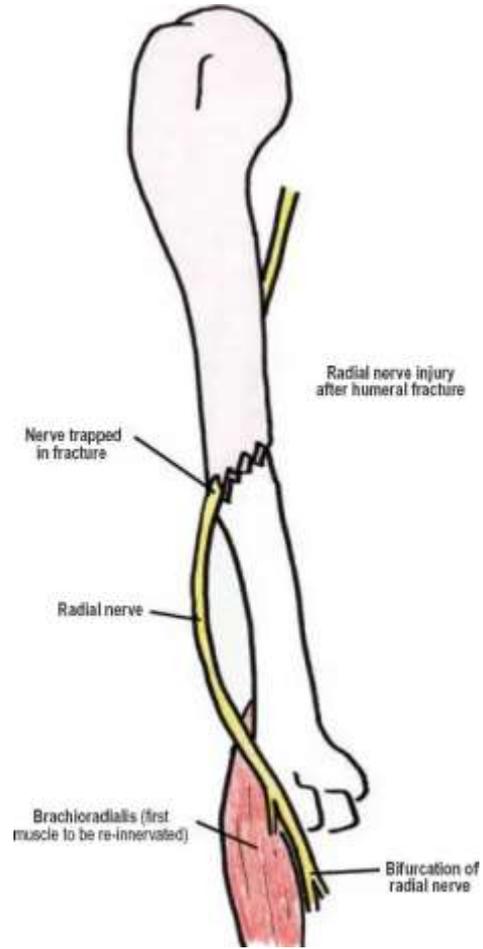


Peripheral Nerve Injuries

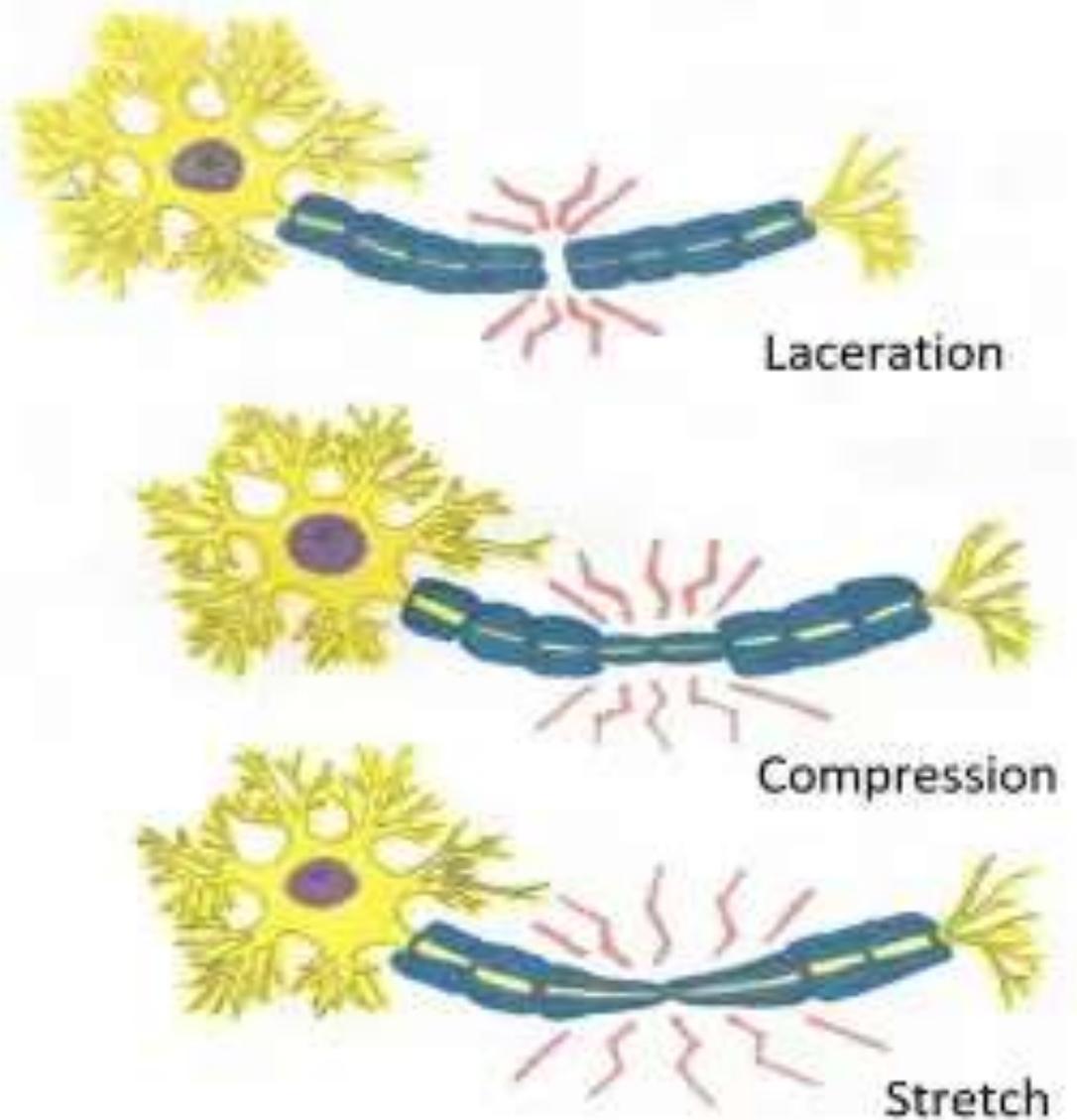
Mr Mohammed Tayyem
MD, MRCSI, FRCS (T&O), FEBOT

