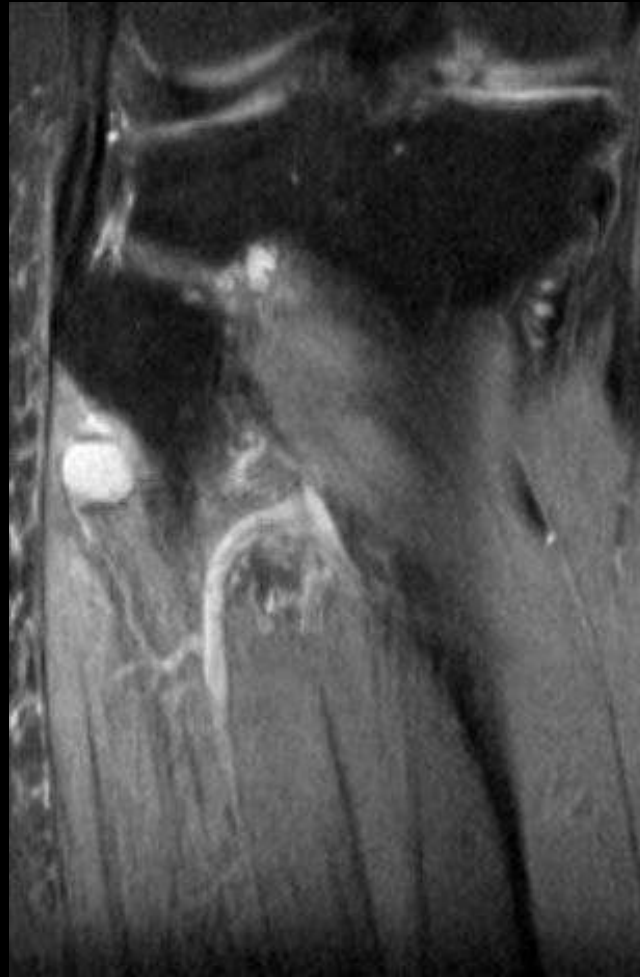
# Entrapment syndromes

## Common Peroneal Nerve

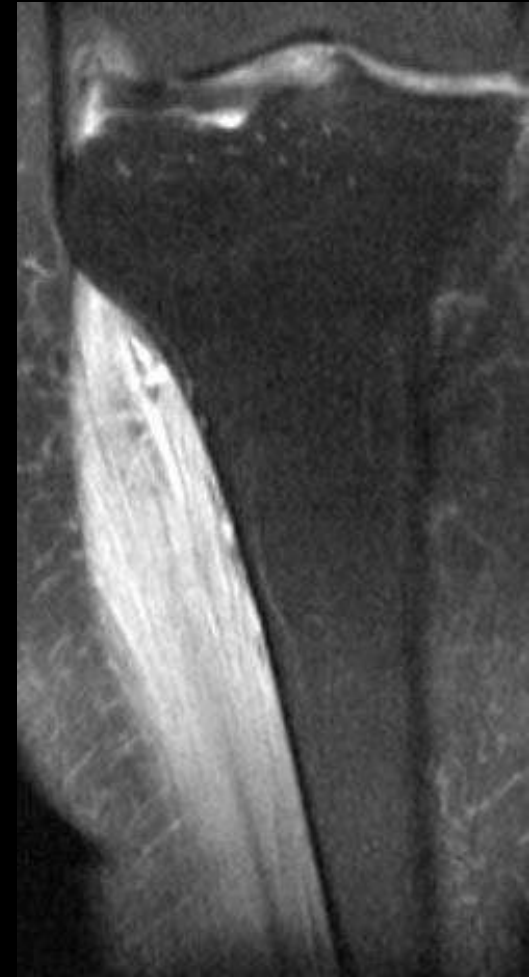
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Cor T1



Cor PDFS



# Entrapment syndromes

## Common Peroneal Nerve

- Deep peroneal nerve
  - Tibialis anterior
  - Extensor hallucis longus
  - Extensor digitorum longus
  - Peroneus tertius
- Superficial peroneal nerve
  - Peroneus longus
  - Peroneus brevis



# Entrapment syndromes

## Common Peroneal Nerve

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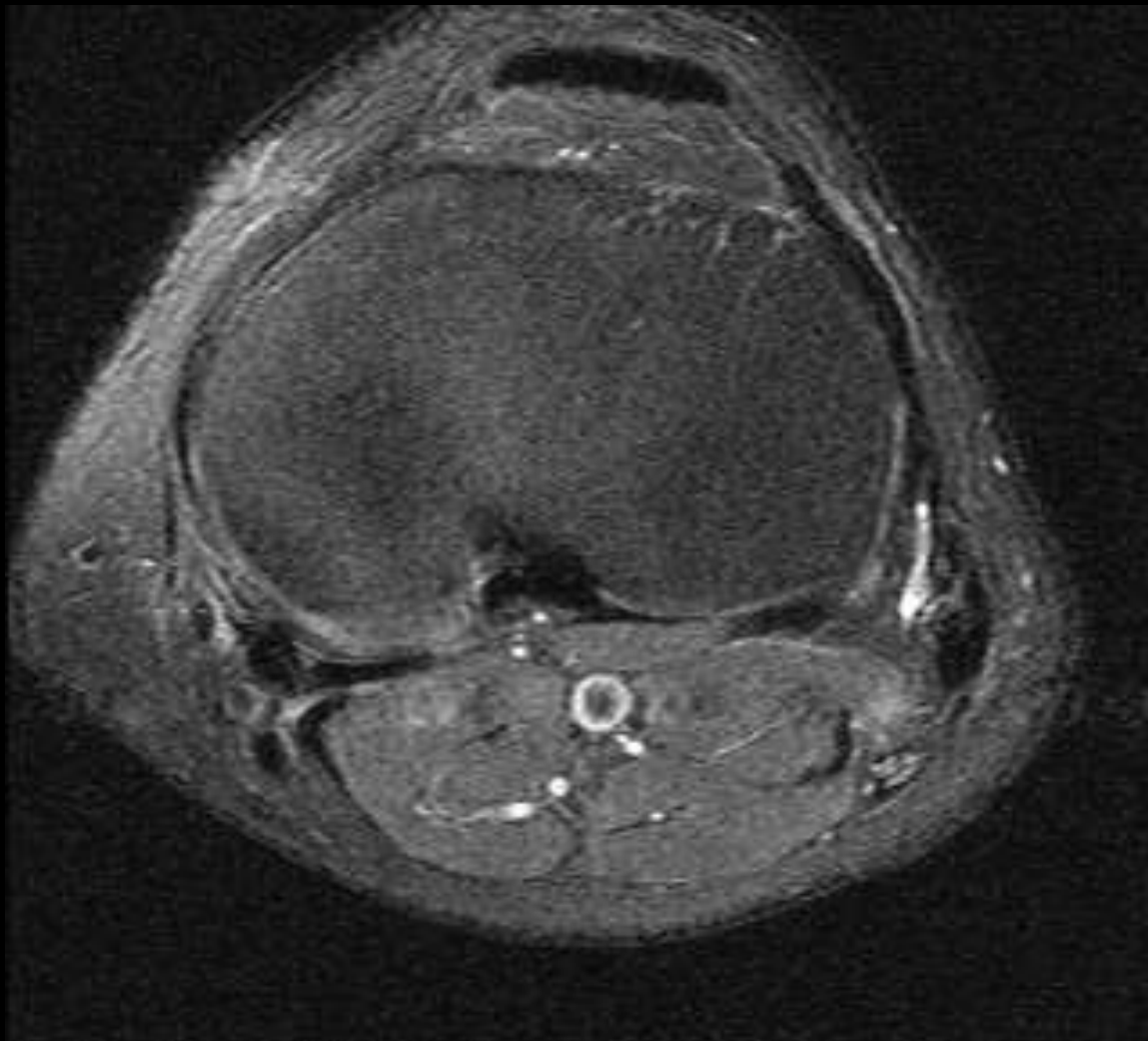


Sept 06

# Entrapment syndromes

## Common Peroneal Nerve

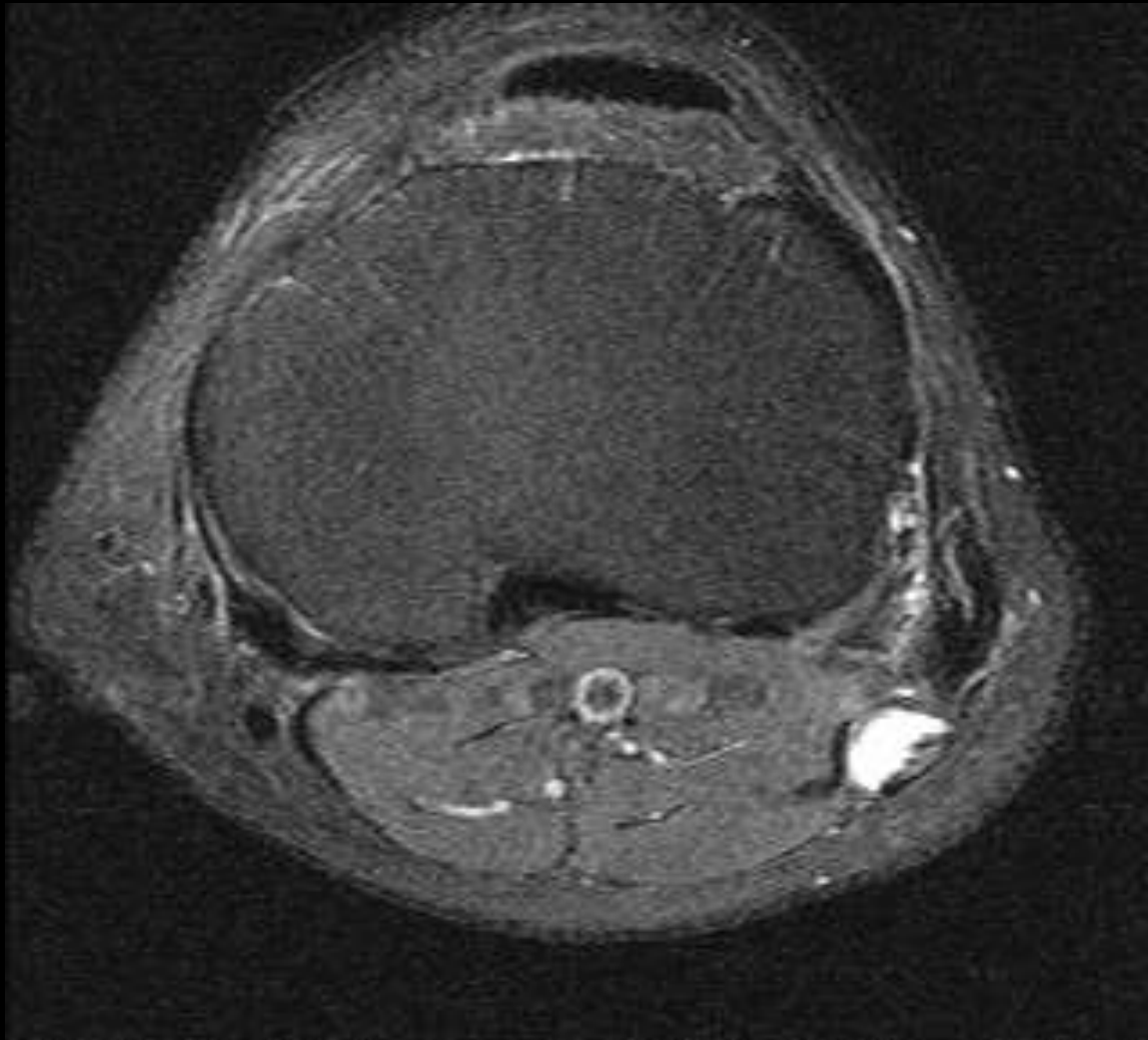
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# Entrapment syndromes

## Common Peroneal Nerve

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# Entrapment syndromes

## Common Peroneal Nerve

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# Entrapment syndromes

## Common Peroneal Nerve

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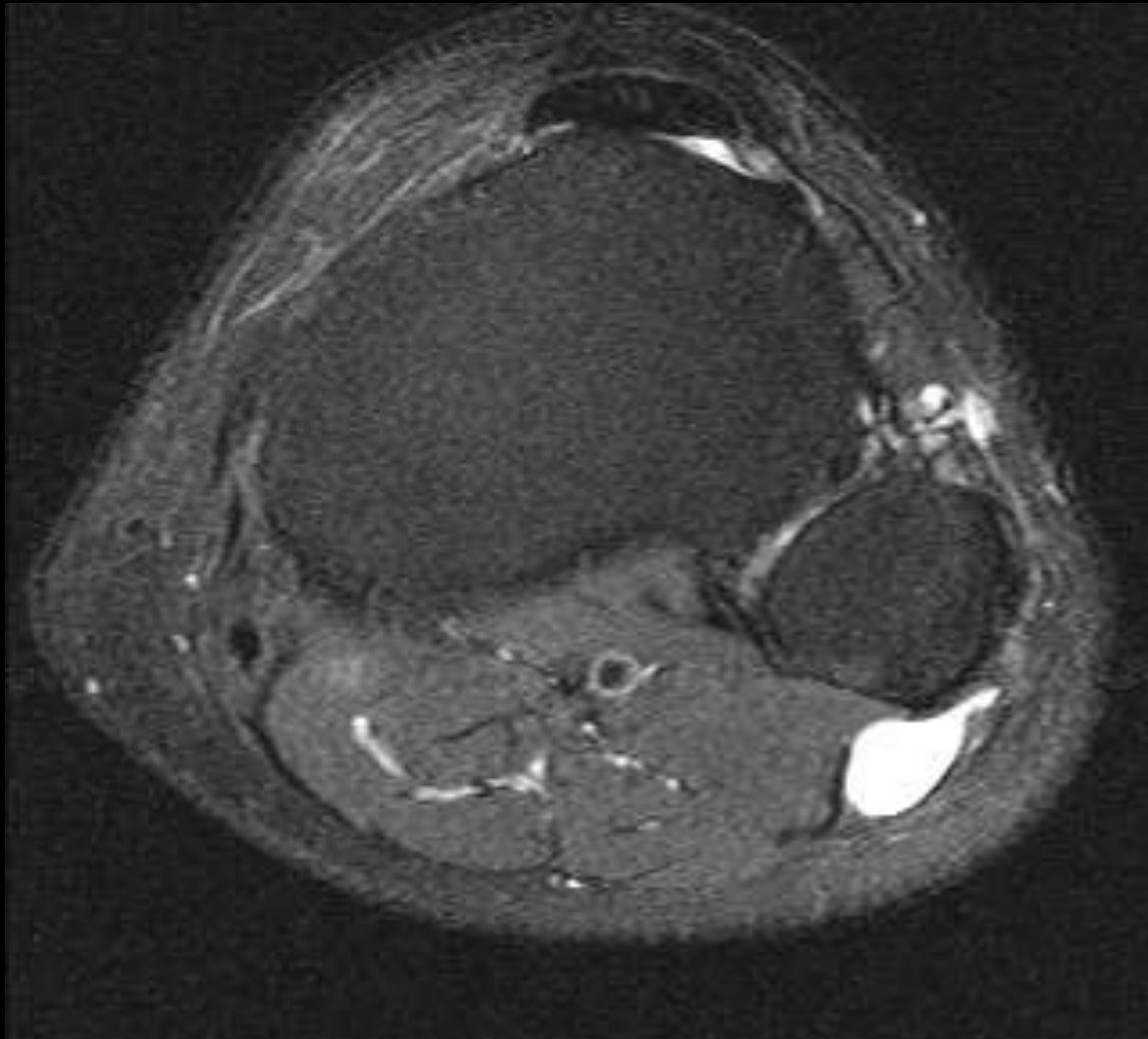




# Entrapment syndromes

## Common Peroneal Nerve

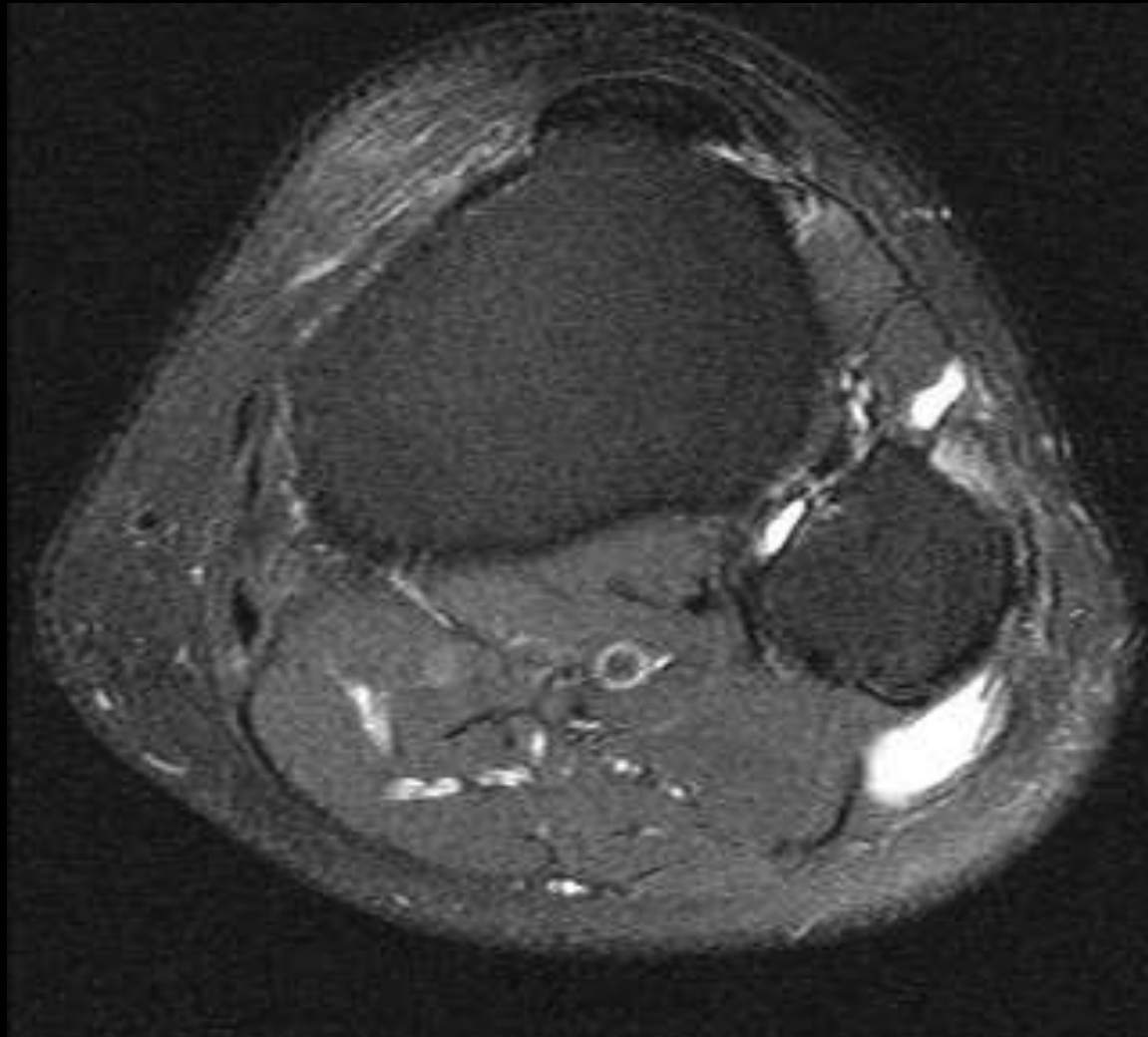
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# Entrapment syndromes

## Common Peroneal Nerve

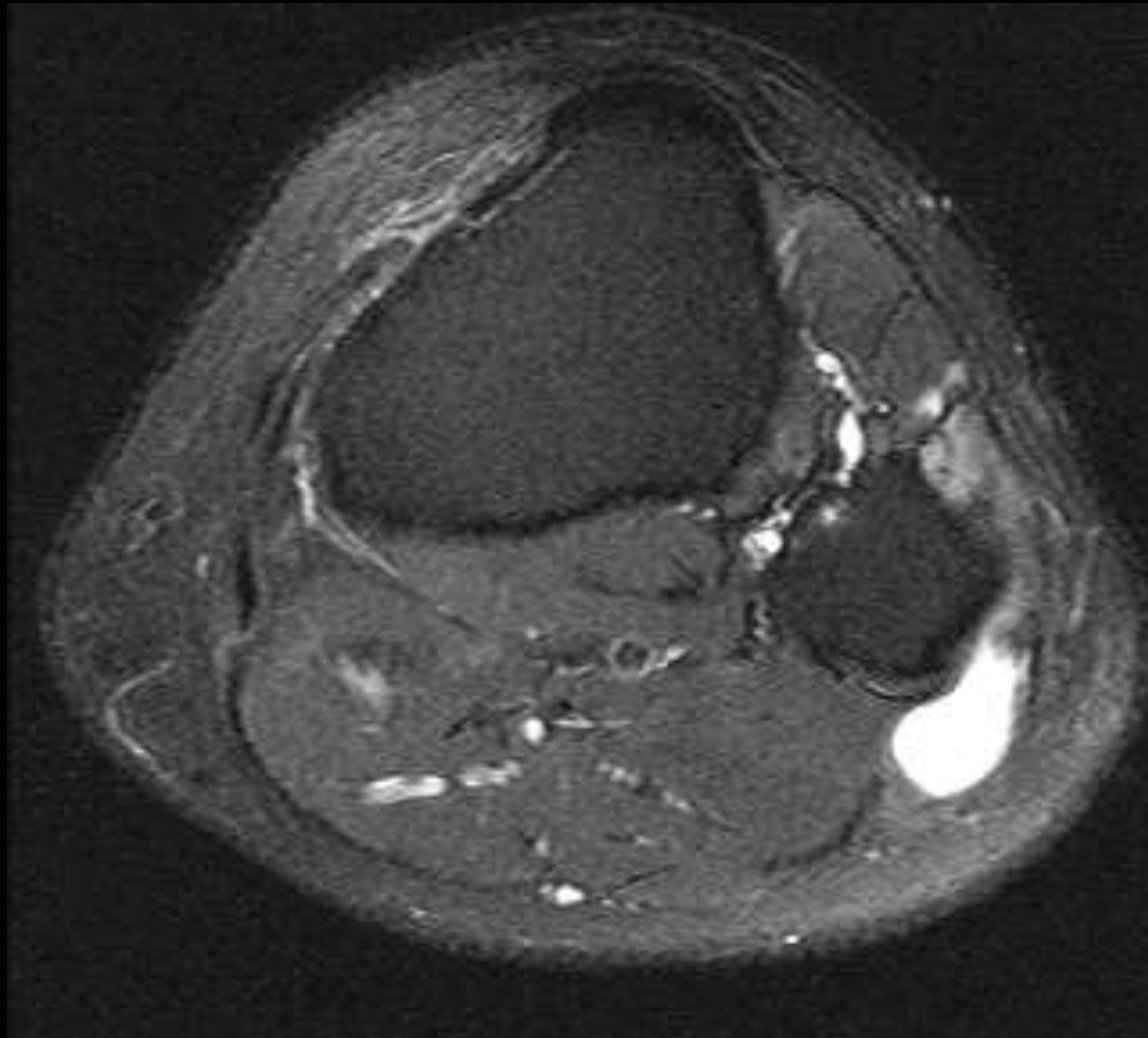
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# Entrapment syndromes

## Common Peroneal Nerve

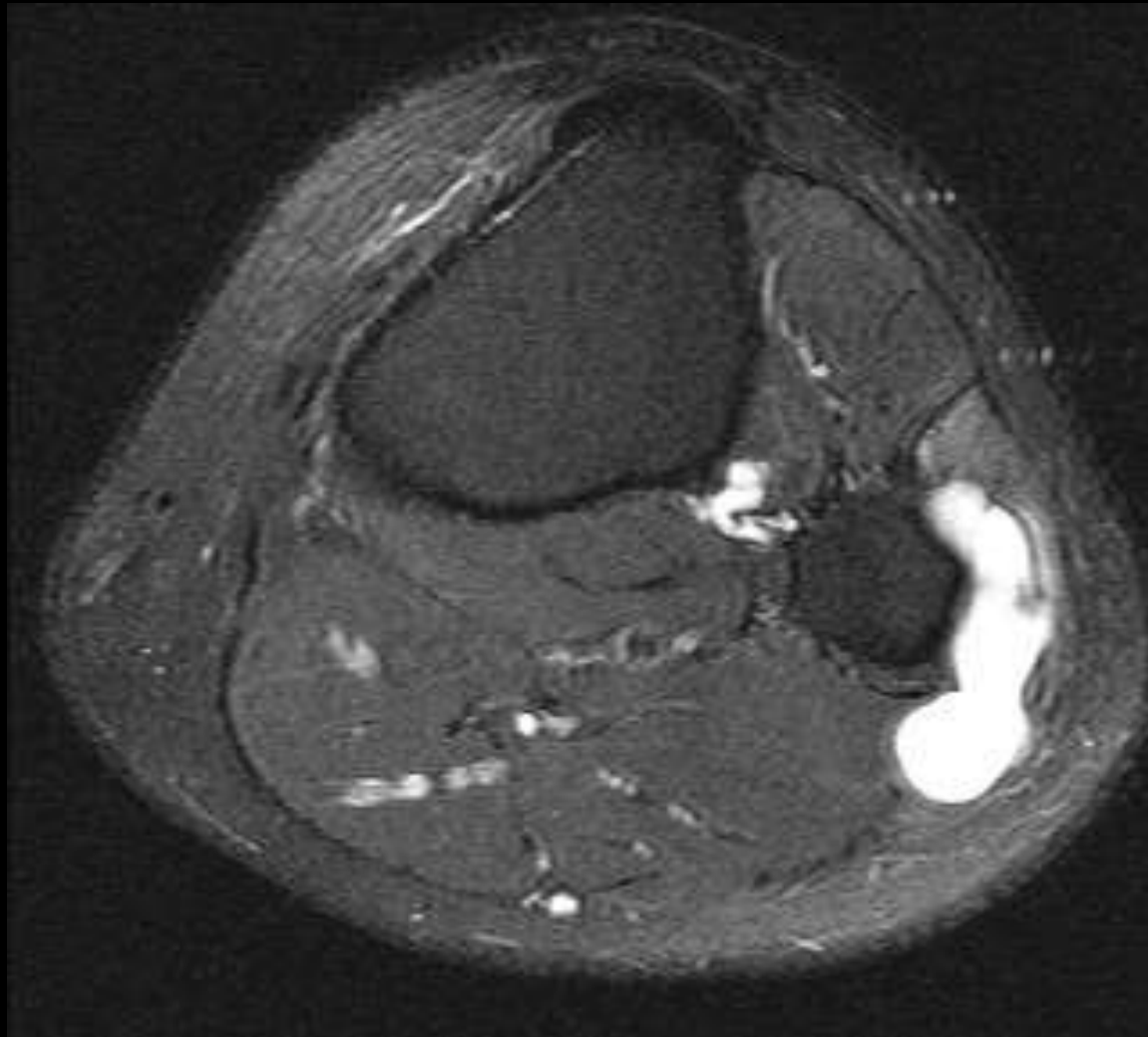
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# Entrapment syndromes

## Common Peroneal Nerve

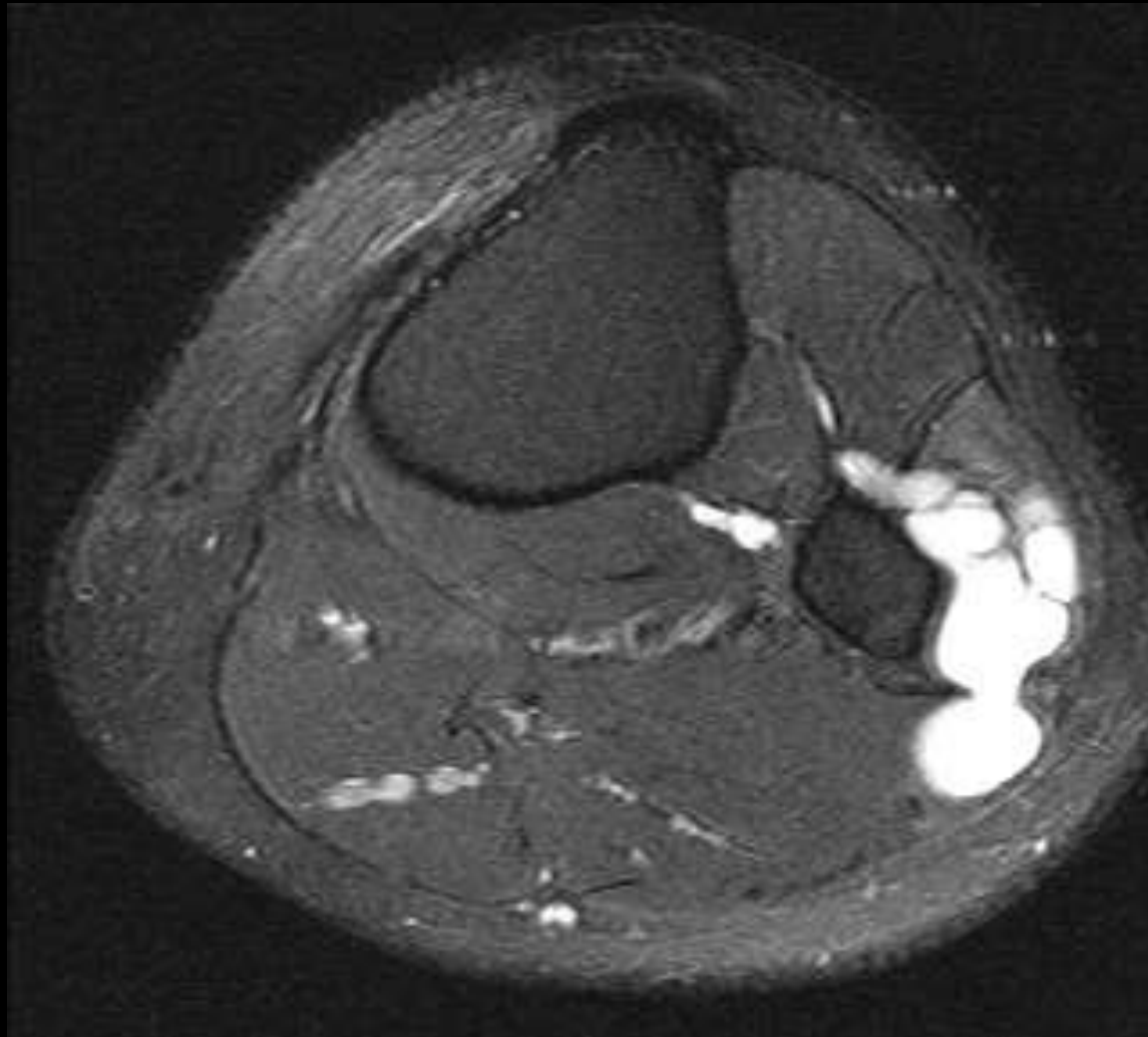
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# Entrapment syndromes

