

**The University Of Jordan  
Faculty Of Medicine**



# **Nerves of the Upper limb**

**By**

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**Associate Professor of Anatomy**

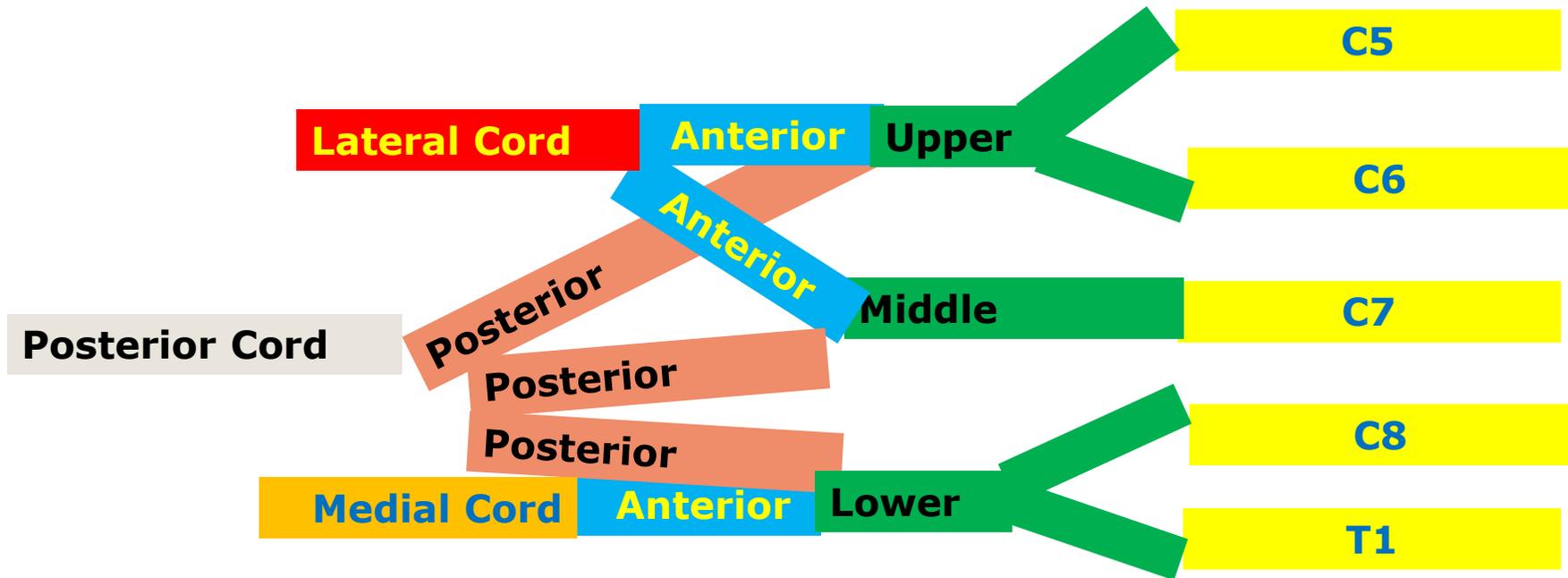
**Branches**

**Cords**

**Division**

**Trunk**

**Roots**



## Lateral cord

1-Lateral Pectoral nerve  
(C5,C6 & C7)

2-Lateral root of Median nerve  
(C5,C6 & C7)

3- Muscul**cutaneous** nerve  
(C5,C6 & C7)

## Medial cord

1-Medial Pectoral nerve  
(C8 & T1)

2-Medial root of Median nerve  
(C8 & T1)

3-Medial **cutaneous** nerve of  
the arm (C8 & T1)

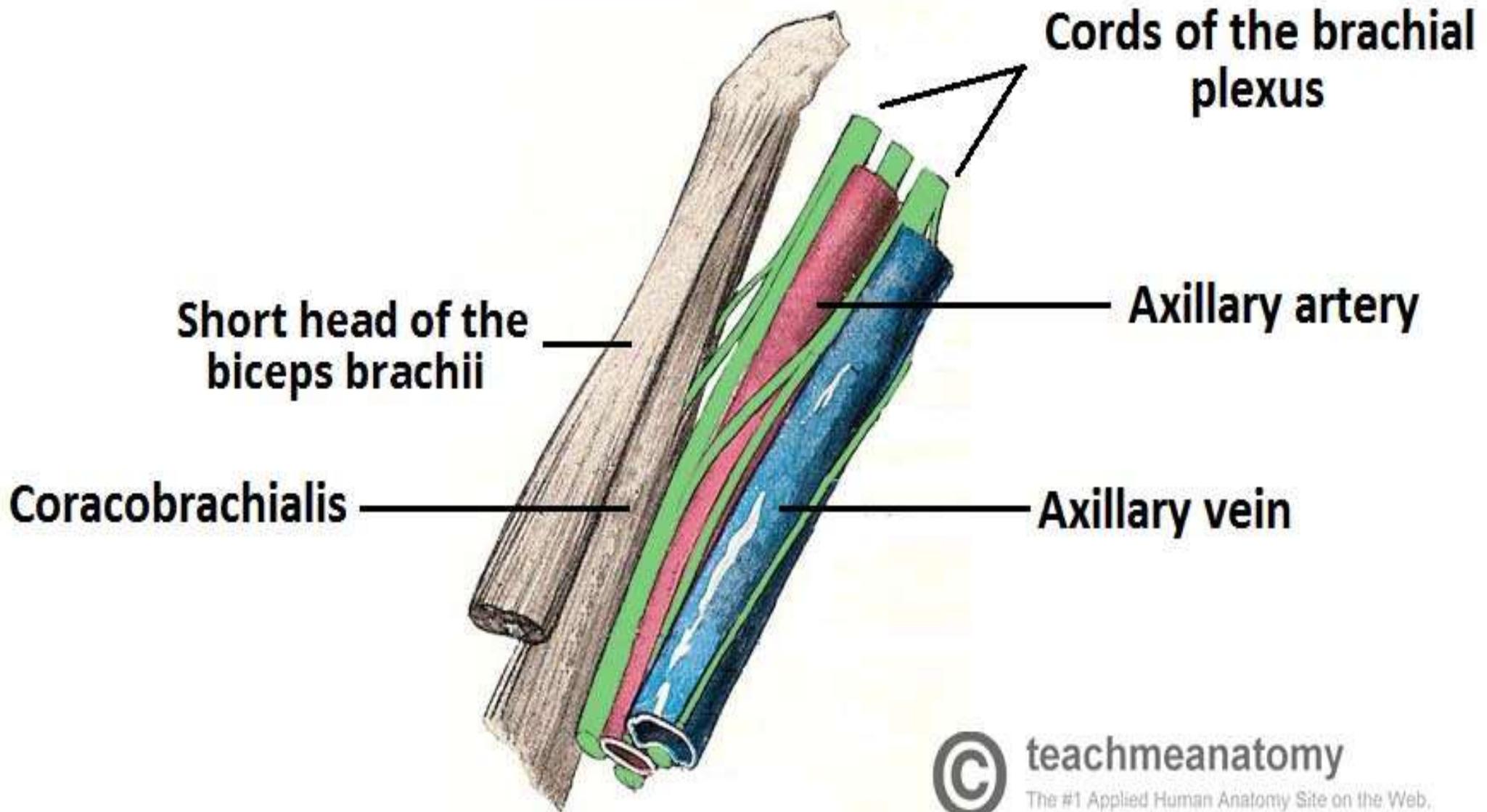
4-Medial **cutaneous** nerve of  
the forearm  
(C8 & T1)

5-Ulnar nerve (C7,C8 & T1)

## Branches from the Posterior Cord of the Brachial Plexus

- 1-Upper subscapular nerve (C5 & C6)
- 2-Lower Subscapular nerve (C5 & C6)
- 3-Axillary nerve (C5, & C6)
- 4-Thoracodorsal nerve (C 6,7 & 8)
- 5-Radial nerve (C5.6.7,8 & T1)

- The cords are related to 2nd part of axillary artery
- The branches are related to 3rd part of axillary artery



- Median nerve
- Ulnar nerve
- Radial nerve



**Palmar Aspect**



**Dorsal Aspect**

## **Sensory Nerve supply of the hand**

## **Sensory Nerve supply of the hand**

### **Ulnar nerve**

Palmar and dorsal aspect medial 1/3 of the palm.

Palmar and dorsal aspect of medial 1½ fingers .

### **Median Nerve**

Palmar aspect lateral 2/3 of the palm

Palmar aspect of lateral 3½ fingers and the skin on the back of the distal phalanges (nail bed) and back of the middle phalanges.