Case 1: Wrist Drop After a Fall

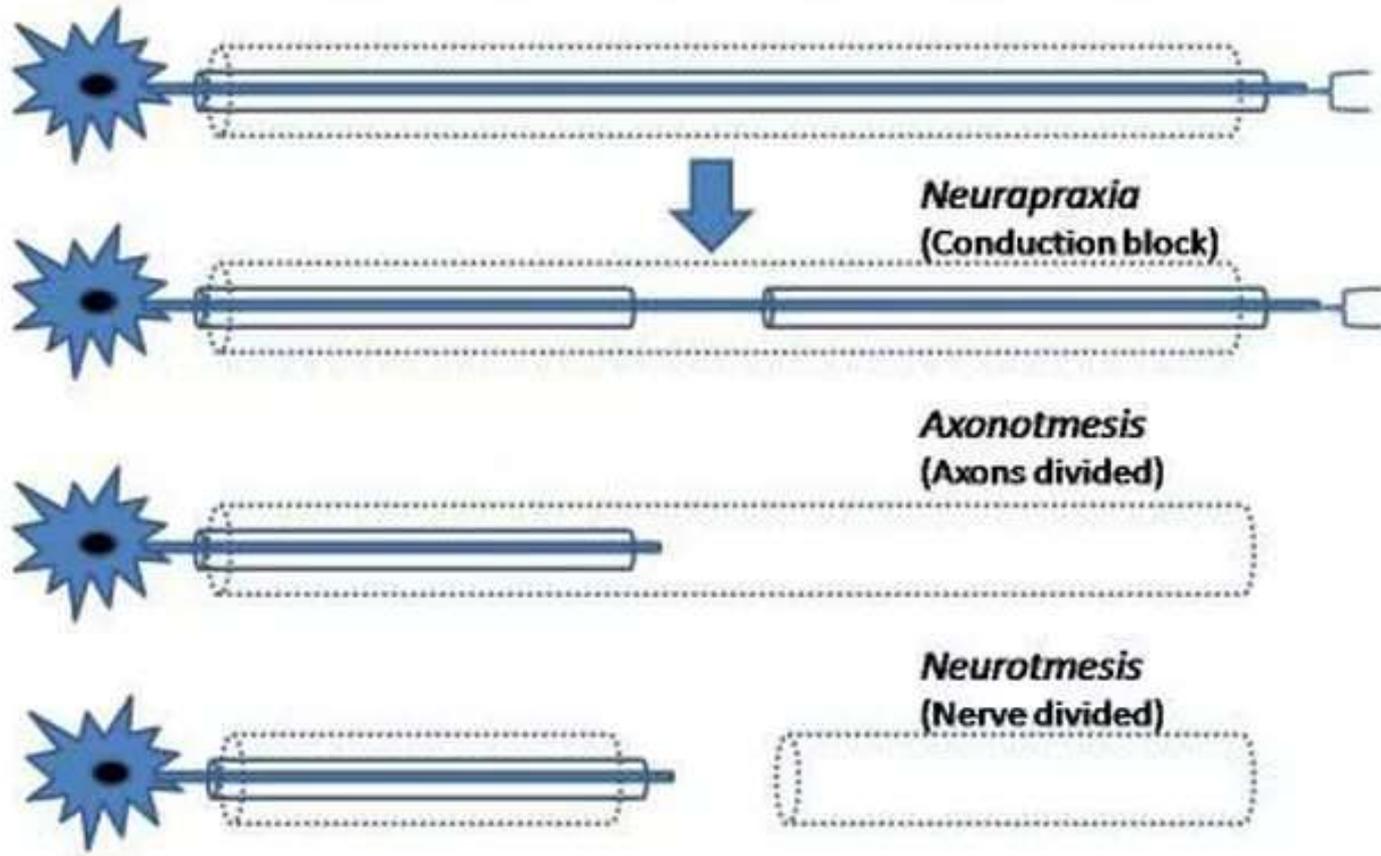
- A 35-year-old man sustains a mid-shaft humeral fracture.
- He cannot extend his wrist and fingers and has numbness over the dorsum of the hand.
- Questions:
 - Which nerve is injured?
 - What is the likely mechanism?
 - What investigations are indicated?