## Common Peroneal Nerve

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# Entrapment syndromes

## Common Peroneal Nerve

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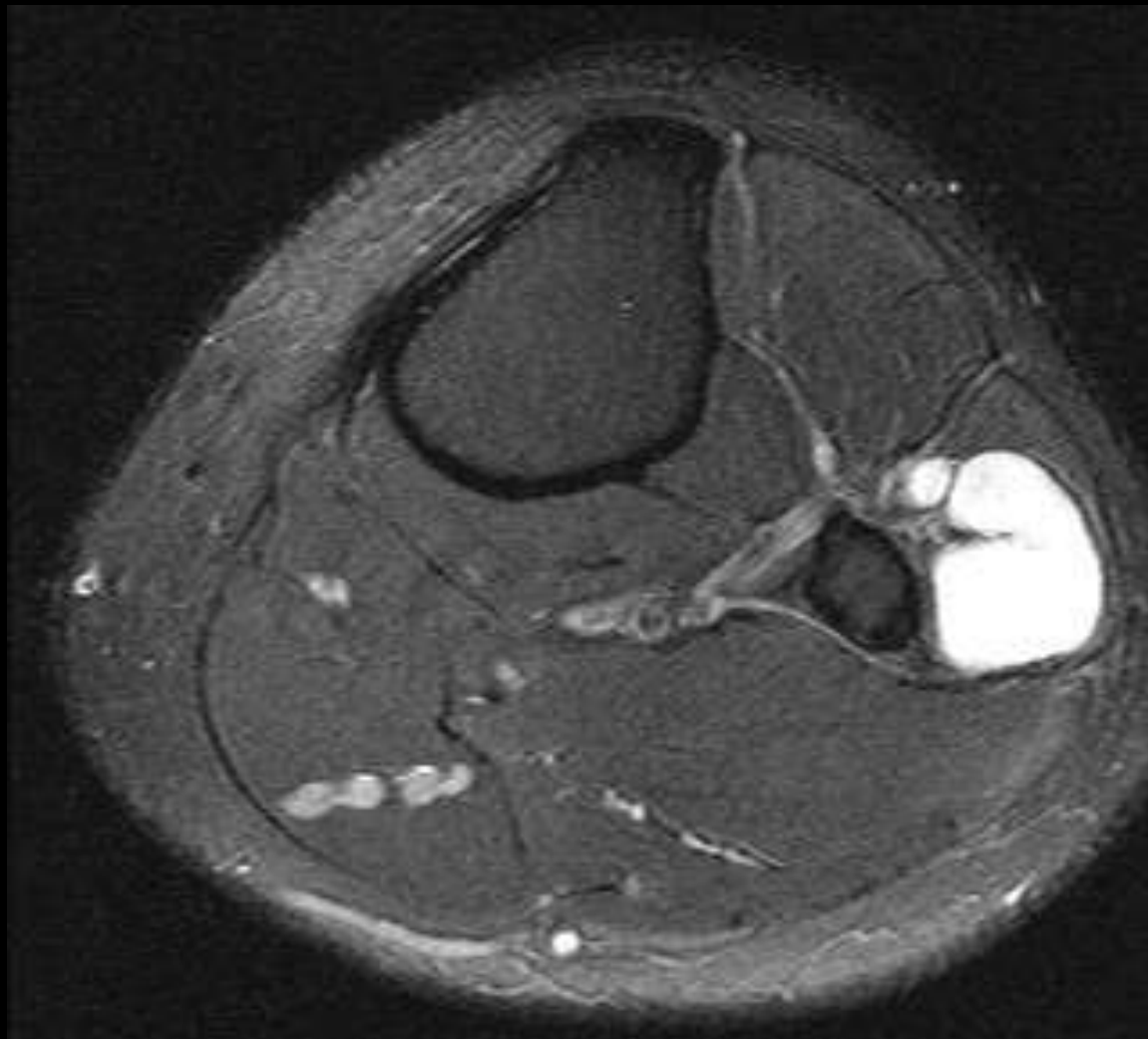




# Entrapment syndromes

## Common Peroneal Nerve

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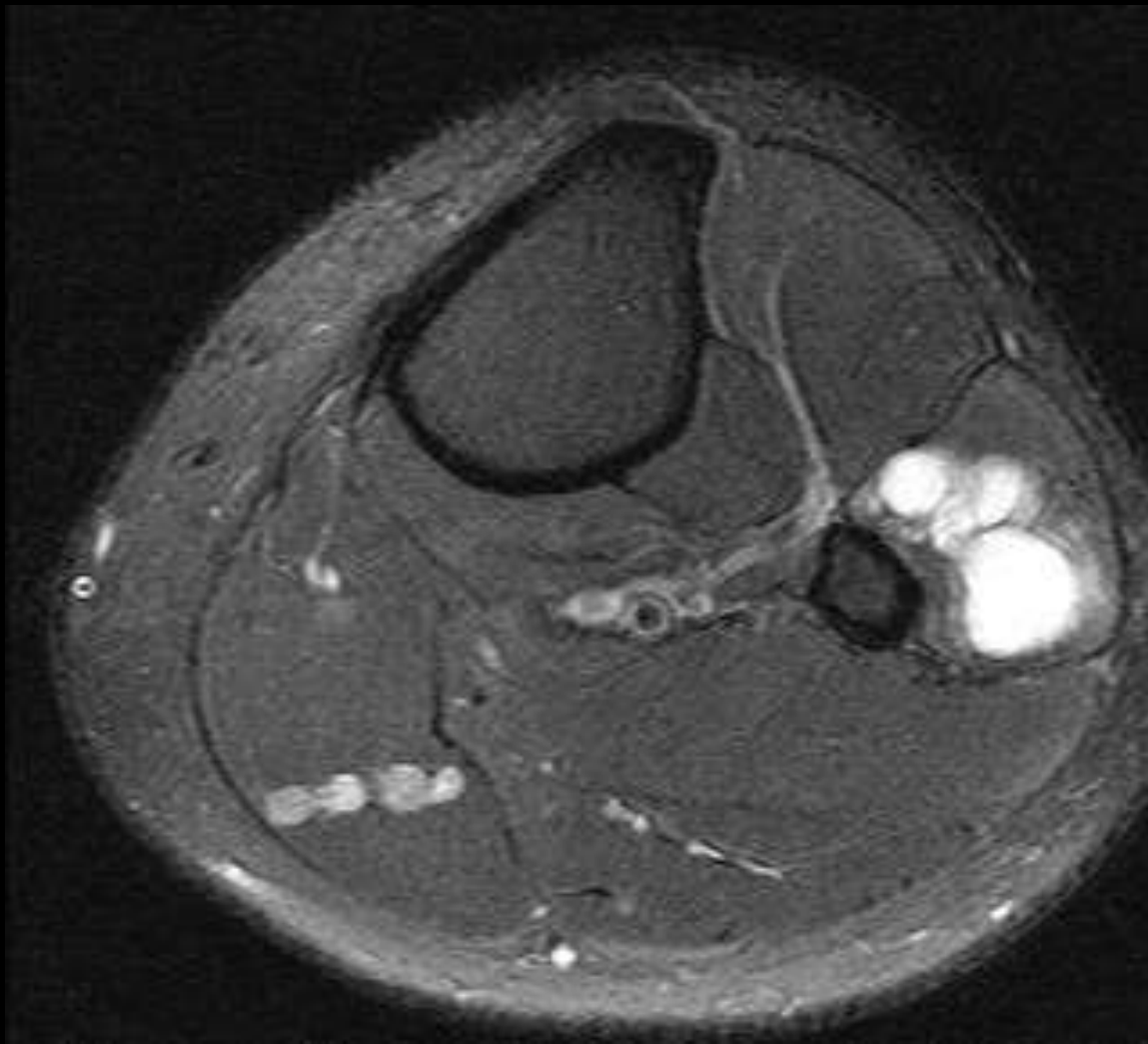




# Entrapment syndromes

## Common Peroneal Nerve

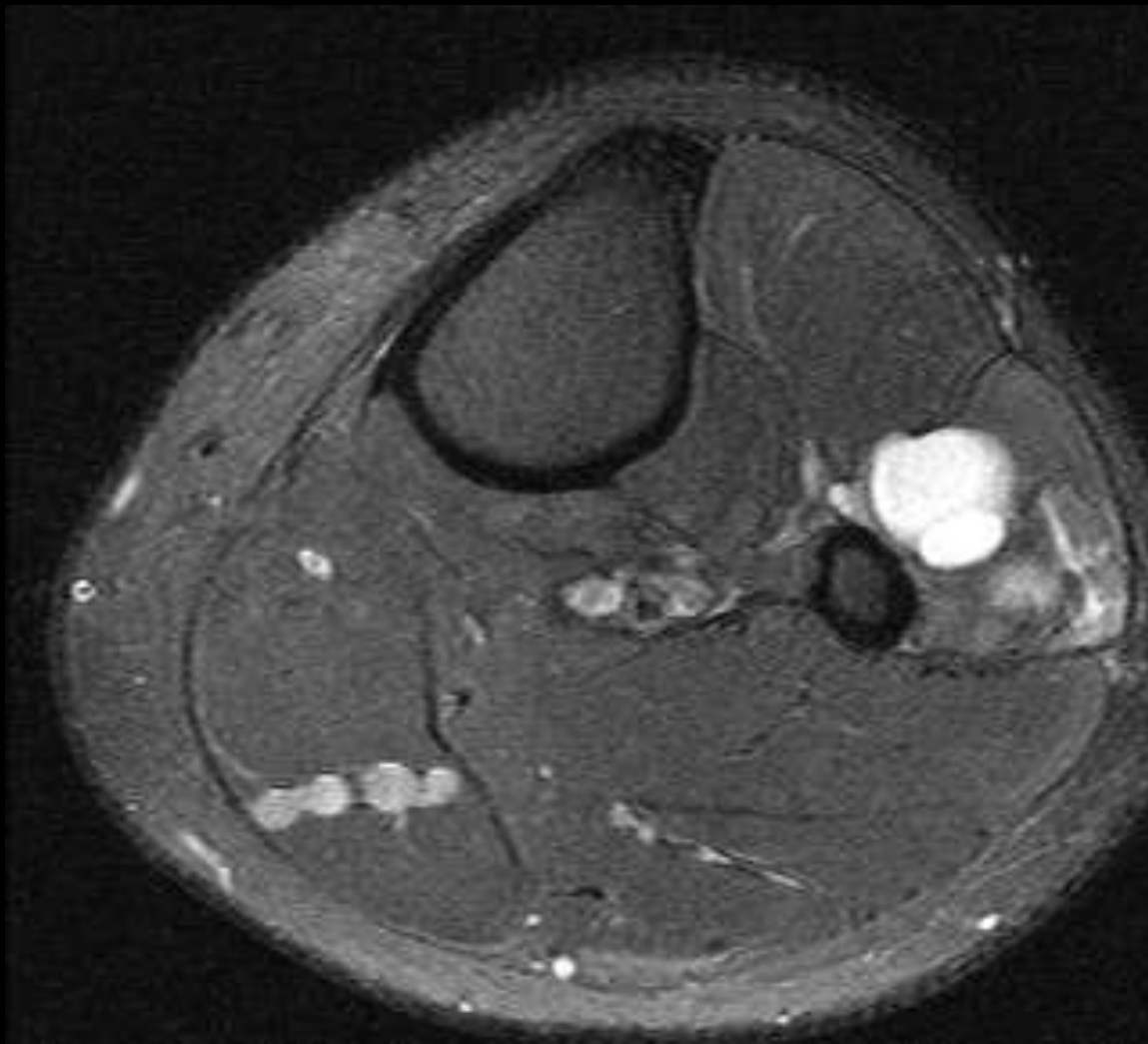
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# Entrapment syndromes

## Common Peroneal Nerve

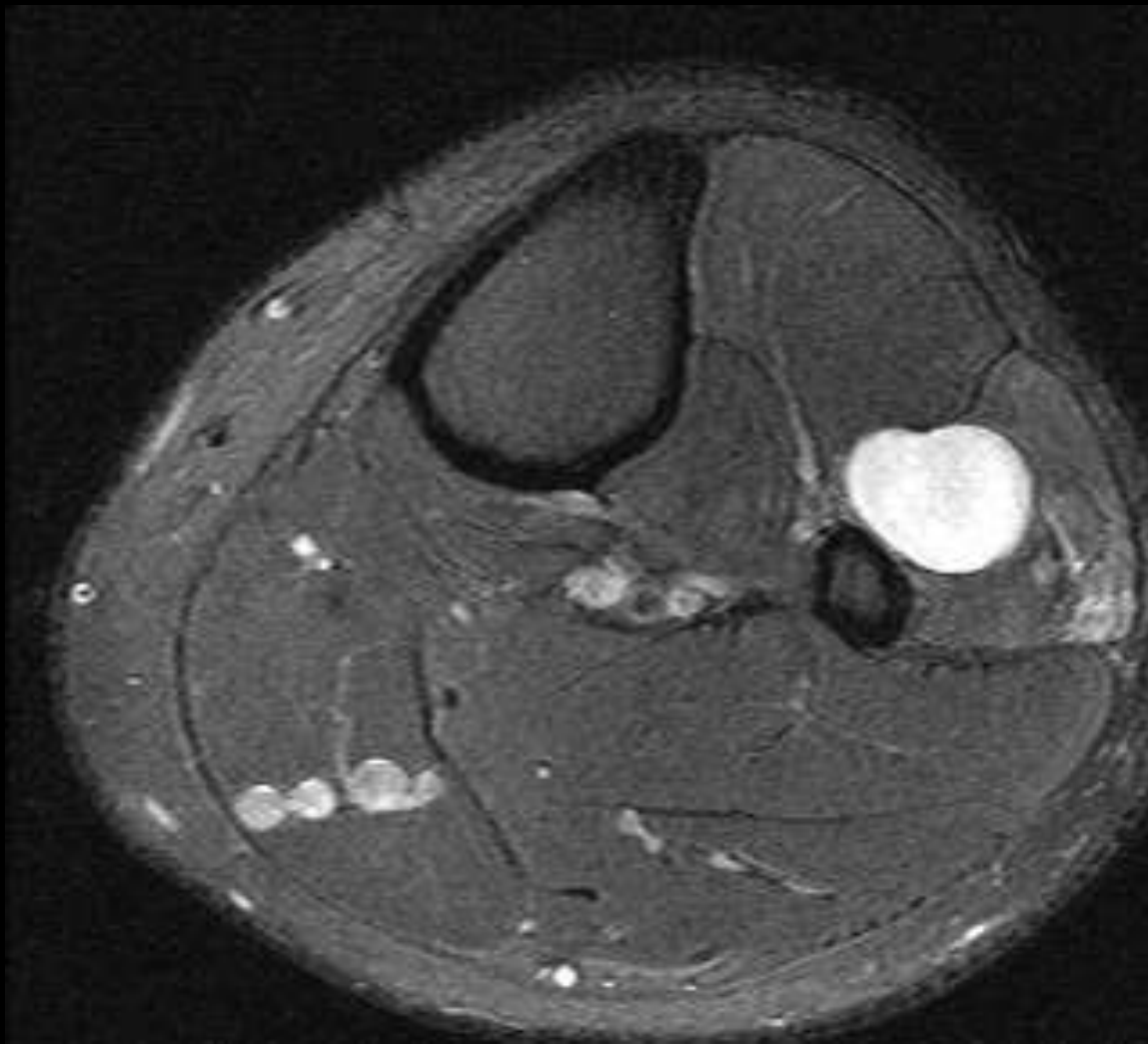
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# Entrapment syndromes

## Common Peroneal Nerve

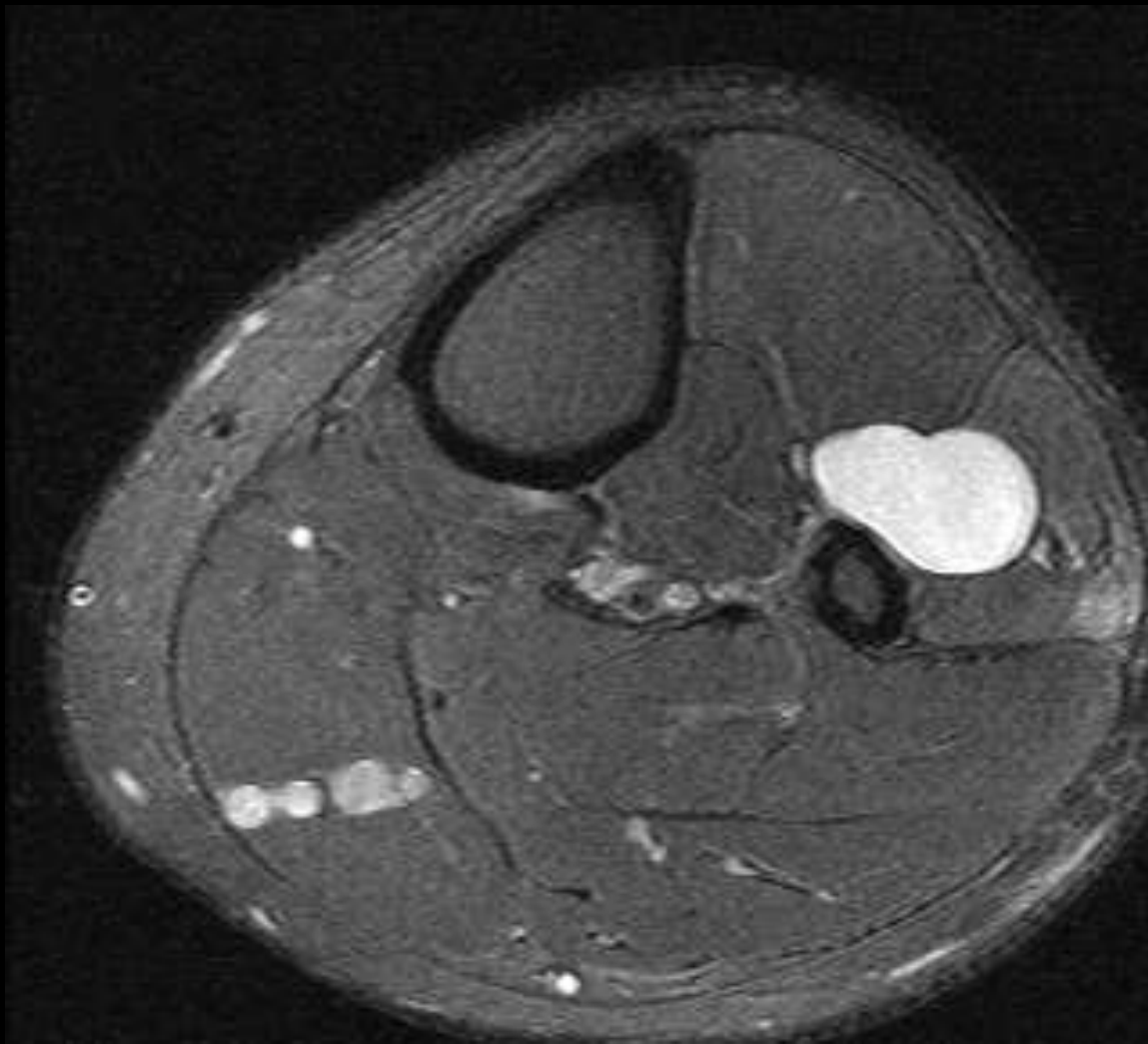
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# Entrapment syndromes

## Common Peroneal Nerve

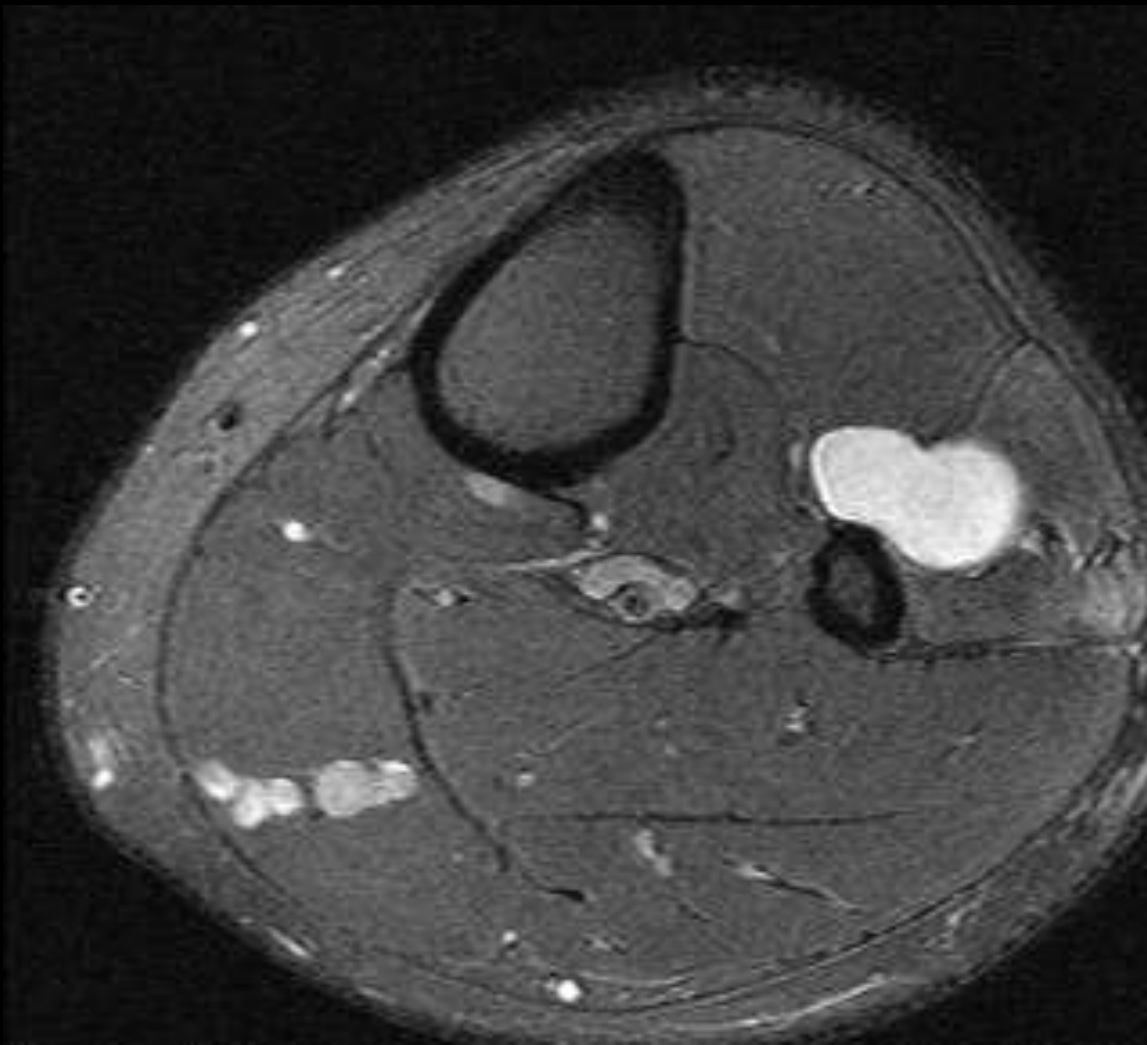
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# Entrapment syndromes

## Common Peroneal Nerve

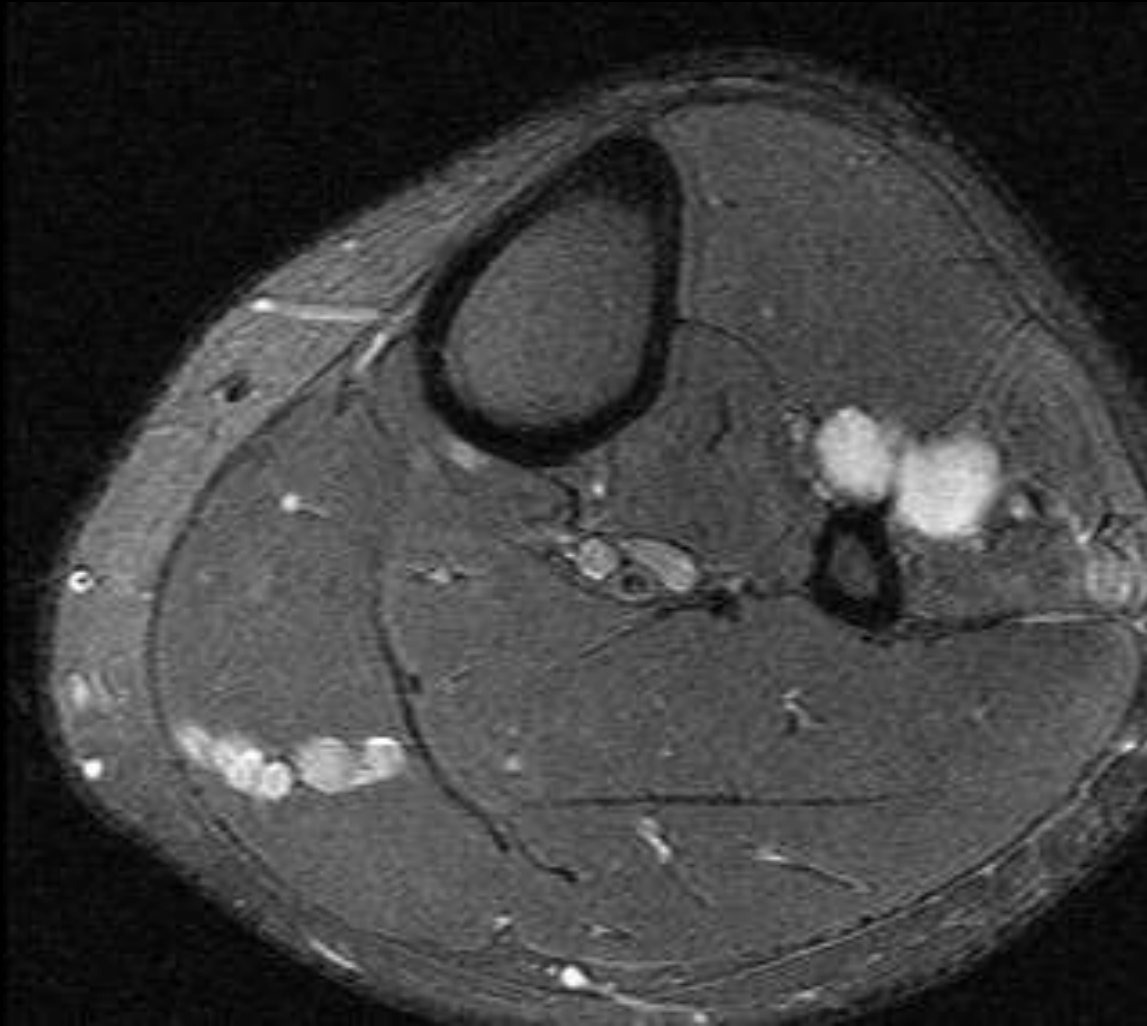
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# Entrapment syndromes

## Common Peroneal Nerve

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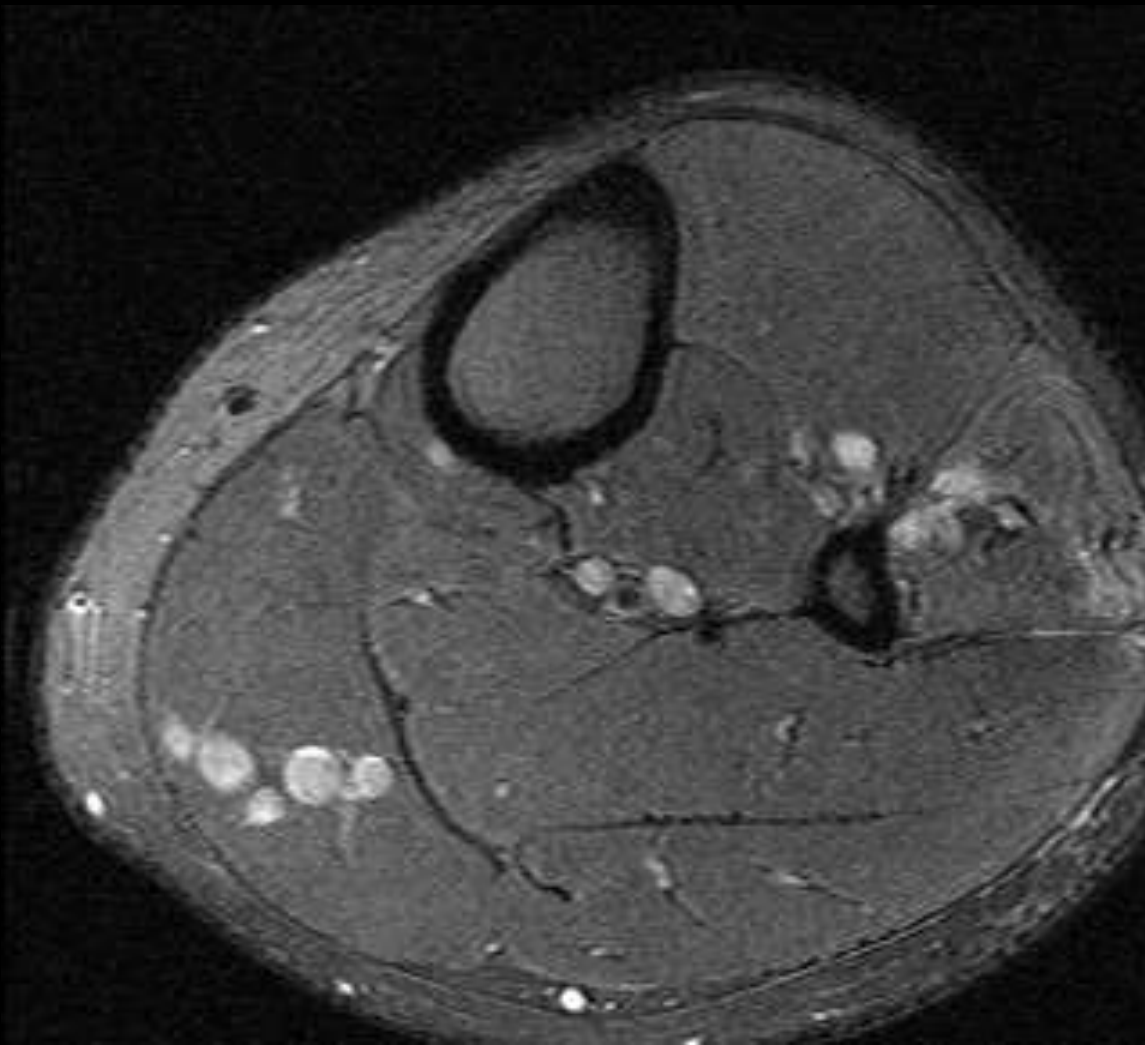




