UPPER LIMB NERVE INJURIES

Dr. Hayder Hamed

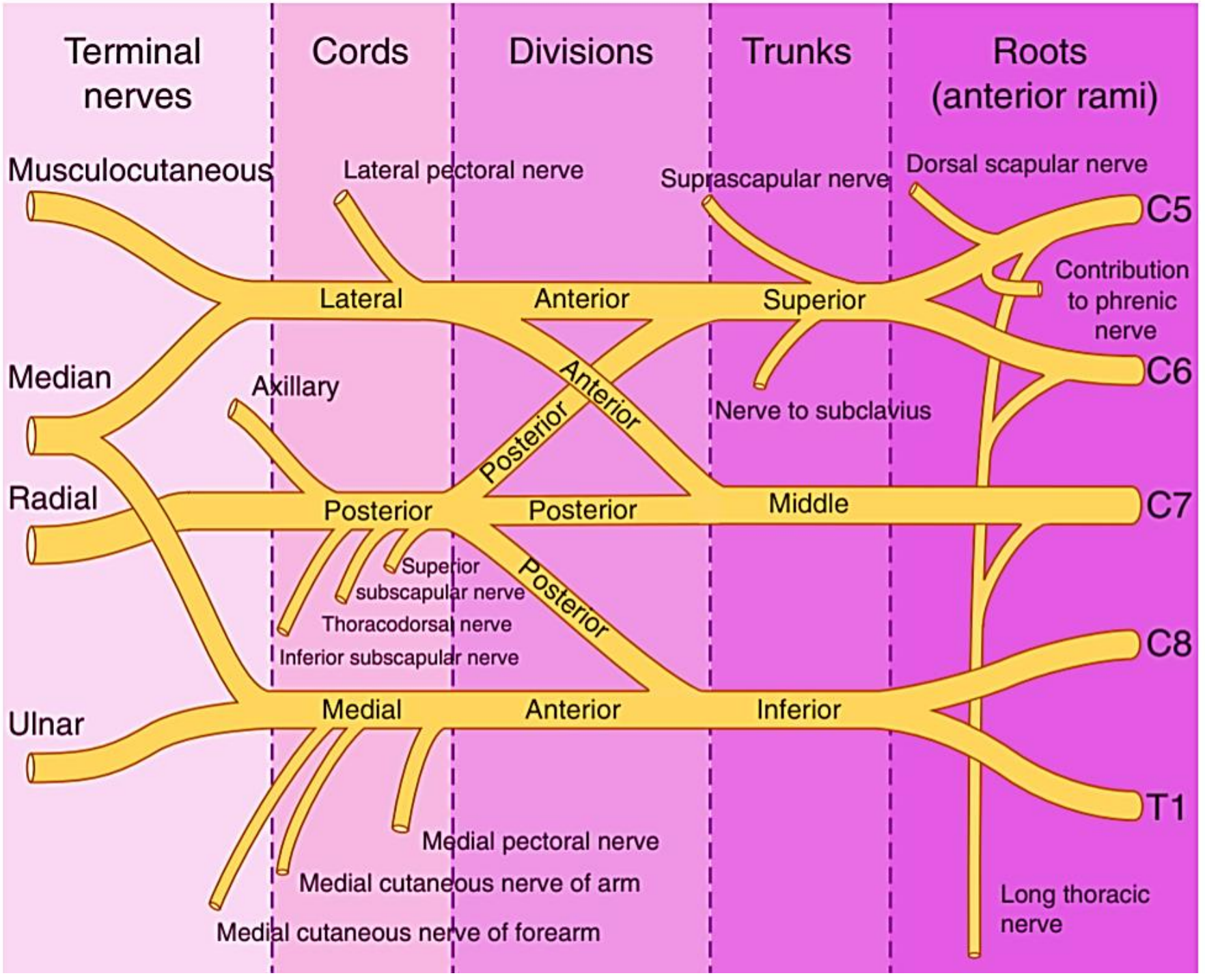
University of Mustansiriyah - College of Medicine

E-LEARNING

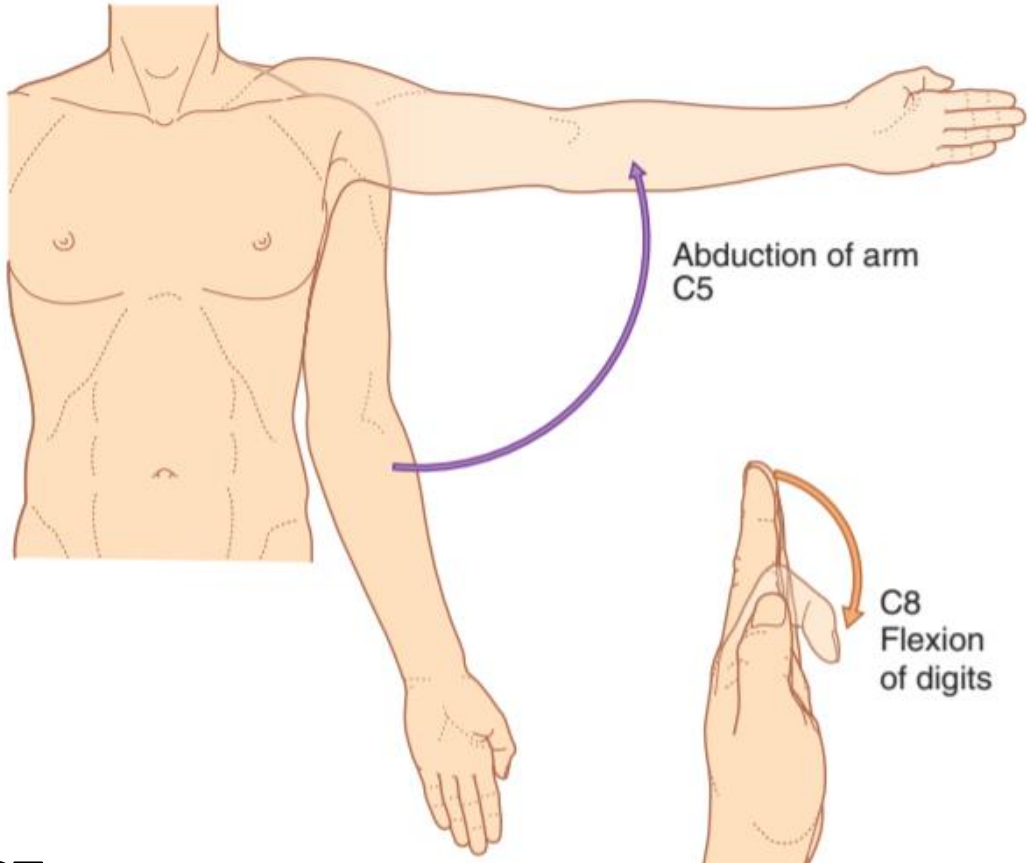
Lecture Objectives

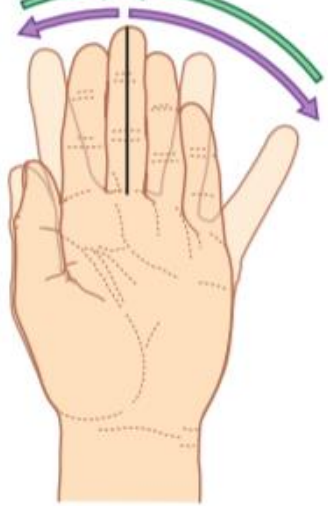
- Review the brachial plexus & its terminal branches
- Determine upper limb myotomes
- Identify deep tendon reflexes of the upper limb
- Explain nerve injuries of the upper limb according to the site of injury and demonstrate the effect of these injuries on motor and sensory functions of the upper limb.

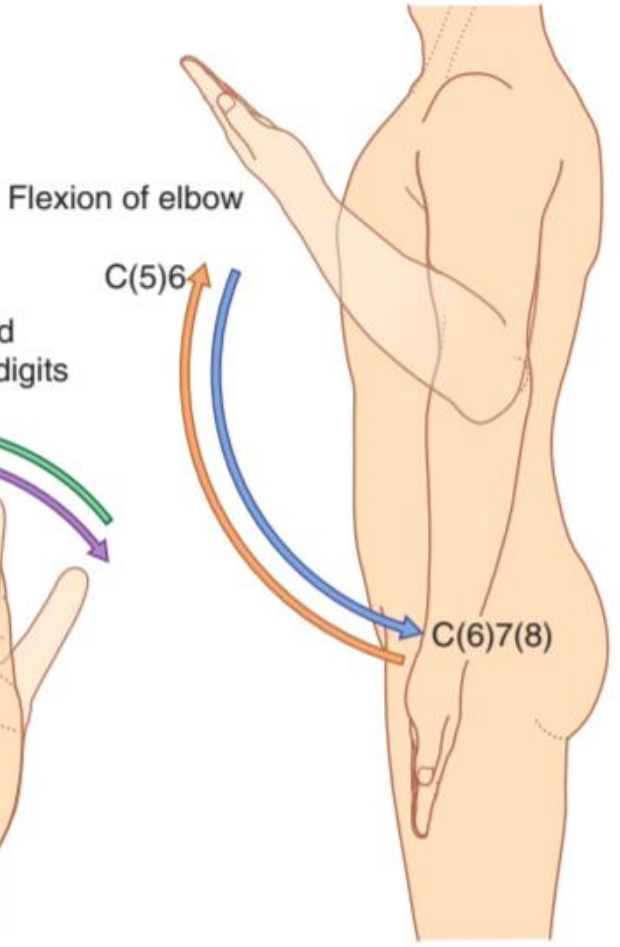
Brachial Plexus



Myotomes



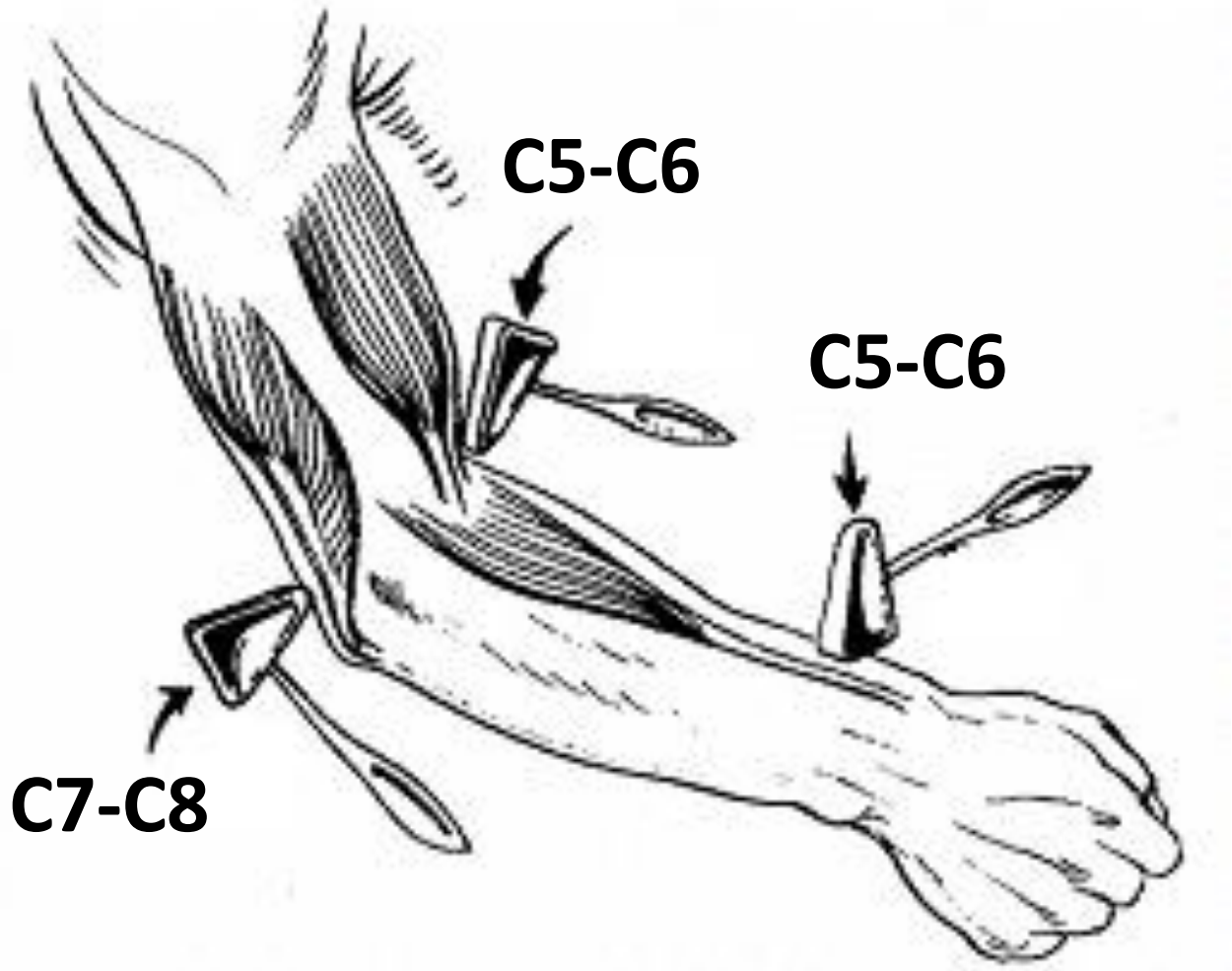




- **Abduction C5**
- **Elbow flexion C6**
- **Elbow extension C7**
- **Supination C6**
- **Pronation C7,8**
- **Finger flexion C8**
- **Fingers abduction & adduction T1**