### **Radial nerve**

It is sensory to dorsal aspect of lateral 2/3 of hand and lateral 3 ½ fingers

# Ulnar Nerve

# **Course and Relations of Ulnar Nerve**

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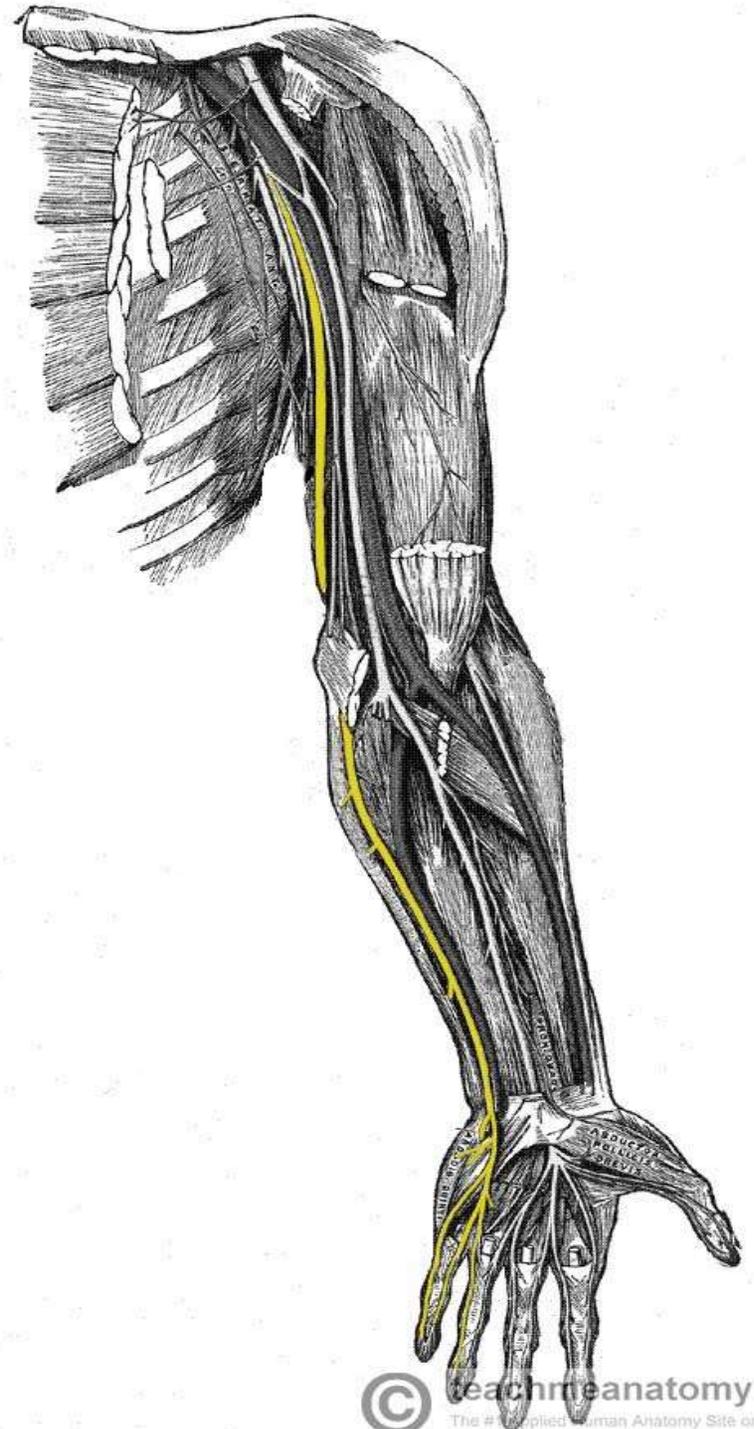
## Important relations

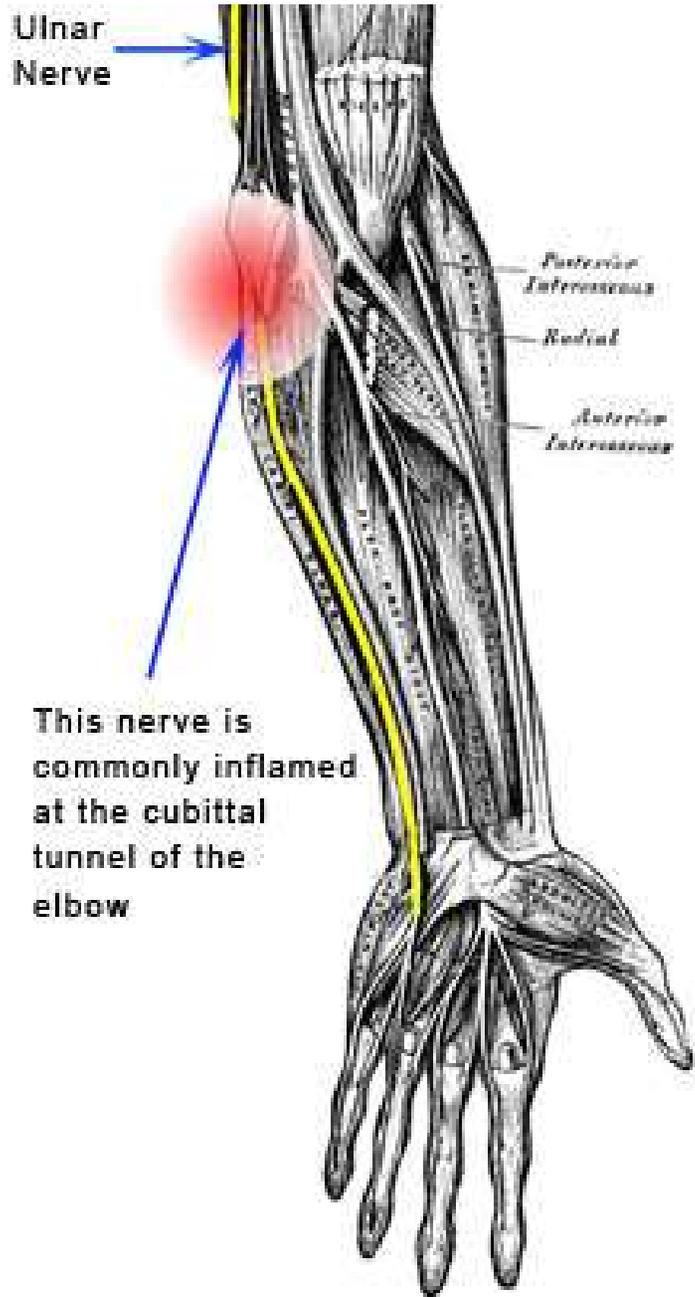
- ❖ **At the Axilla** : It passes medial to 3<sup>rd</sup> part of axillary artery
- ❖ **At the arm** : It passes medial to brachial artery
- ❖ **At the Elbow** : It passes behind medial epicondyle in the cubital tunnel
- ❖ **At the Forearm** : It passes between Flexor flexor carpi ulnaris and Flexor digitorum profundus.
- ❖ **At the wrist** : It enters hand superficial to flexor retinaculum
- ❖ **Hand** : It divided into superficial and deep branches within Guyon's (ulnar) canal