# Entrapment syndromes

## Common Peroneal Nerve

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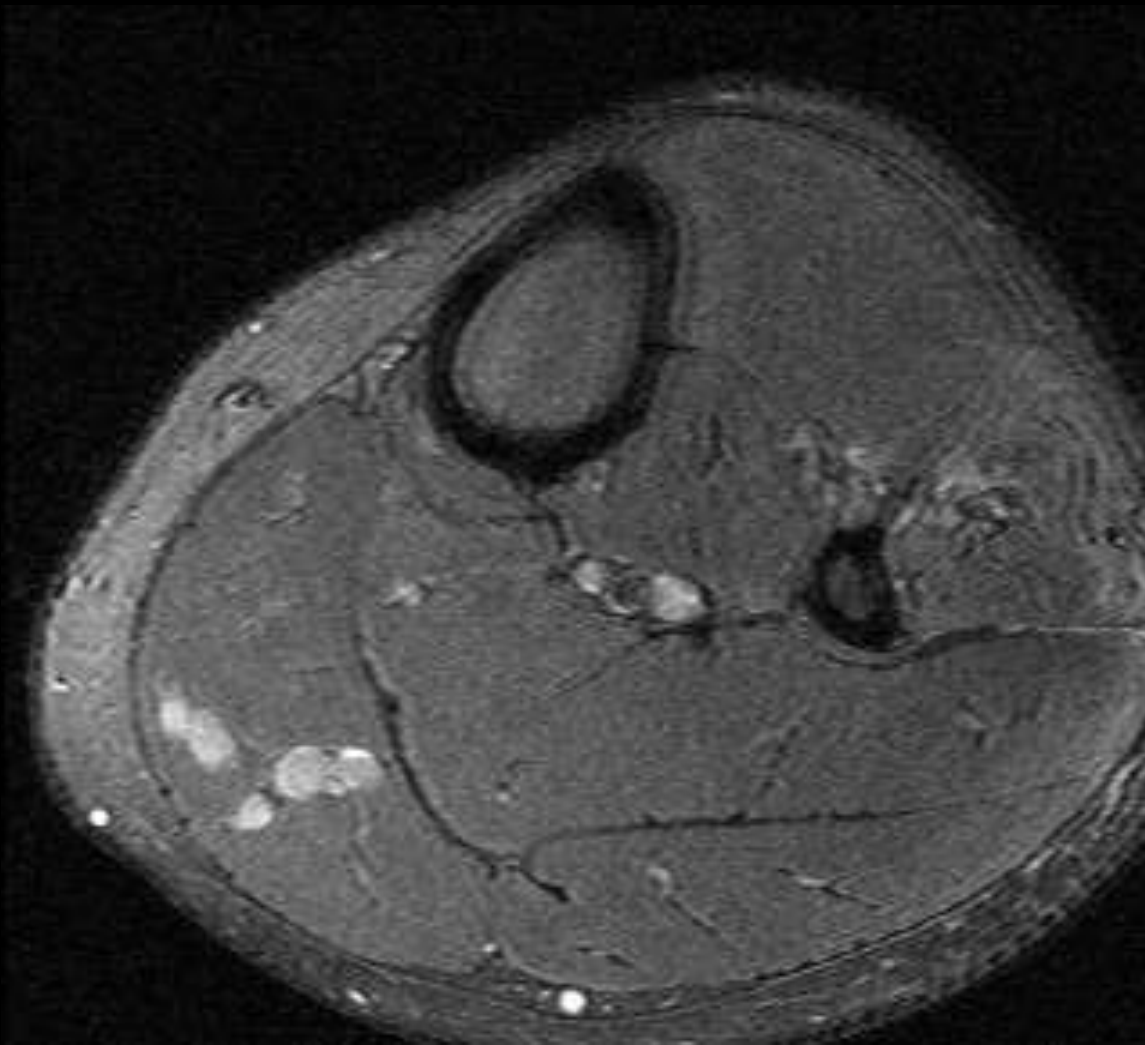




# Entrapment syndromes

## Common Peroneal Nerve

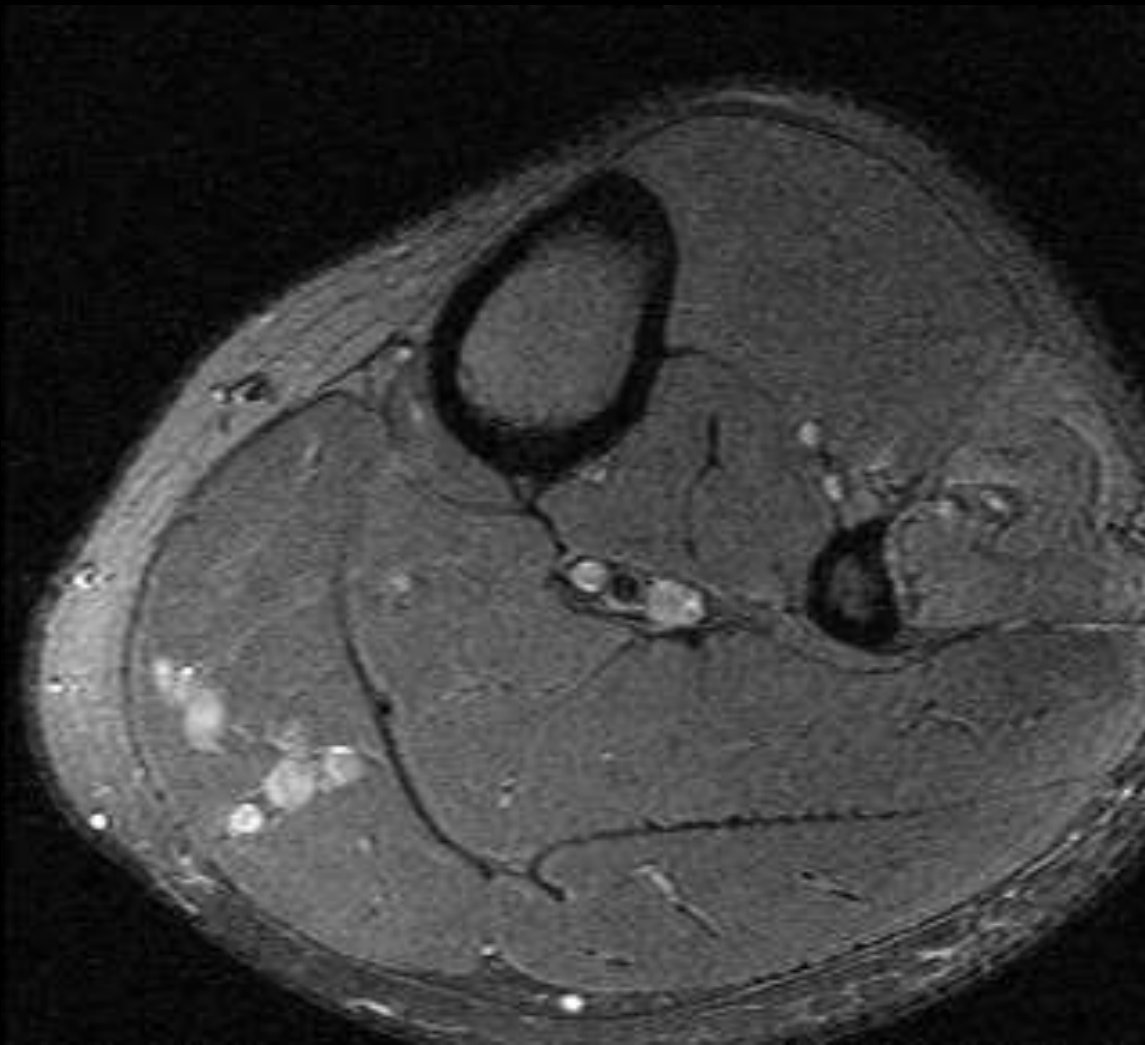
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# Entrapment syndromes

## Common Peroneal Nerve

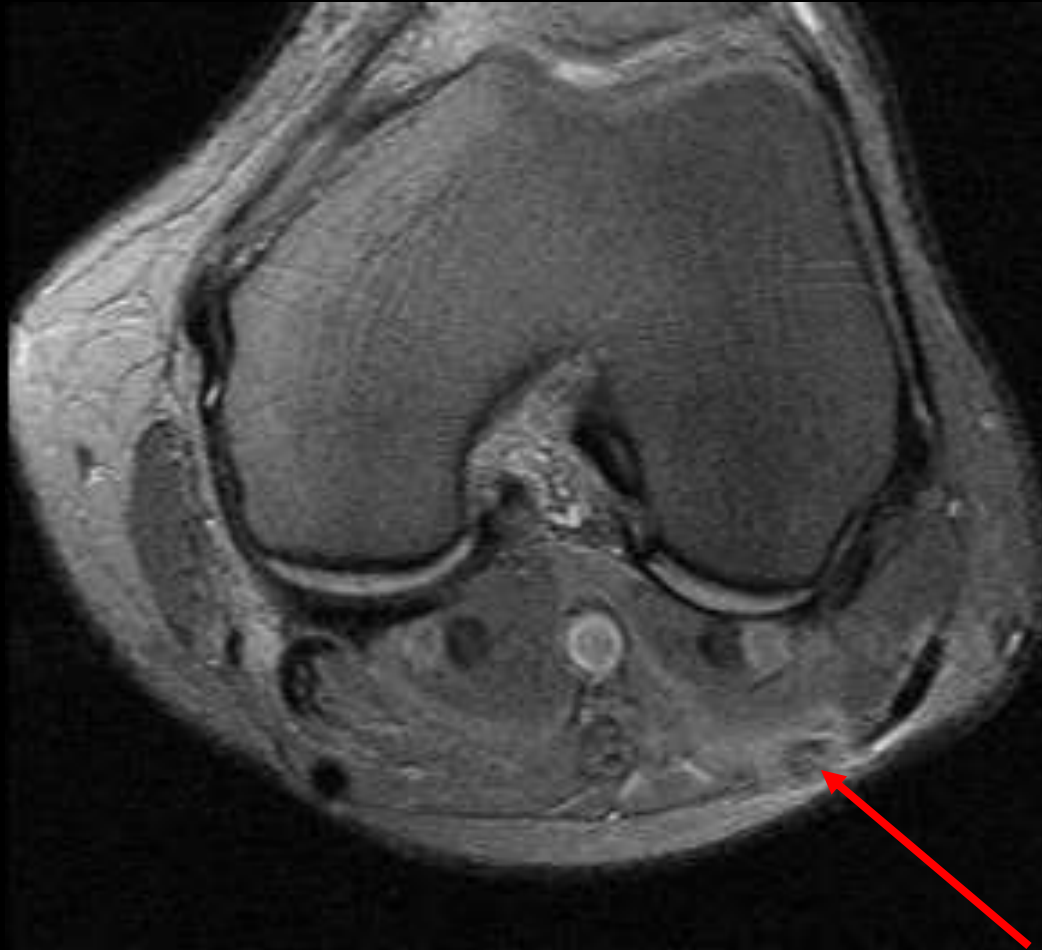
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# Entrapment syndromes

## Common Peroneal Nerve

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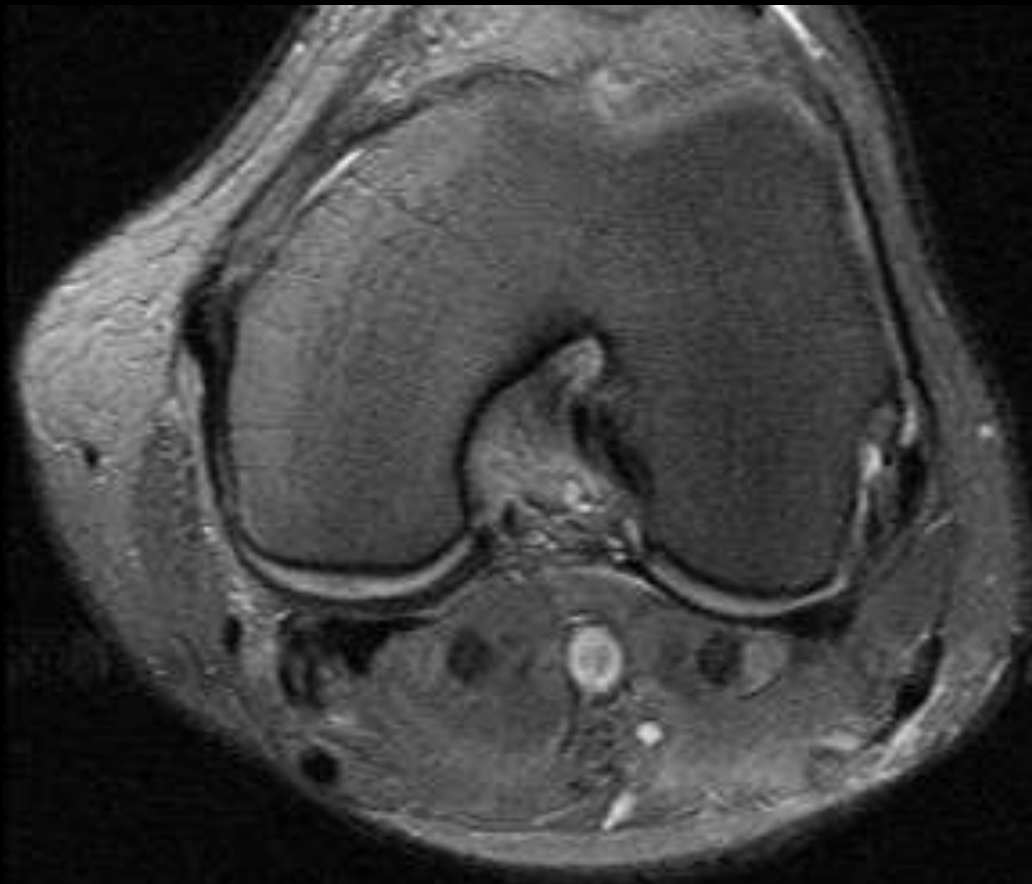


March 07

# Entrapment syndromes

## Common Peroneal Nerve

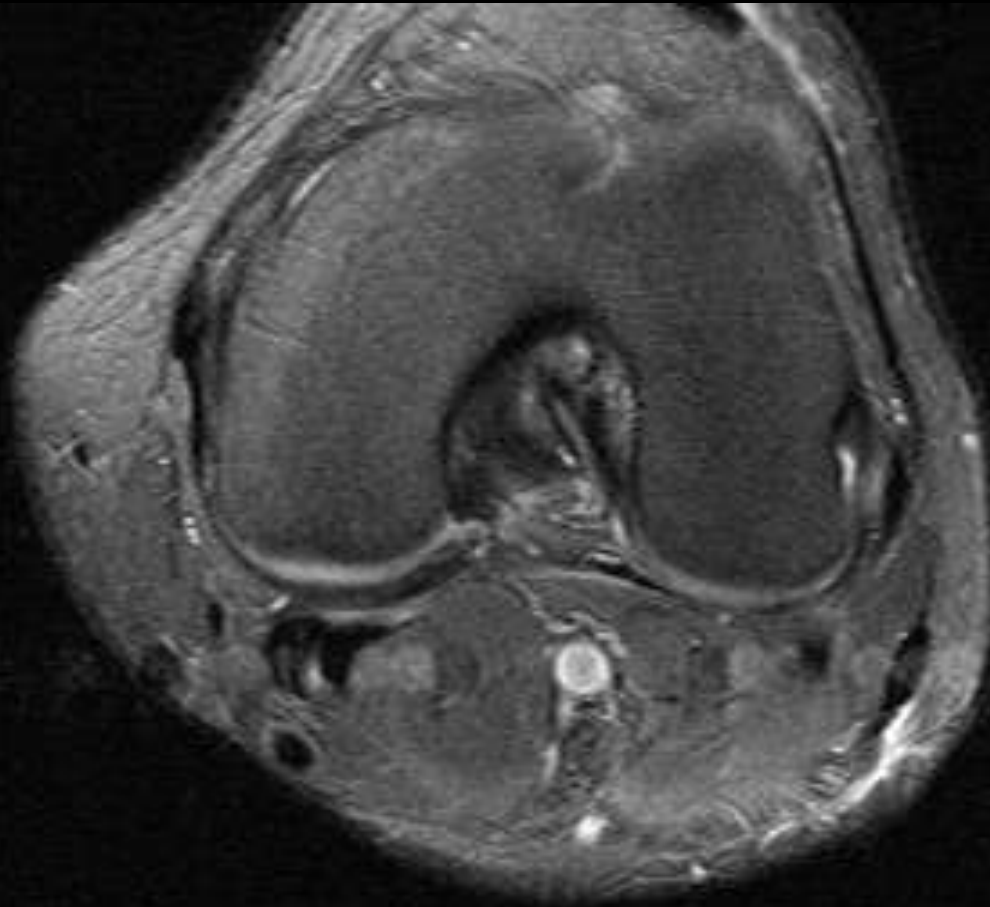
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# Entrapment syndromes

## Common Peroneal Nerve

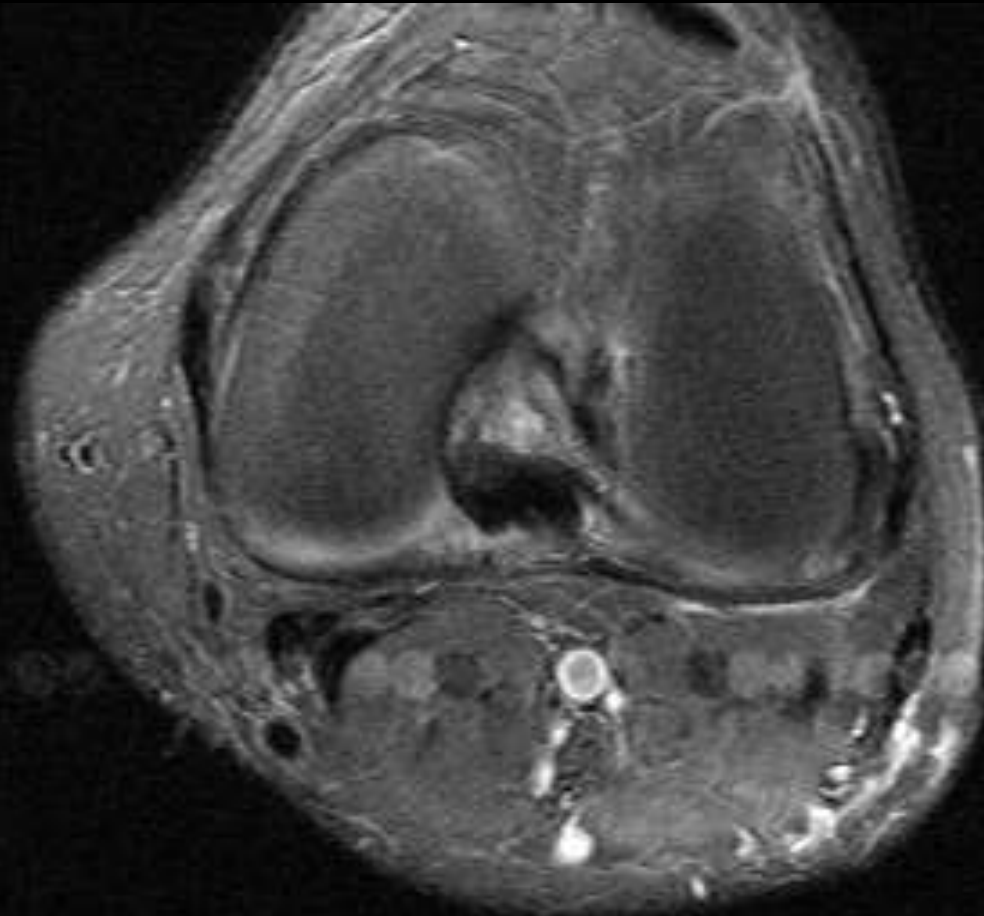
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# Entrapment syndromes

## Common Peroneal Nerve

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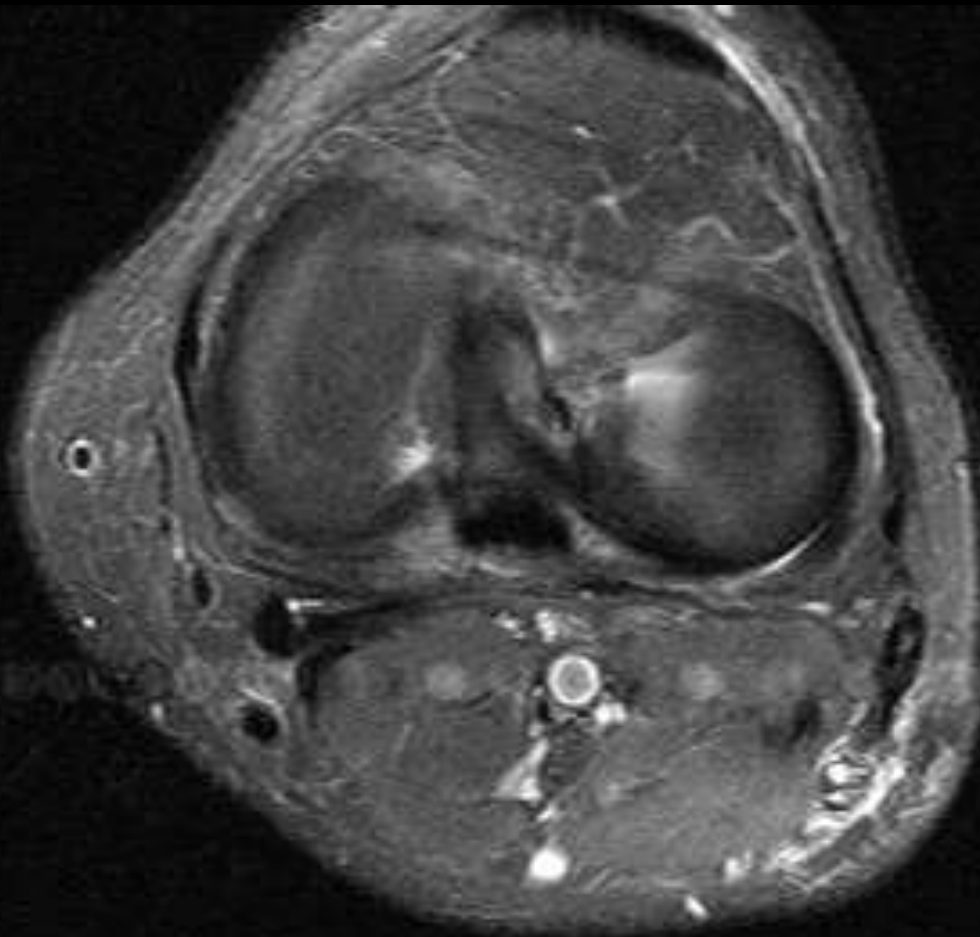




# Entrapment syndromes

## Common Peroneal Nerve

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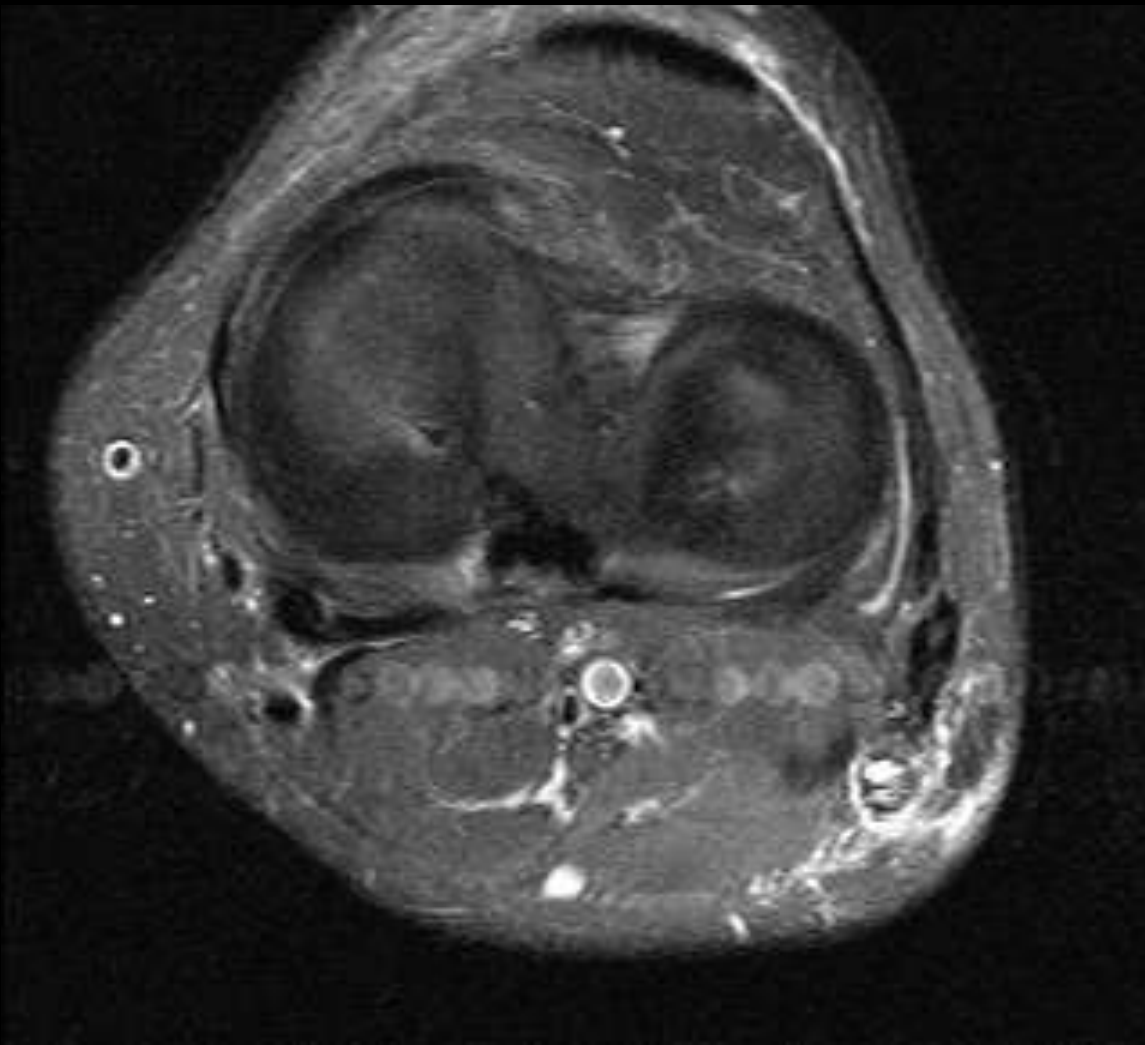




# Entrapment syndromes

## Common Peroneal Nerve

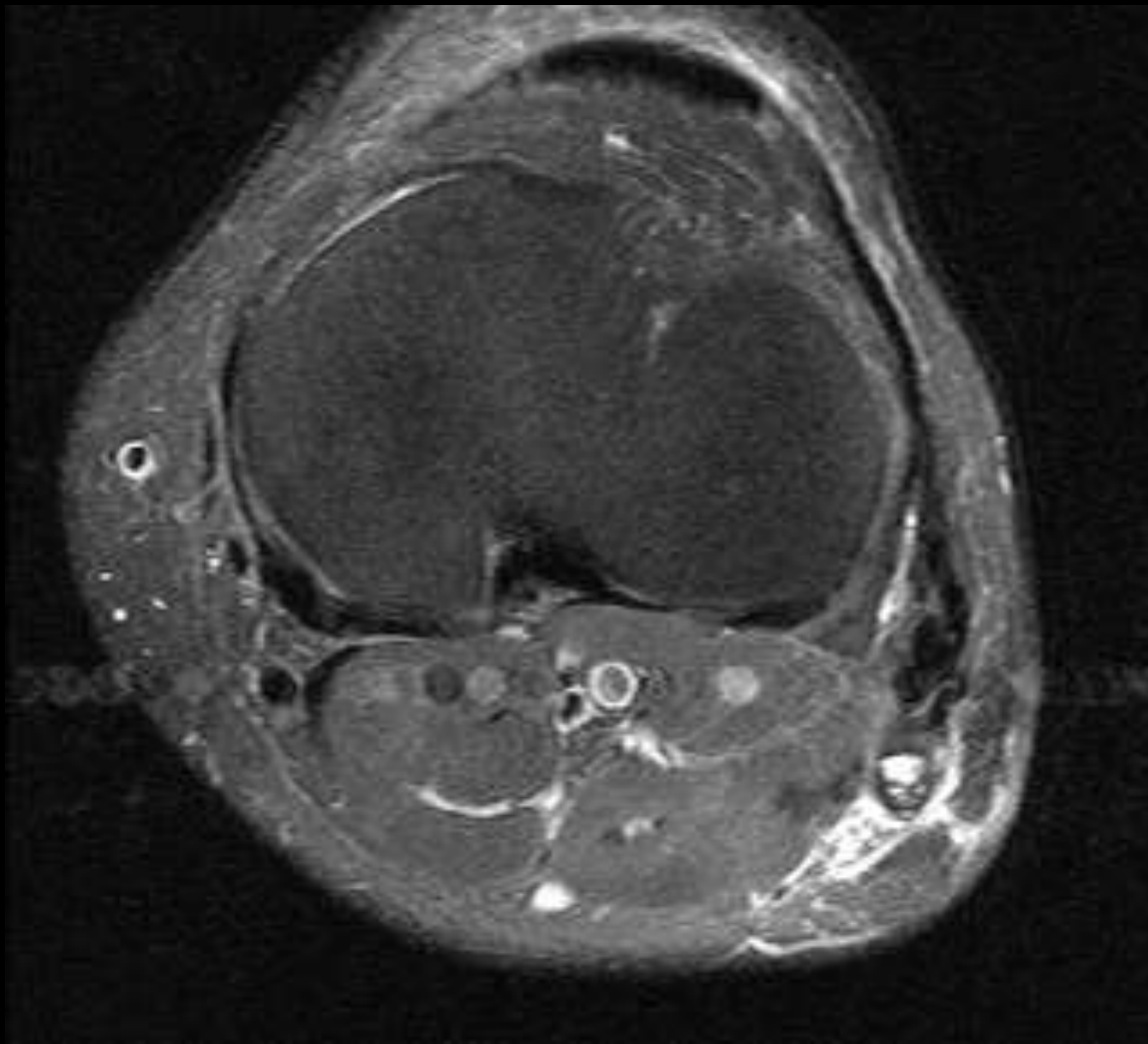
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# Entrapment syndromes