Deep tendon reflexes

- Biceps jerk C5-C6
- Brachioradialis C5-C6
- Triceps C7-C8



Upper limb nerve injuries

- Brachial plexus injuries (upper & lower lesions)
- Injuries of individual nerves
- Long thoracic nerve
- Axillary nerve
- Radial nerve
- Ulnar nerve
- Median nerve

Brachial plexus injuries

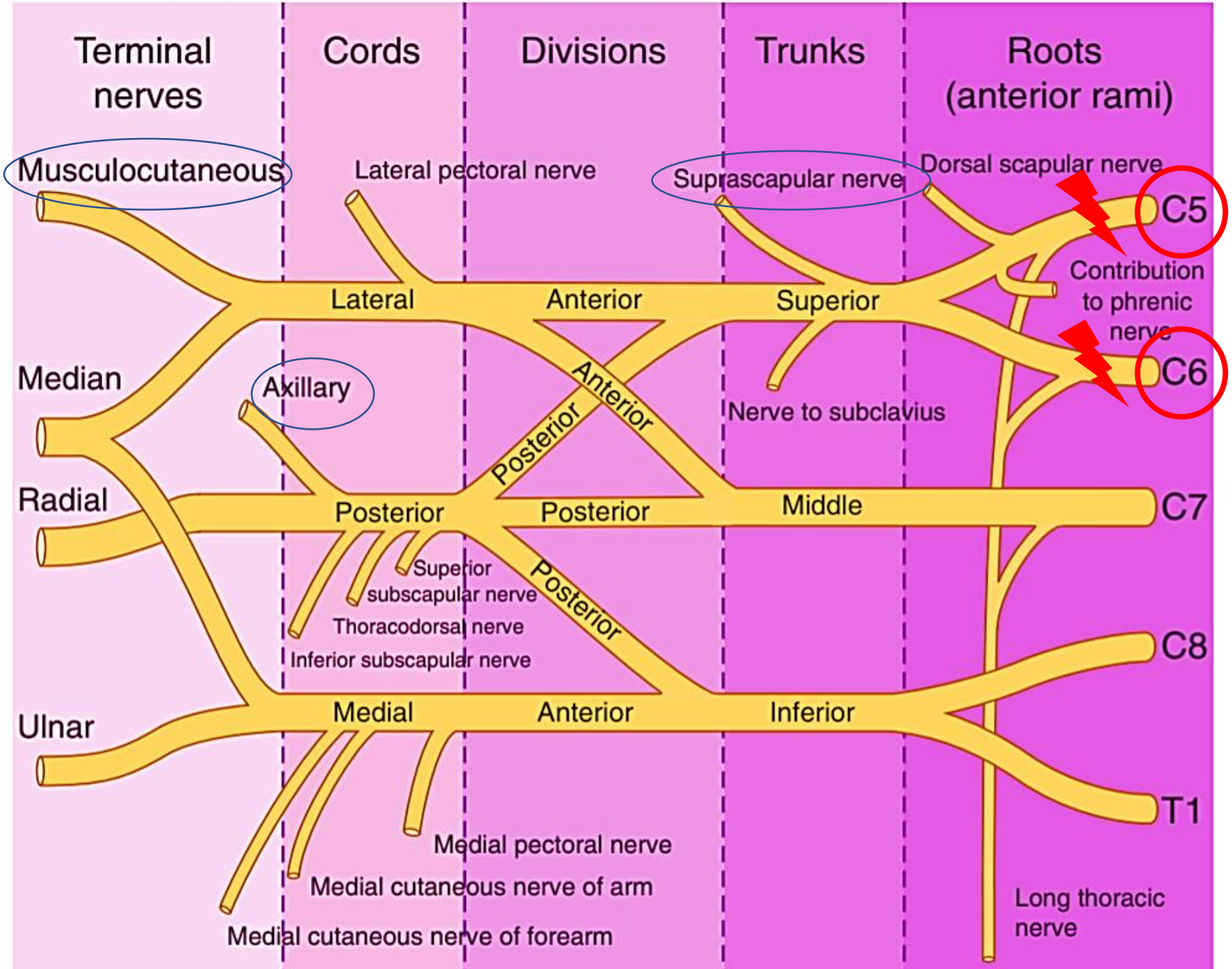
- Upper brachial plexus injuries

C5-C6 Roots (upper trunk)

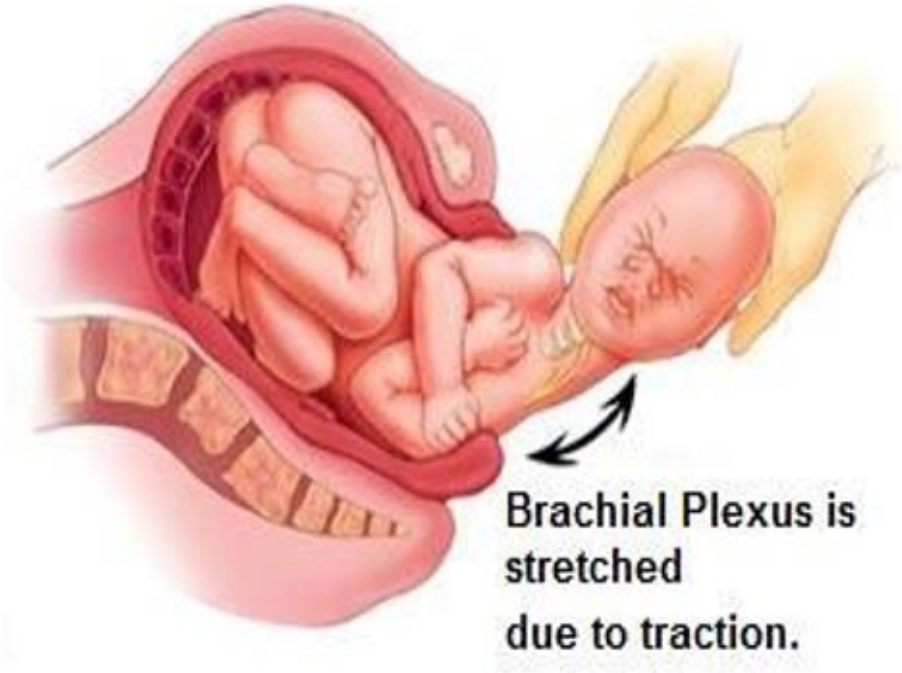
Suprascapular n.

Musculocutaneous n.

Axillary n.



Cause of injury



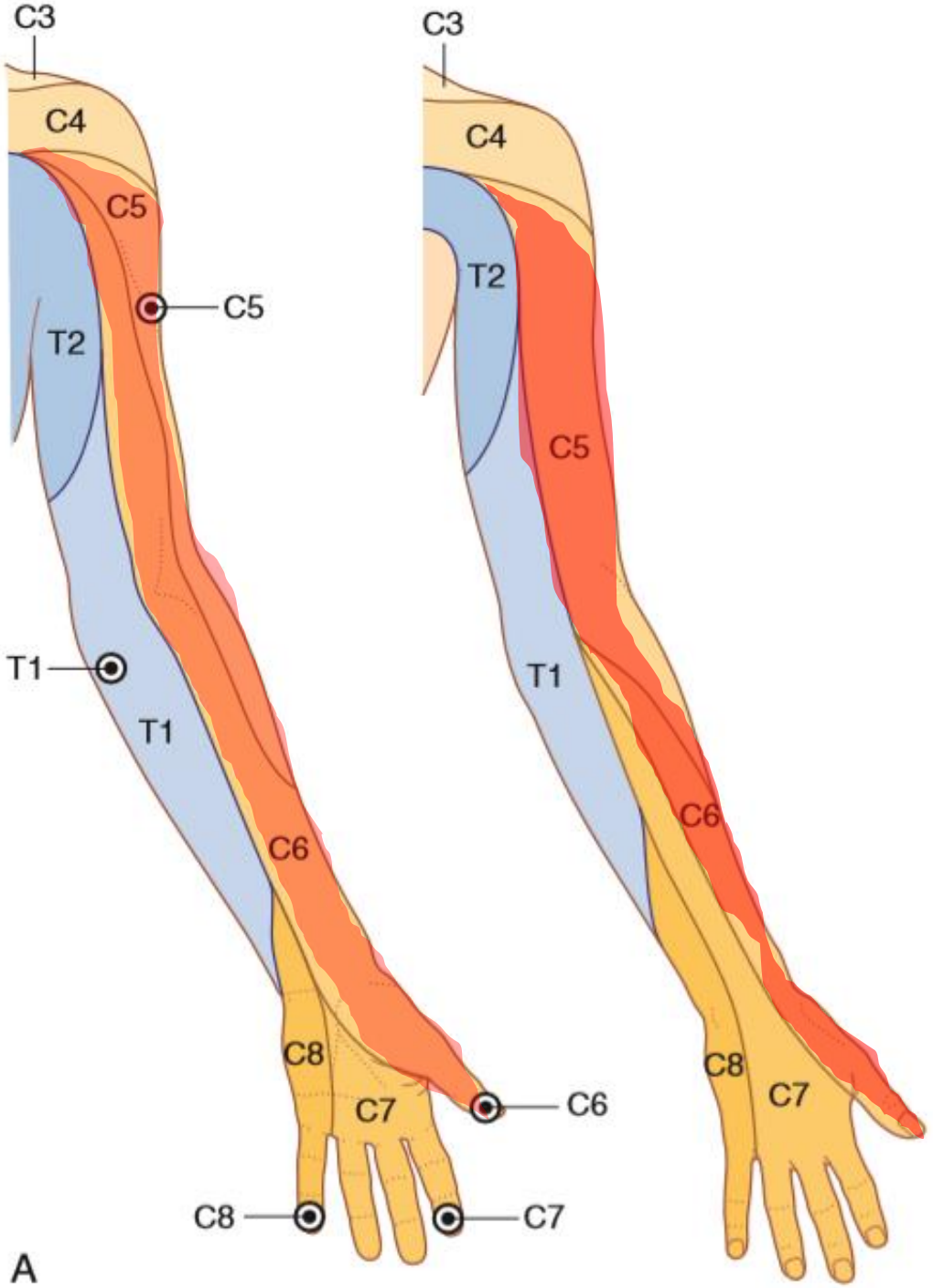
Deformity

Erb's palsy (Erb-Duchenne palsy)

- Loss of shoulder abduction (C5 myotome) → **adducted arm**
- Loss of lateral rotation → **laterally rotated arm**
- Weak shoulder flexion
- Weakness of elbow flexion → **extended forearm**
- Weakness of supination (C6 myotome) → **pronated forearm**

Waiter's tip position!