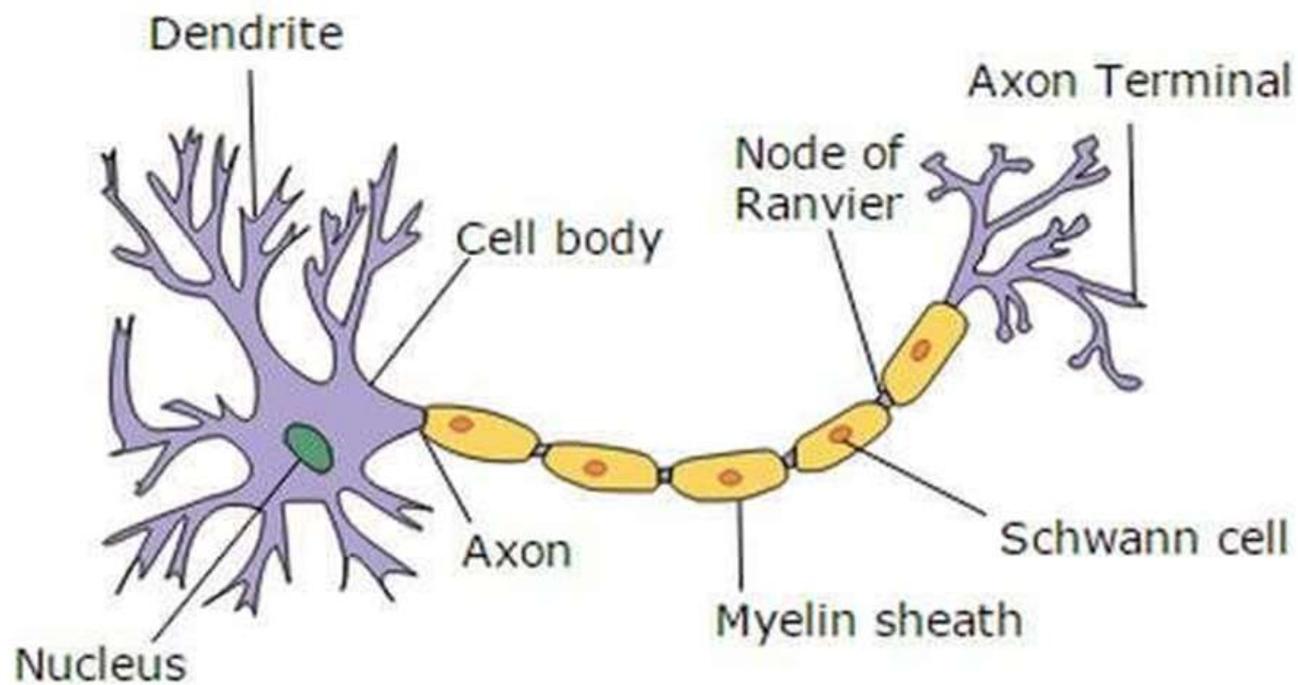


Mechanisms of Injury for Peripheral Nerves