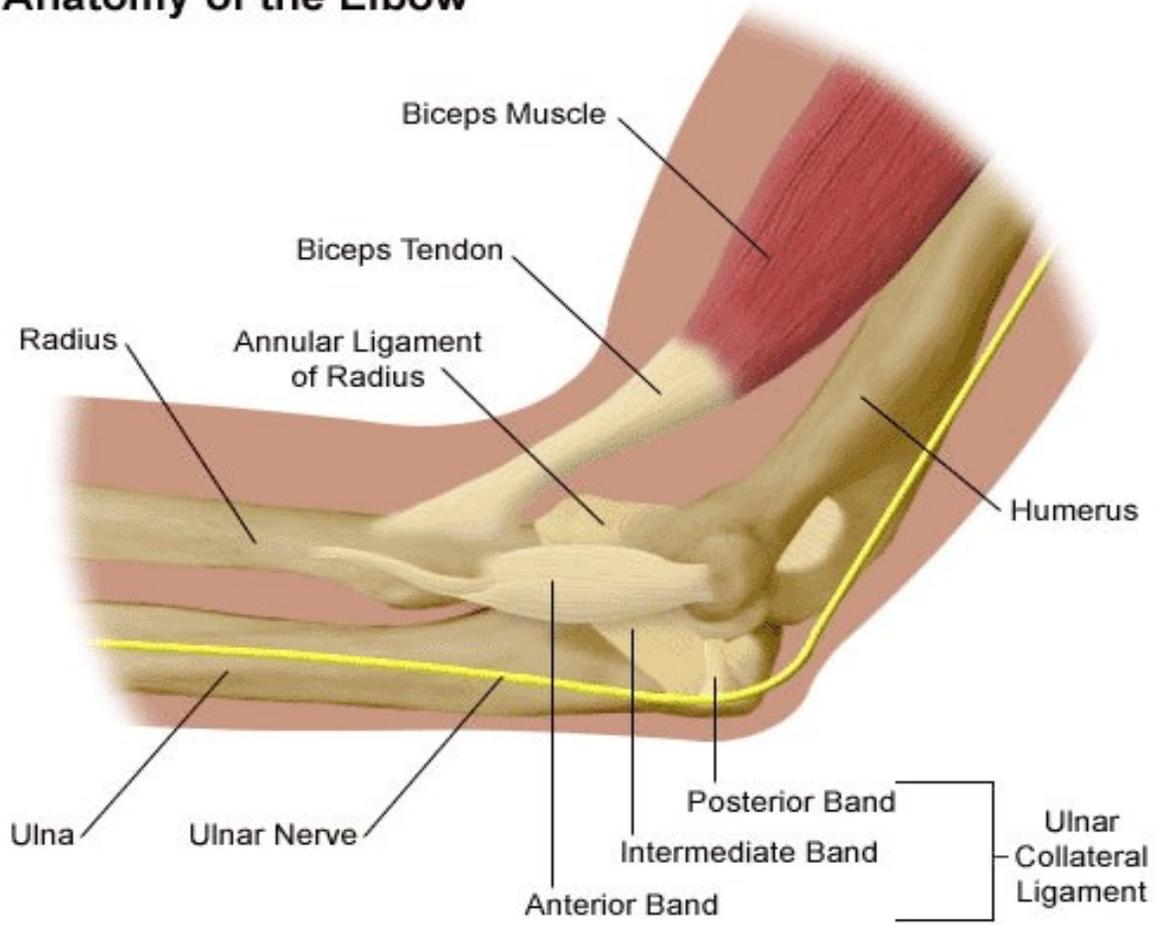
**Medial Epicondyle**

**Ulnar Nerve**





## Anatomy of the Elbow



# Branches of Ulnar Nerve

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	Motor	Sensory	Articular
<b>Arm</b>	<b>No Branches</b>		
<b>Forearm</b>	1-Flexor carpi ulnaris 2-Medial half of flexor digitorum profundus (4rd and 5th fingers)	<u><b>Palmar branch</b></u> : medial 1/3 of the palm. <u><b>Dorsal branch</b></u> : medial 1/3 of the dorsum of the hand and the dorsum of the medial 1½ fingers	Elbow joint.
<b>Hand</b>	-Muscles of hypothenar eminence -3rd and 4th lumbricals -Adductor pollicis. -All interossei (palmar and dorsal). -Palmaris brevis muscle	Palmar aspect of medial 1½ fingers .	Wrist joint and metacarpophalangeal joints  <div style="background-color: yellow; padding: 5px; text-align: center;"> <b>Articular branches REED ONLY</b> </div>

# Ulnar nerve Injury

## **A- Causes**

### **Lesion at the elbow:**

1. Fracture of the medial epicondyle of the humerus.
2. Cubital Tunnel Syndrome (compression of ulnar nerve within cubital tunnel)

### **Lesion at the wrist:**

Cuts and stab wounds.

### **B-Manifestation :**

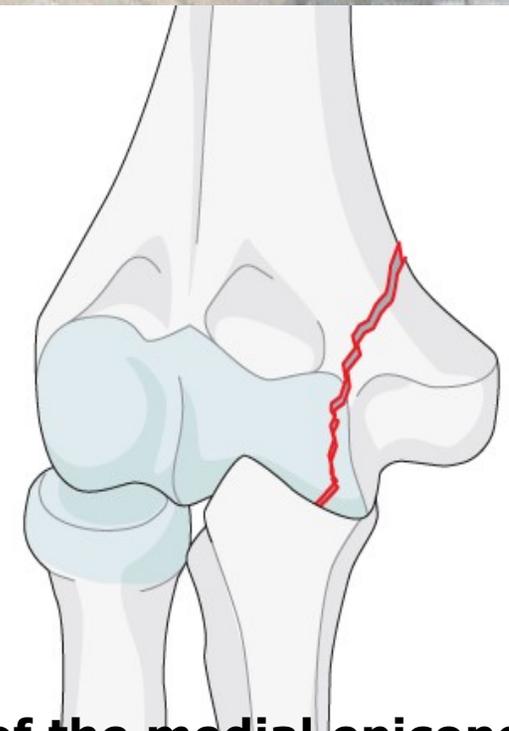
- 1- Weak flexion at the wrist with radial deviation and flattening of the medial side of the forearm.
- 2- Inability to adduct thumb
- 3- Inability to adduct or abduct medial four fingers
- 4- Loss of sensation from the palmar and dorsal aspects over the medial 1/3 of the hand and the medial 1½ fingers.

### **C-Deformity:**

Partial claw hand

# Deformity

Partial claw hand deformity



<sup>1</sup> Fracture of the medial epicondyle

# Test for Ulnar nerve Injury



**Adduction and abduction of the fingers**

## Froment's Sign

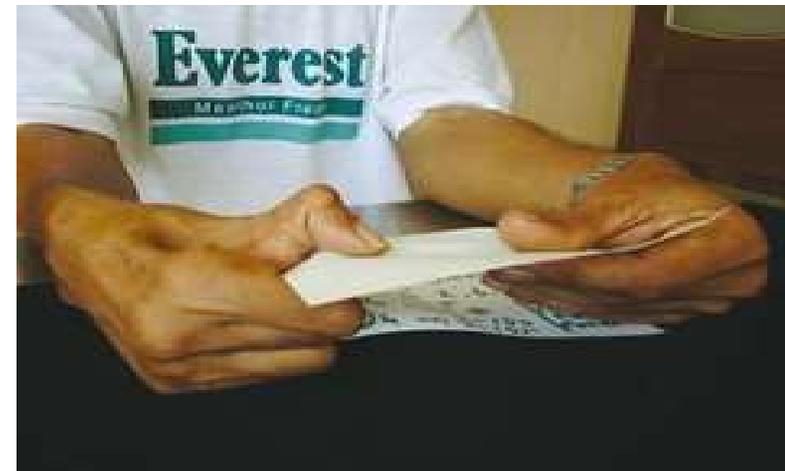
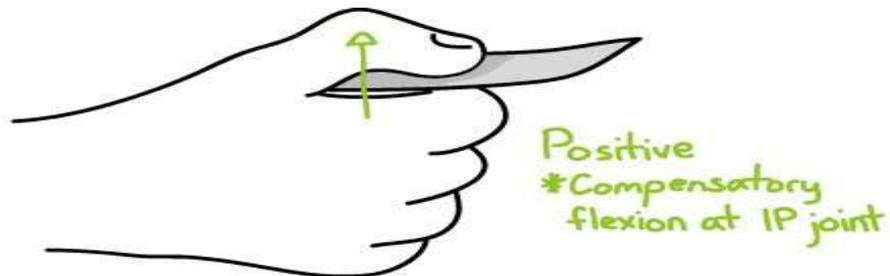
The patient is asked to make a strong pinch between the thumb and index finger and grip a flat object paper between the thumb and index finger

<https://www.youtube.com/watch?v=yJTIhm1VfSI>

Adductor Pollicis



sketchymedicine.com  
Froment's Test



## Ulnar Canal Syndrome

**Cause :** compression of the ulnar nerve within the ulnar(Guyon's) canal.

### Clinical features

**Sensory :** Pain and paraesthesia ulnar 1 1/2 digits (palmar aspect )

### Motor:

- Weakness of thumb adduction (adductor pollicis)
- Weakness of finger abduction and adduction (interossei)
- Weakness of little finger flexion, abduction and opposition (hypothenar muscles)