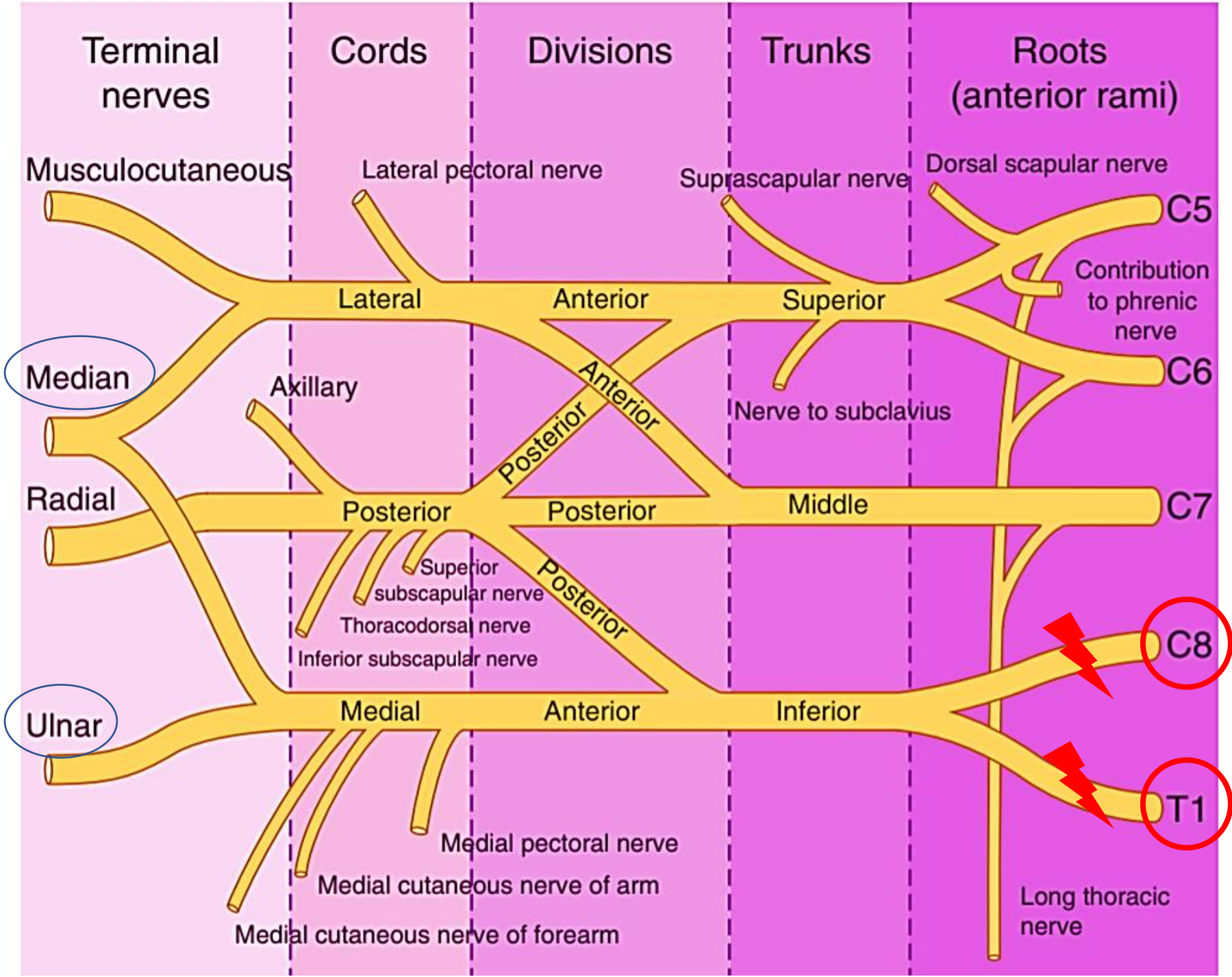
- Sensory loss



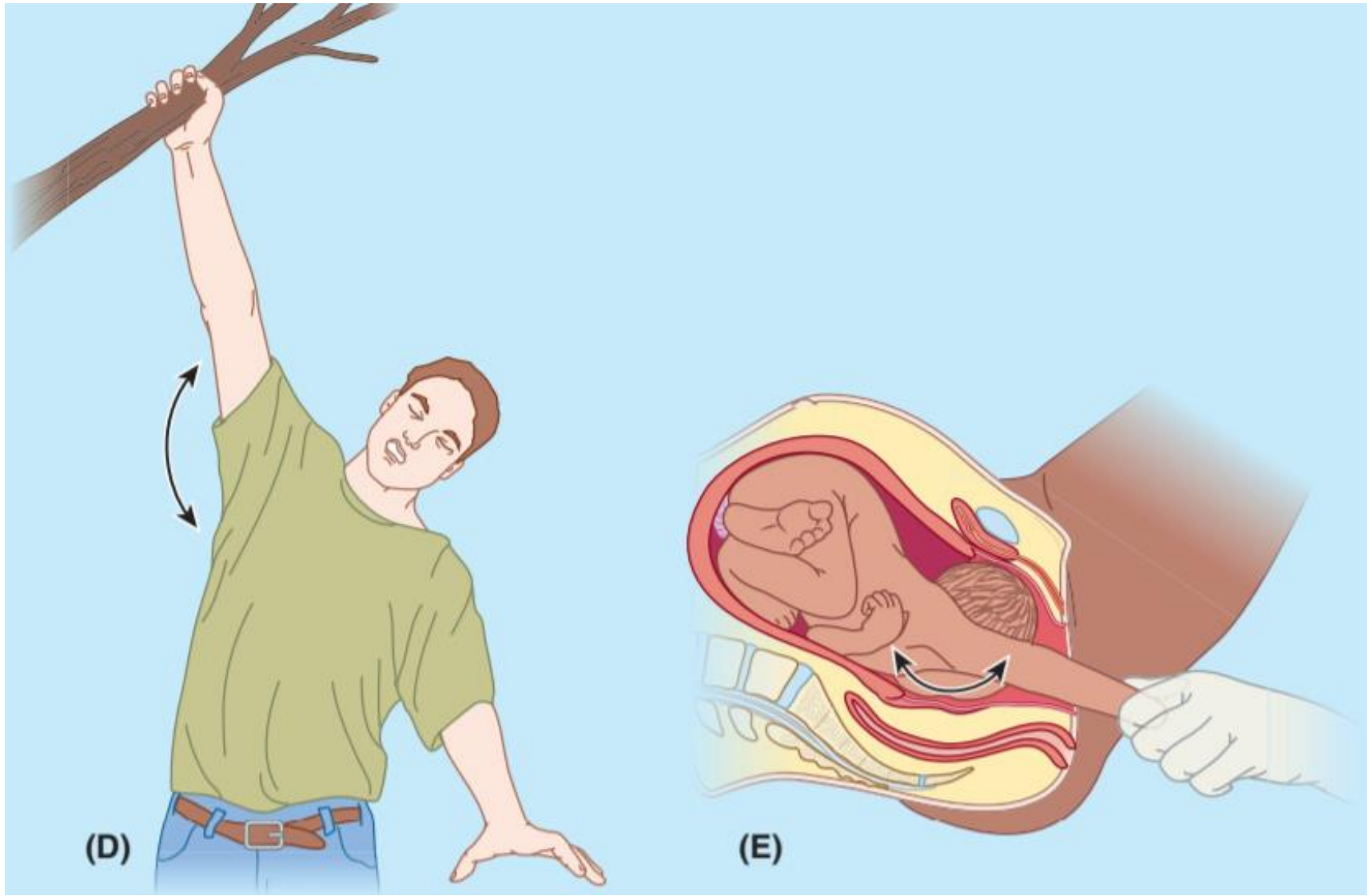
Lower brachial plexus injuries

C8-T1 Roots (Lower trunk)

Klumpke's Paralysis



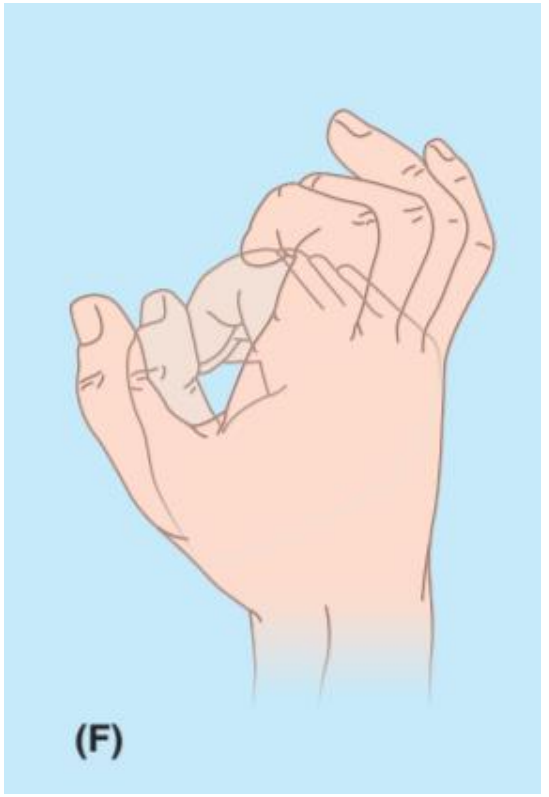
Cause of injury



Deformity

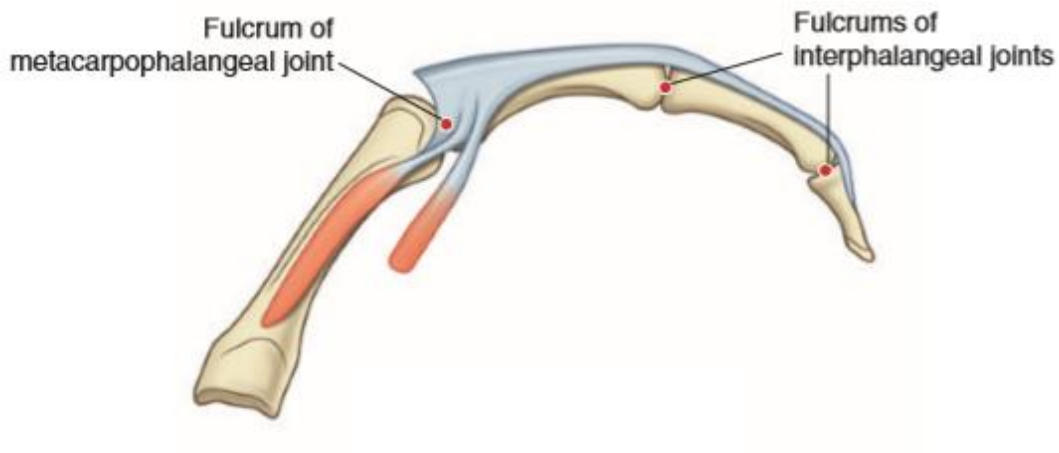
Klumpke's Paralysis

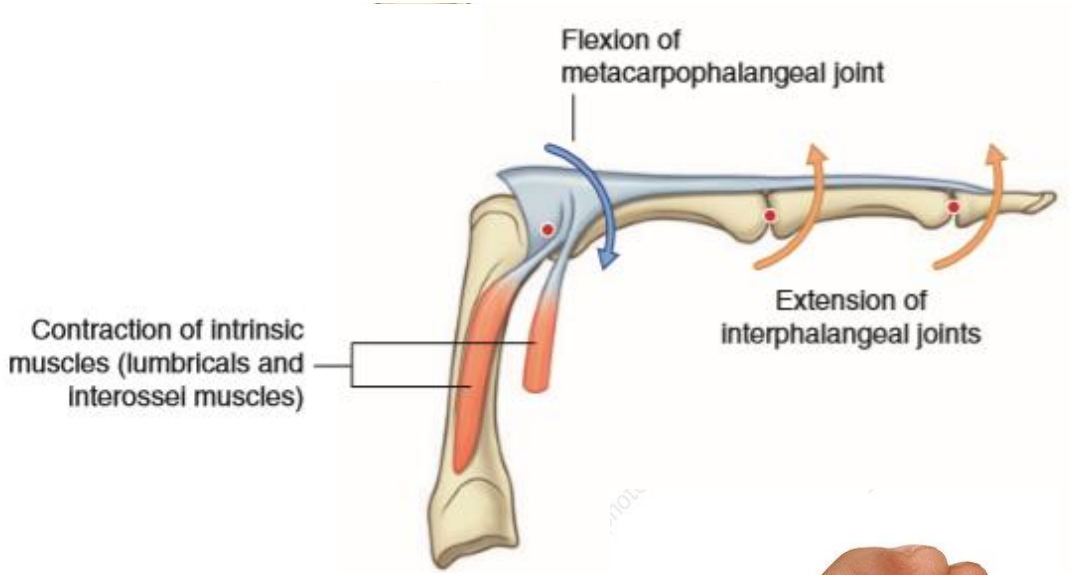
- Paralysis of all small muscles of had
- Claw hand:
  - Hyperextended MCP joints
  - Flexion of IP joints