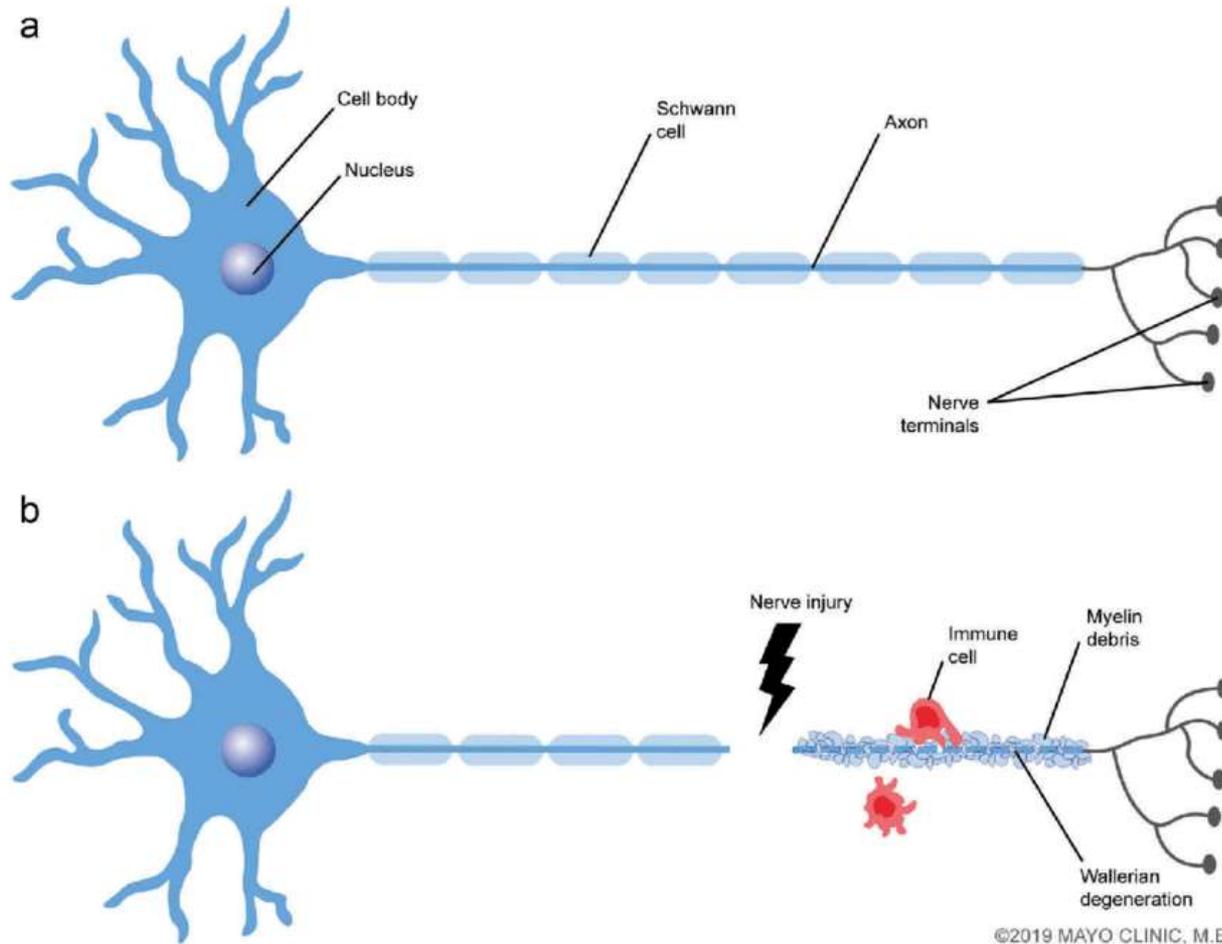


Grades of Nerve Injury (Seddon 1942)