**What the difference between Cubital Tunnel and Ulnar Canal Syndromes**

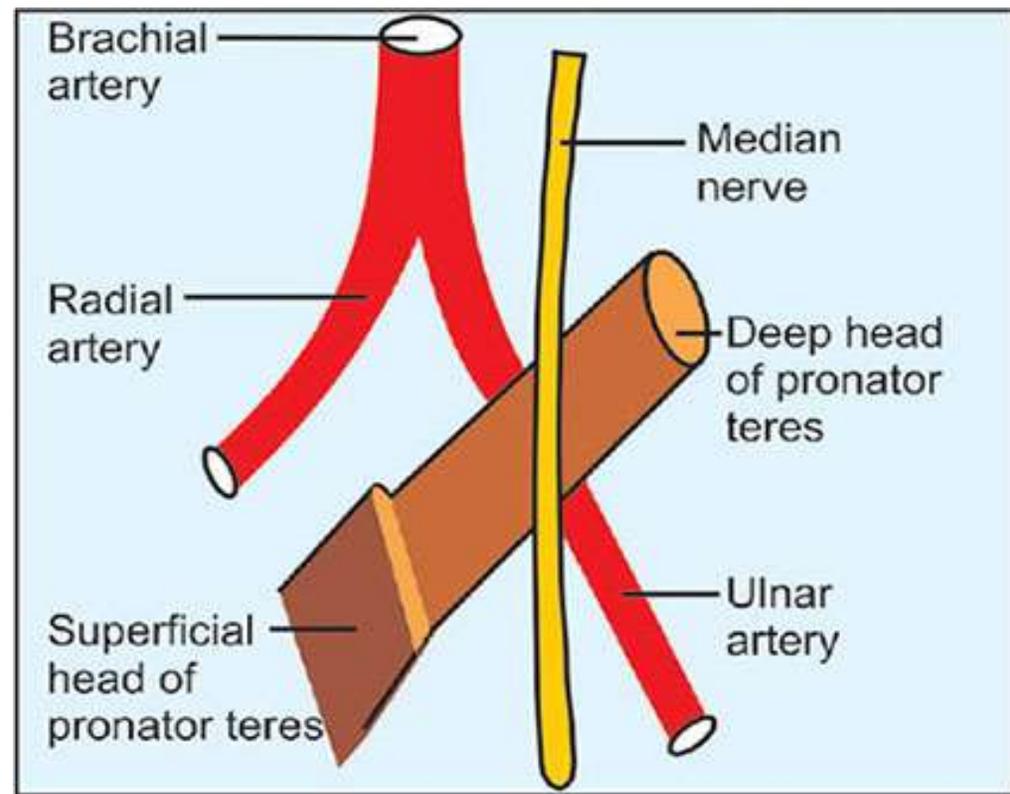
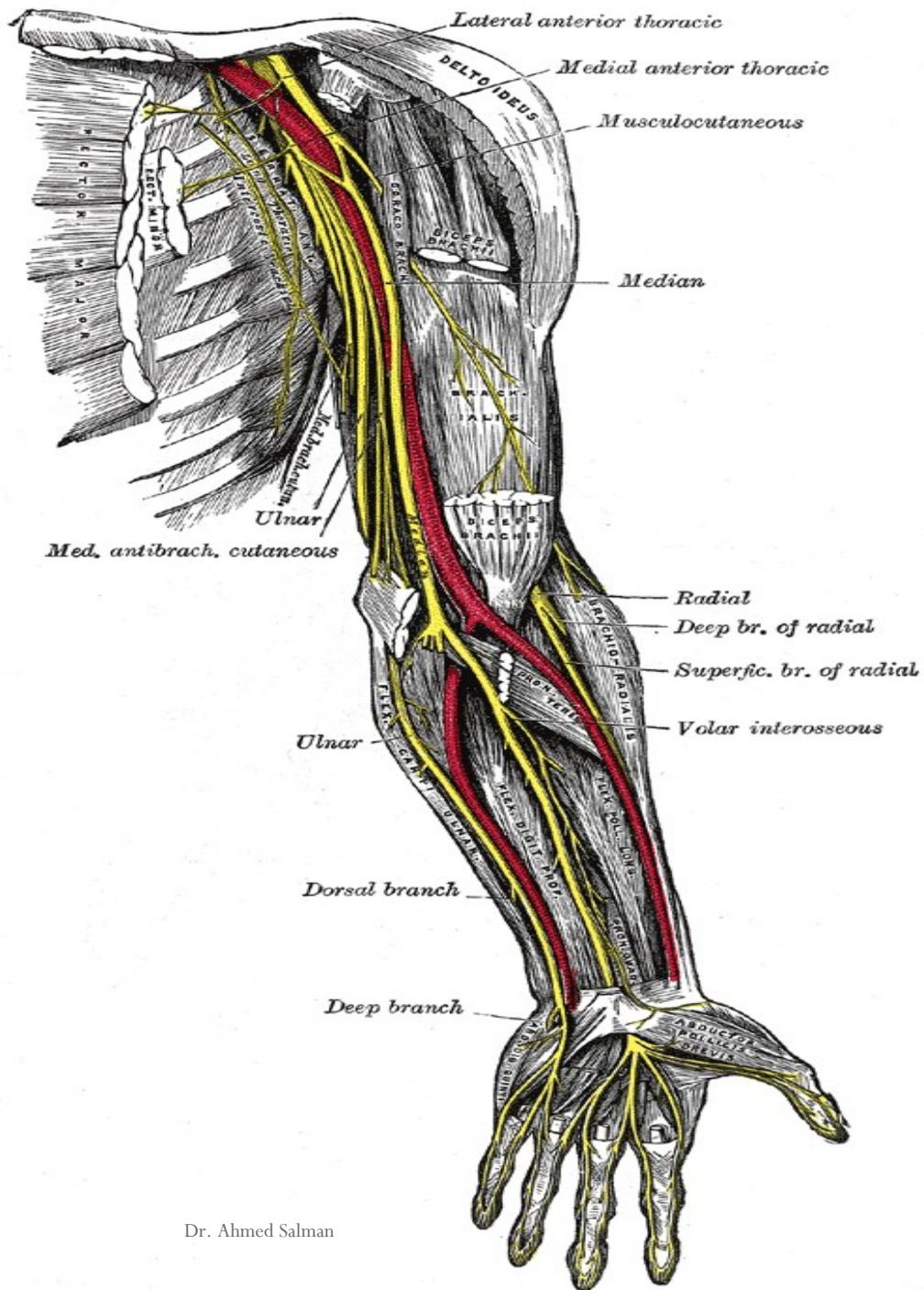