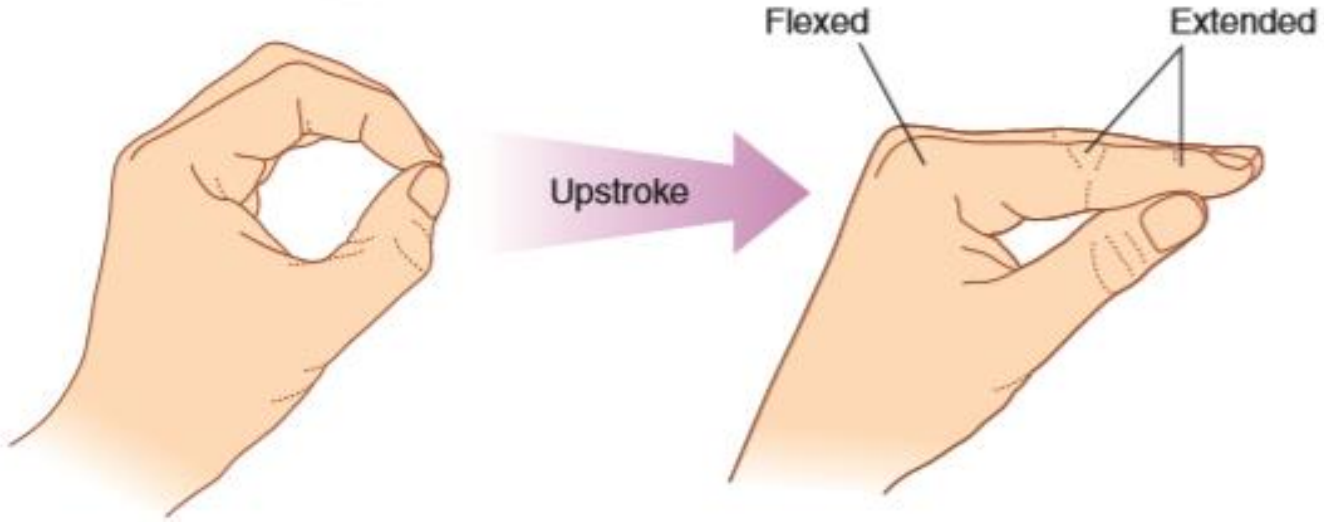


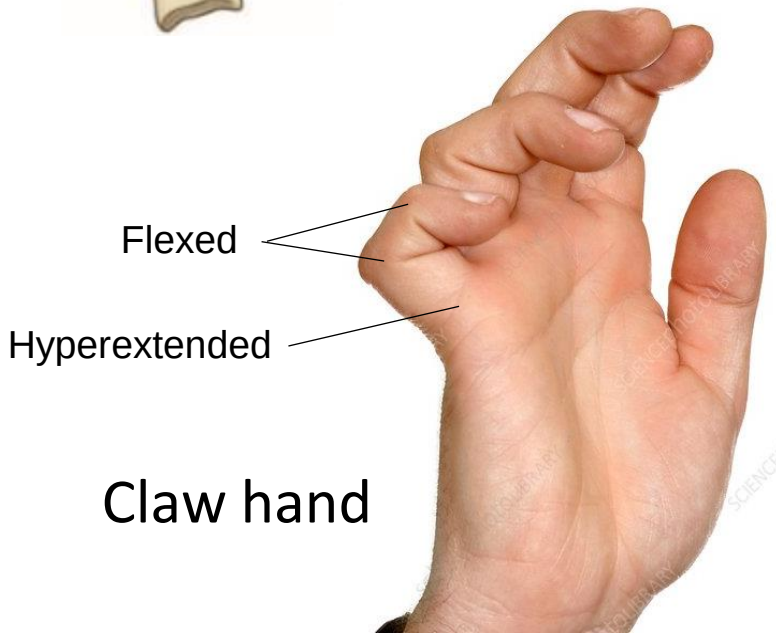
Claw hand

Actions of interossei & lumbricals



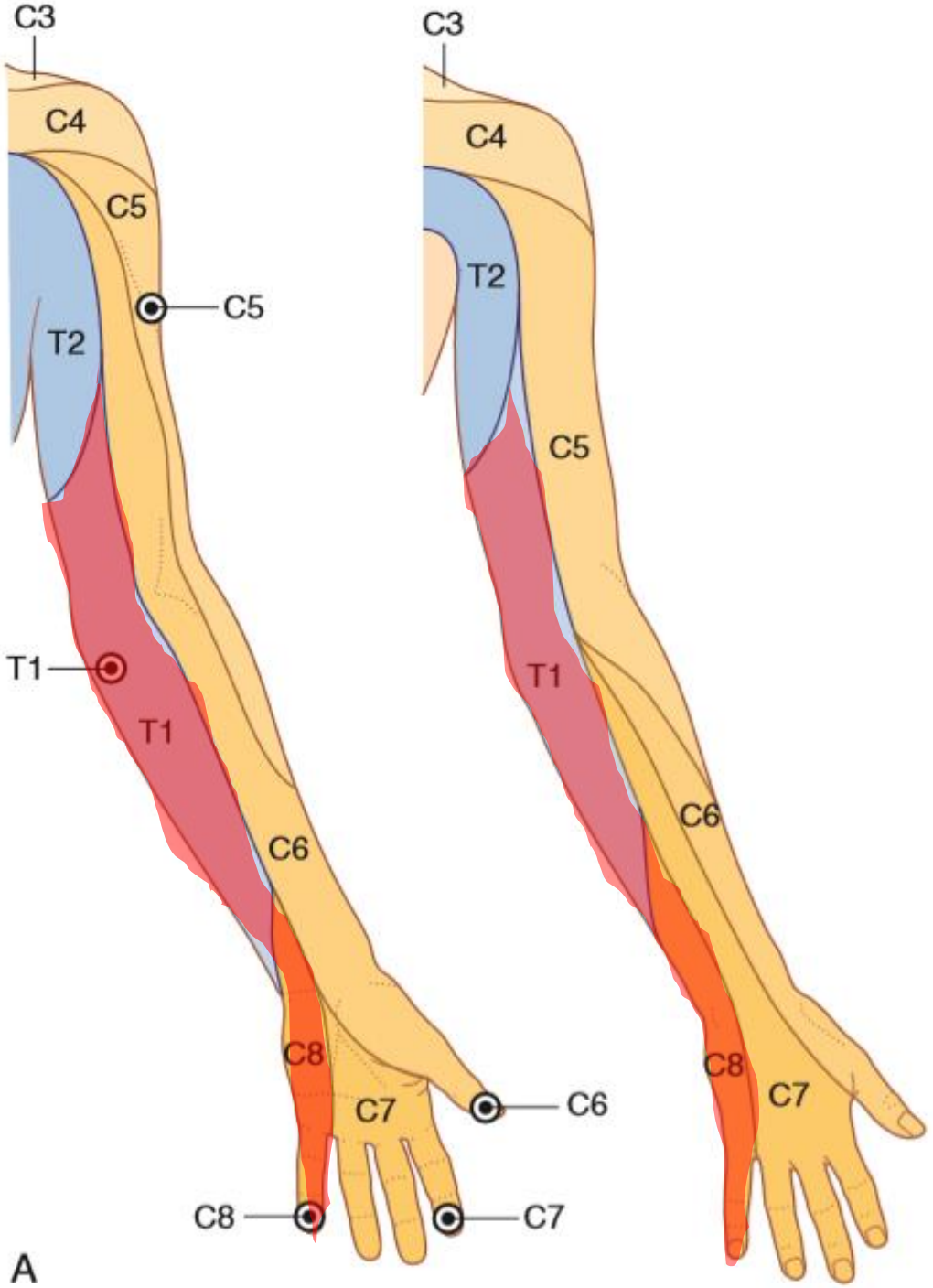






Claw hand

- Sensory loss



Long thoracic nerve C5,6,7

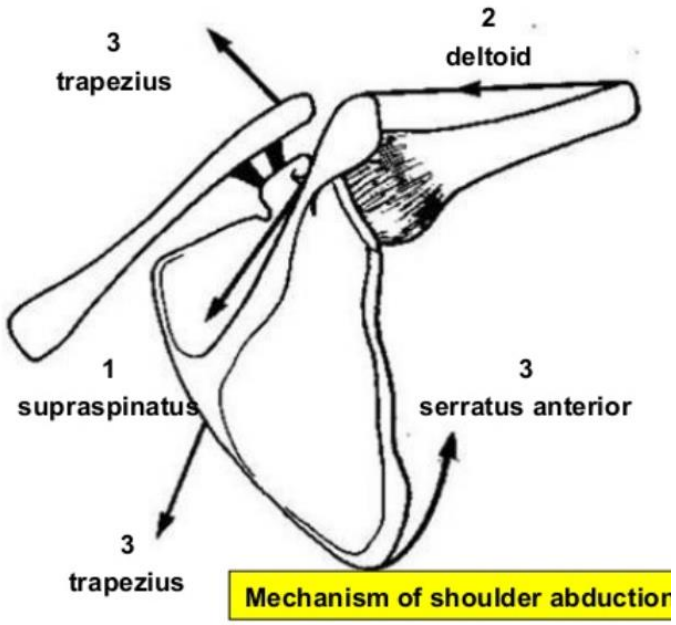
Causes:

- In Radical Mastectomy
- Thorax surgery
- Penetrating wound
- Insertion of chest tube

Deformity

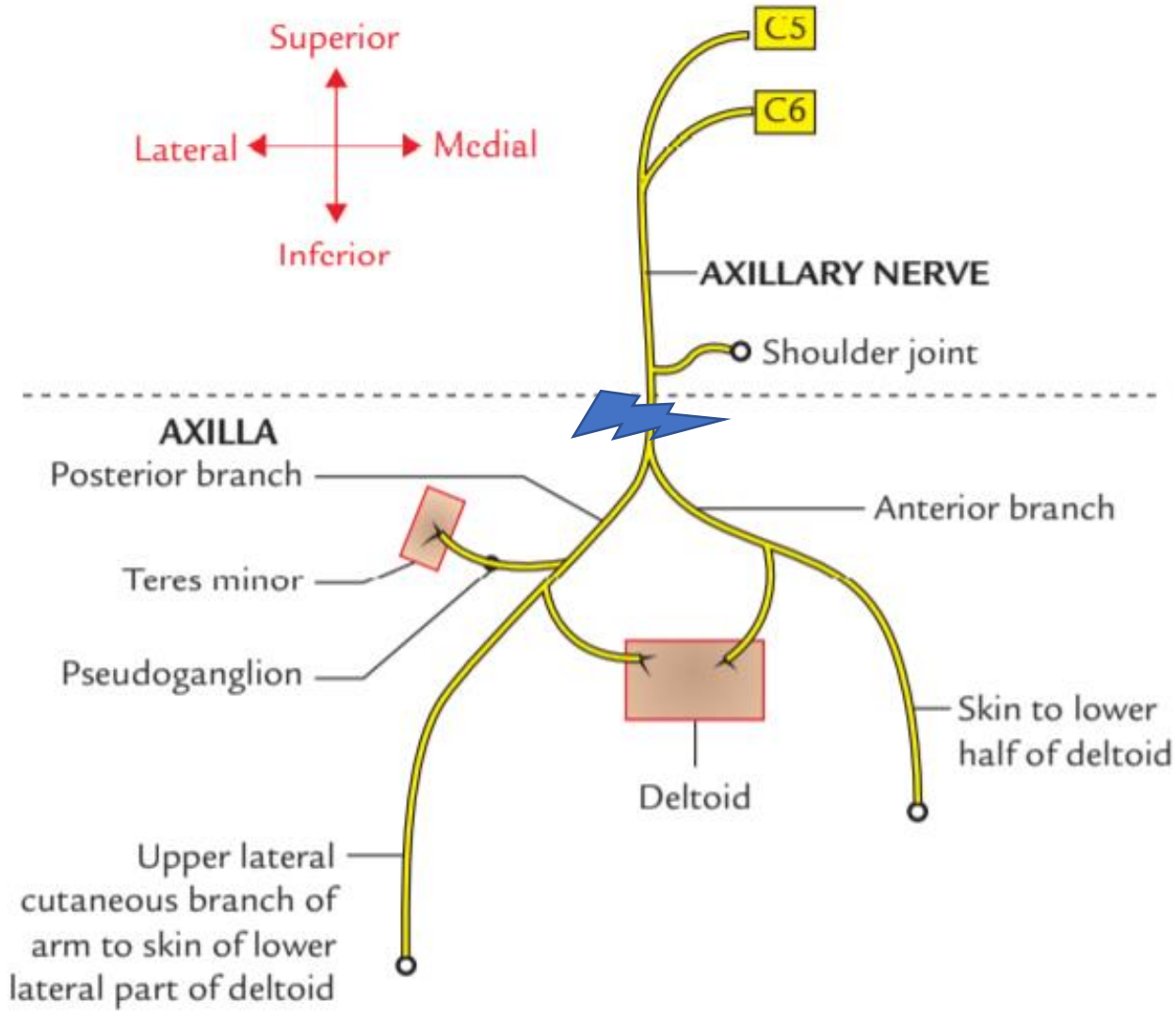
- Winging of scapula: medial border and inferior angle of scapula prominent