Wallerian degeneration Axonotmesis + Neurotmesis



Sedon Classification

	Mechanism	Wallerian degeneration	Prognosis	Muscle denervation
Neuropraxia	Demyelinating	No	Reversible	No
Axonotmesis	Axon loss	Yes	Variable	Yes
Neurpraxia	Nerve loss	yes	irreversible	yes

Case 1 Discussion: Localizing the Lesion

- • Humeral shaft fracture → risk of radial nerve injury at spiral groove.
- • Motor: wrist and finger drop.
- • Sensory: dorsal hand numbness.
- Diagnosis: Radial nerve palsy (neuropraxia likely).

Radial nerve

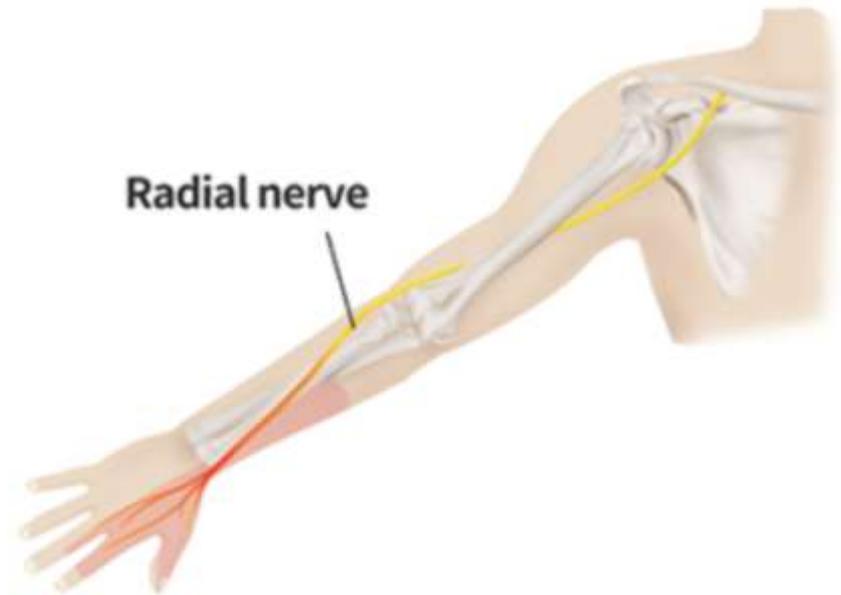
Superficial radial
→ sensation first web space