## Common Peroneal Nerve

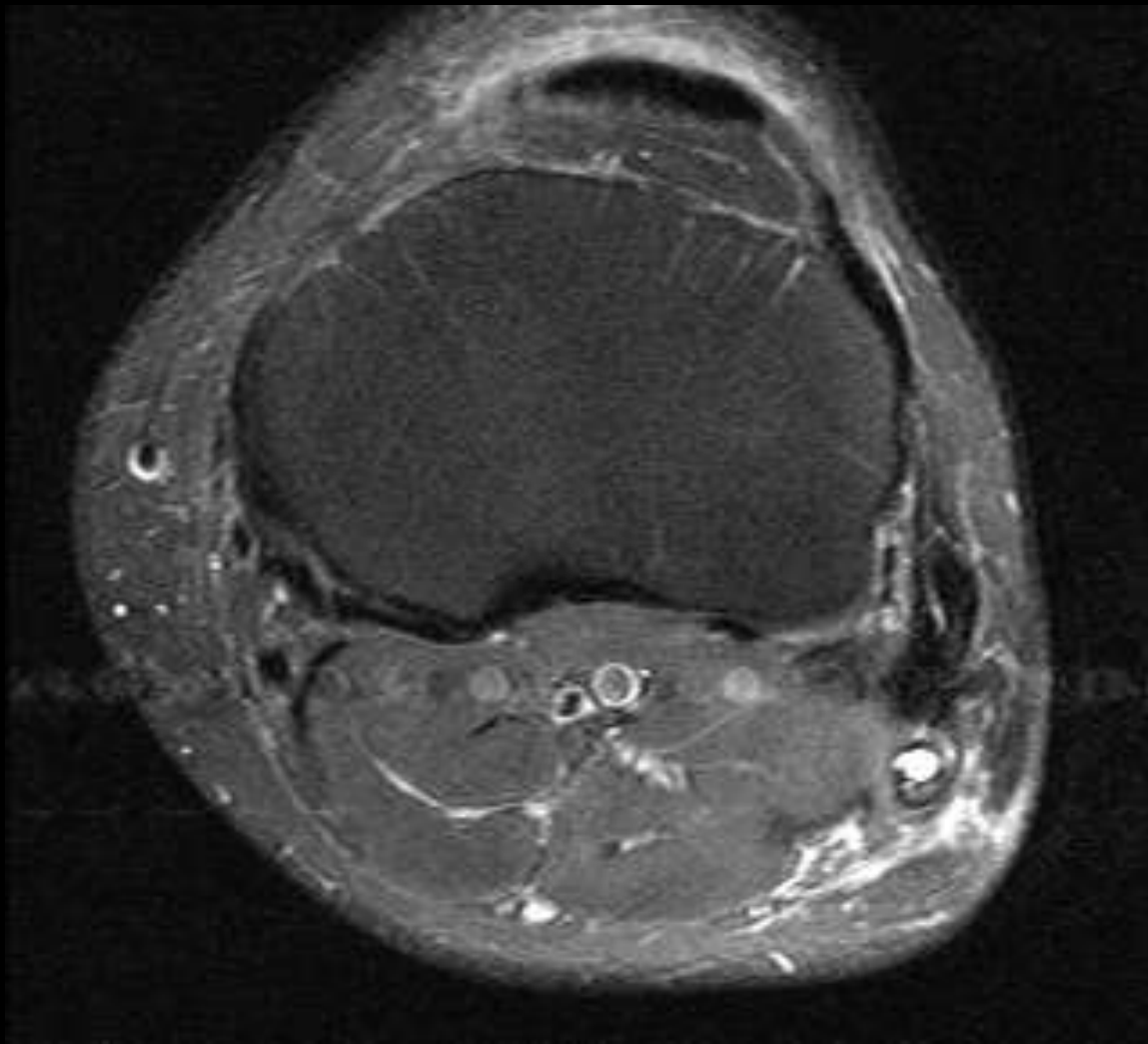
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# Entrapment syndromes

## Common Peroneal Nerve

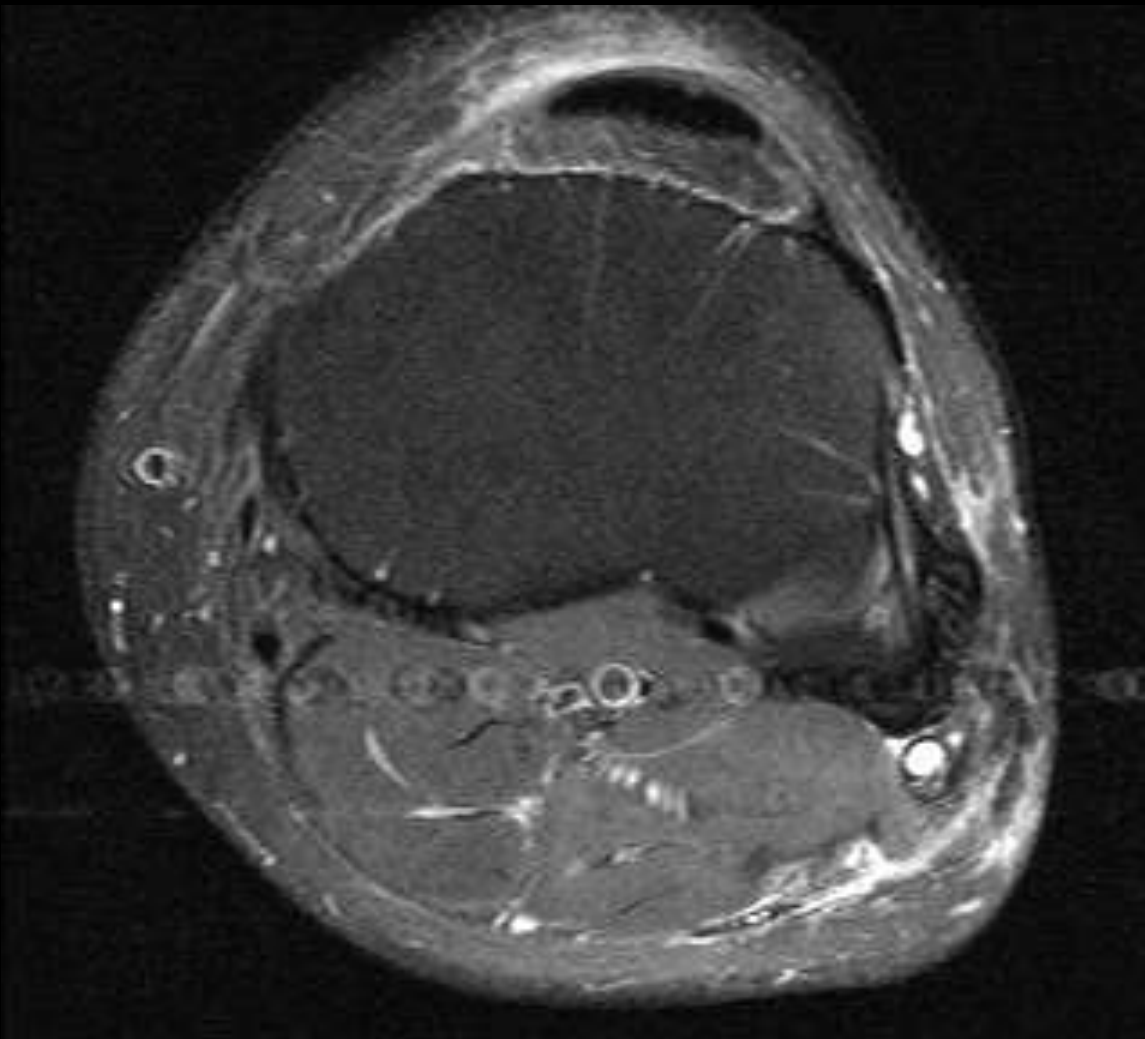
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# Entrapment syndromes

## Common Peroneal Nerve

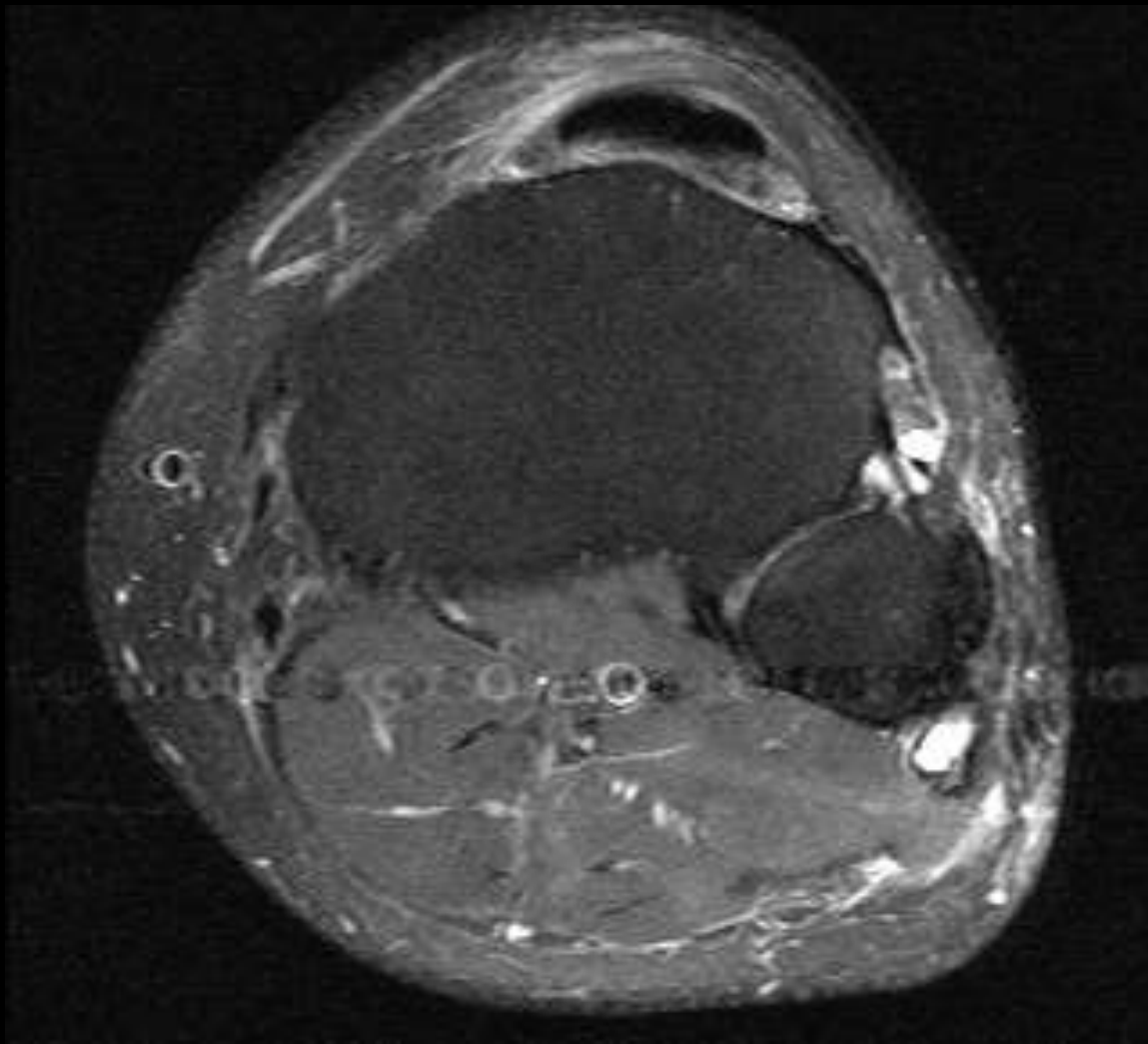
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# Entrapment syndromes

## Common Peroneal Nerve

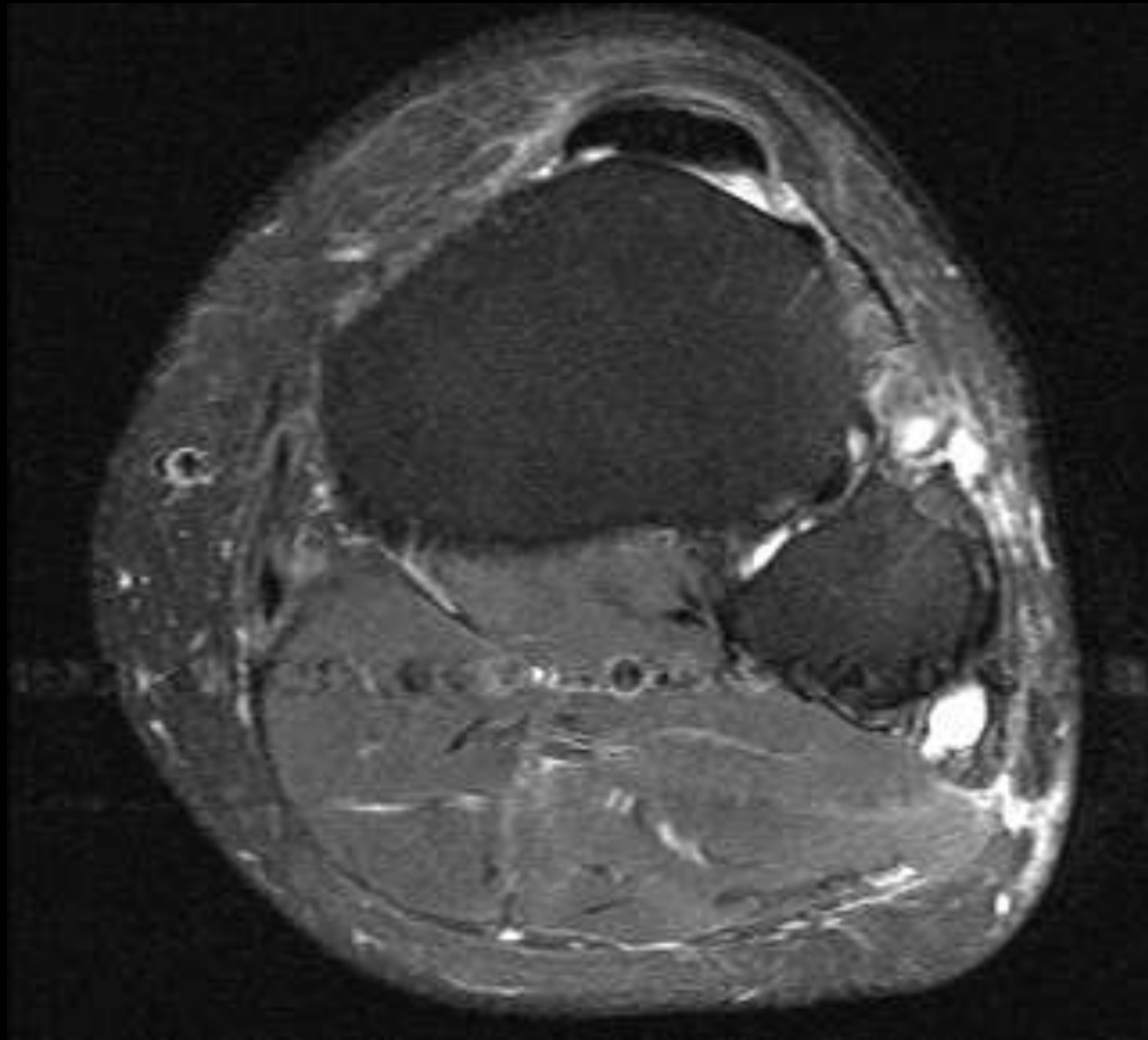
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# Entrapment syndromes

## Common Peroneal Nerve

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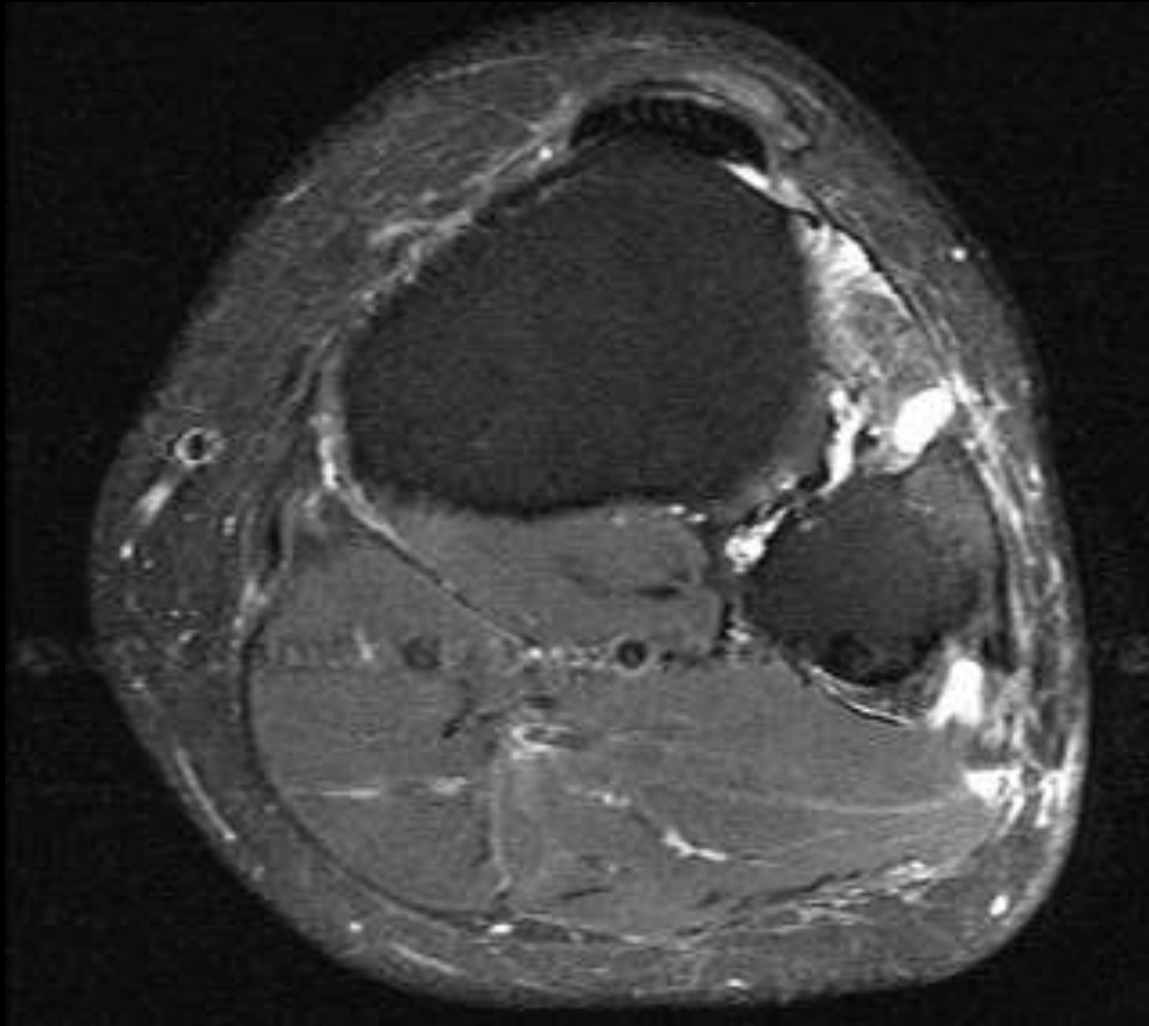




# Entrapment syndromes

## Common Peroneal Nerve

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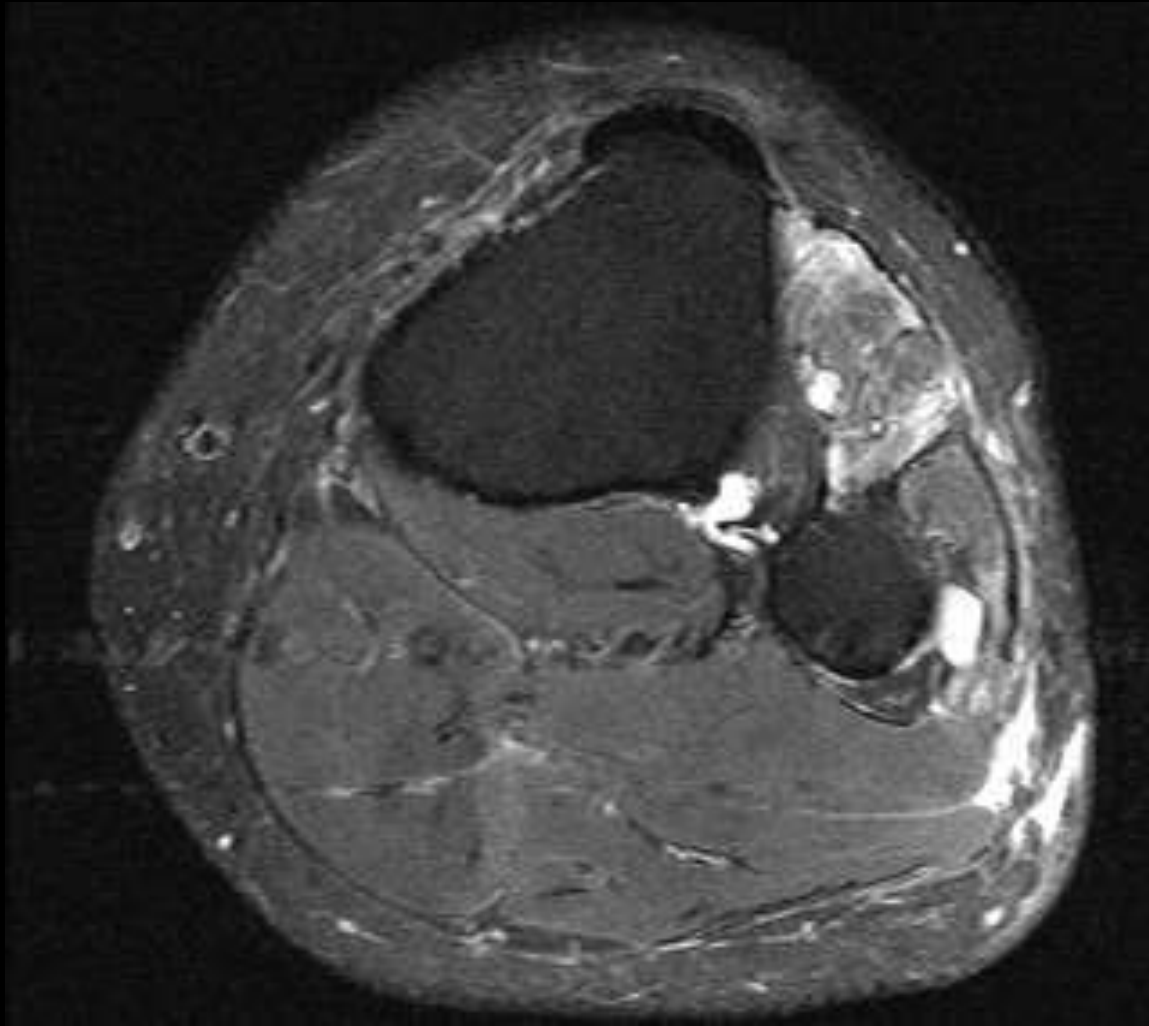




# Entrapment syndromes

## Common Peroneal Nerve

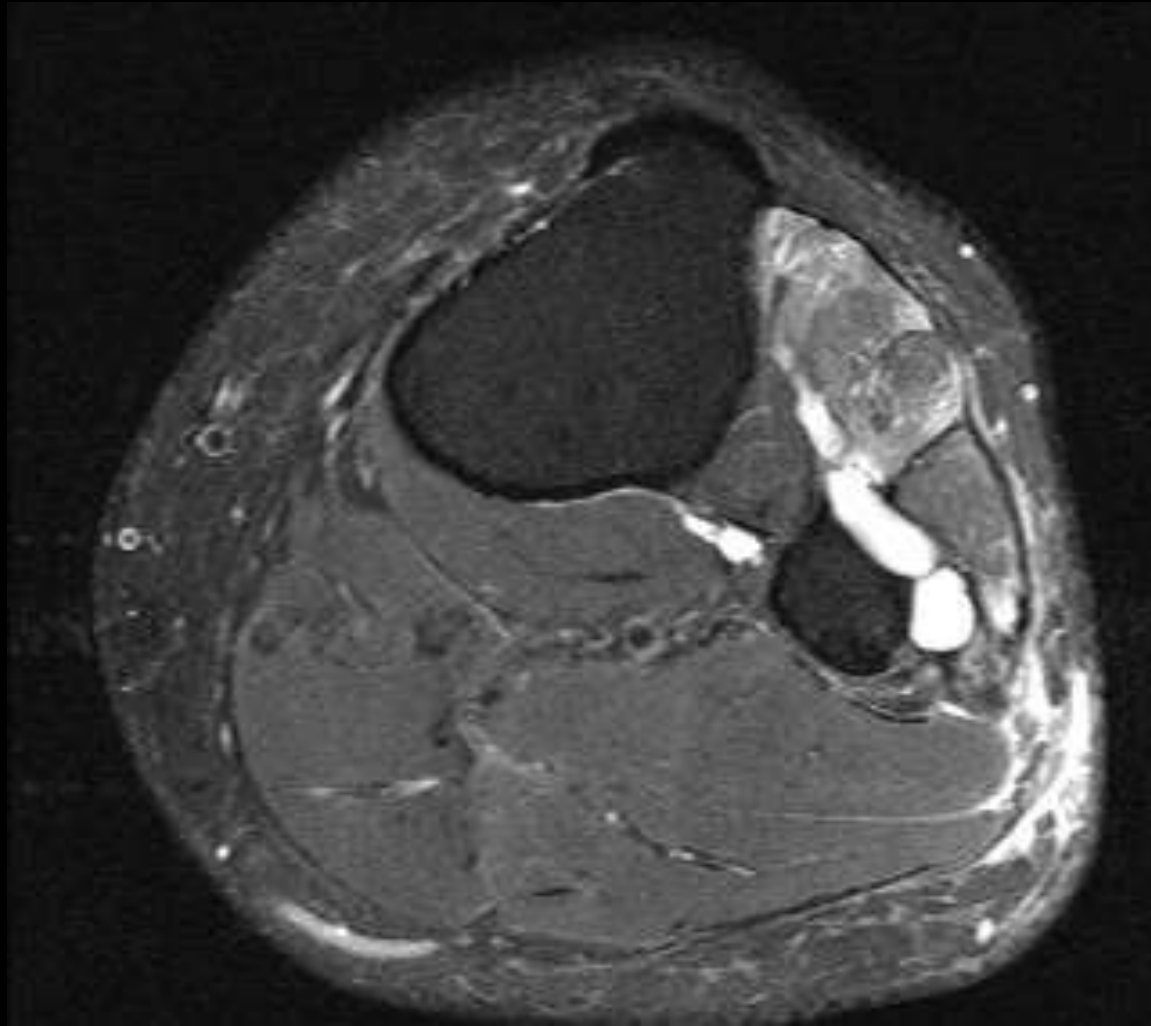
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# Entrapment syndromes

## Common Peroneal Nerve

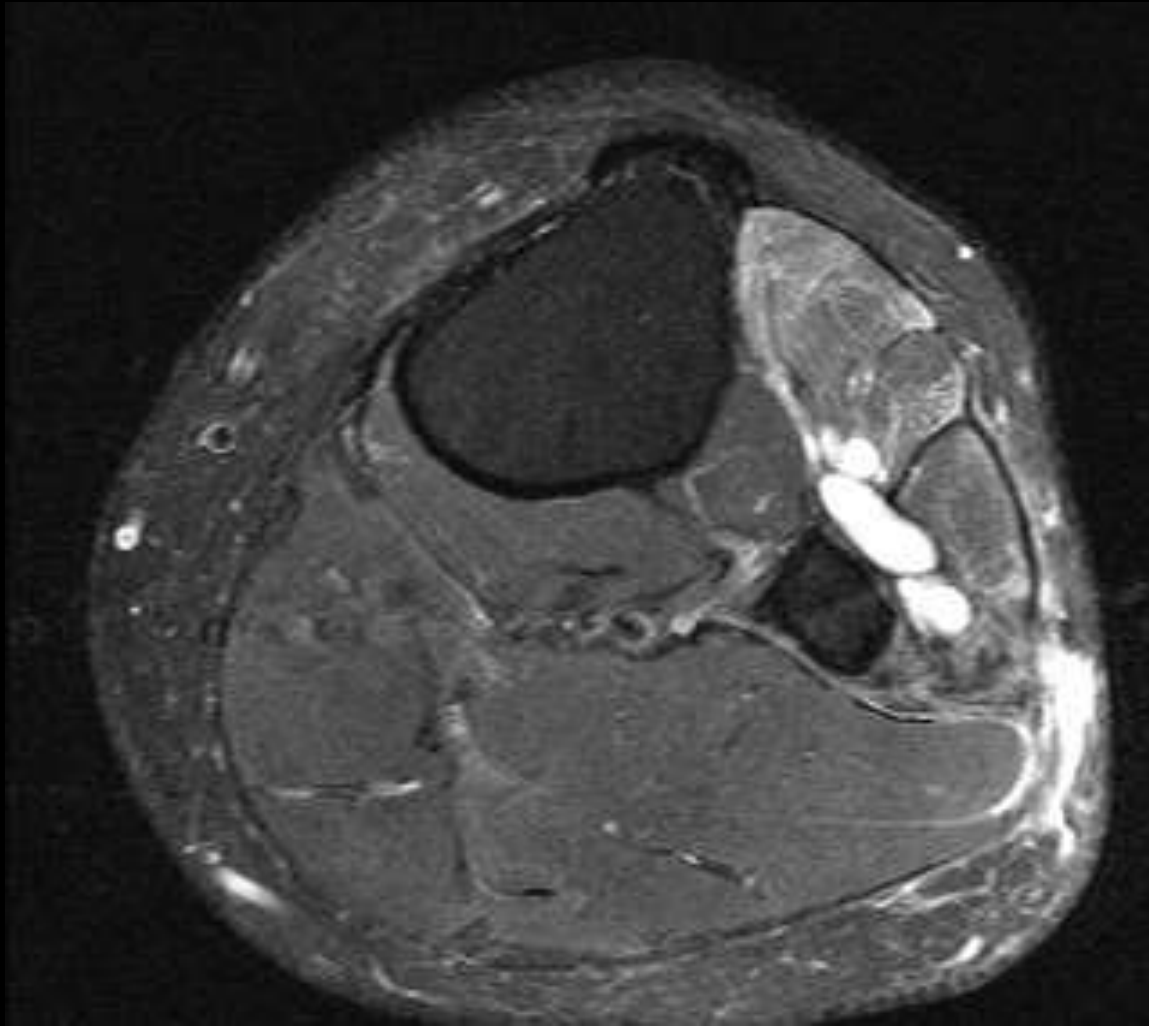
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# Entrapment syndromes