Functions lost: Abduction above 90 degrees, Protraction



Axillary nerve

- C5-C6



Axillary nerve injury

Causes

a. Inferior dislocation of shoulder joint

b. Fracture of surgical neck of humerus

c. Misplaced injection into deltoid

• Muscles involved : Deltoid and Teres minor

Manifestations

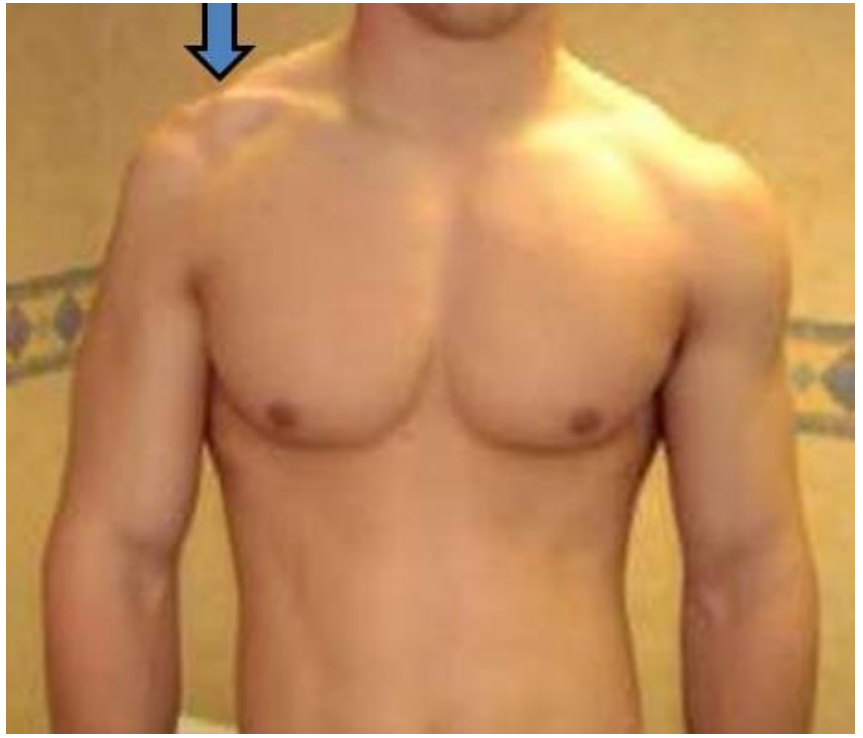
• Loss of abduction from 15° to 90°

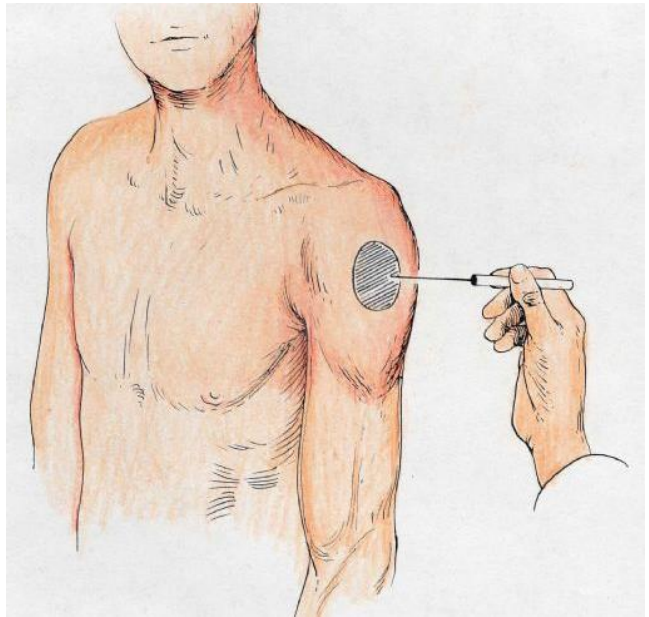
• Shoulder weakness

• As the deltoid atrophies, the rounded contour of the shoulder is lost and becomes flattened compared to the uninjured side.

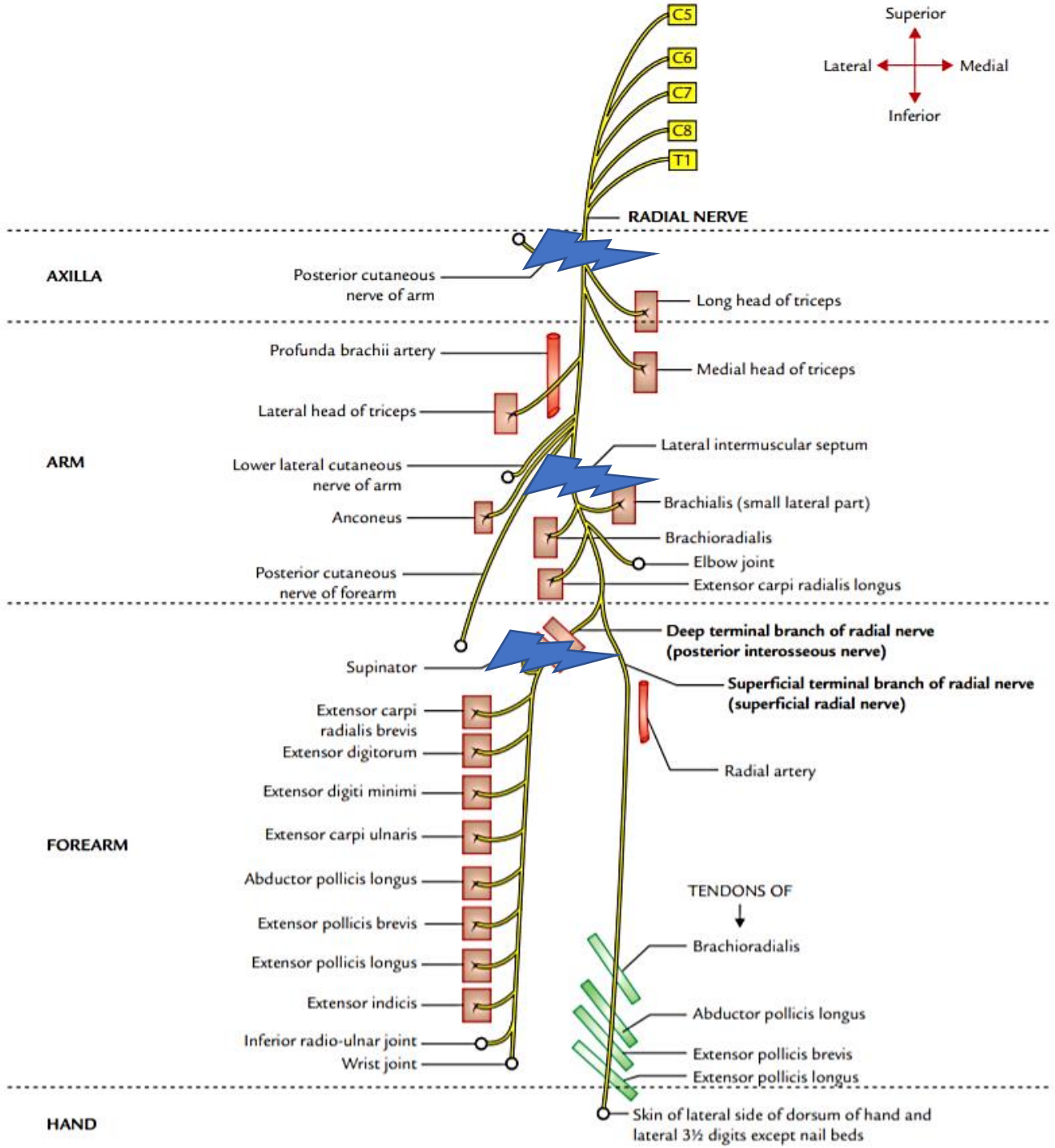
Sensory loss

Injury of the upper lateral cutaneous nerve of arm leads to loss of skin sensation over the lower half of deltoid muscle





Radial nerve



Radial nerve injury in axilla

- **Causes**:

Pressure of badly fitted crutches into armpit

Falling a sleep with arm over the back of chair (Saturday night palsy)

- **Motor loss**

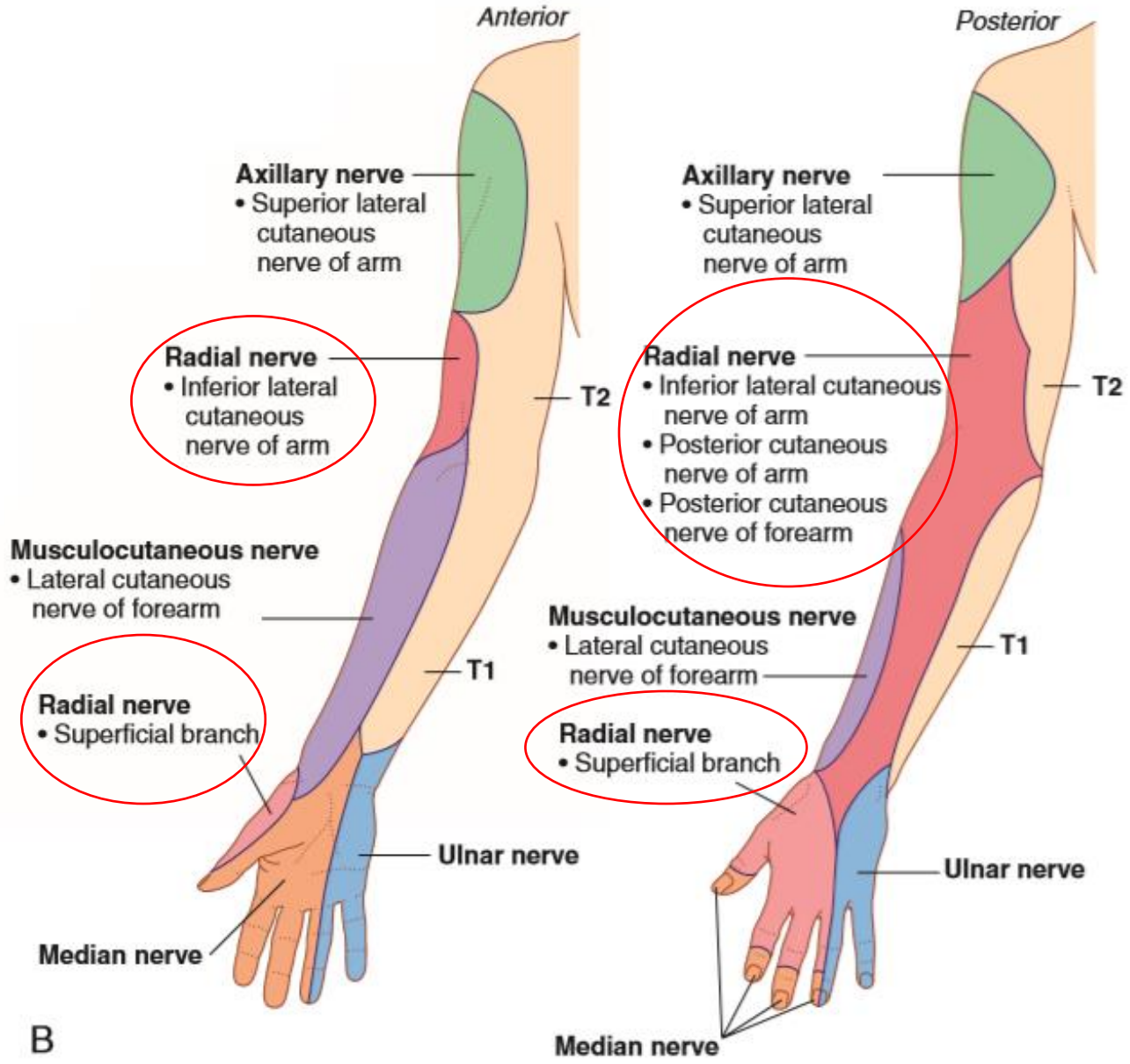
Loss of elbow extension

Loss of wrist extension & digits

Loss of supination (except with flexed elbow)