PIN → Extensor indicis , EPL ,
Extensor Carpi Ulnaris

Radial nerve /spiral groove →
Brachioradialis , ECRL

High lesion → Triceps

Radial nerve palsy



Investigation

- Xray
- Ultrasound/MRI
- NCS/EMG

NCS/EMG

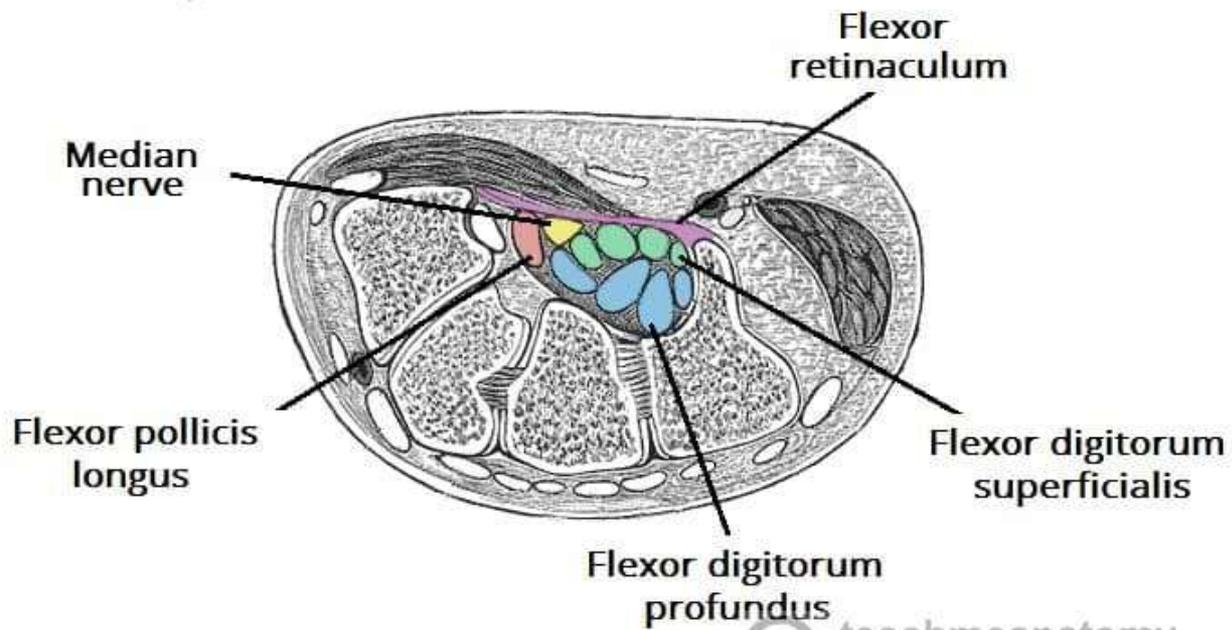
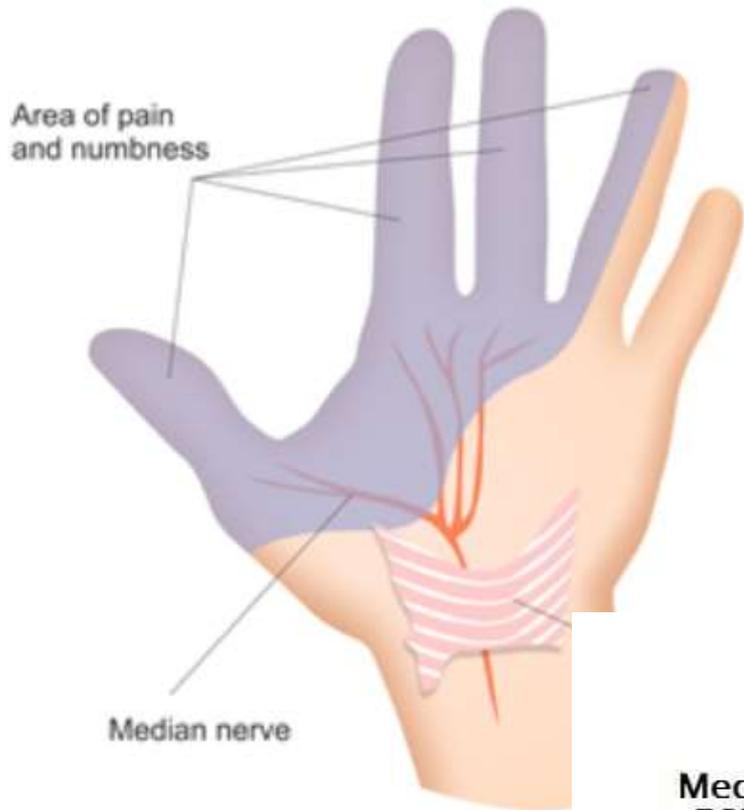
- FIRST 2 WEEKS > Not useful
- 3-4 weeks > picks up **denervation signs**
(Fibrillation)
(axontmesis OR Neurotmesis)
- 3 months > signs of reinnervation

Case 1 Management

- Observation and physiotherapy.
- Wrist splint in extension.
- EMG at 3–4 weeks.
- Surgical exploration if no recovery by 3 months.

Case 2: Hand Numbness at Night

- A 48-year-old lady has tingling in thumb, index, and middle fingers, worse at night.
- Symptoms improve when she shakes her hand.



Differential diagnosis

Cervical radiculopathy

Thoracic outlet

Cervical myelopathy

Peripheral (diabetic neuropathy)

Brachial plexus compression

Risk Factors

- Hand work.
- Endocrine imbalance (hypothyroidism , DM , pregnancy)
- History of neuropathy.
- Rheumatoid arthritis.
- Amyloidosis.
- Multiple myeloma .
- Trauma.
- Alcoholism.
- Gout.
- Space-occupying lesions within carpal tunnel.