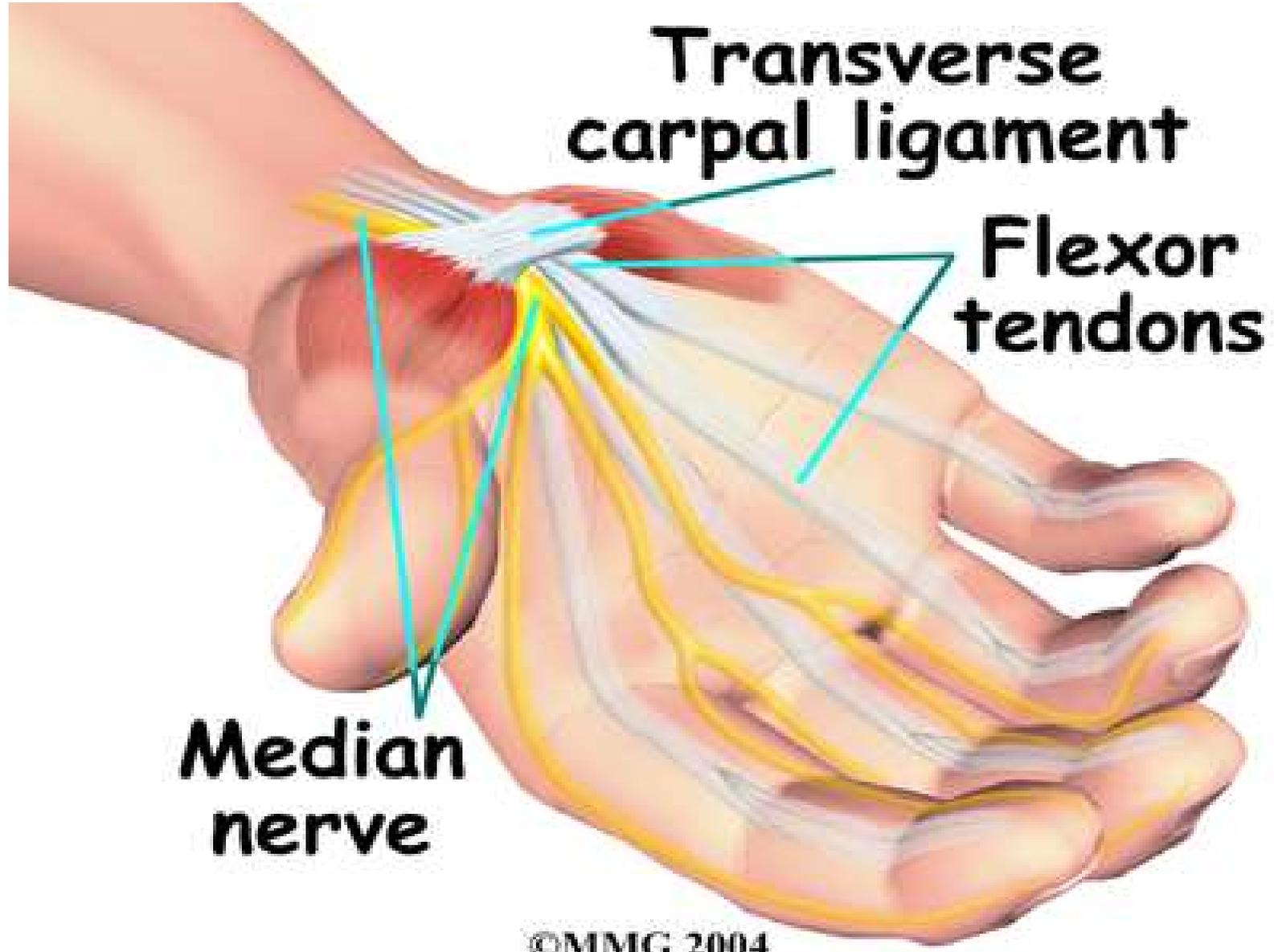
# Median Nerve

# Median Nerve Course and Relations

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- ❖ **At the Axilla** :It passes lateral to 3<sup>rd</sup> part of axillary artery
- ❖ **At the arm** :It passes lateral then medial to brachial artery (**LAM**)
- ❖ **At the Elbow** : It passes between superficial and deep head of pronator teres
- ❖ The deep head of pronator teres separates **median nerve** from **ulnar artery**
- ❖ **At the forearm** : It passes between Flexor digitorum Superficialis and Flexor digitorum profundus.
- ❖ 2 inch above the wrist it is covered with skin only (**dangerous site** )
- ❖ **At the wrist** : It passes in the carpal tunnel below flexor retinaculum





**Transverse  
carpal ligament**

**Flexor  
tendons**

**Median  
nerve**

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# Branches of Median Nerve

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	Motor	Sensory	Articular
Arm	<b>No Branches</b>		
Forearm	<p>1-To all the superficial flexors of the forearm <b>EXCEPT</b> flexor carpi ulnaris</p> <p>2- Anterior interosseous nerve to all deep flexor muscles <b>EXCEPT</b> medial half of flexor digitorum profundus</p>	<p><b><u>Palmar branch</u></b> : Lateral 2/3 of the palm.</p> <p><b><u>(It passes superficial to flexor retinaculum)</u></b></p>	Elbow and superior radioulnar joints
Hand	<p>-Thenar Muscles</p> <p>-1<sup>st</sup> &amp; 2<sup>nd</sup> lumbricals</p> <p style="text-align: center; font-size: small;">Dr. Ahmed Salman</p>	Palmar aspect of Lateral 3½ fingers and supply the skin on the back of the distal phalanges (nail bed) and back of the middle phalanges.	<p>Wrist joint and metacarpophalangeal joints</p> <div style="background-color: yellow; padding: 5px; text-align: center; margin-top: 10px;"> <b>Articular branches REED ONLY</b> </div>

# Median Nerve injury

## Causes

### Above the elbow:

Fractures of the lower end of the humerus.

### Above the wrist :

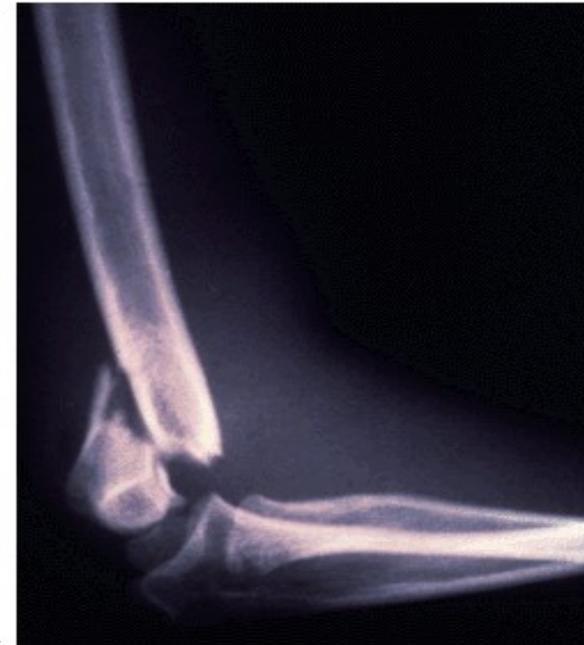
Stab wound, broken glass and butcher's knife.

### **B-Manifestation :**

- 1- Loss of pronation
- 2-Inability to flex thumb
- 3-Inability to oppose thumb
- 4-Loss of sensation
  - Over the lateral 2/3 of the palm .
  - The palmar surface of the lateral 3½ fingers and over their distal part on the dorsal surface

### **C-Deformity:**

Ape like hand



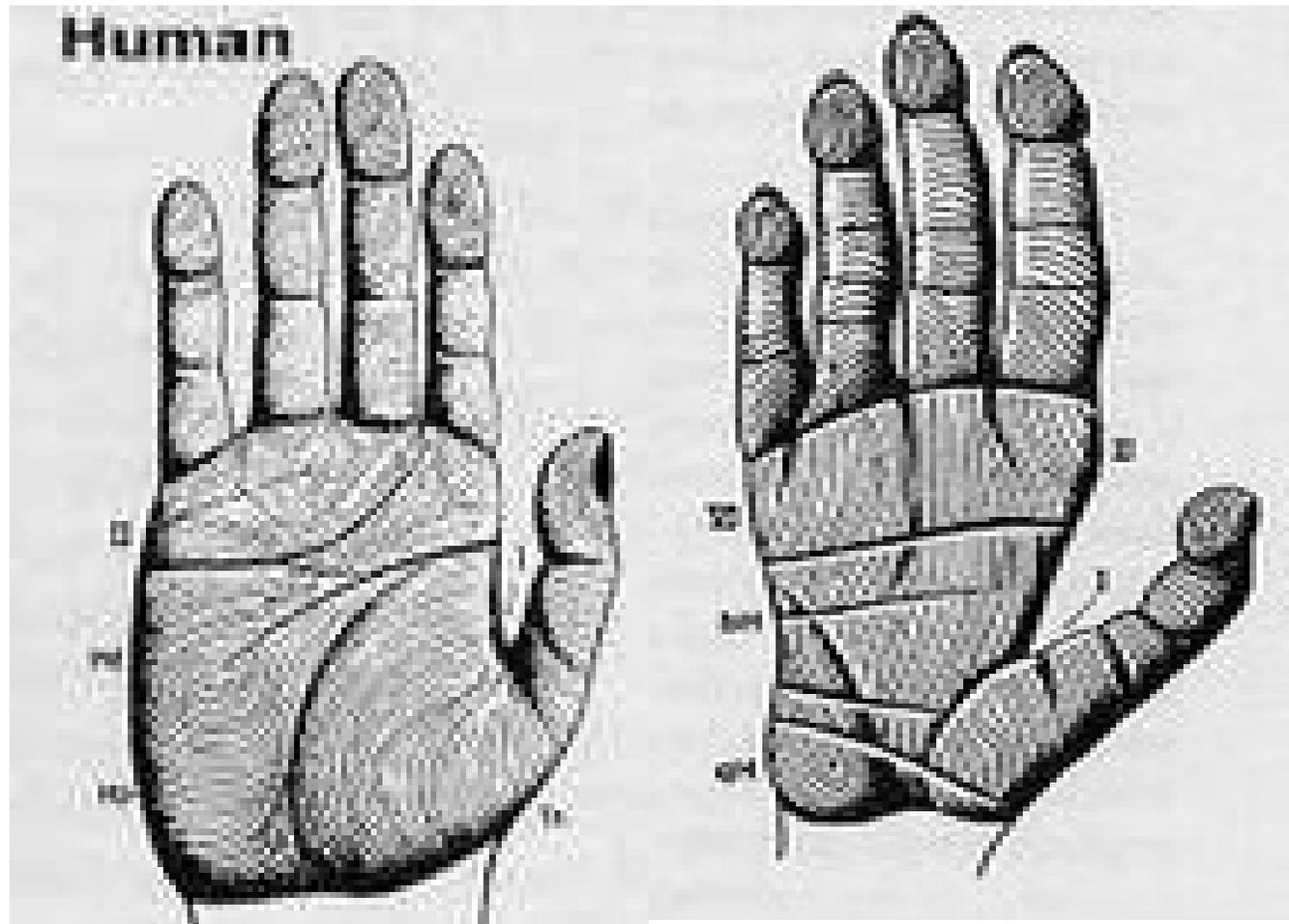
## Deformity: (Ape like hand)