Deformity: wrist drop

Sensory loss



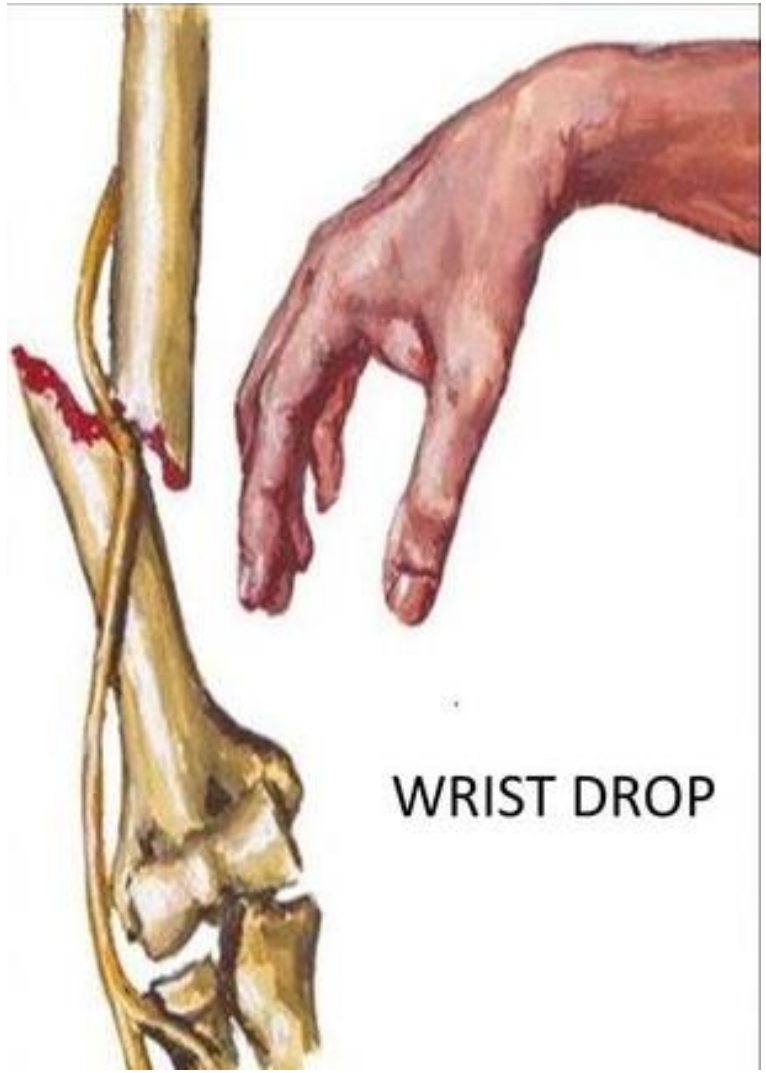
Radial nerve injury in spiral groove

Most commonly in distal part of groove beyond the origin of nerves to triceps and anconeus and cutaneous nerves

- **Causes**:

- Fracture of shaft of humerus
- Improper position on the operating table
- Prolonged application of tourniquet

- **Motor loss**: loss of extension of wrist, fingers and thumb (wrist drop)
- **Sensory loss**: Dorsum of hand and dorsum of lateral 3 ½ fingers



Radial nerve injury in the forearm

Cause: fracture proximal end of radius

Clinical manifestation:

- Loss of MCP joints extension
- Weak wrist extension with radial deviation (intact ECRL)
- IP joints can still be extended by small muscles of the hand
- Muscle wasting

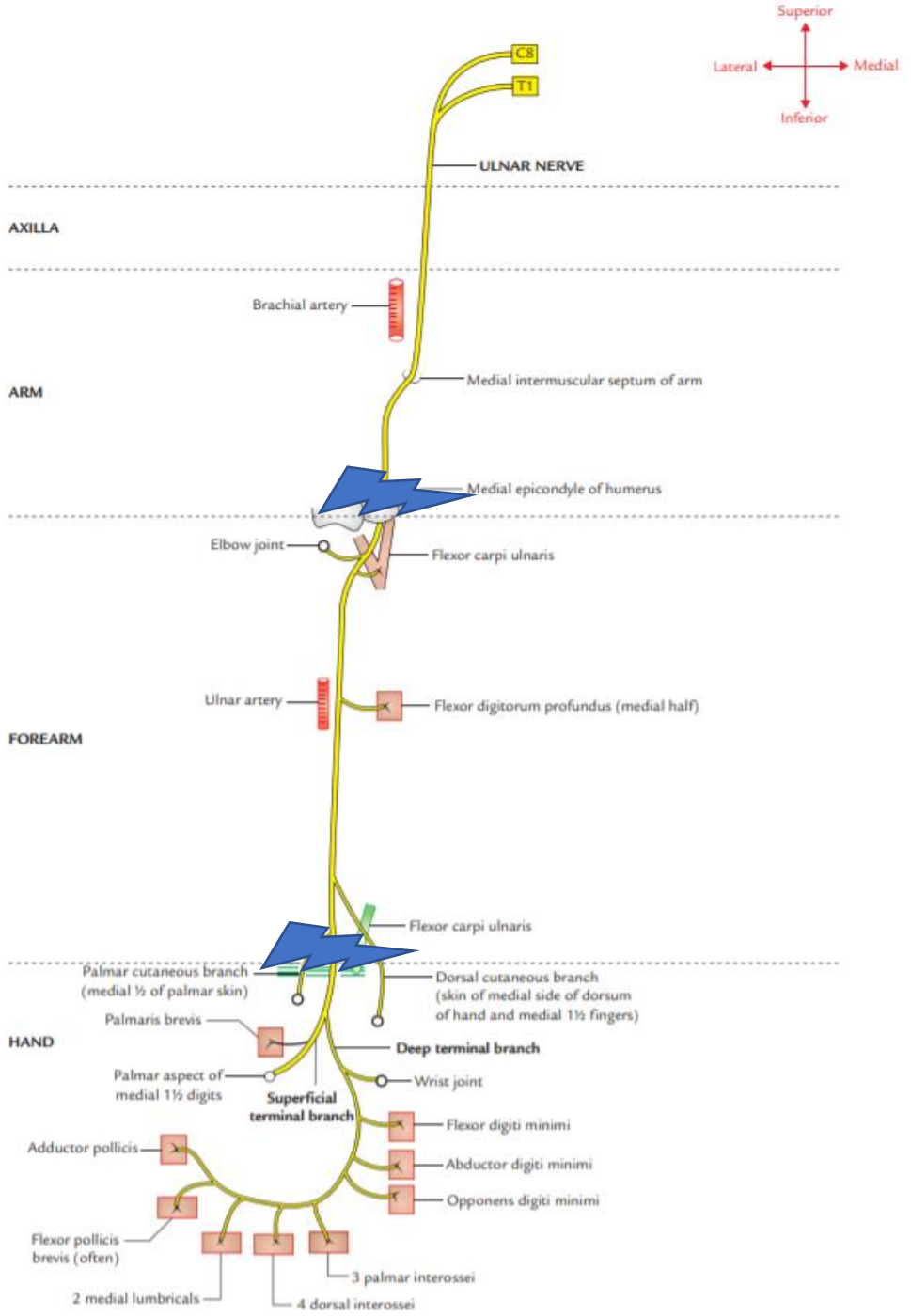
Sensory loss: no sensory loss in posterior interosseous nerve injury (motor)

Dr. Akram Jaffar

Inability to extend metacarpophalangeal joint but interphalangeal joints can be extended

Extensor muscle wasting

Ulnar nerve


Superior
Lateral
Medial
Inferior
C8
T1
ULNAR NERVE
AXILLA
Brachial artery
ARM
Medial intermuscular septum of arm
Medial epicondyle of humerus
Elbow joint
Flexor carpi ulnaris
Ulnar artery
Flexor digitorum profundus (medial half)
FOREARM
Flexor carpi ulnaris
Palmar cutaneous branch
(medial ½ of palmar skin)
Dorsal cutaneous branch
(skin of medial side of dorsum
of hand and medial 1½ fingers)
Palmaris brevis
HAND
Deep terminal branch
Palmar aspect of
medial 1½ digits
Wrist joint
Superficial
terminal branch
Flexor digiti minimi
Adductor pollicis
Abductor digiti minimi
Opponens digiti minimi
Flexor pollicis
brevis (often)
3 palmar interossei
2 medial lumbricals
4 dorsal interossei

Ulnar nerve injury at the elbow (high lesion)

Most common site of injury

Cause: Cubital tunnel syndrome, fracture medial epicondyle

Motor loss:

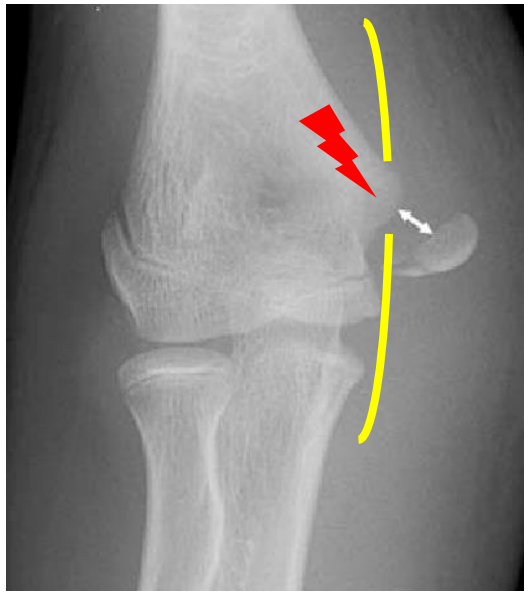
- FCU, medial ½ of FDP
- Hypothenar muscles
- All interossei & medial 2 lumbricals
- Adductor pollicis

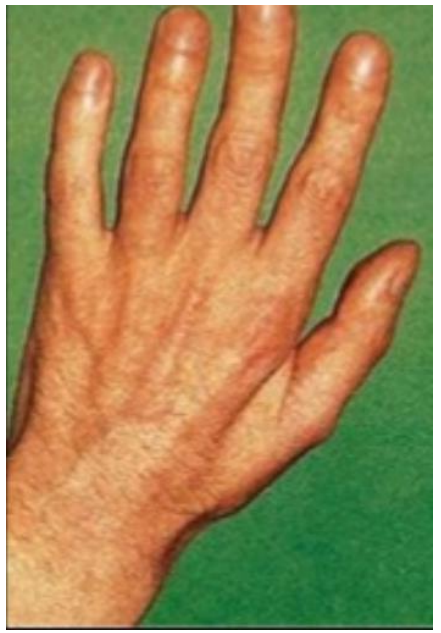
Deformity: ***Claw hand*** (MCP joints of ring & little fingers hyperextended, IP joints flexed)

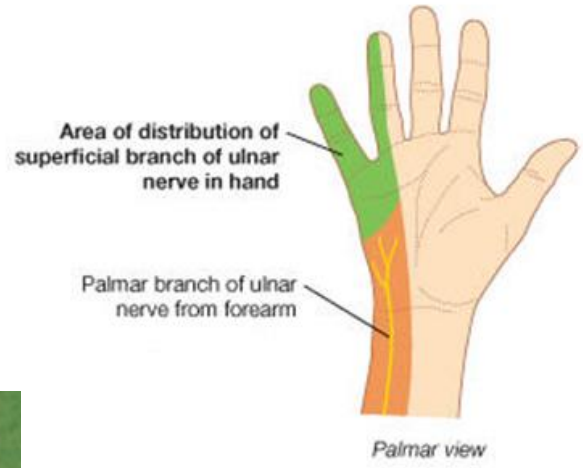
Flat hypothenar eminence

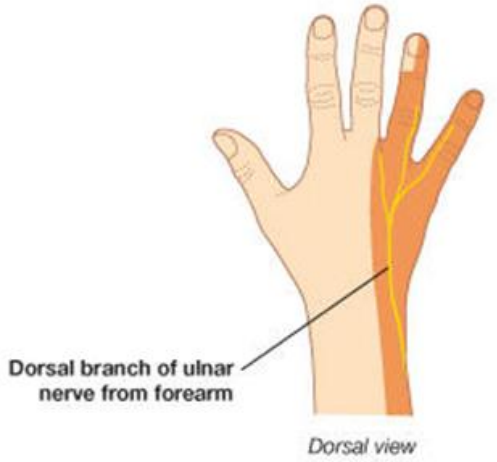
Wasting of interossei (dorsal)