Median nerve

Low lesion-CTS

- Motor:
 - Thenar muscles
 - ABP muscle
- sensory
 - Radial 3.5 digits

High lesion

- FCR+ FDS
- Motor(AIN):
 - OK signs
- Sensory(Low)
 - Thenar area
 - Palmar cut. branch

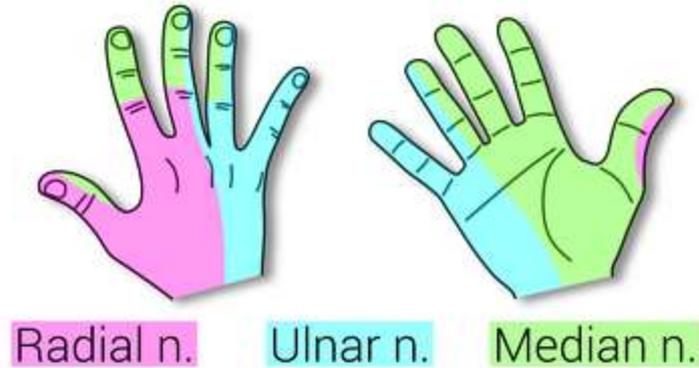
Case 2 Discussion: Carpal Tunnel Syndrome

- • Compression of median nerve at wrist.
- • Clinical tests: Tinel's sign, Phalen's test.

- Treatment: wrist splint, NSAIDs, steroid injection , or surgical decompression.

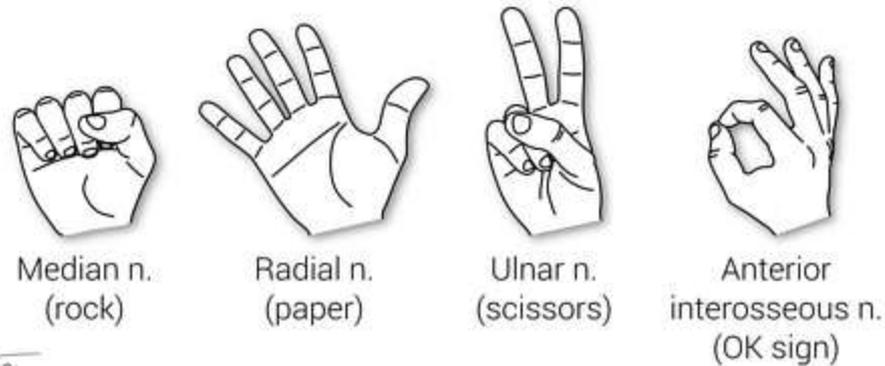
NEUROLOGICAL EXAMINATION OF THE UPPER LIMB

Sensory distribution



Note: the sensory distribution is subject to intra- and inter-individual variability*

Motor function



Butera

References

1. Davidson RW. Rock paper scissors injury. 2003 Jan;34(1):61-3.
2. March-All, Robertson JC, Goldman A, Boyle J, Hundley JL. Introduction of a simple guideline to improve neurological assessment in paediatric patients presenting with upper limb fractures. *Emerg Med J*. 2018 Apr;23(4):273-7.
3. Bunnell JC, Asherman CC, Owen G. Nerve injuries associated with pediatric supracondylar humeral fractures: a meta-analysis. *J Pediatr Orthop*. 2010 Apr;30(3):283-93.
4. Kijlgager M, Marhofer A, Murgg B, Zeitlinger M, Mairhofer M, Matzweg S, Marhofer S. Cutaneous innervation of the hand: clinical testing in volunteers shows high intra- and inter-individual variability. *Br J Anaesth*. 2018 Apr;120(4):838-848.