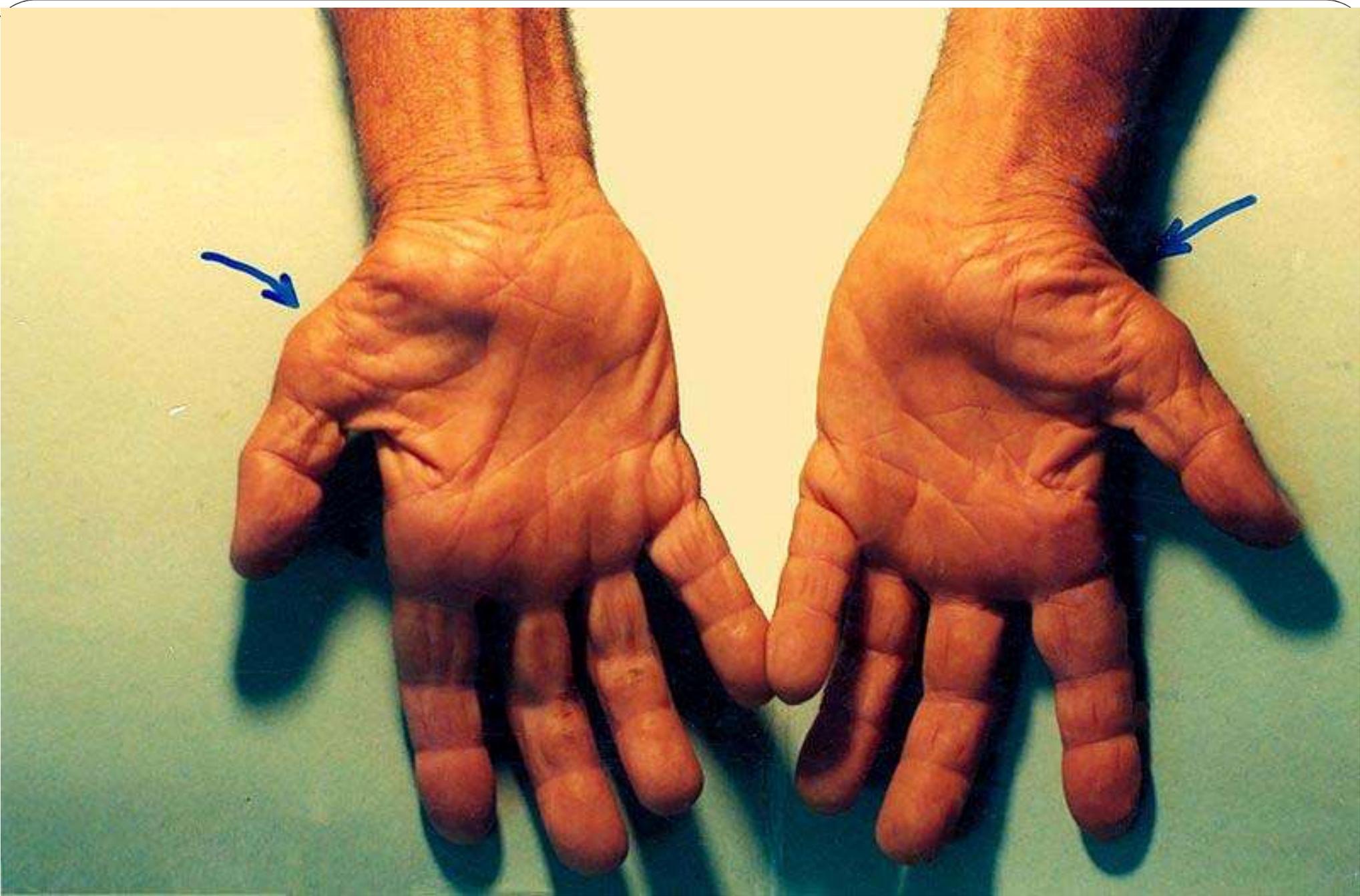
The thenar eminence is flattened.

The thumb is extended and laterally rotated and is adducted



## Ape Hands





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# Carpal Tunnel Syndrome



## Causes:

Compressing the median nerve in the carpal tunnel.

## Results:

- Numbness along the distribution of median nerve to the lateral 3½ fingers.
- Sensory loss (paraesthesia) on palmar surface of the lateral 3½ fingers and extends on dorsal aspect of the distal & middle phalanges.
- Weakness and flattening of muscles of the thenar eminence.
- **The lateral 2/3 of the palm not affected ?? WHY**

## Deformity:

Monkey's hand (Ape hand).

## Phalen's test

your doctor will ask you to press the back of your hands and fingers together with your wrists flexed in completion and your fingers pointed down. You will stay in that position for at least one or two minutes. If your finger develops a tingle or gets numb, then you have carpal tunnel syndrome.

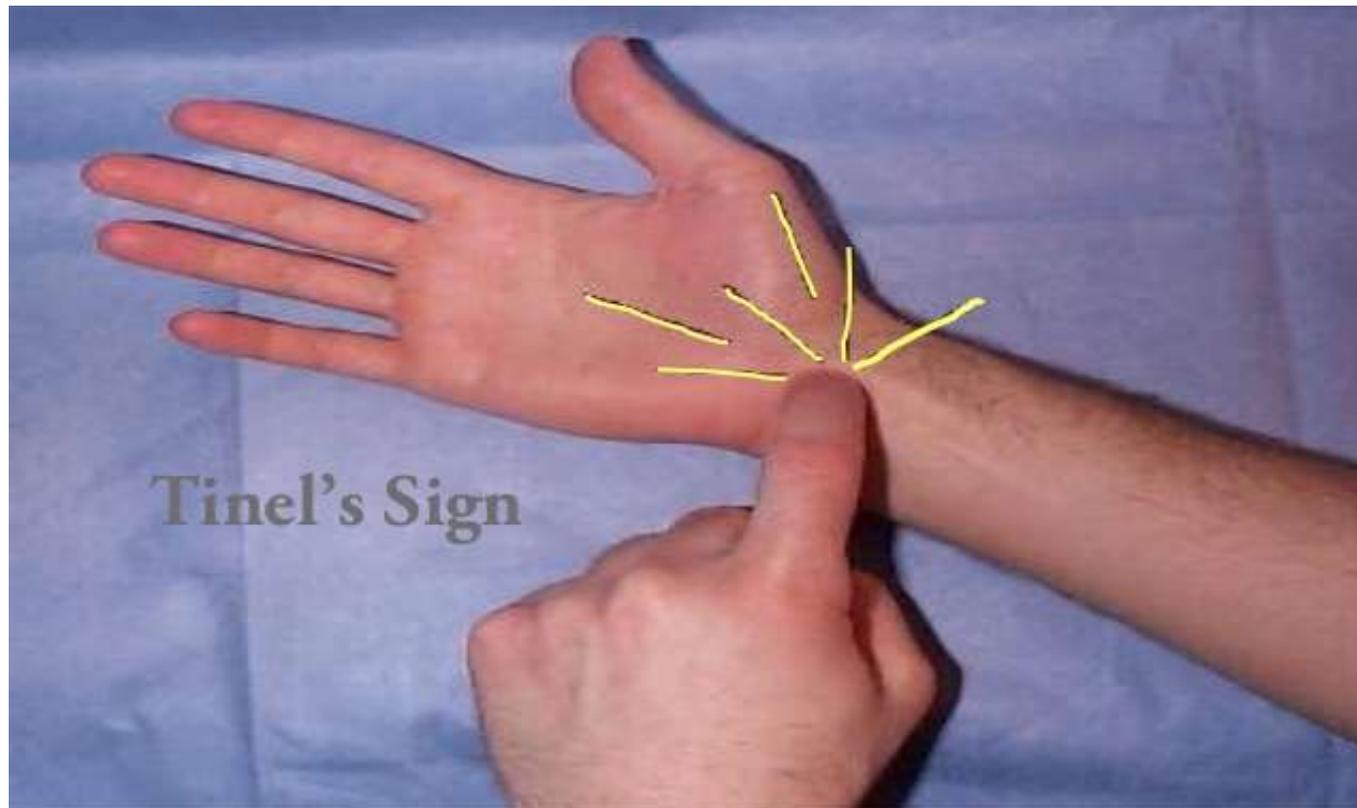


## Tinel's sign

REED ONLY

It is a tingling or “pins and needles” feeling you get when the doctor taps the skin over a nerve.

Tinel's sign may be an indicator that you have nerve compression or damage where they're tapping.