## Common Peroneal Nerve

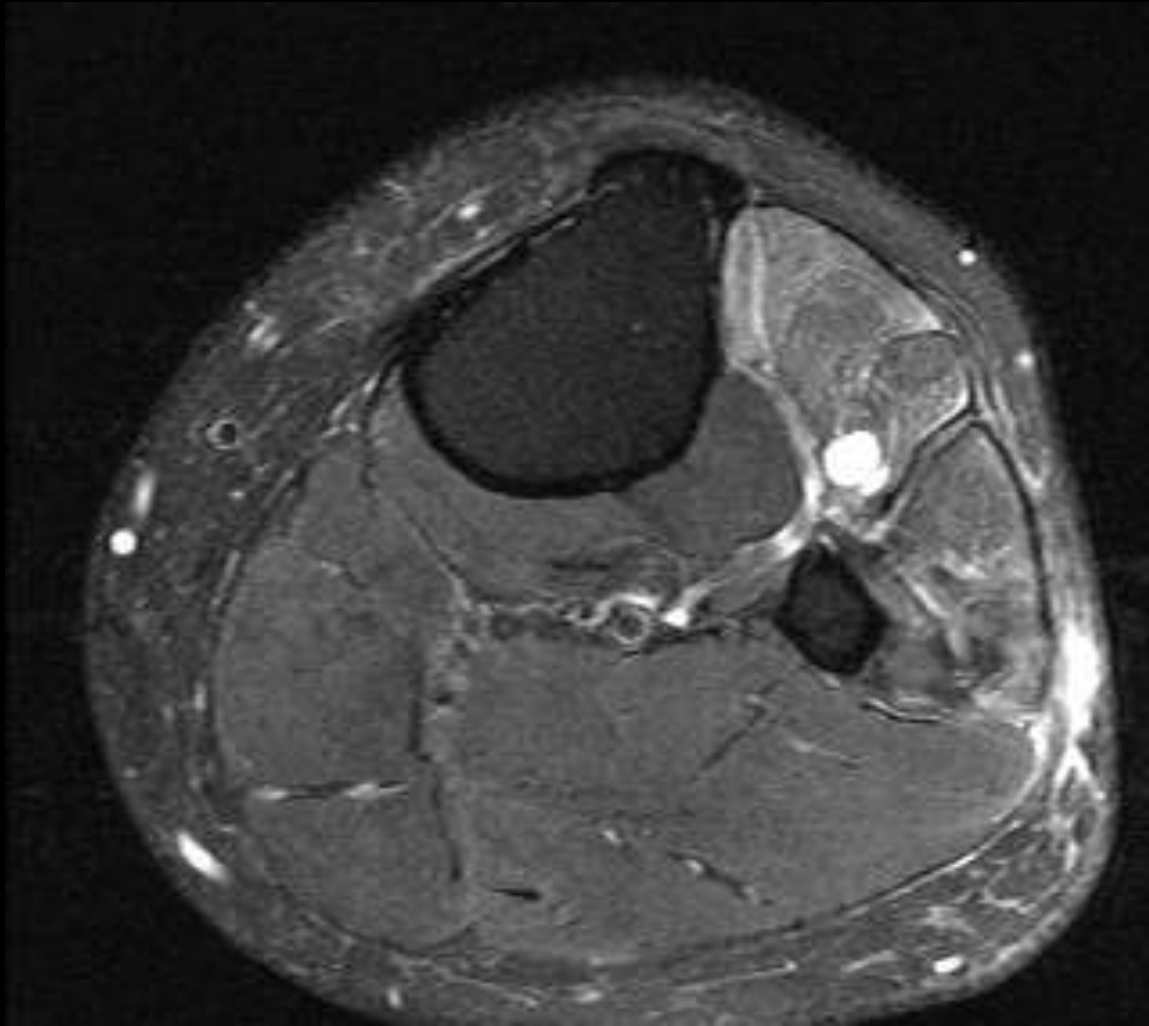
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# Entrapment syndromes

## Common Peroneal Nerve

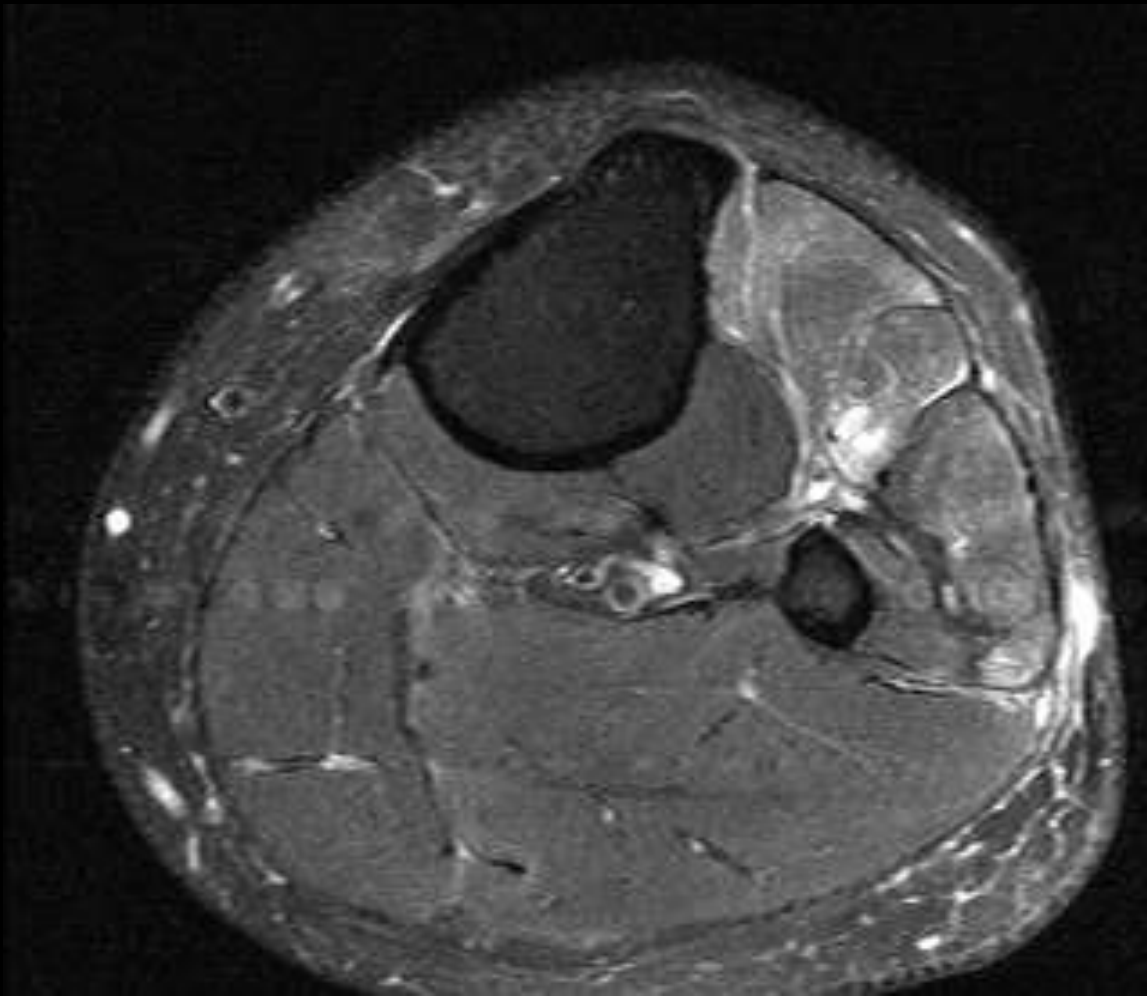
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# Entrapment syndromes

## Common Peroneal Nerve

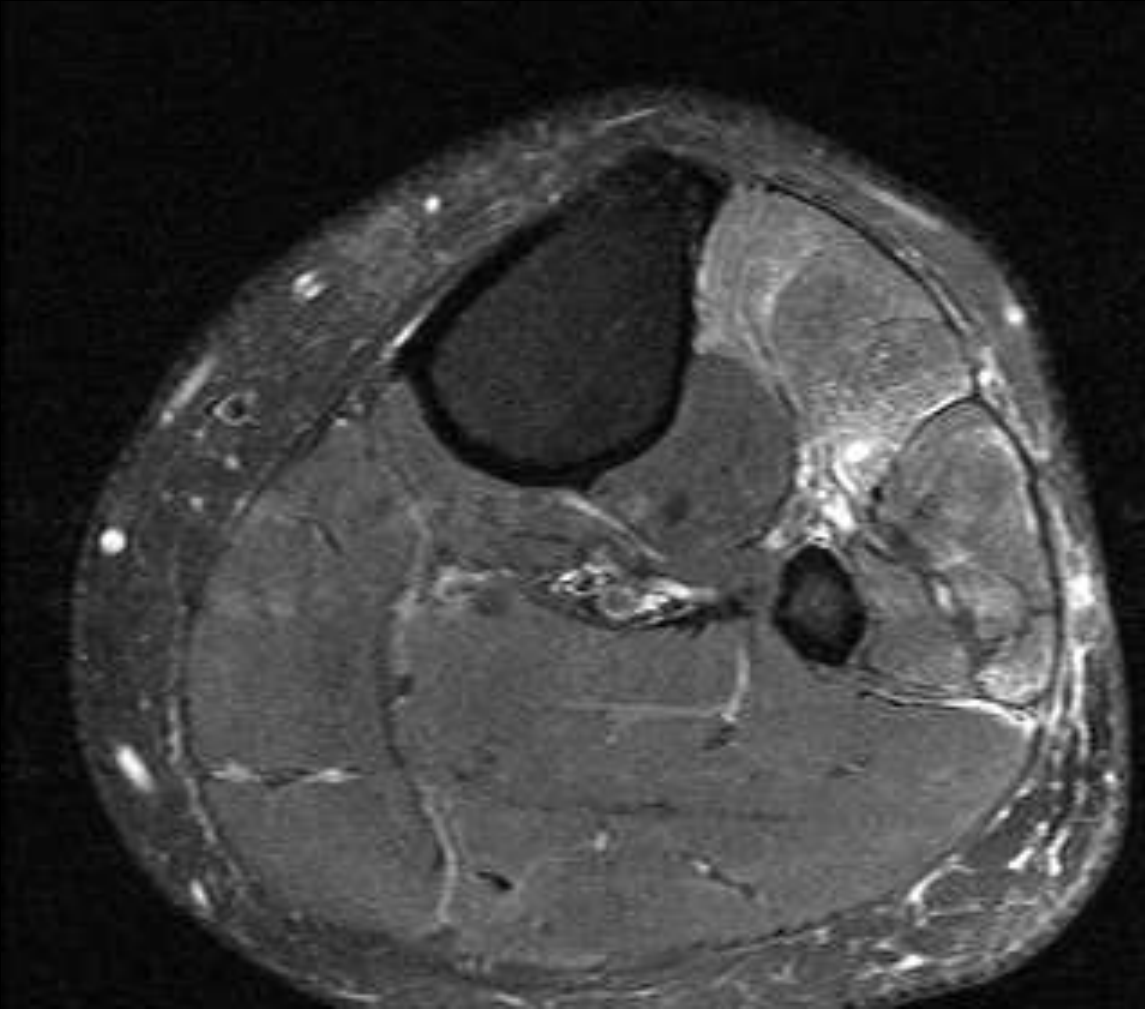
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# Entrapment syndromes

## Common Peroneal Nerve

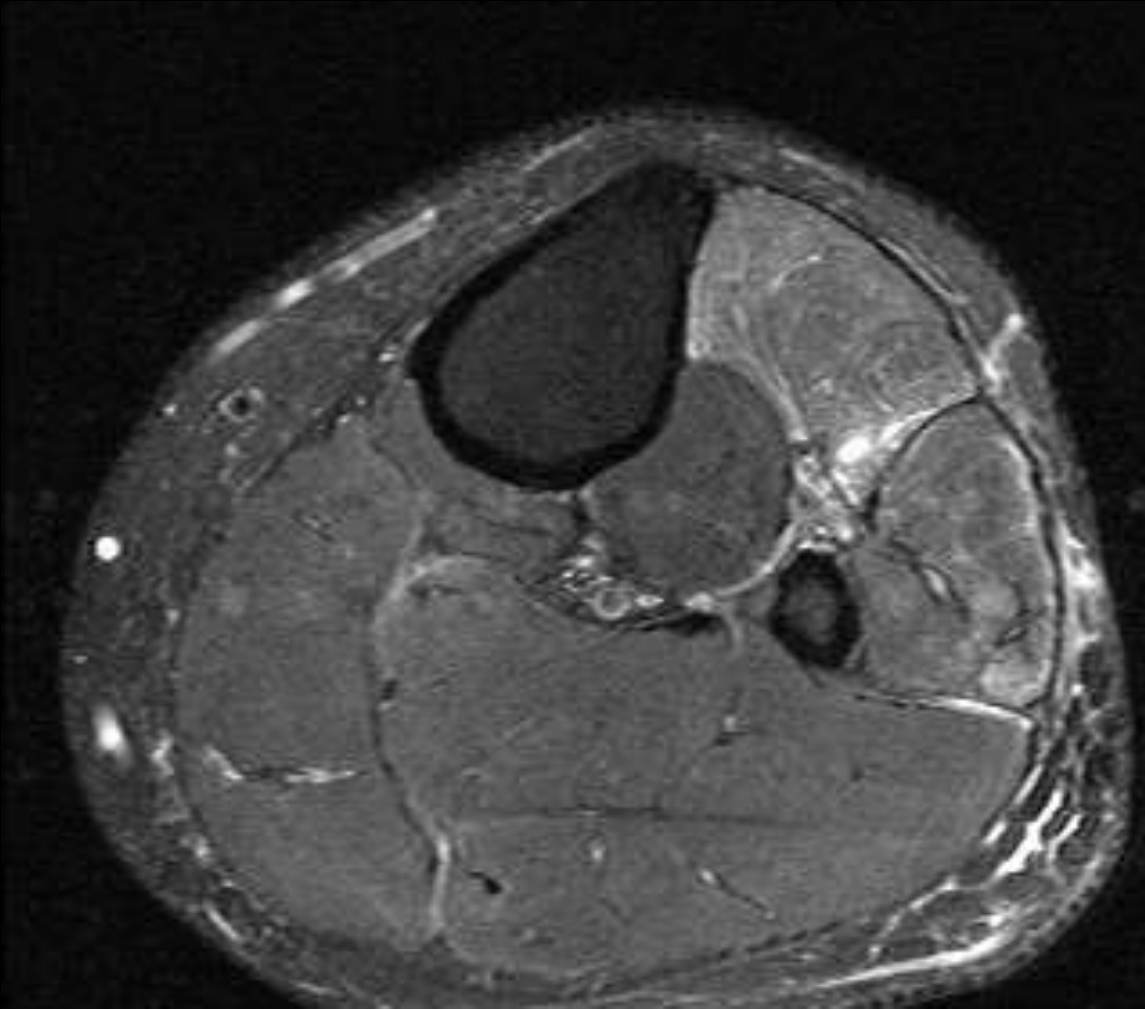
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# Entrapment syndromes

## Common Peroneal Nerve

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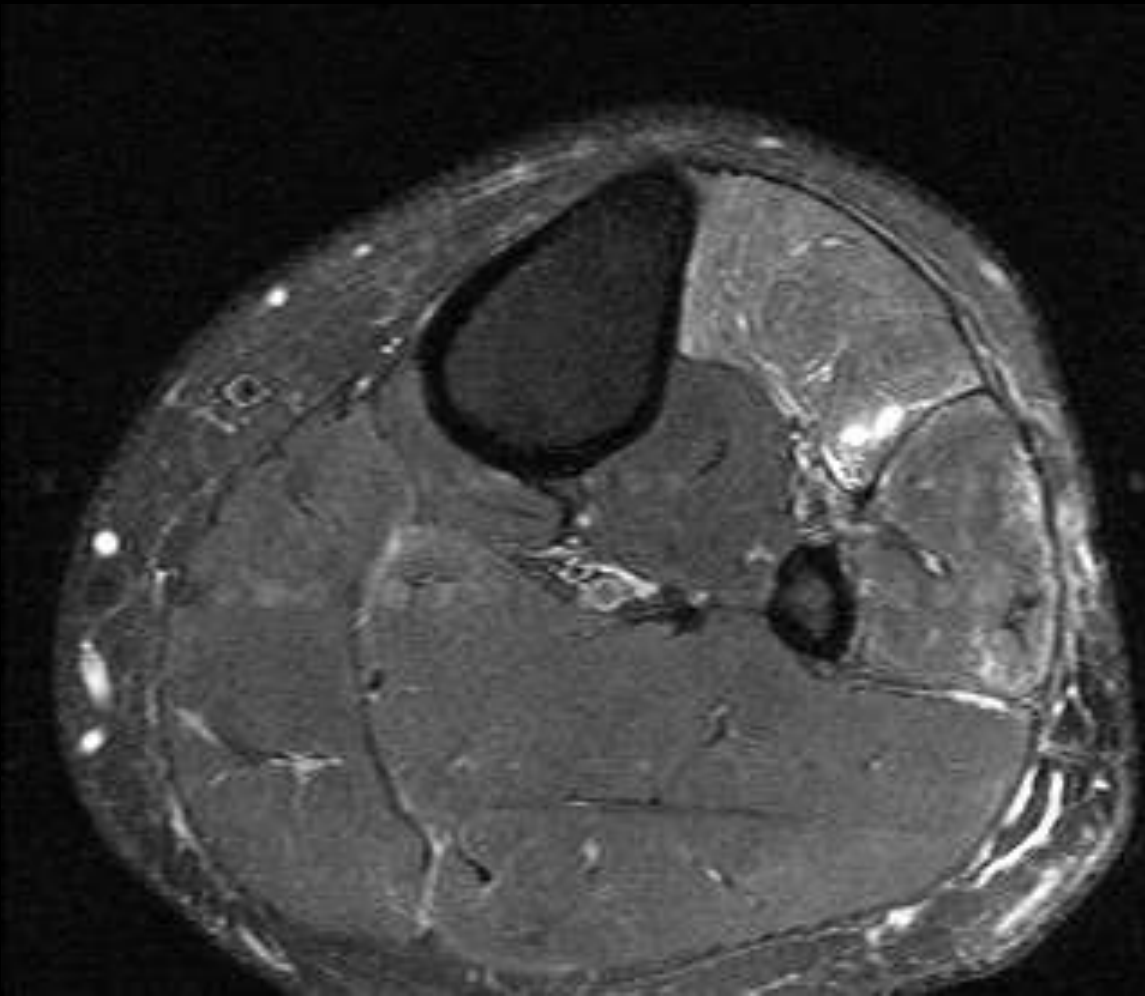




# Entrapment syndromes

## Common Peroneal Nerve

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# Entrapment syndromes

## Tibial Nerve – Popliteal Fossa

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



# Entrapment syndromes

## Common Peroneal Nerve



Ax T1



Ax T2

Intraosseous ganglion proximal fib

# Entrapment Syndromes - Tibial nerve

## Tarsal Tunnel - 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\*



# Entrapment Syndromes - Tibial nerve

## Tarsal Tunnel - Anatomy

### Tibial nerve

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



# Entrapment Syndromes - Tibial nerve

## Tarsal Tunnel Syndrome

---

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

# Entrapment Syndromes - Tibial nerve

## Tarsal Tunnel Syndrome - Etiology

---

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



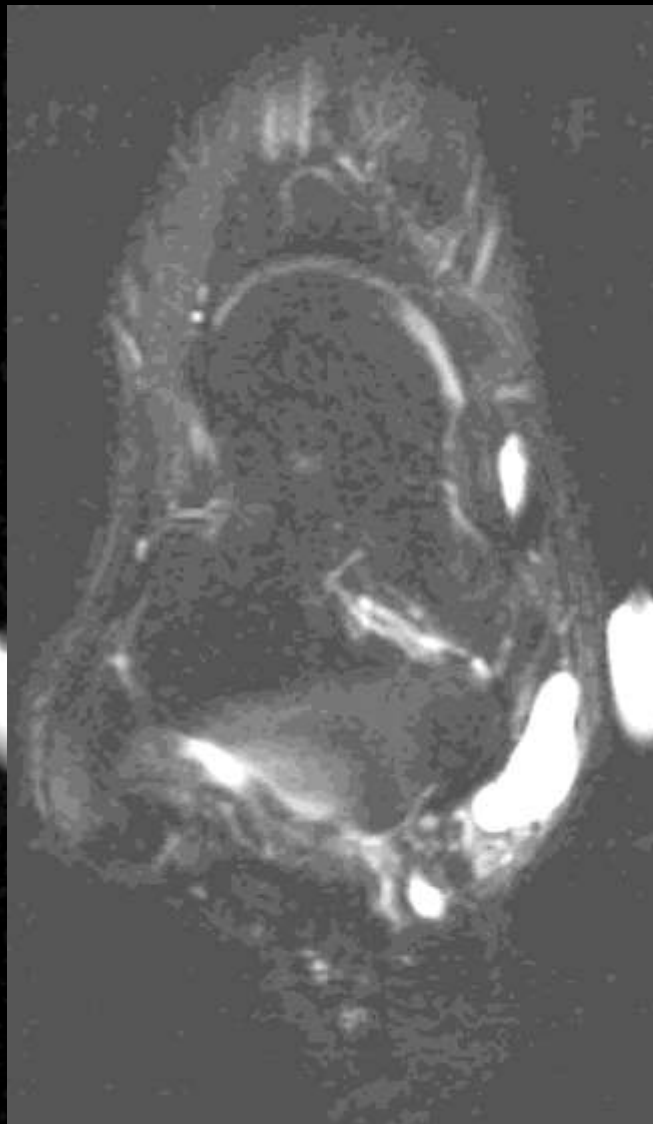
# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Tarsal Tunnel Ganglion

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Ax PD



Ax STIR



Ax T1FSGd

20M

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome Neuroma

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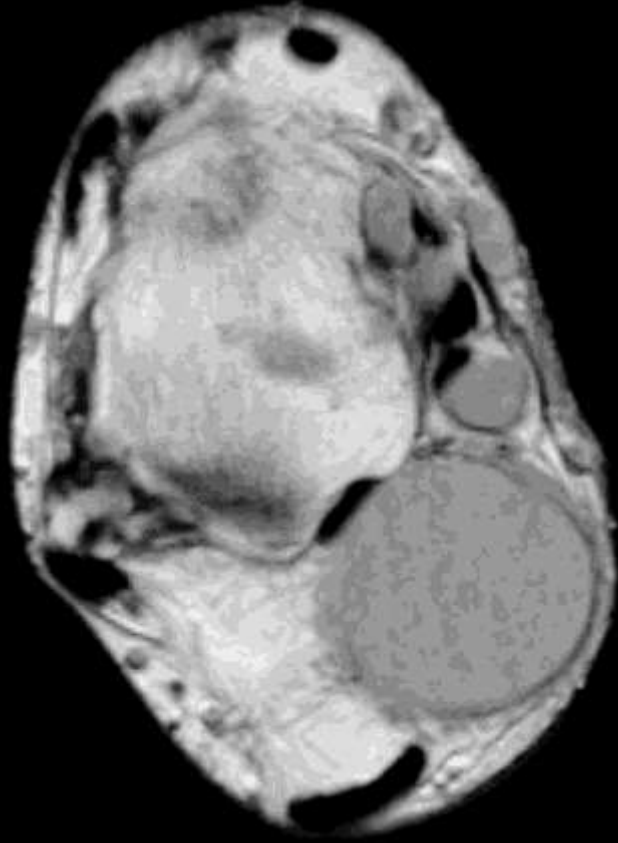
# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome Neuroma

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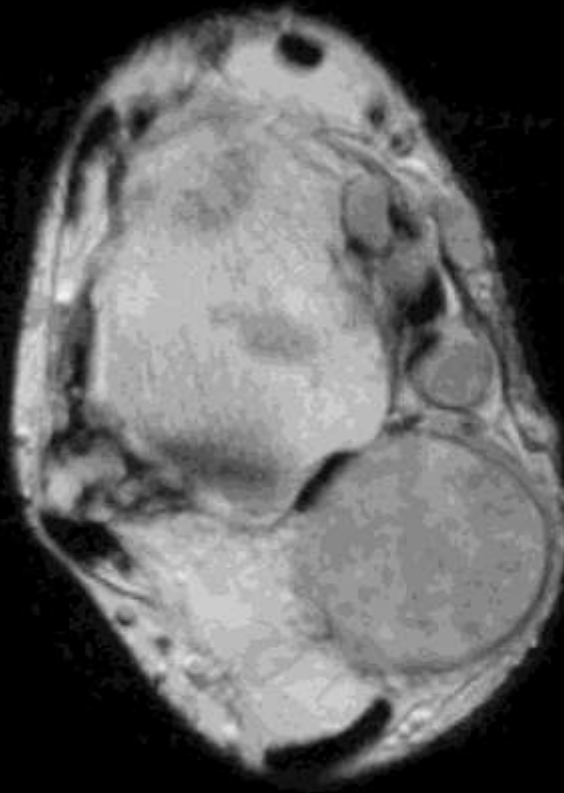


# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome Neuroma

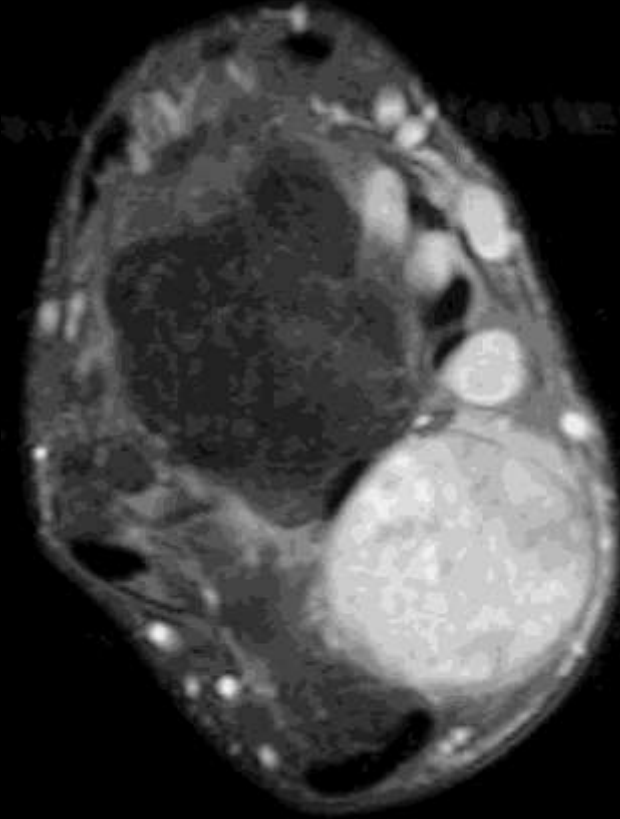
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Ax PD



Ax T2



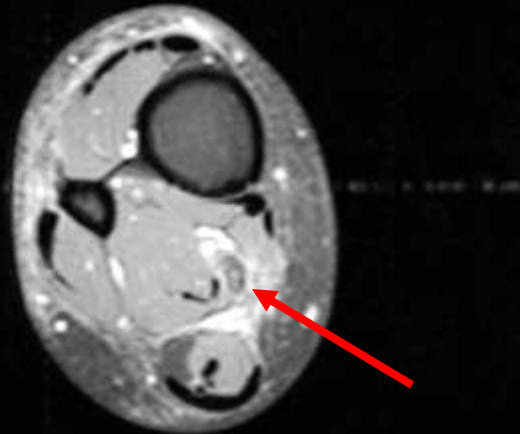
Ax T1FSGd

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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1



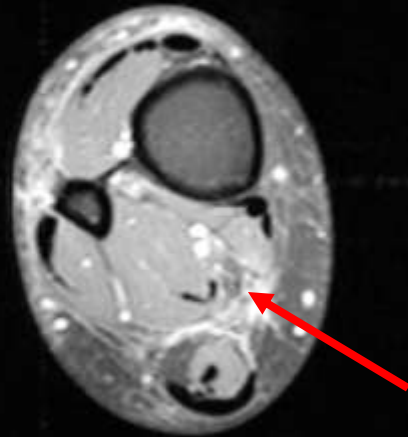
W 1288 : L 600

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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2



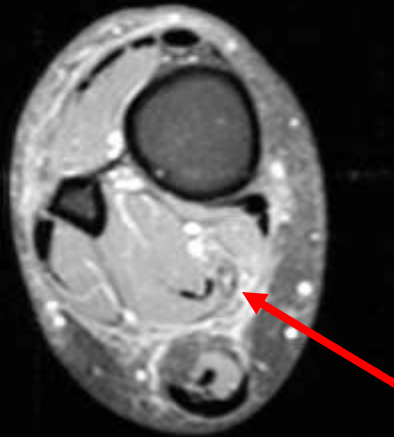
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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3



W 1244 : L 583

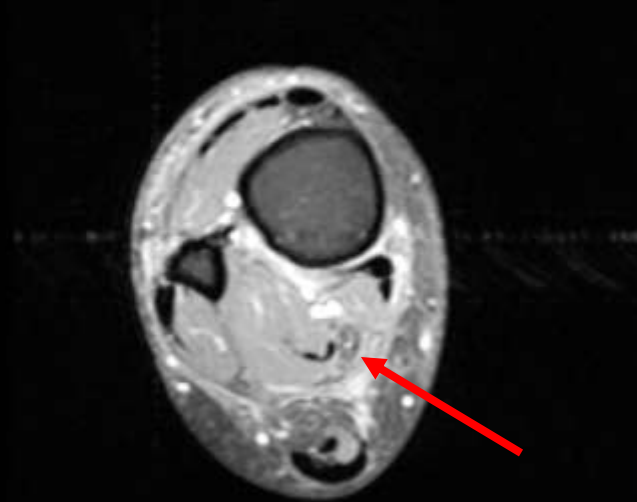


# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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4



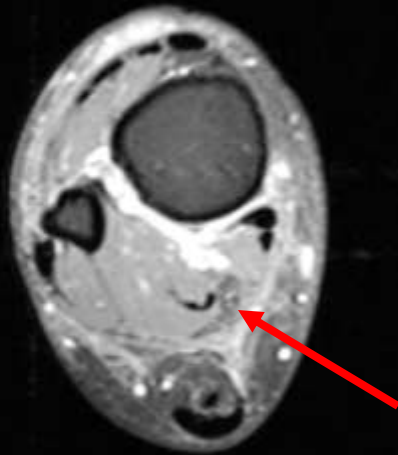
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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5