Sensory loss: palmar & dorsal one third of the hand + one & a half fingers



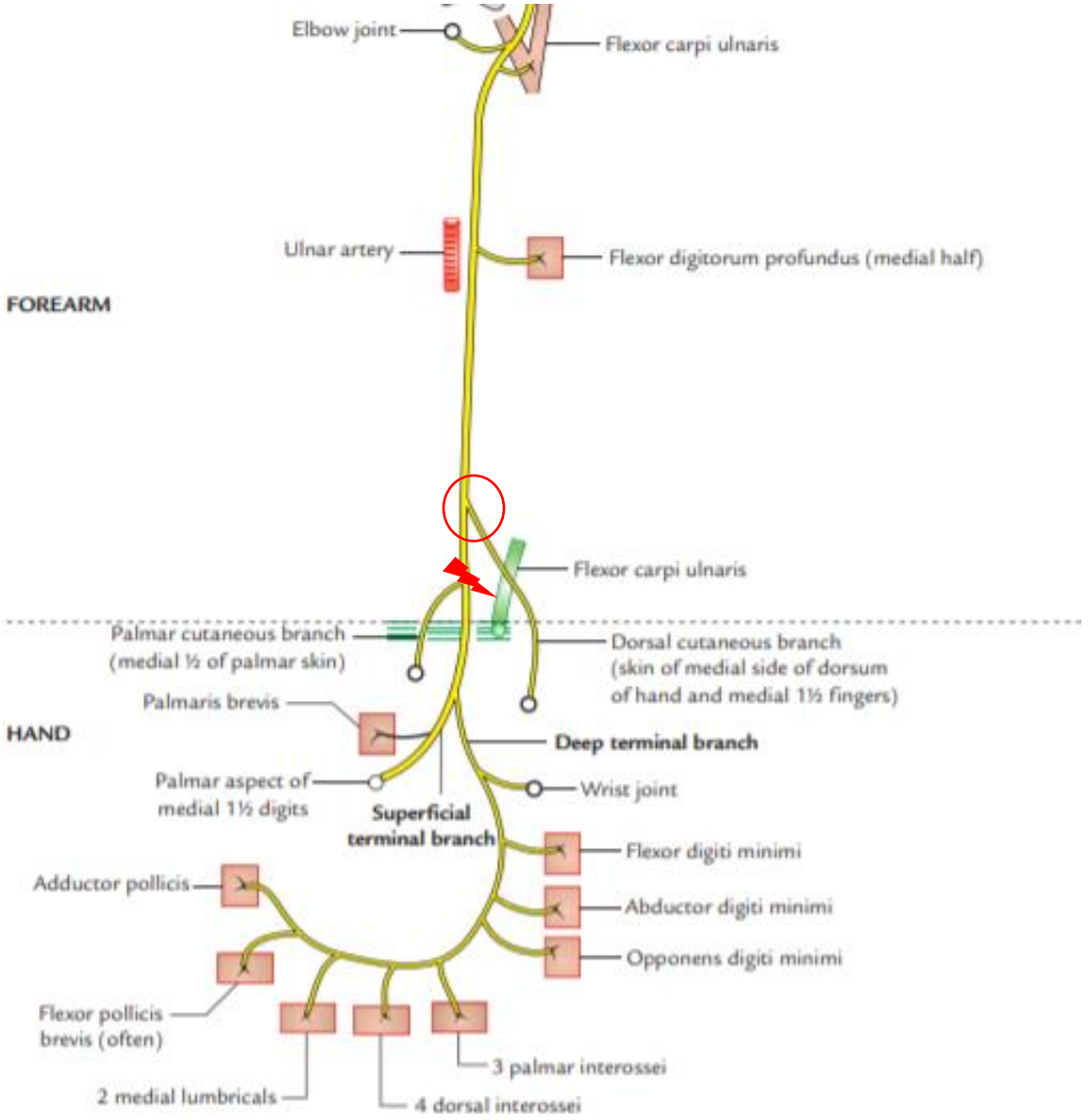






Ulnar nerve injury at the wrist (low lesion)

- **Cause**: cutting injury
- **Motor loss**: small muscles of hand except (3 thenar muscles & lateral 2 lumbricals)
- **Deformity**: ***Claw hand*** **(more prominent than upper lesion)**
- **Sensory loss:** palmar one third of the hand + one & a half fingers
- Sensation on dorsal aspect of the hand & fingers are intact



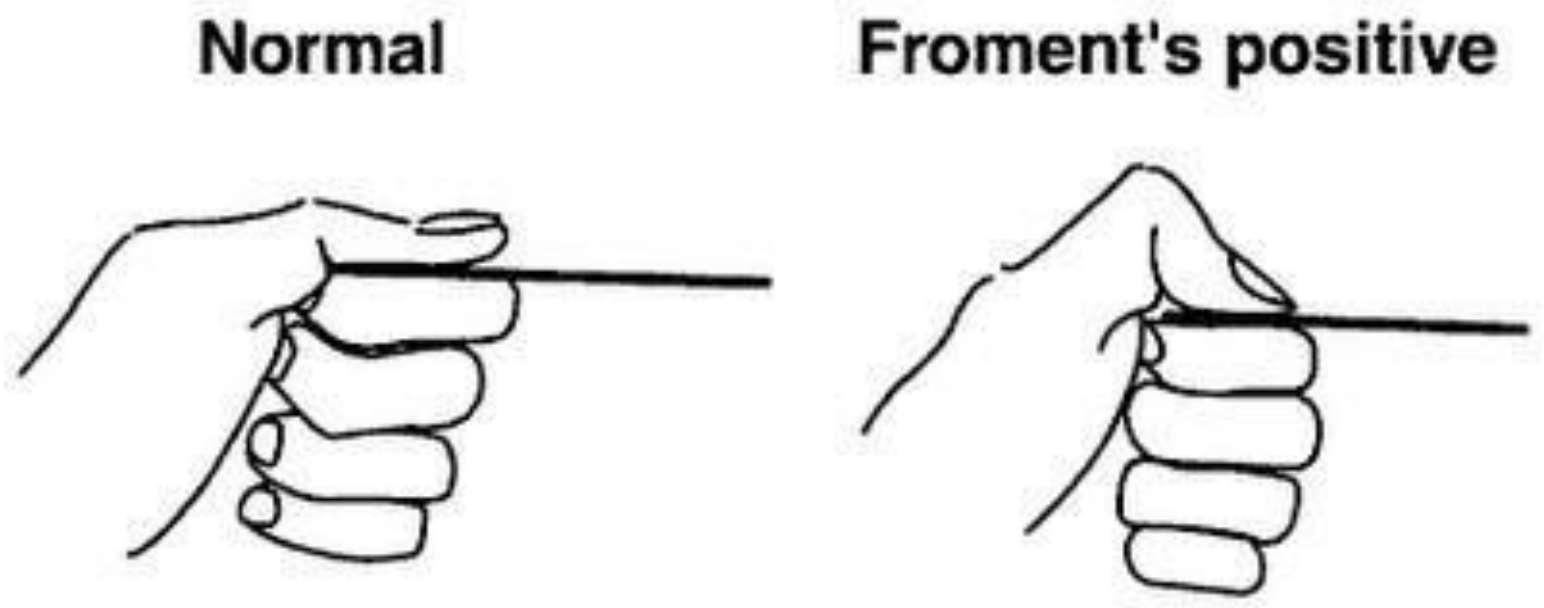
Claw in high vs low lesions of ulnar nerve

High lesion → less clawing

Ulnar nerve paradox!

Low lesion → more clawing

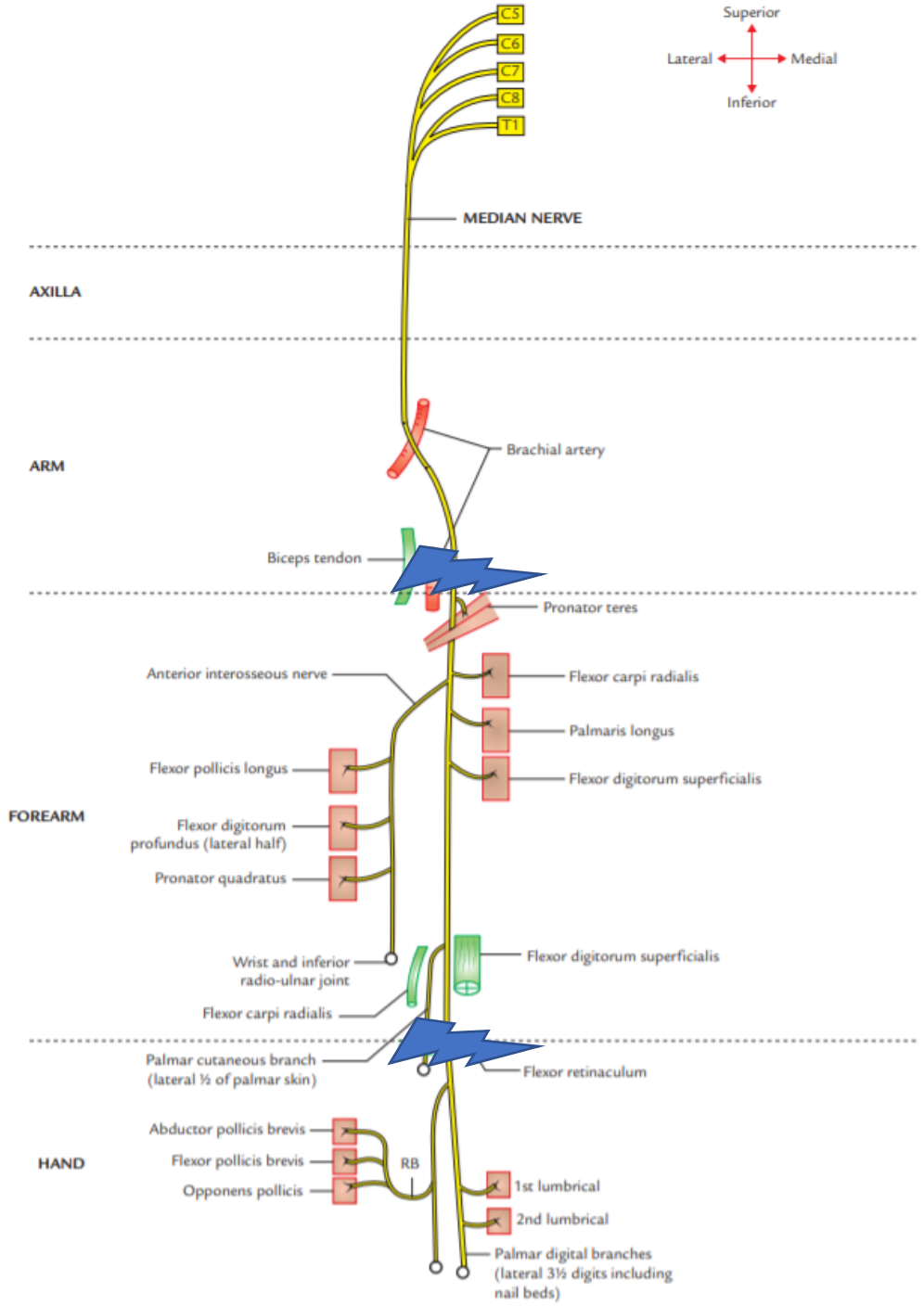
Froment’s sign



Intact ulnar nerve &
normal adductor polices

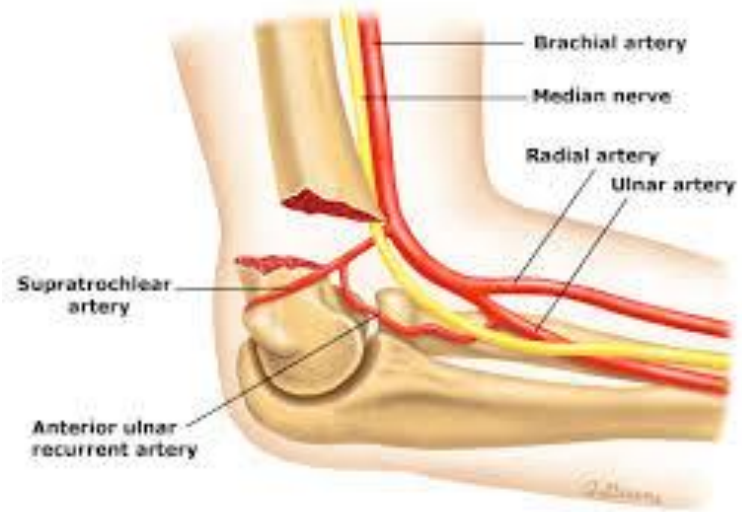
Injured ulnar nerve & paralyzed
adductor polices

Median nerve



Injury of median nerve at elbow

Cause: Supracondylar fracture of humerus
Motor loss Paralysis of pronators of forearm Paralysis of long flexors of wrist and fingers (except FCU & medial half of FDP) paralysis of the flexor pollicis longus
• Paralysis of thenar muscles (wasted)
Deformity: Forearm: loss of pronation (supinated)
Wrist: flexion is weak accompanied by adduction
Fingers: no flexion of interphalangeal joint of index and middle fingers
Thumb: loss of flexion, abduction and opposition
APE'S HAND: thumb laterally rotated, adducted and thenar eminence flattened
Sensory loss Lateral side of palm, Palmar surface of lateral 3 ½ fingers and distal part of dorsal surface of lateral 3 ½ fingers