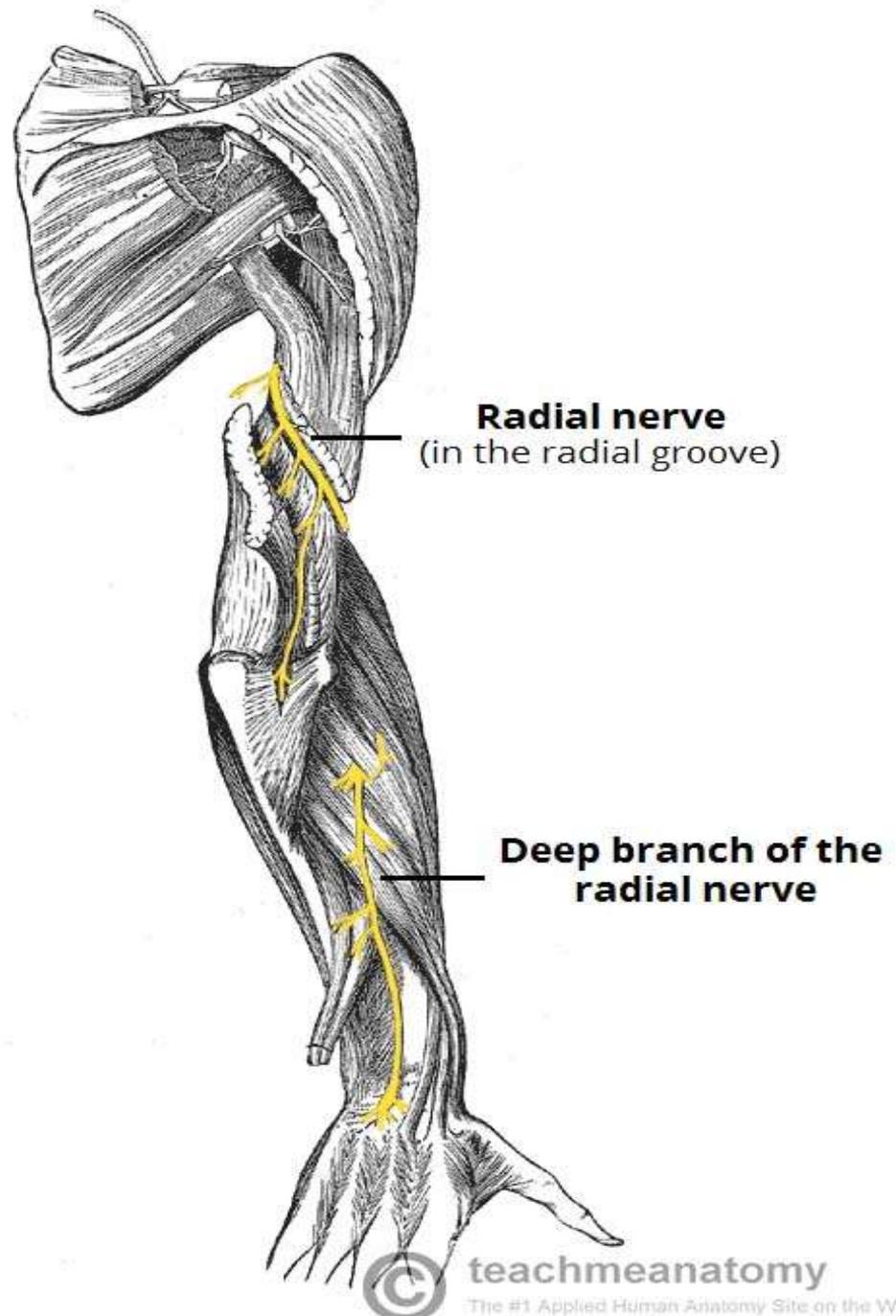


# Radial Nerve

- ❖ **At he Axilla :** It passes posterior to 3<sup>rd</sup> part of axillary artery .
- ❖ **At the arm** it descends in the spiral groove with profunda brachii artery
- ❖ **At the elbow :** It divides in front of the lateral epicondyle into superficial and deep terminal branches.

# Radial N.

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# Branches of Radial Nerve

## Motor

- 1-Triceps.
- 2-To the lateral fibres of brachialis.
- 3-To the brachioradialis.
- 4-To the extensor carpi radialis longus
- 5-Nerve to anconeus

**Deep branch** (posterior interosseous nerve)

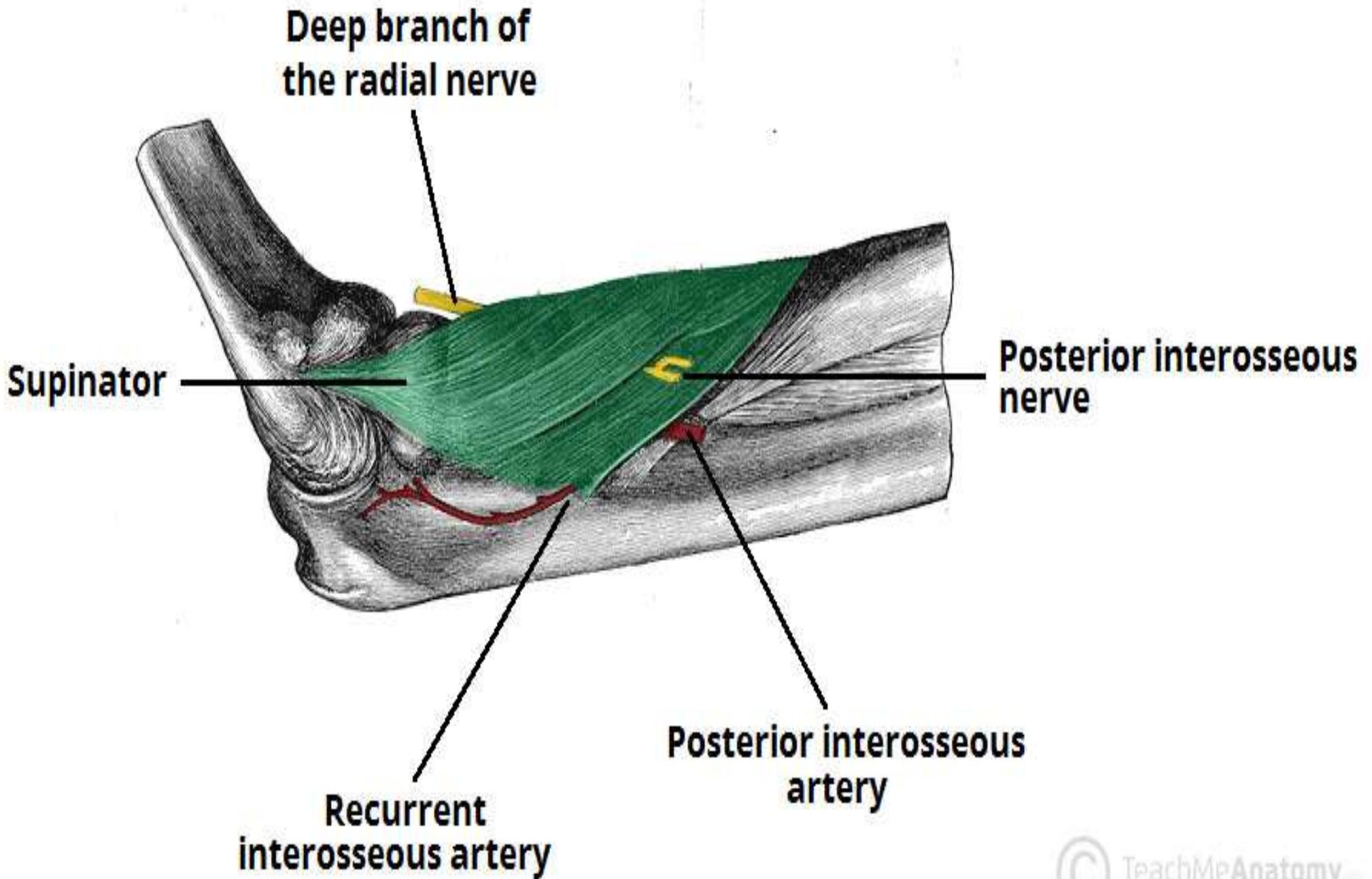
supplies ALL the muscles of the back of the forearm(except anconeus)