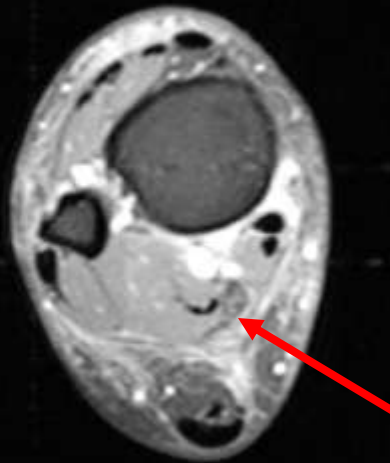
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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6



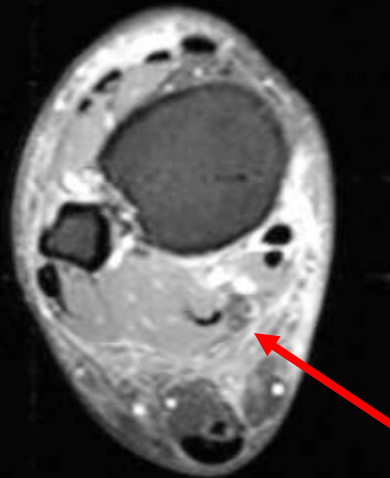
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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7



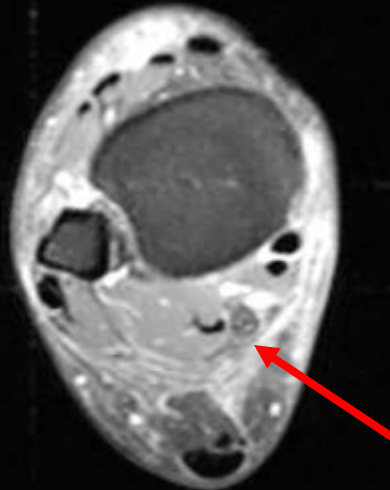
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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8



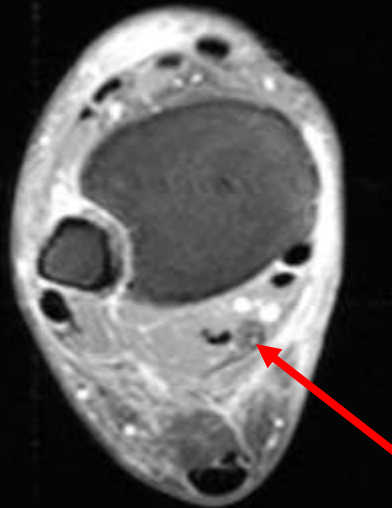
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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9



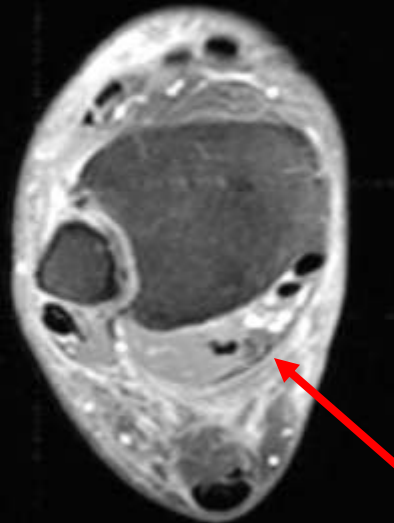
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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10



W 1413 : L 646

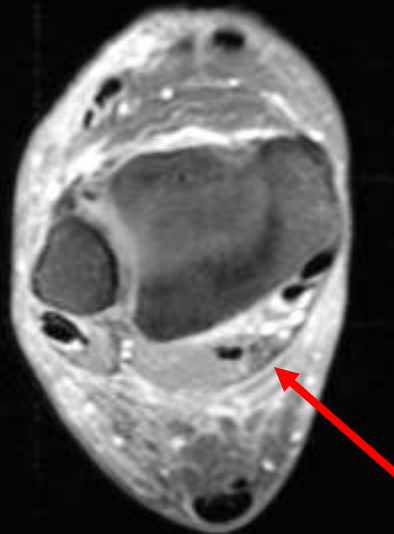


# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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11



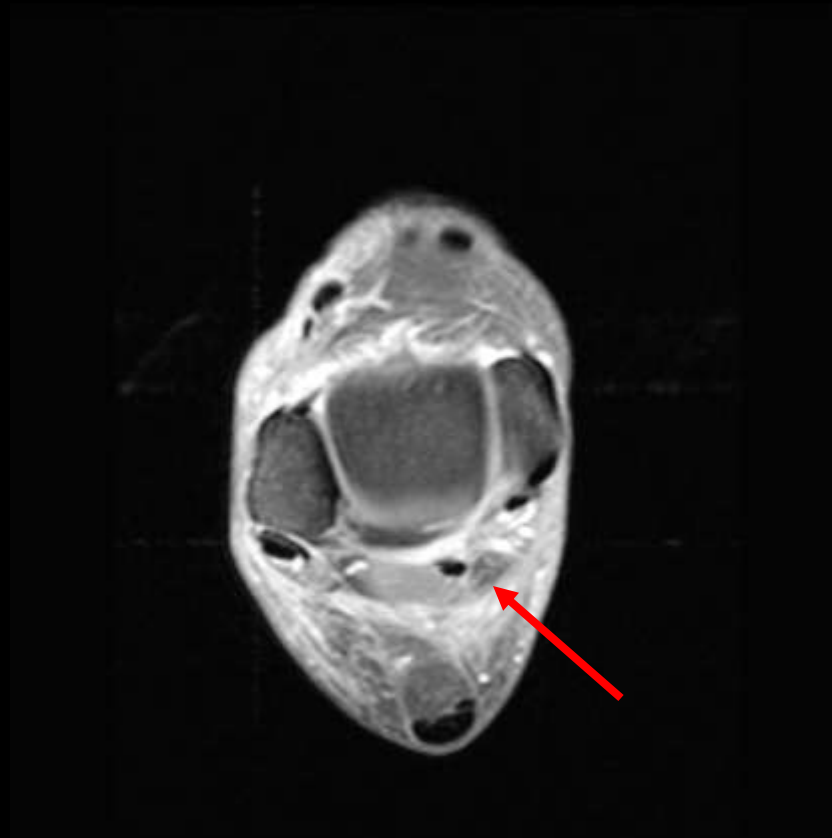
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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12



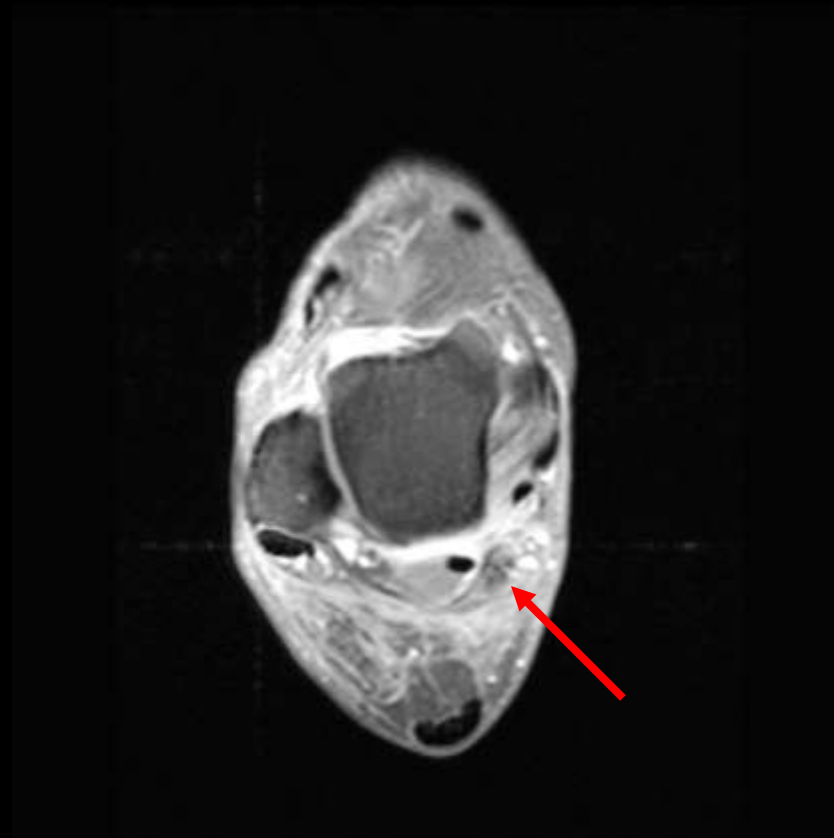
W 1520 : L 684

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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13



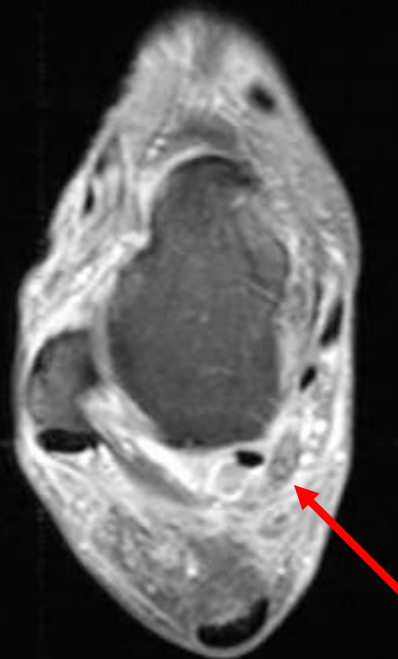
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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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14



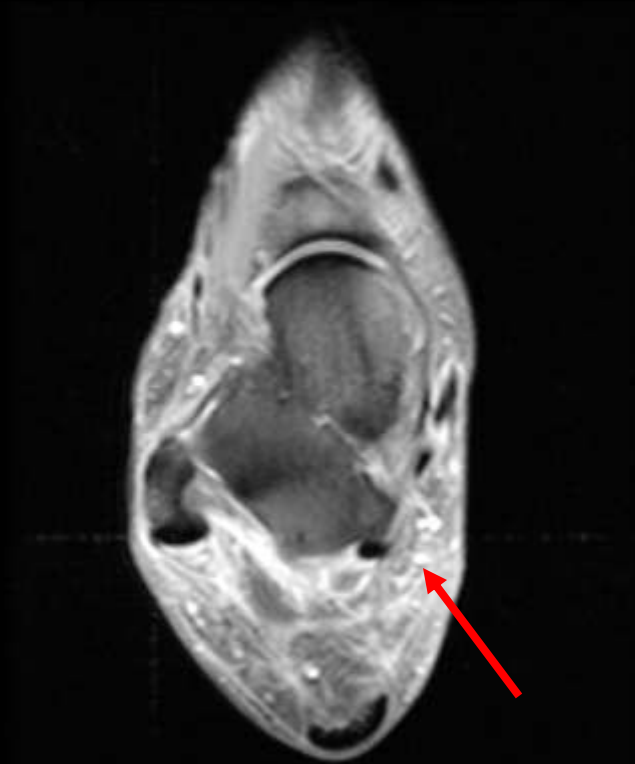
W 1532 : L 695

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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15



W 1512 : L 694

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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16



W 1545 : L 713

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

---

17



W 1556 : L 721



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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18



W 1588 : L 735

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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5



W 1551 : L 735

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Hypertrophic Neuritis

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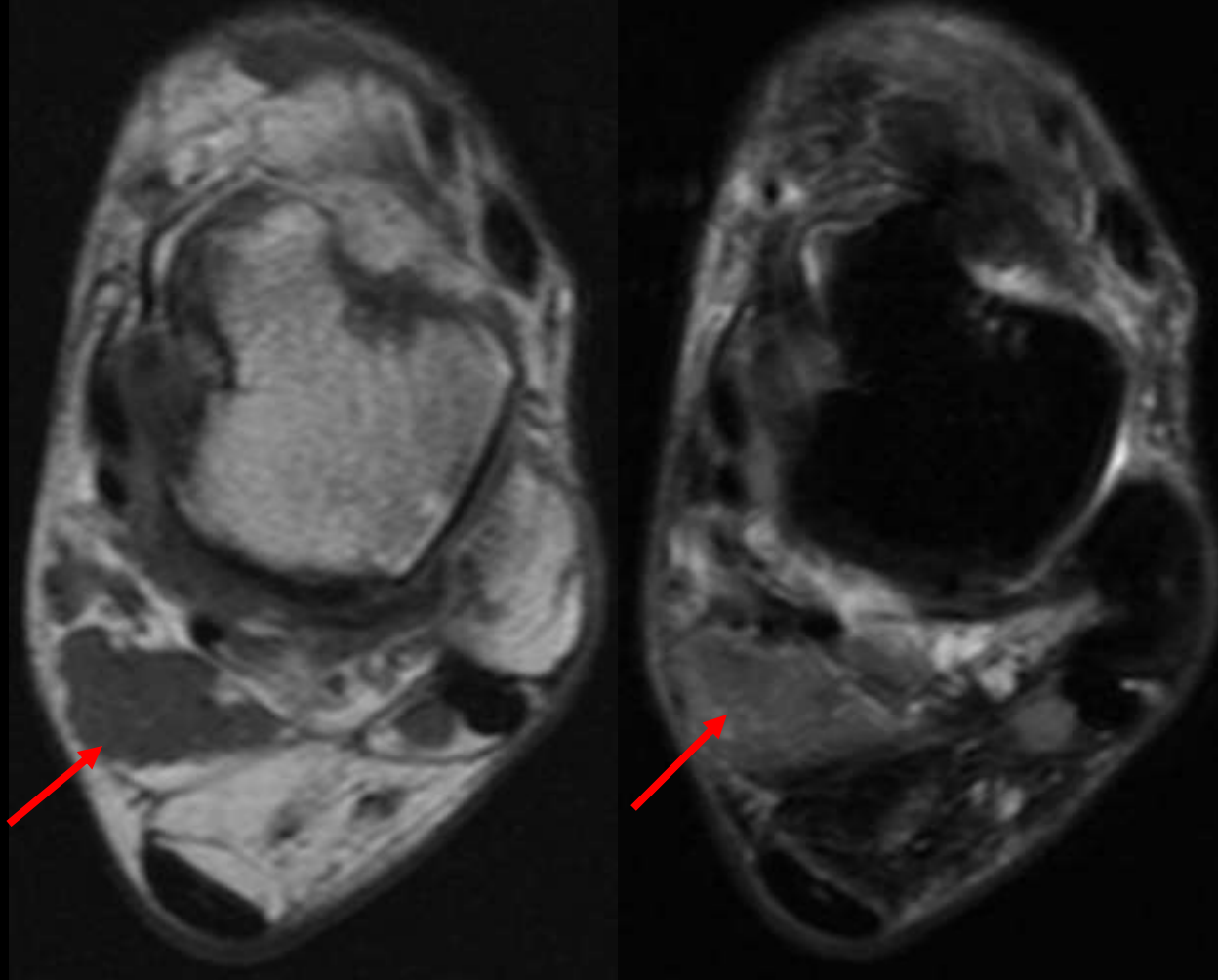
6



W 1610 : L 761

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

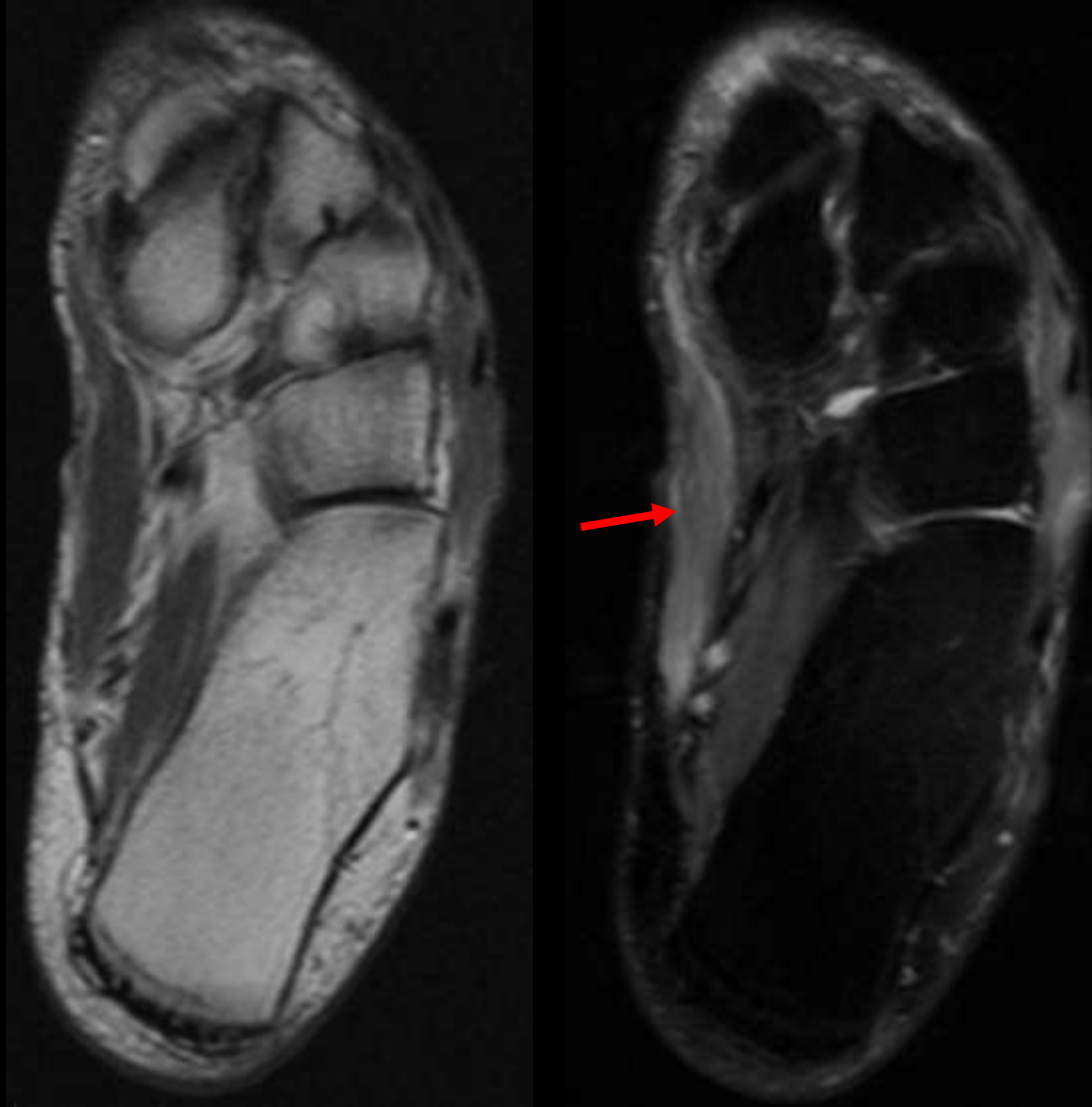
## Peroneocalcaneus Internus Muscle



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Peroneocalcaneus Internus Muscle

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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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Ax PD

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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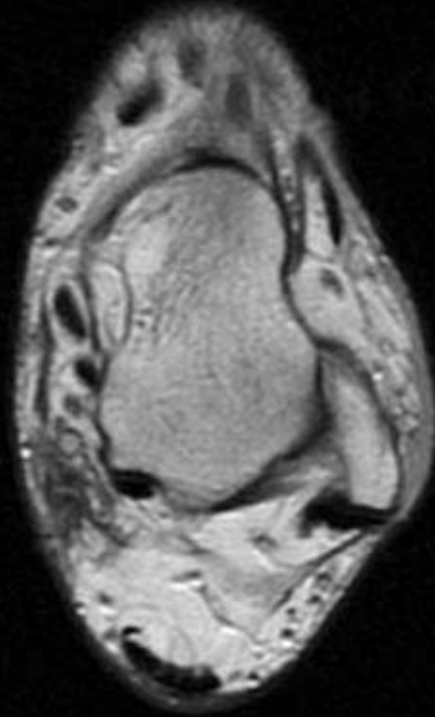
Ax PD



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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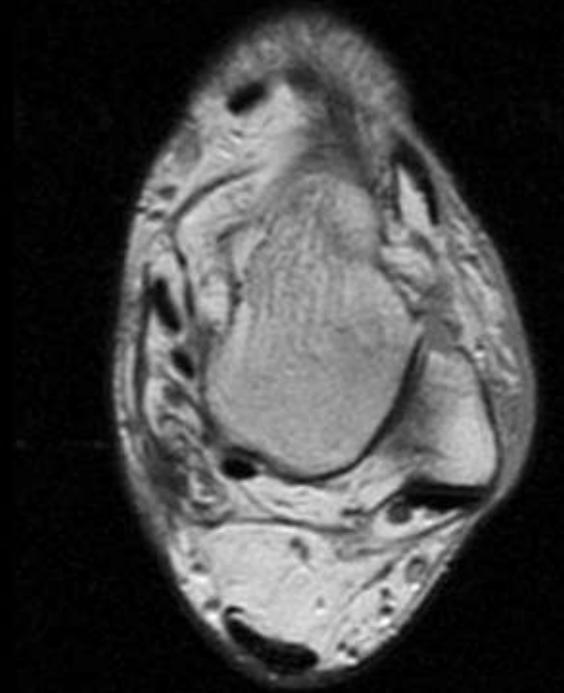


Ax PD

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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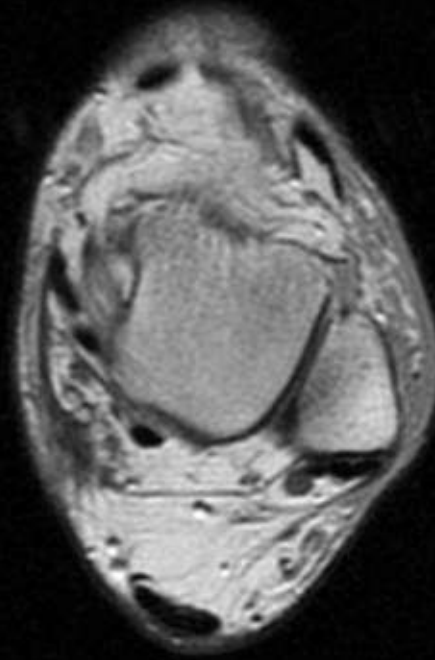


Ax PD

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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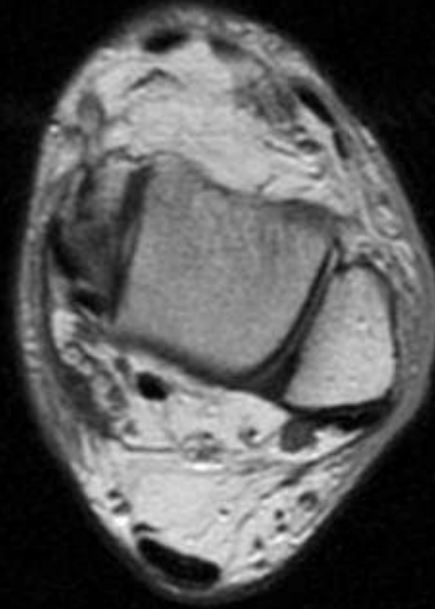


Ax PD

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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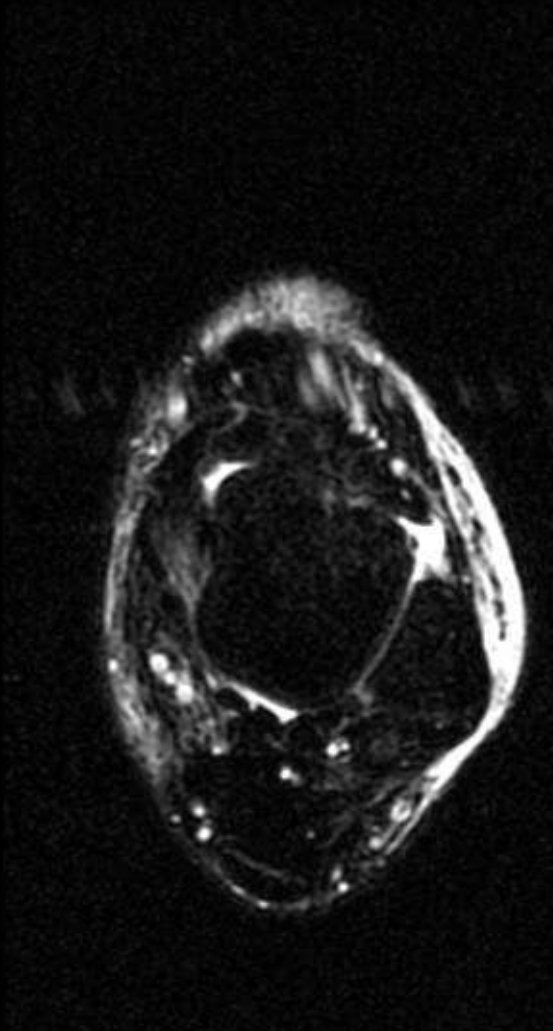


Ax PD

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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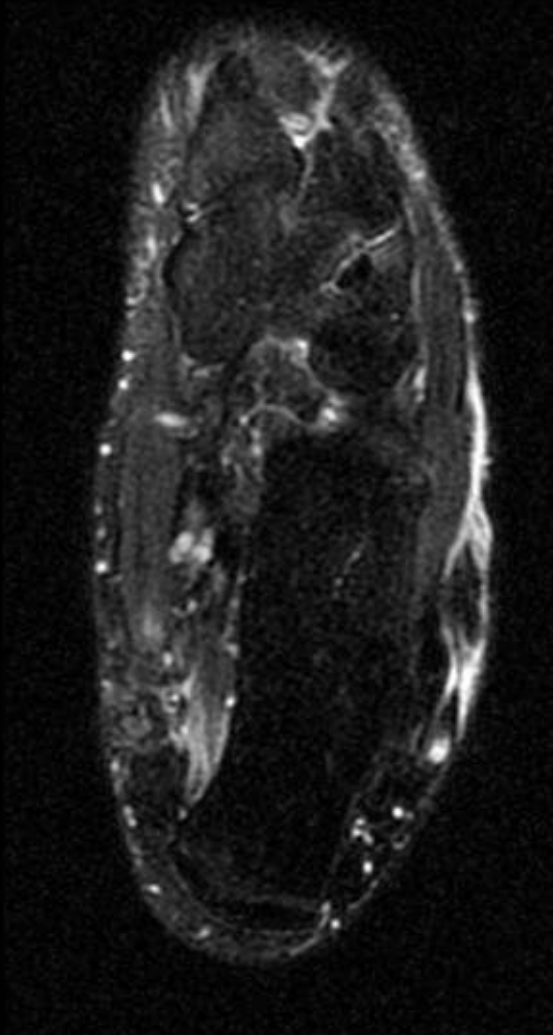


Ax T2FS

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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Ax T2FS

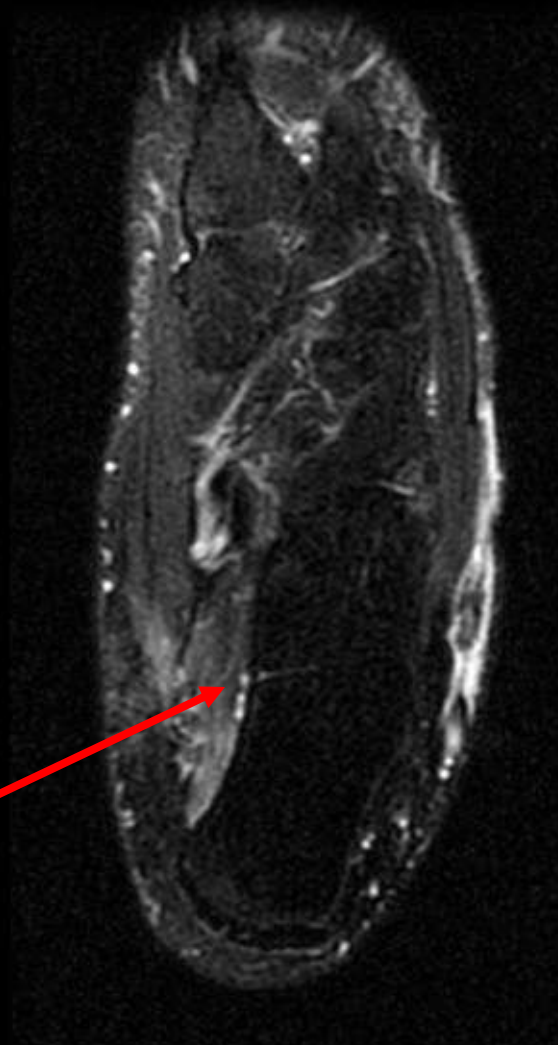
# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

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- Lateral plantar nerve

Muscles –  
QP  
FDB  
AbDquinti



Quadratus Plantaris

Ax T2FS

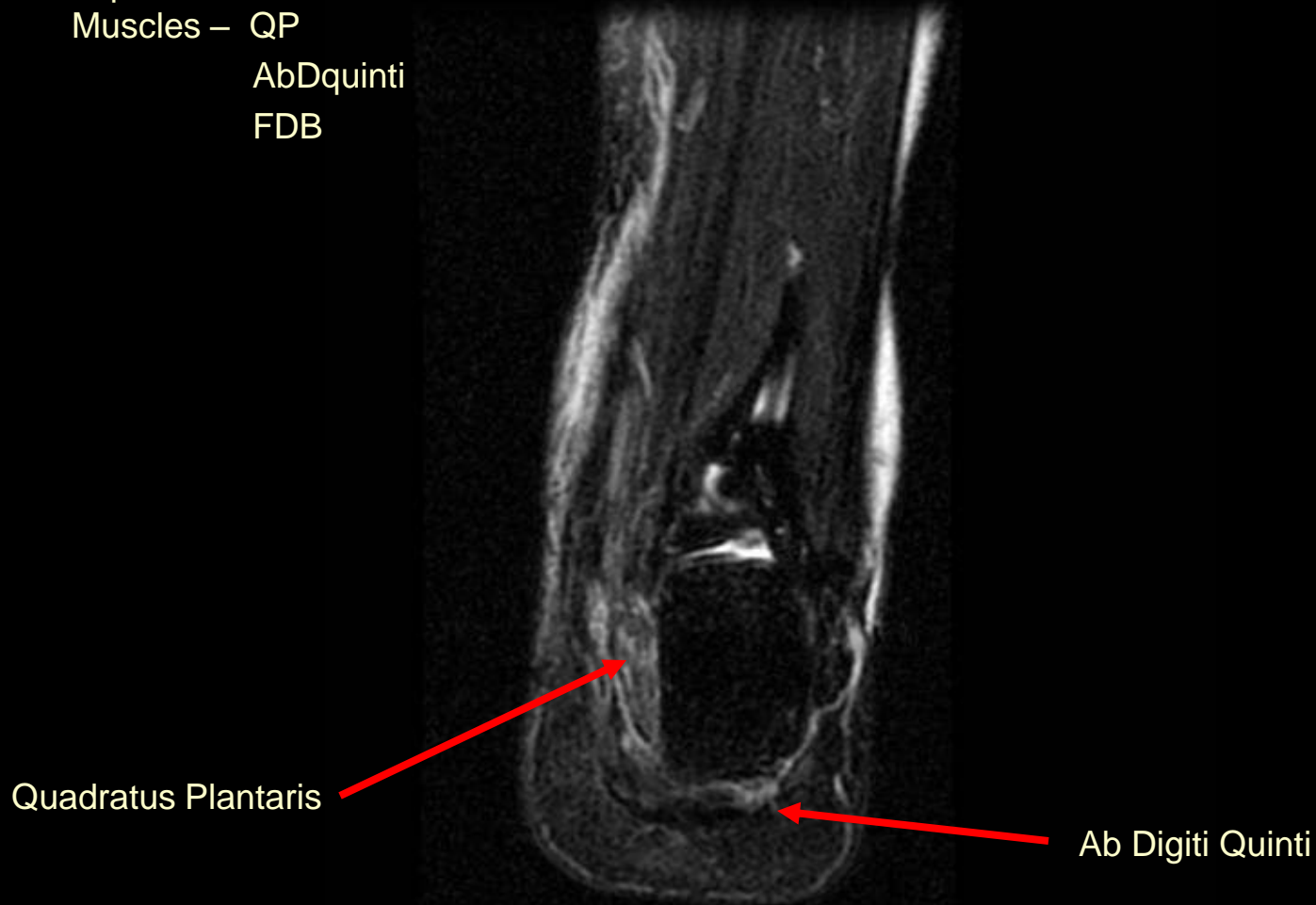


# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Thickened flexor retinaculum