• Radial Nerve

Sensation

First web space

Motor

Brachioradialis

Extensor Carpi Radialis Longus

Extensor Carpi Ulnaris

Extensor Indicis

Extensor Pollicis Longus

• Ulna Nerve

Sensation

Dorsum of hand over 5th metacarpal

Tip of little finger

Motor

Flexor Carpi Ulnaris

FDP to little finger

Abductor Digiti Minimi

First dorsal interosseous

Froment's test

• Median Nerve

Sensation

Tip of index finger

Base of Thenar Muscles crease

Motor

Flexor Carpi Radialis

Flexor Digitorum Superficialis

Opponens Pollicis

Abductor Pollicis Brevis

OK sign



Case 3: Foot Drop After Weight Loss

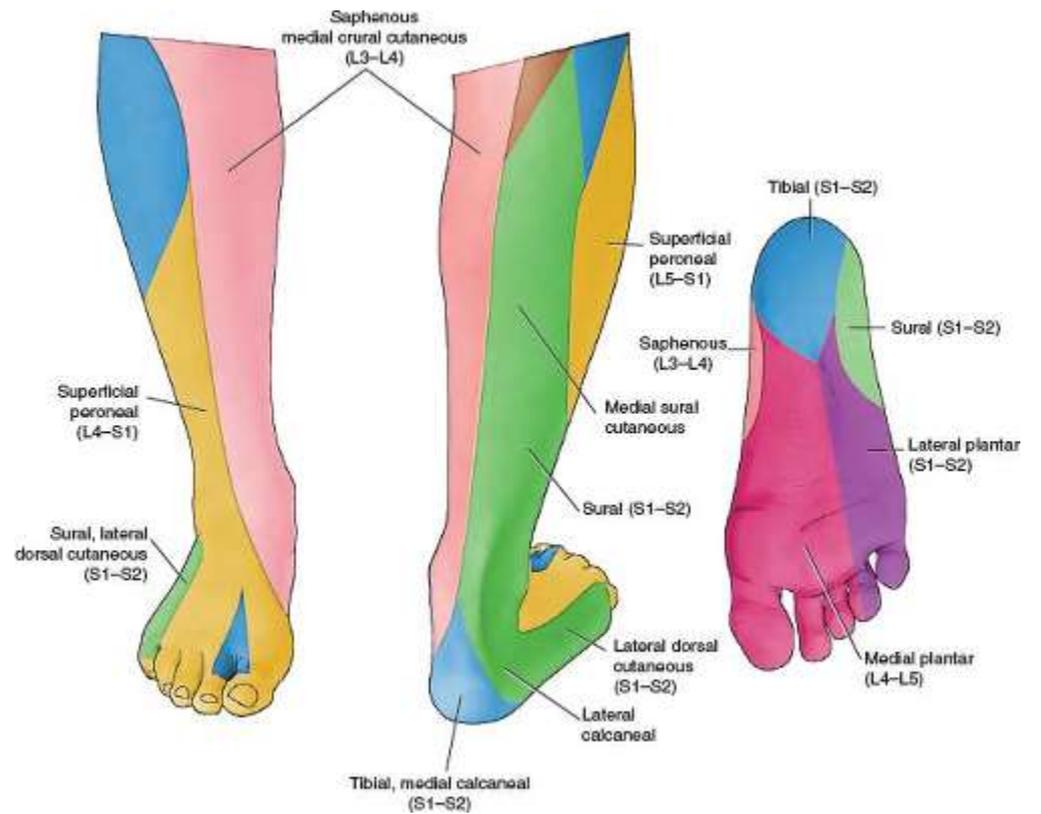
- A 28-year-old man presents with foot drop and numbness over the dorsum of foot after sustaining fibular neck fracture
- Questions:
 - Which nerve is involved?
 - What is the mechanism?
 - How should it be managed?

DDX of drop foot

- General
- Spine – L5 Nerve root
- Sciatic nerve
- Common peroneal
- Deep peroneal

DDX of drop foot

- General
- Spine – L5 Nerve root
- Sciatic nerve
- Common peroneal
- Deep peroneal



Case 3 Discussion: Common Peroneal Nerve Palsy

- Compression near fibular neck.
- Weak dorsiflexion, toe extension, and eversion.
- Sensory loss over dorsum of foot.
- Management: relieve pressure, physiotherapy, ankle-foot orthosis, surgical exploration if persistent.

Summary Table: Common Nerve Syndromes

- Radial – Spiral groove – Wrist drop
- Median – Carpal tunnel – Thenar wasting
- Ulnar – Cubital tunnel – froment sign
- Common peroneal – Fibular neck – Foot drop
- Tibial – Tarsal tunnel – Plantar sensory loss
- Axillary nerve – shoulder dislocation – Deltoid