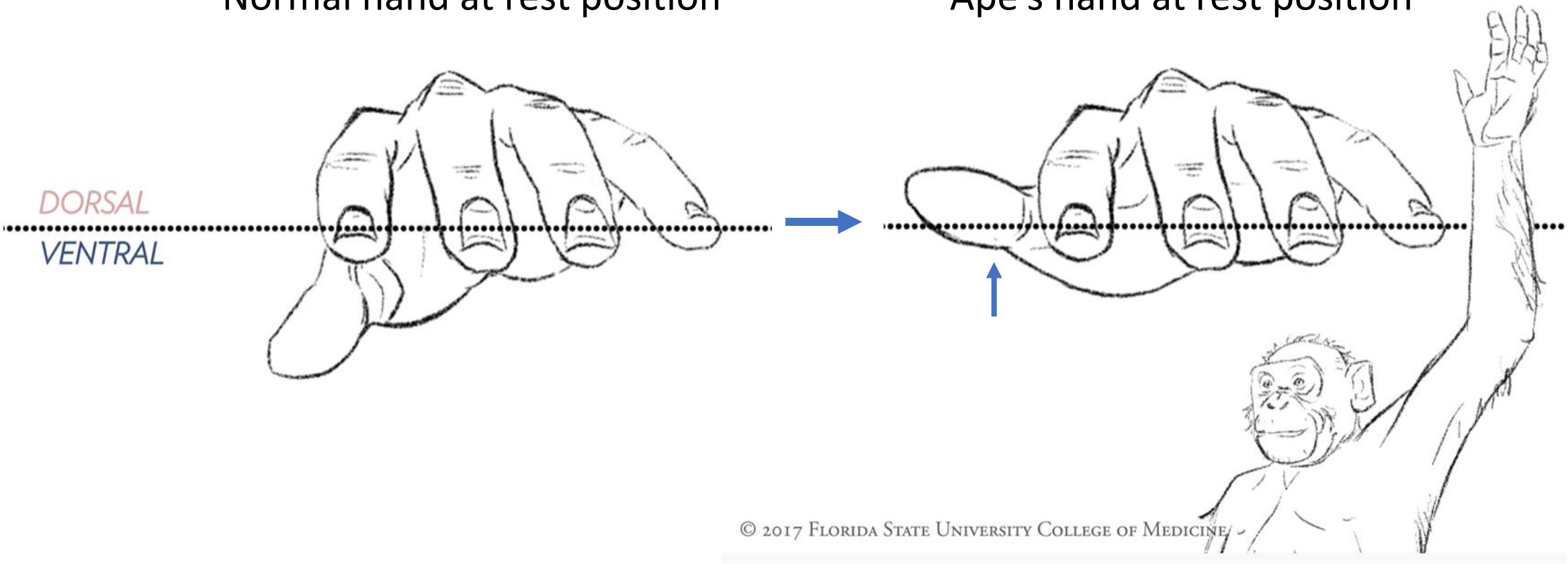

Loss of opposition


Ape's hand deformity

Ape’s Hand deformity

Normal hand at rest position

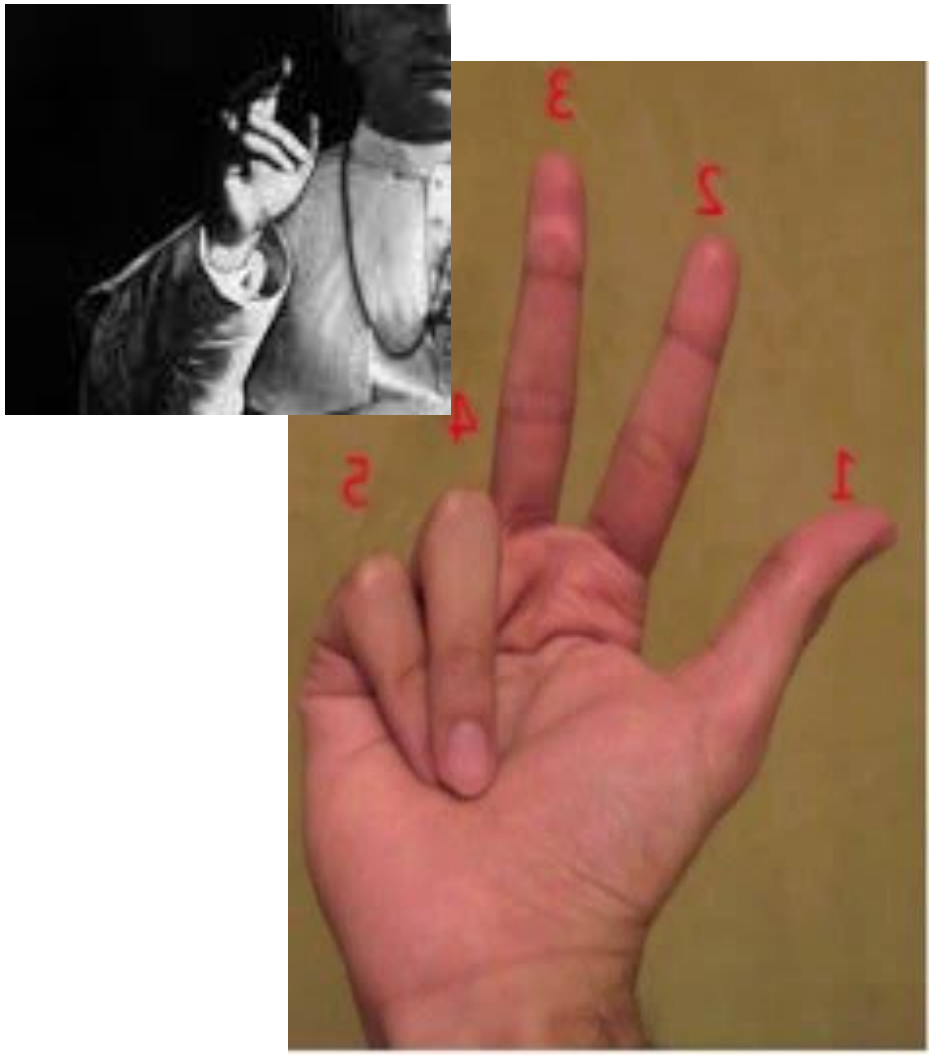
Ape’s hand at rest position



Sign of Benediction

- Active sign
- Only when the patient is asked to flex fingers or make a fist

Ape hand



Benediction hand

Injury to median nerve at wrist

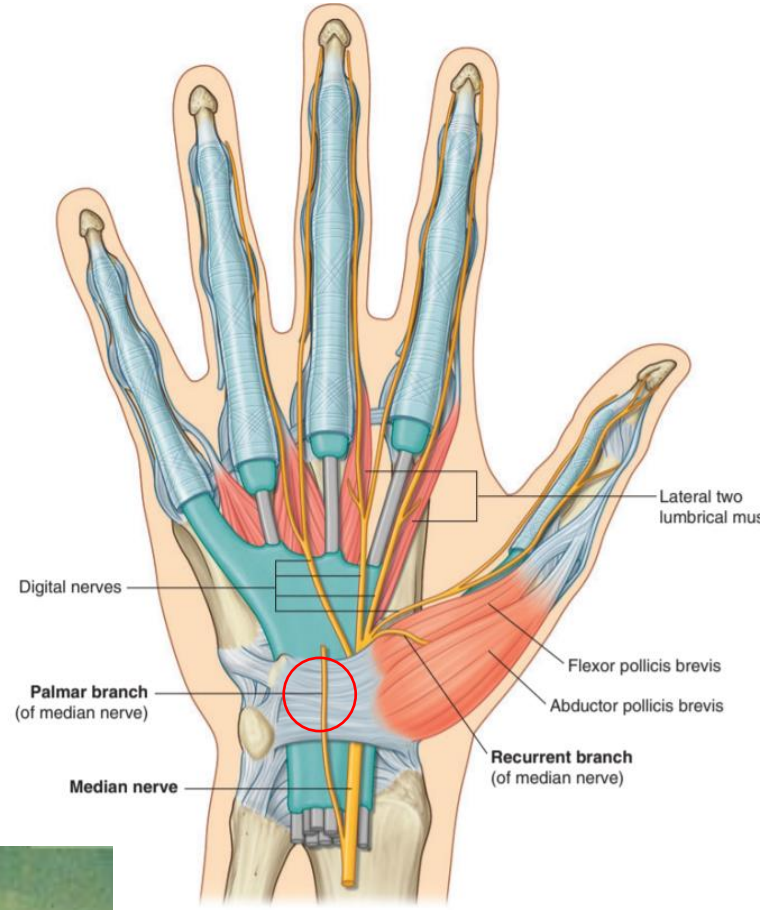
Causes: Due to penetrating injuries or stab wound at the wrist

Motor loss: thenar Muscles & lateral two lumbricals

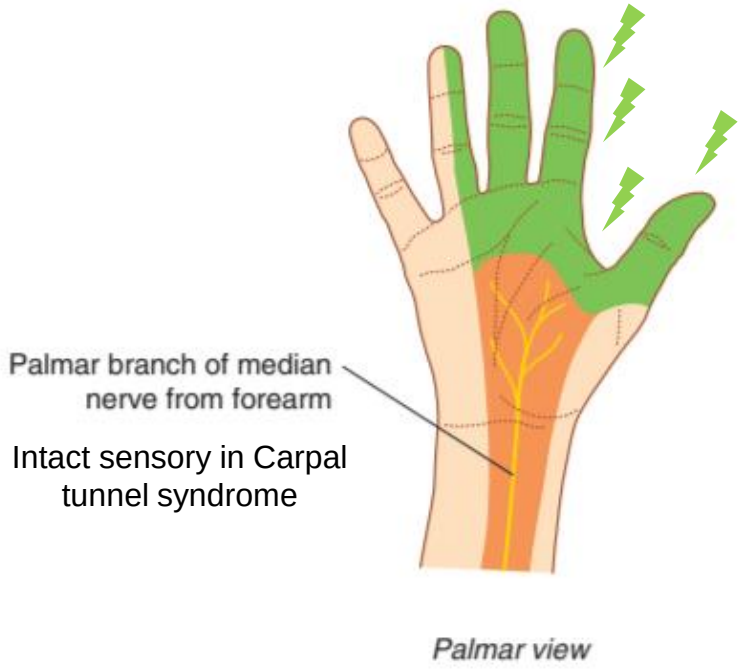
Deformity: APE'S HAND **Sensory loss:** Same as in elbow lesion

Carpal tunnel syndrome

- Entrapment syndrome caused by pressure on the median nerve within the carpal tunnel
- Symptoms: paresthesia (pins & needles pain over the palmar aspect of lateral 3 & half fingers & lateral aspect of palm **BUT NOT THE SKIN OVER THENAR EMINENCE**)
- Muscle weakness & wasting of thenar eminence

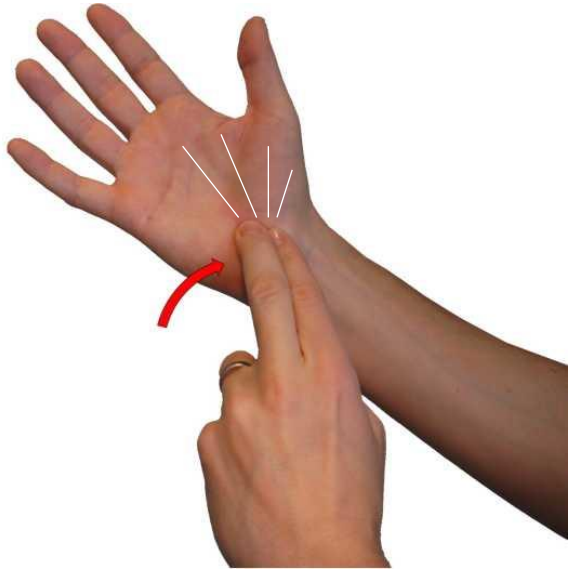


Sensory loss



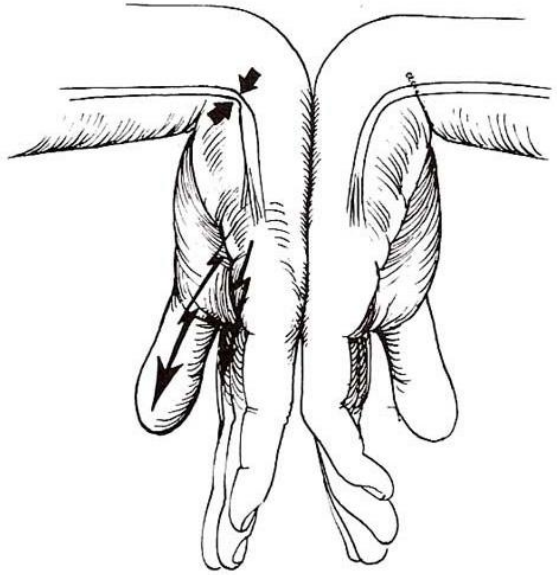
Tinel's test

- Gentle tap over the median nerve (in the region of the flexor retinaculum) produces carpal tunnel syndrome symptoms.



Phalen test

- Forced wrist flexion for few seconds reproduce the symptoms of carpal tunnel syndrome.



Thank You