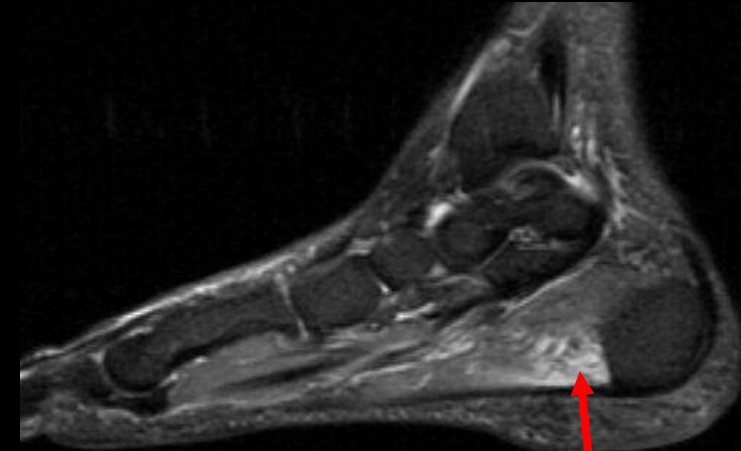
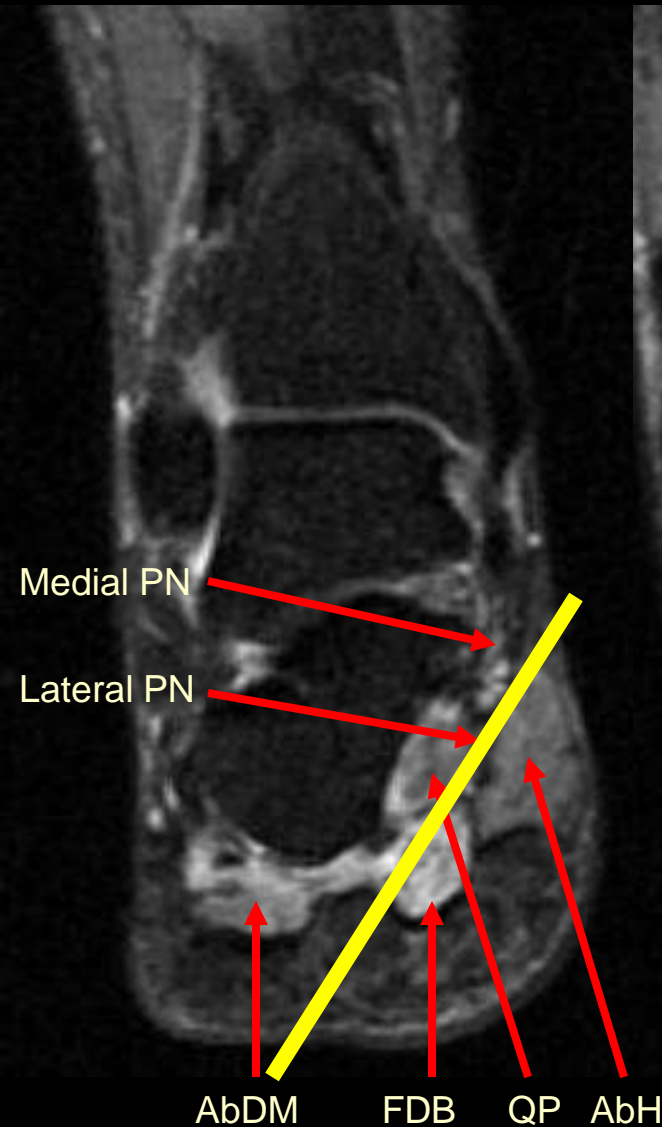
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- Lateral plantar nerve
  - Muscles – QP
  - AbDquinti
  - FDB



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Jogger's heel – Lateral Plantar Nerve



Cor, Ax, Sag PDFS

AbH

Tibial nerve

- Medial plantar nerve
  - Muscles – AbH, FHB, FDB, 1<sup>st</sup> lumbrical
- Lateral plantar nerve
  - Muscles – QP, AbDquinti, FDB

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Jogger's heel – Lateral Plantar Nerve



Rt Cor T1



Lt Cor T1

AbDQ

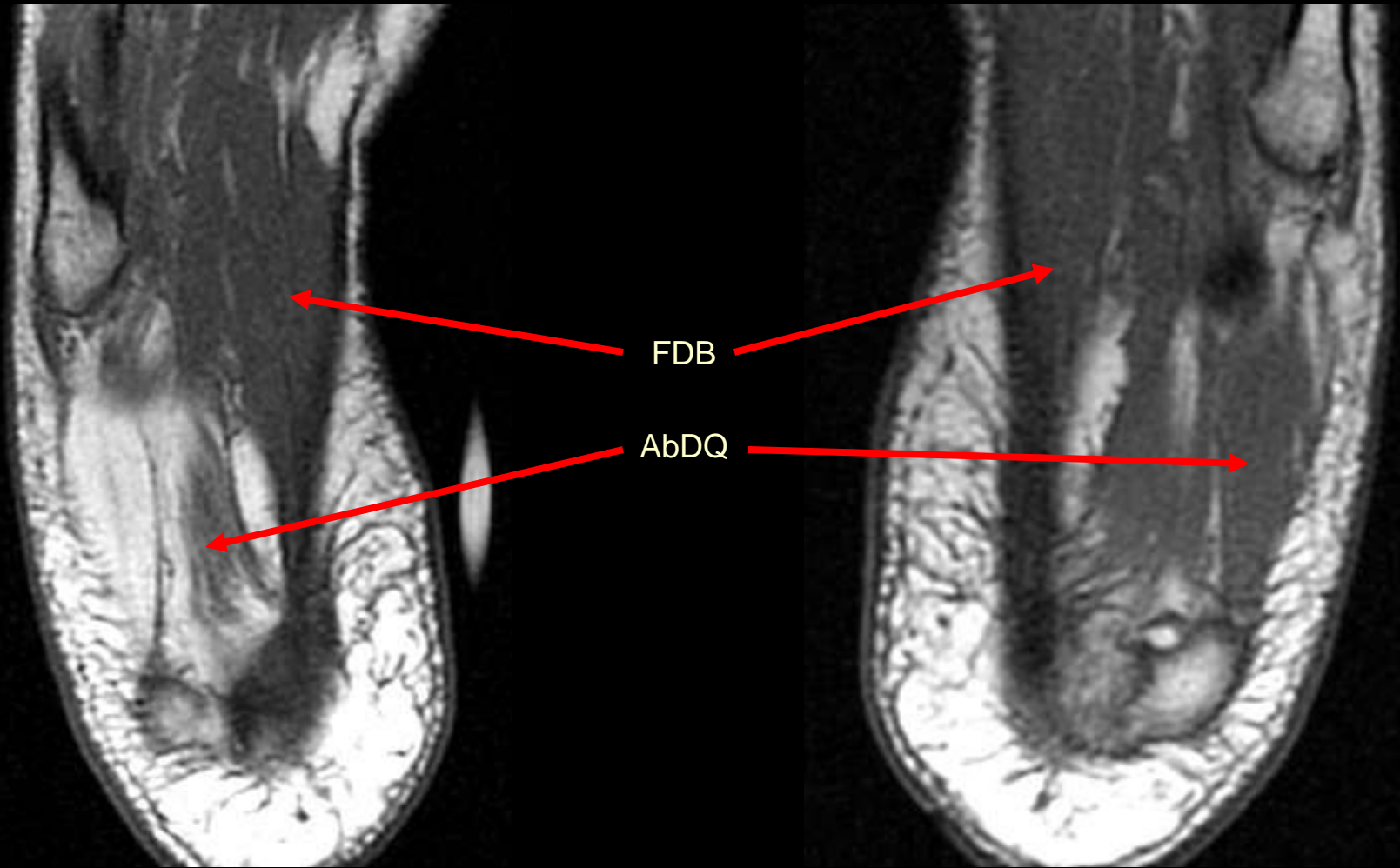
FDB

Abd digiti quinti atrophy

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Jogger's heel – Lateral Plantar Nerve

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Rt Ax T1

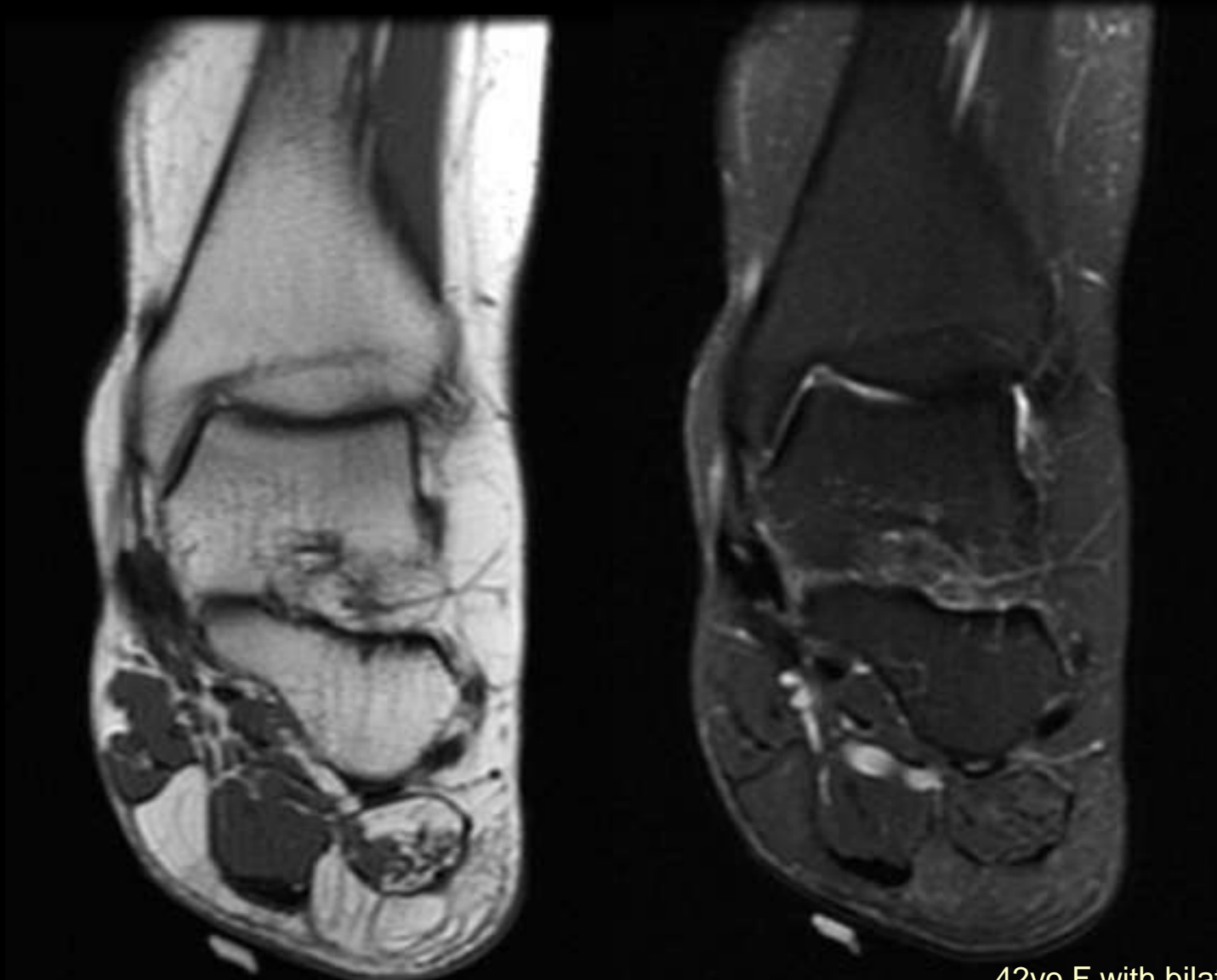
Lt Ax T1

Abd digiti quinti atrophy

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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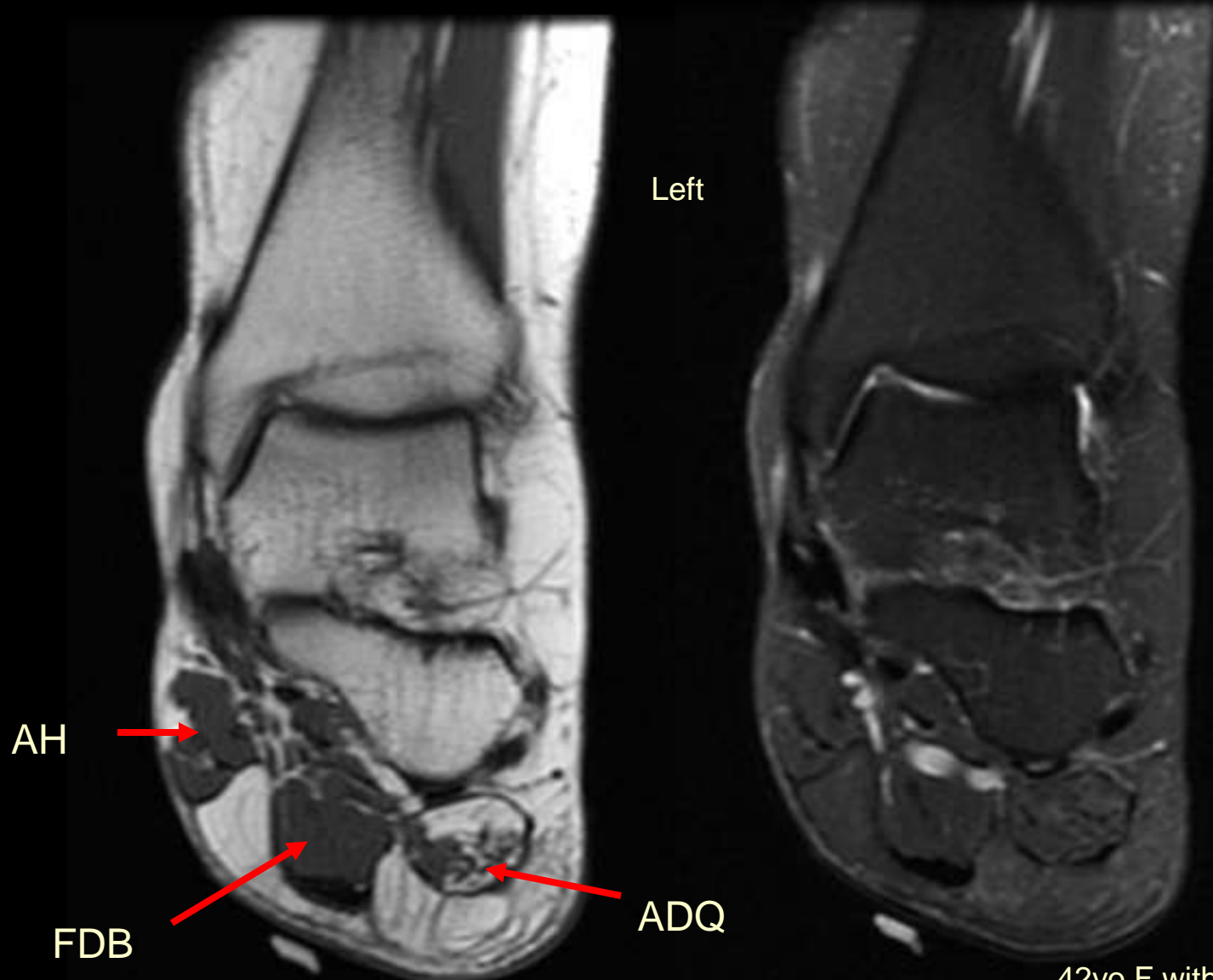


42yo F with bilateral heel pain

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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42yo F with bilateral heel pain



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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Left



42yo F with bilateral heel pain



# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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42yo F with bilateral heel pain

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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42yo F with bilateral heel pain

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

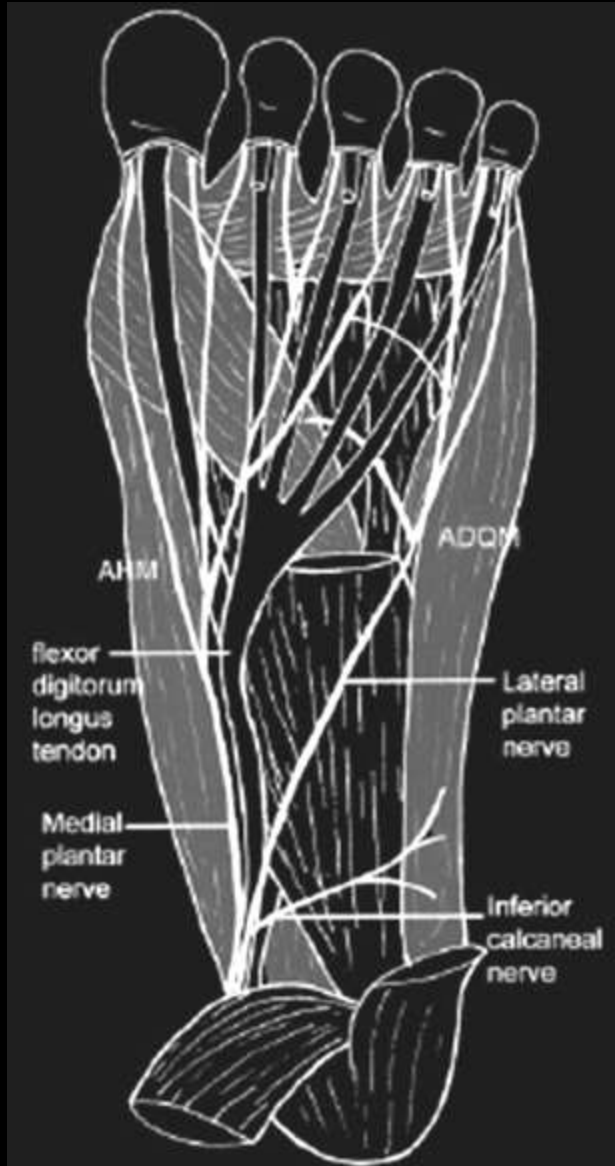
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- Aka=Inferior Calcaneal Nerve Compression
- Branch of lateral plantar nerve
- Supplies:
  - Sensory:
    - Lateral calcaneal periosteum
    - Long plantar ligament
  - Motor:
    - Quadratus Plantae
    - Abductor Digiti Quinti
    - Flexor Digitorum Brevis

# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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# Entrapment Syndromes - Tibial nerve – Tarsal Tunnel Syndrome

## Baxter's Neuropathy

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- Compression can be due to:
  - Microtrauma
    - Calcaneal spur
    - Internal foot derangement
  - Plantar fasciitis

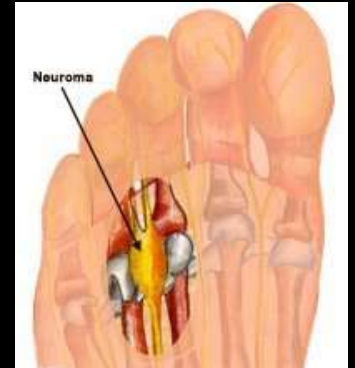


# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma

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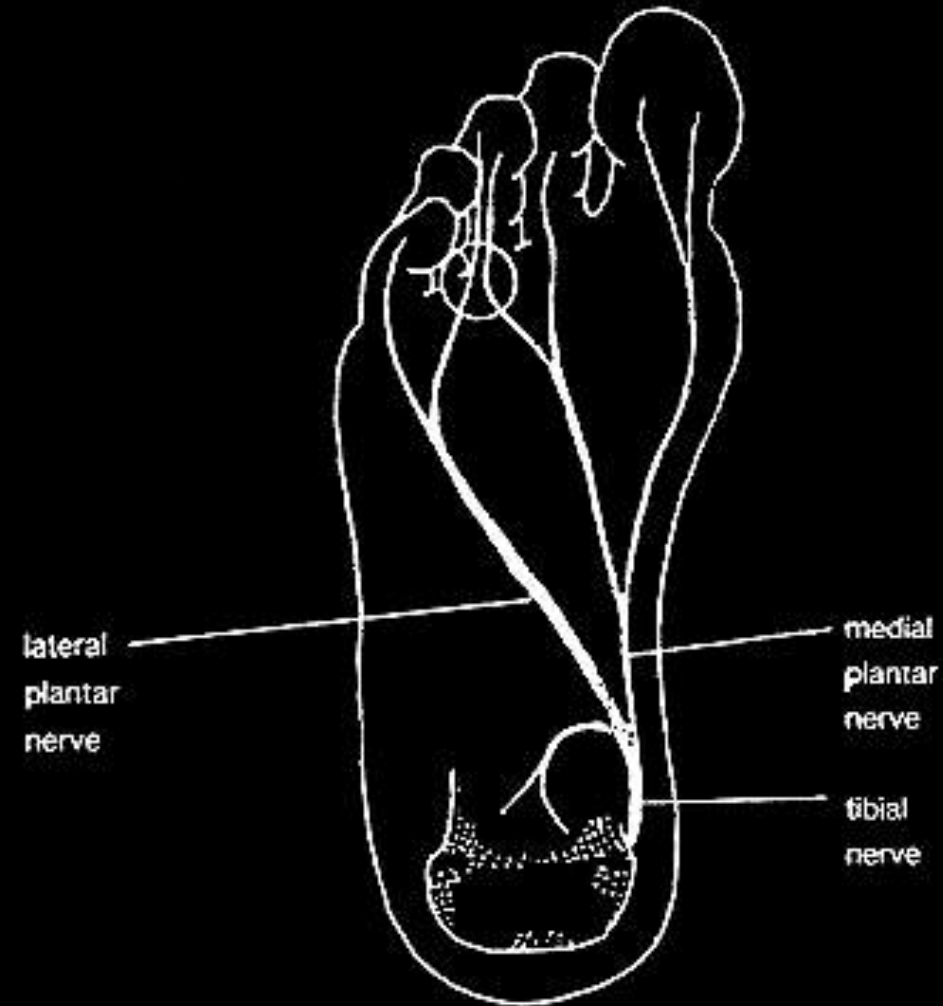
- AKA - Interdigital Neuroma
- NOT a neoplasm
- Perineural fibrosis response in and about the plantar digital nerves
- Usually females 18:1, ? Shoes, ? Ischemia
- Most common between third and fourth toes
- Look for intermetatarsal bursitis....high SI on T2



# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma - Anatomy

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# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma – Anatomy

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Joplin

Heuter

Hauser

Morton

Iselin



# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma – X-ray

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- Radiographs invariably normal
- Used to exclude other pathology



# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma

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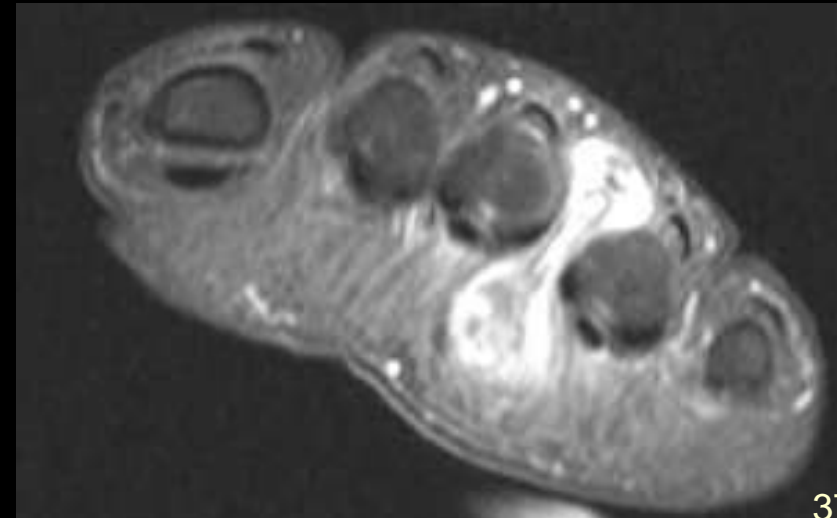
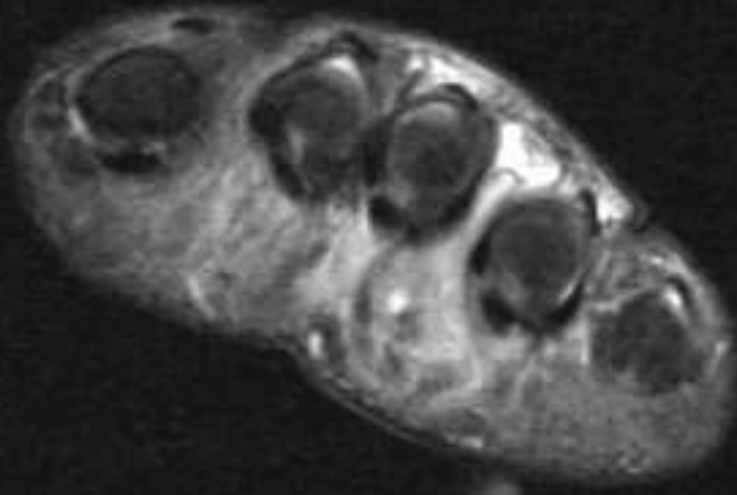
Cor T1

Cor PDFS



Cor T2FS

Cor T1FSGd



# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma - MRI

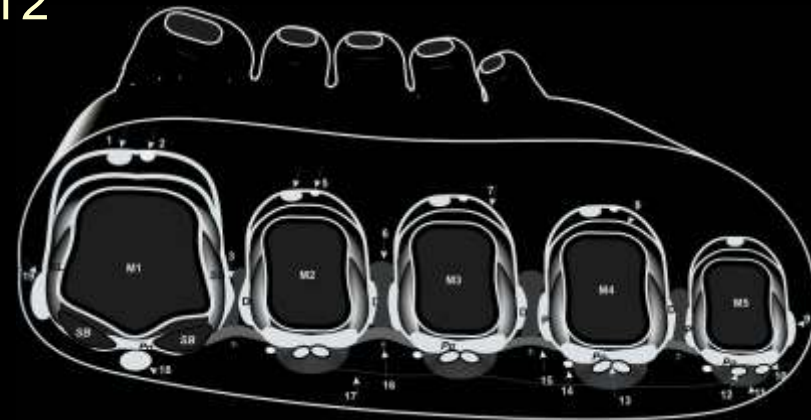
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- MR signal characteristics
  - Low signal on T1
    - Best seen on Cor T1
  - High signal on T2,
    - Isointense or mildly hypo to fat
    - Best seen with FS
- Post IV Gad images often demonstrate peripheral enhancement. May increase sensitivity over T2FS
  - Separate fibrosis from bursa
- Intermetatarsal bursitis often coexists with, or causes a Morton neuroma
  - Can be normal <3mm 1-3 spaces

# Entrapment Syndromes - Tibial nerve

## Morton's Neuroma - MRI

- 90% accurate, PPV 100%, NPV 60%
- Diagnostic criteria — Zanetti et al
  - a) Centered in NV bundle
  - Intermetatarsal space
  - Plantar side of intermetatarsal ligament
  - b) Well demarcated
  - c) SI = muscle on T1, =< fat on T2

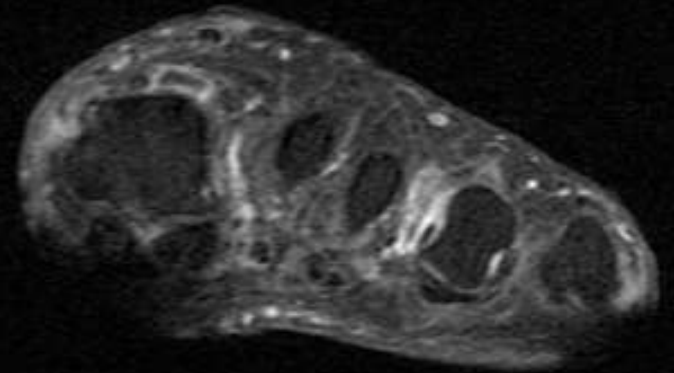
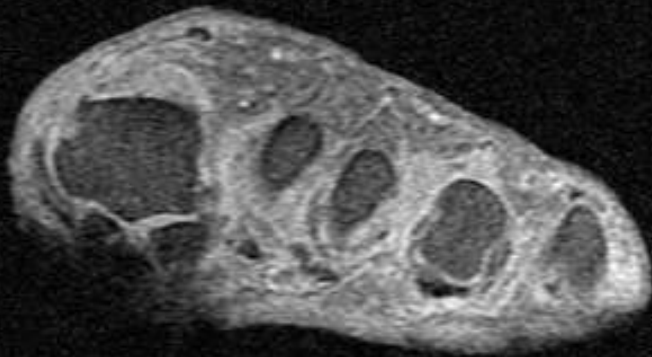
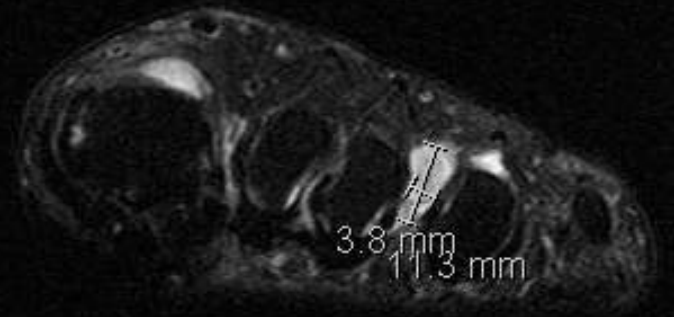
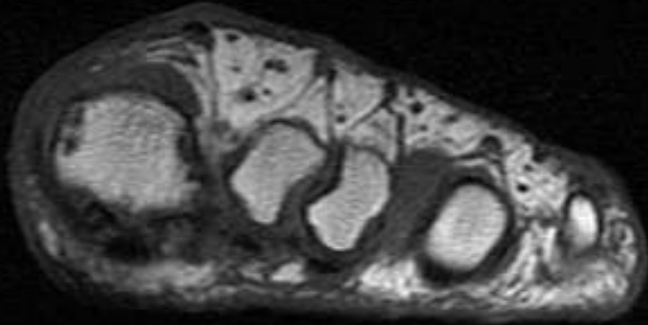


- Intermetatarsal bursal fluid 67%
- Erikson et al

- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

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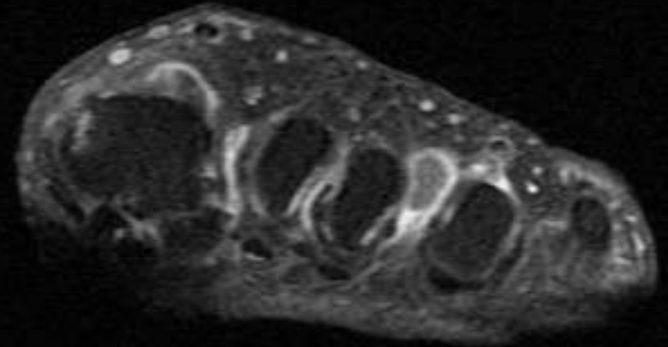
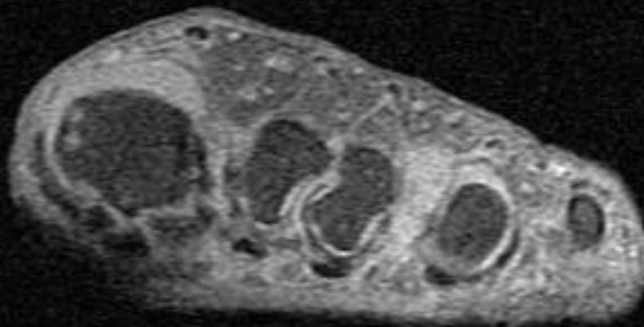
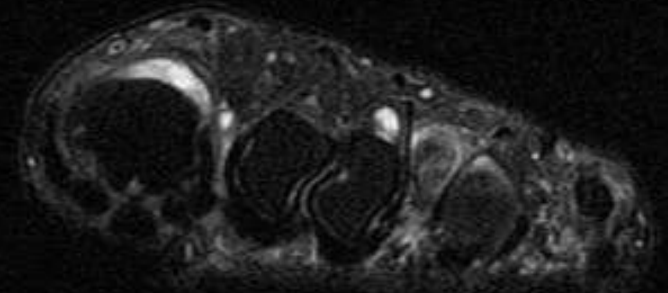
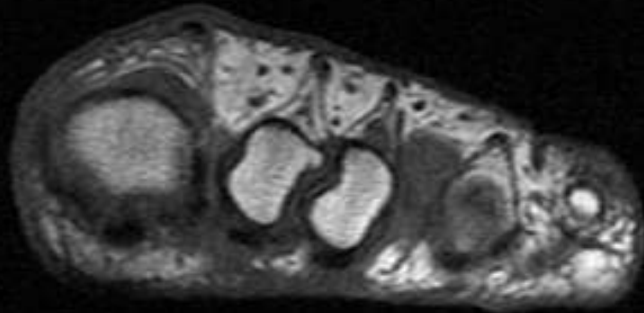




- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

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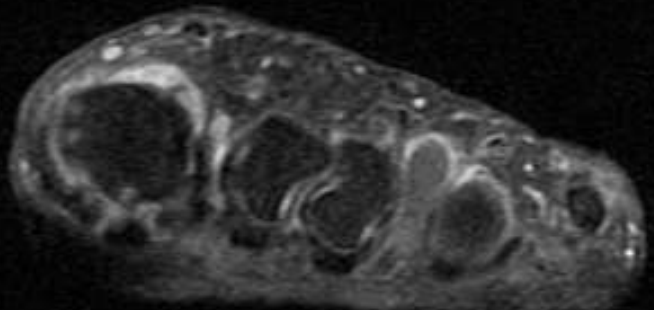
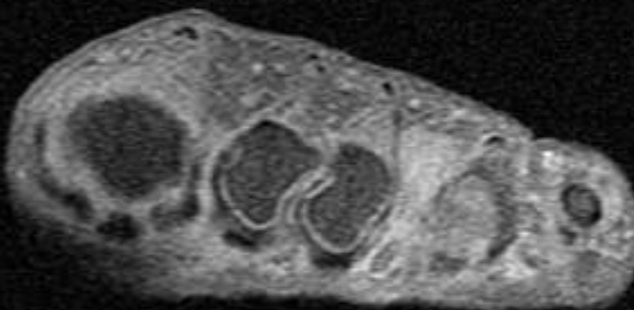
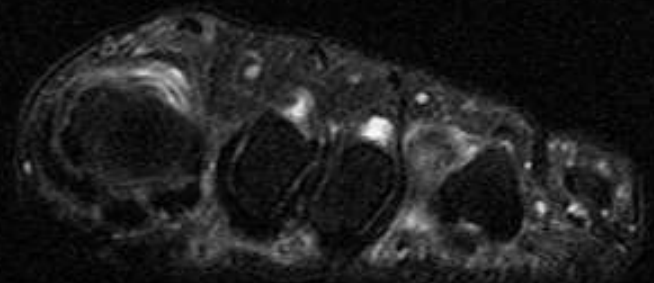
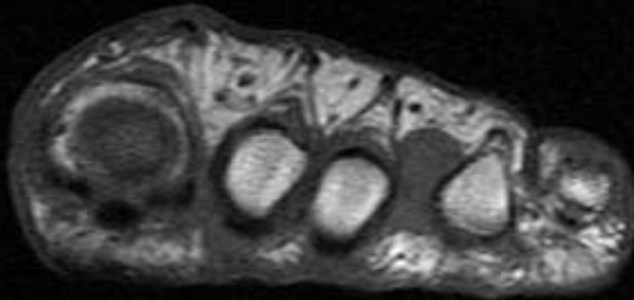




- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

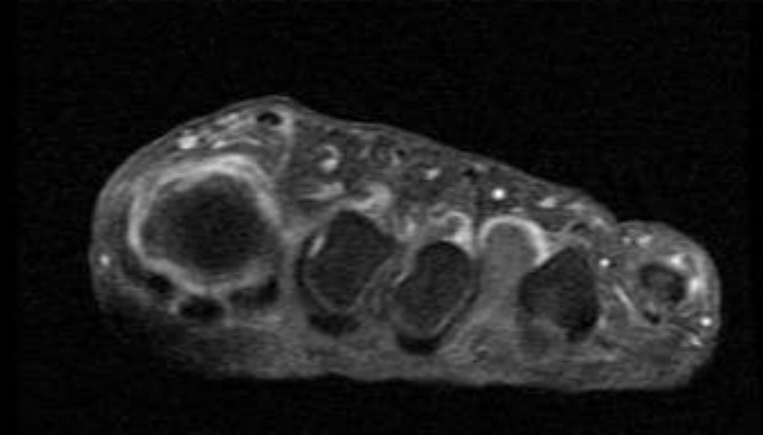
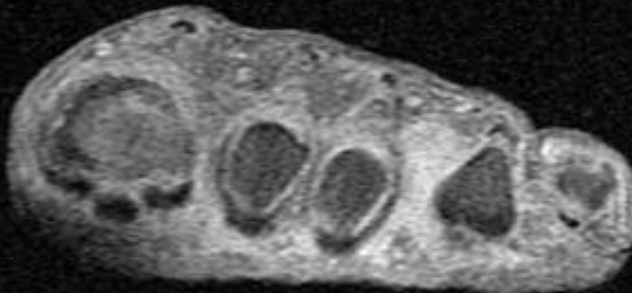
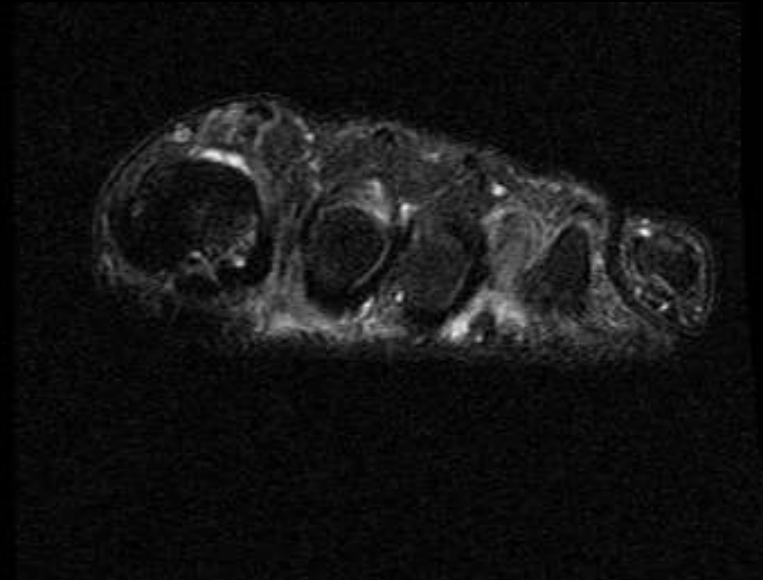
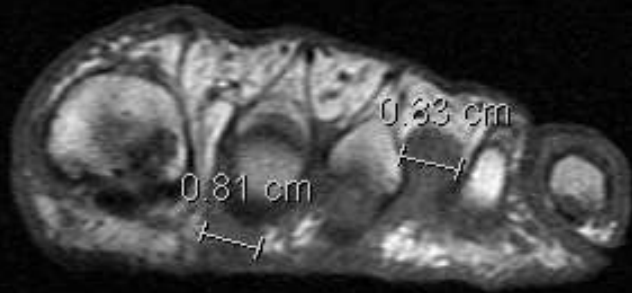
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- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

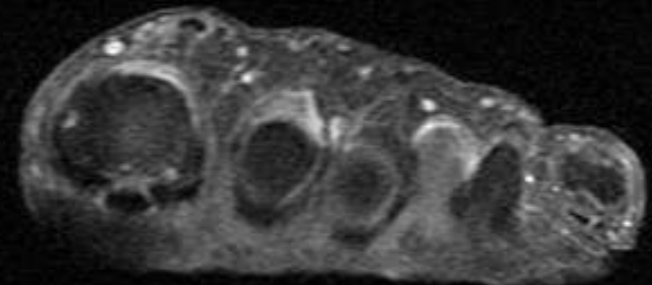
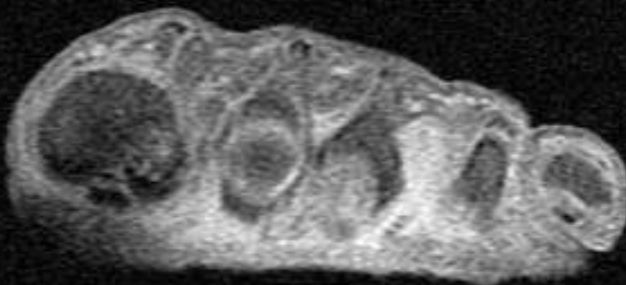
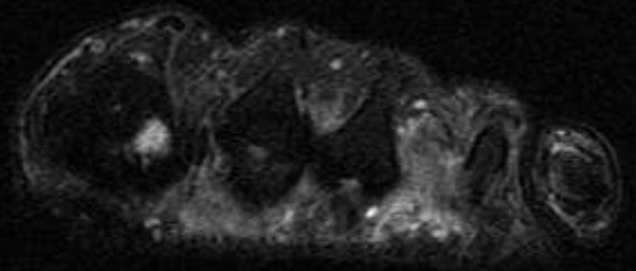
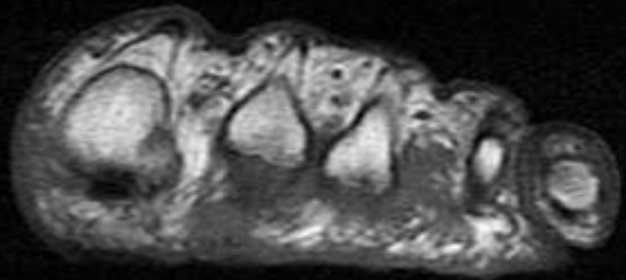
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- Entrapment Syndromes - Tibial nerve

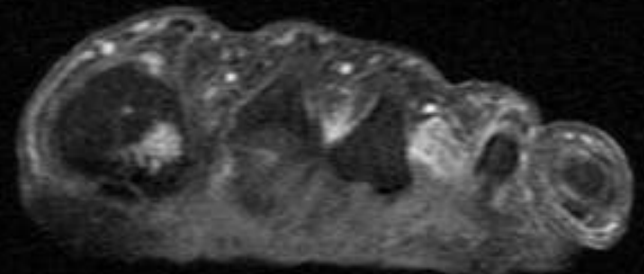
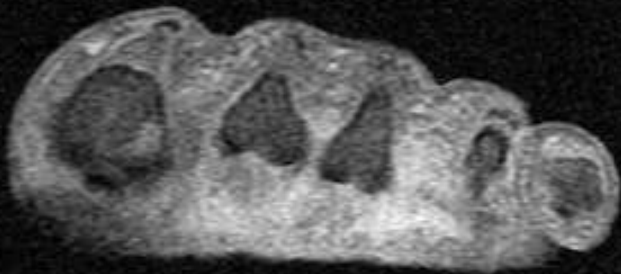
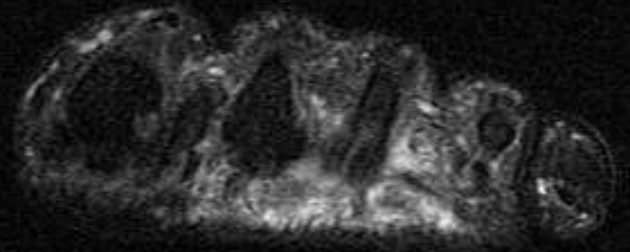
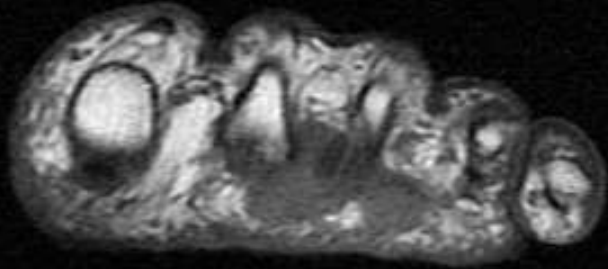
# Morton's Neuroma

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- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

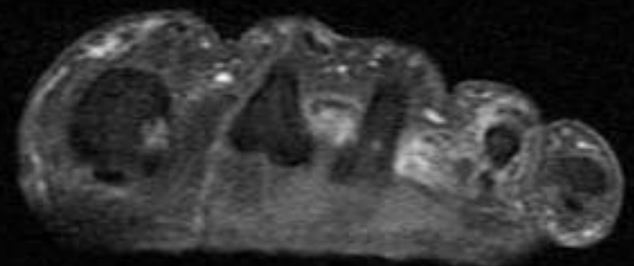
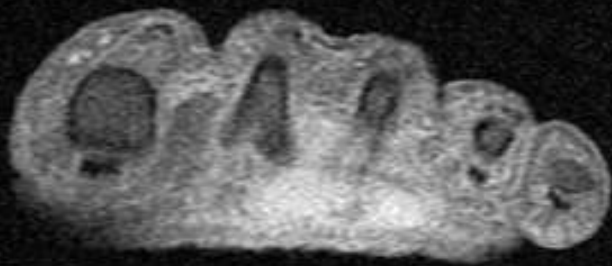
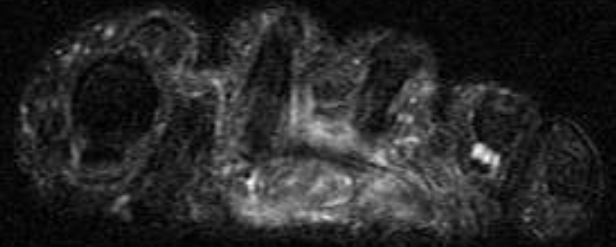
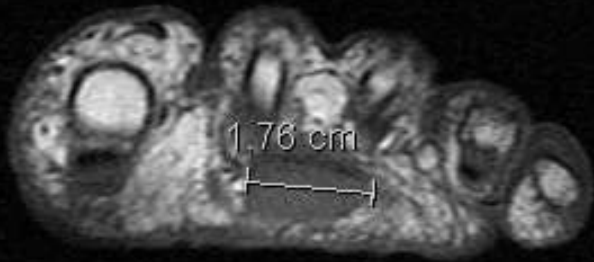




- Entrapment Syndromes - Tibial nerve

# Morton's Neuroma

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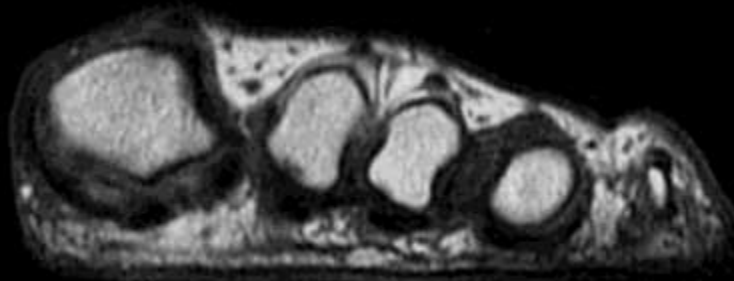


# Entrapment Syndromes - Tibial nerve

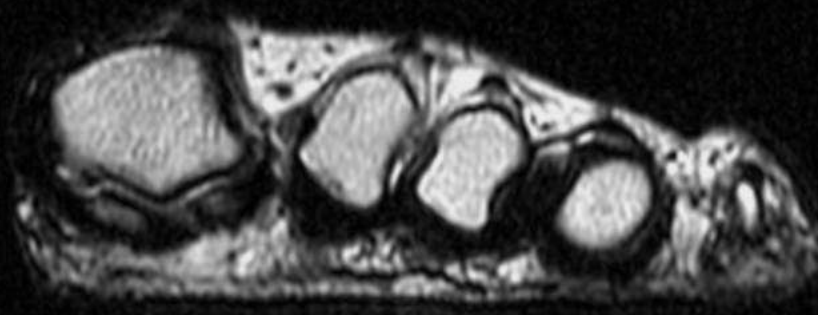
## Bilateral Morton's Neuromas

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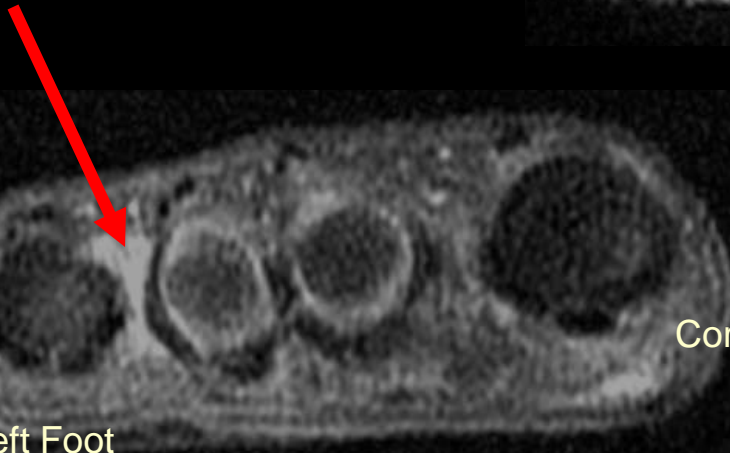
Cor T1



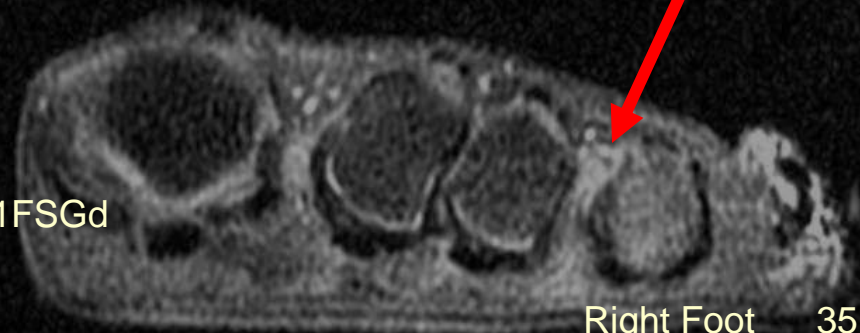
Cor T2



Left Foot



Cor T1FSGd



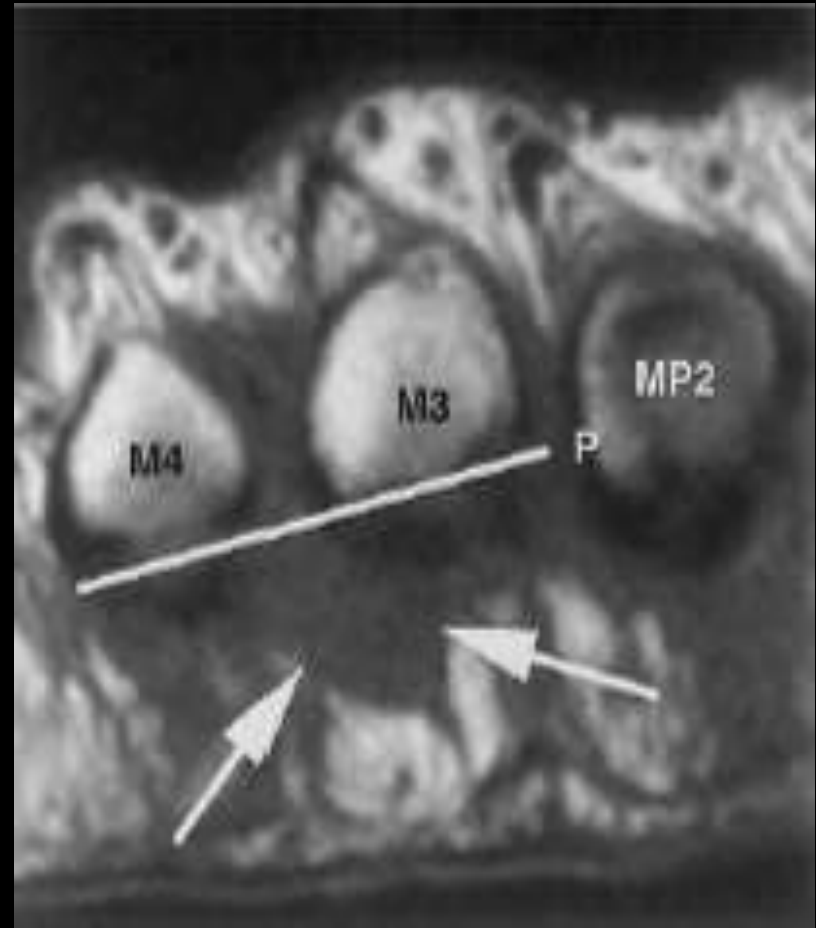
Right Foot

35F

## Entrapment Syndromes - Tibial nerve

# Morton's Neuroma - Effect of Foot Positioning

- With prone imaging the neuroma is plantar to “virtual plantar cortical line”
- With supine & weight bearing imaging the neuroma migrates dorsally
- The shape & transverse measurement change
- This is important since neuromas >5mm have a much better surgical outcome
- Neuromas are most conspicuous on prone images



Prone

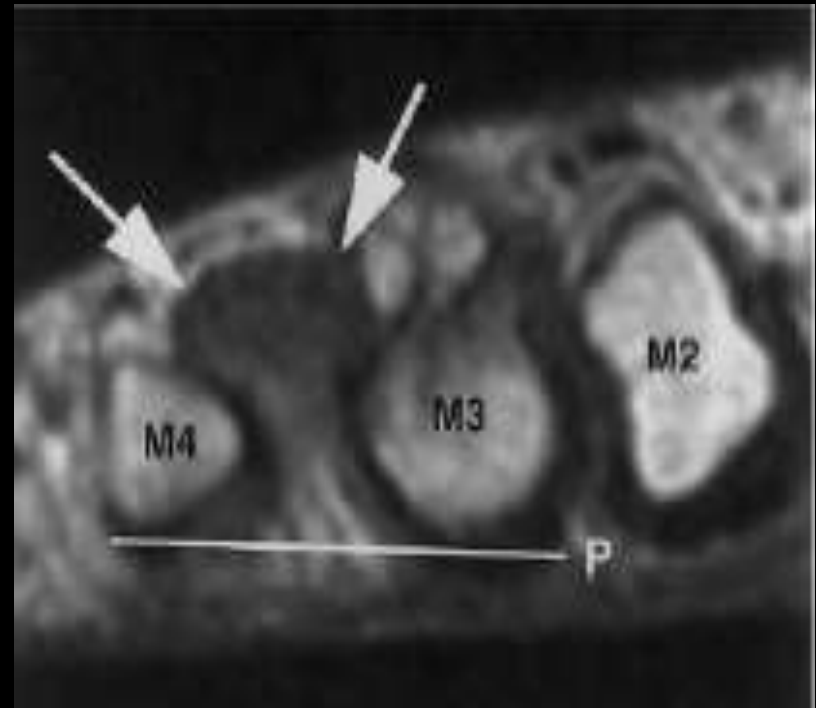


## Entrapment Syndromes - Tibial nerve

# Morton's Neuroma - Effect of Foot Positioning

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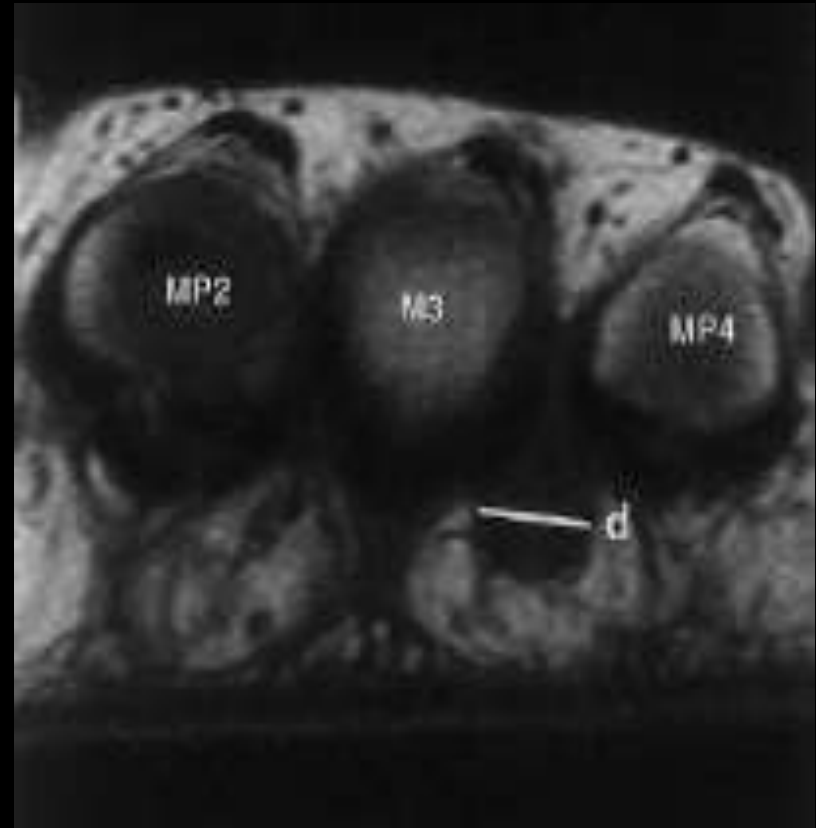
Supine

## Entrapment Syndromes - Tibial nerve

# Morton's Neuroma - Effect of Foot Positioning

---

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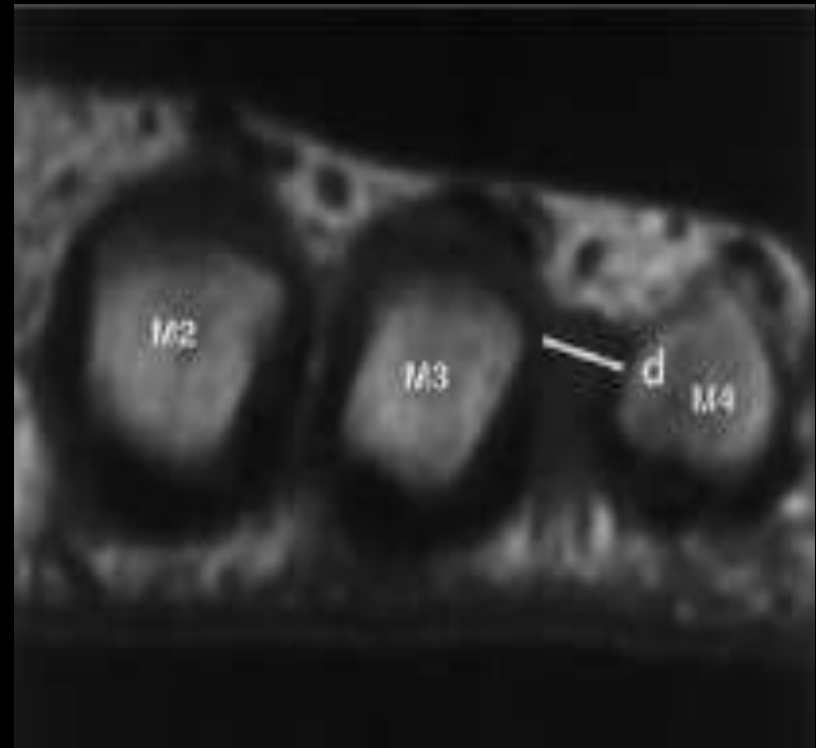
Prone

## Entrapment Syndromes - Tibial nerve

# Morton's Neuroma - Effect of Foot Positioning

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Supine

## Entrapment Syndromes - Tibial nerve

# Morton's Neuroma - Effect of Foot Positioning

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