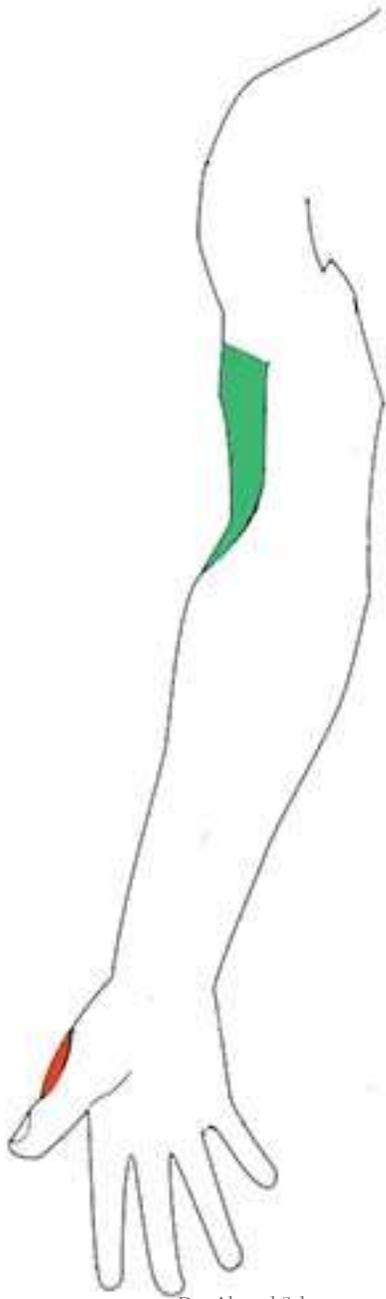
## Sensory

- 1-**Posterior** cutaneous nerve of the **arm**
- 2-Lower **lateral** cutaneous nerve of **the arm.**
- 3-**Posterior** cutaneous nerve of the **forearm.**

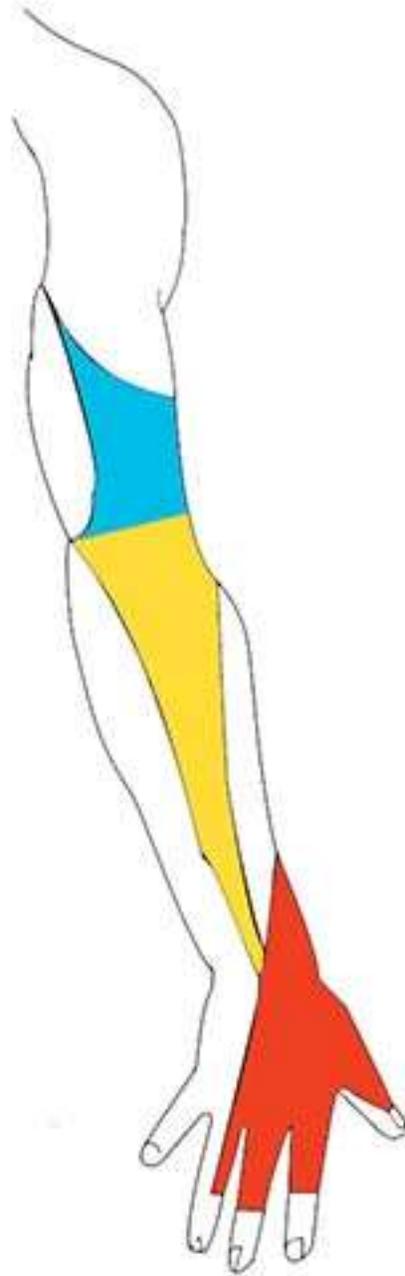
### **4-Superficial branch**

It is sensory to dorsal aspect of lateral 2/3 of hand and lateral 3 ½ fingers





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-  Lower lateral cutaneous nerve of arm
-  Posterior cutaneous nerve of arm
-  Posterior cutaneous nerve of forearm
-  Superficial branch



teachmeanatomy

The #1 Applied Human Anatomy Site on the Web.

# Radial Nerve Injury

## A-Causes

1- Drunken person falling asleep with one arm over the back of a chair (**Saturday night's palsy or sleep palsy**).

2-Fracture of the shaft of the humerus.

2-Using a tourniquet to the arm for a long time.

## B-Manifestation :

1-Loss of extension of the elbow joint , wrist and fingers.

## C-Deformity:

Wrist drop



## Fracture Mid-Shaft Of The Humerus



## X-Ray Fracture Mid-Shaft Of The Humerus



## Saturday Night Palsy



## Axillary Nerve

- It arises from posterior cord of the brachial plexus.
- It winds around **surgical neck of humerus**
- It ends under deltoid muscle by dividing into anterior and posterior terminal branches

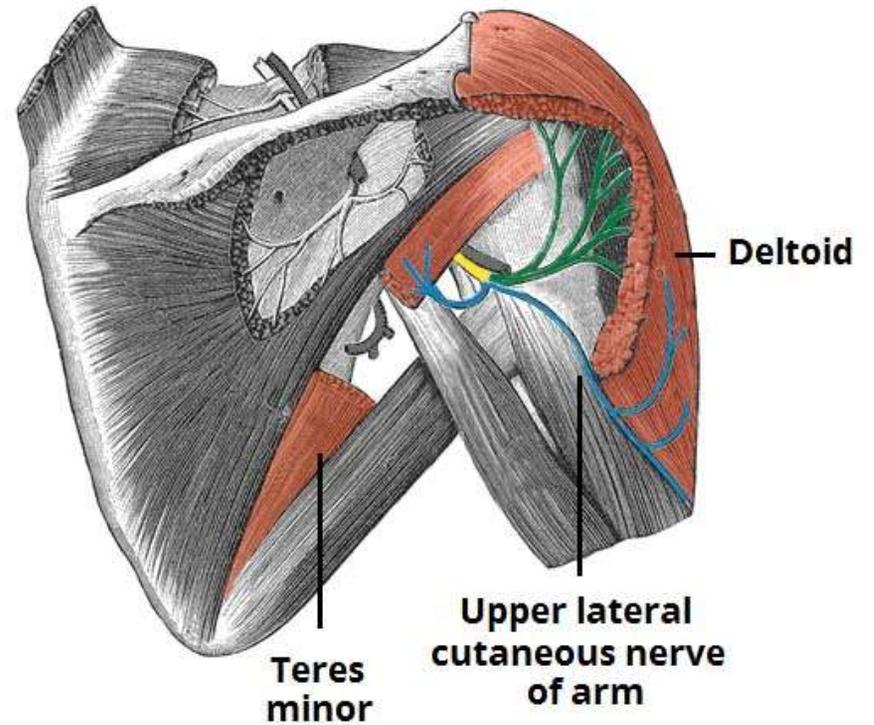
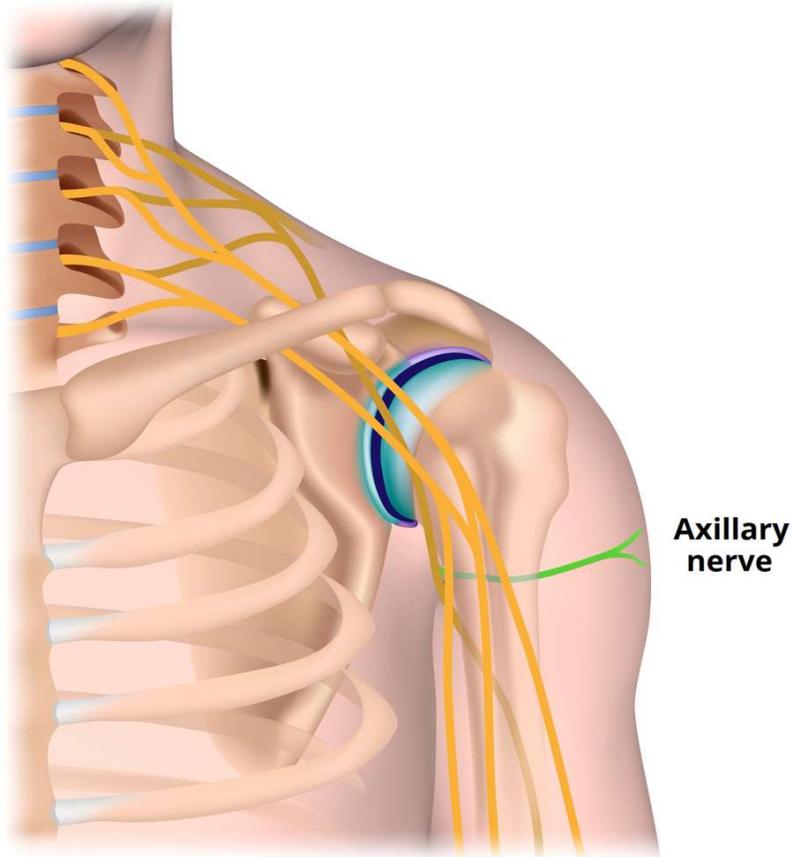
# Branches

## Motor

Deltoid and teres minor muscles

## Sensory

To skin over the lower half of deltoid muscle.



- Anterior terminal division
- Posterior terminal division

# Axillary Nerve Injury

## A-Causes

- 1-Compression by a Cruch
- 2-Fractures of surgical neck of humerus

## B-Manifestation :

Loss of power of abduction at the shoulder.

## C-Deformity:

Atrophy of the shoulder



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# **Musculocutaneous nerve**

## Course:

It Arises from lateral cord of brachial plexus

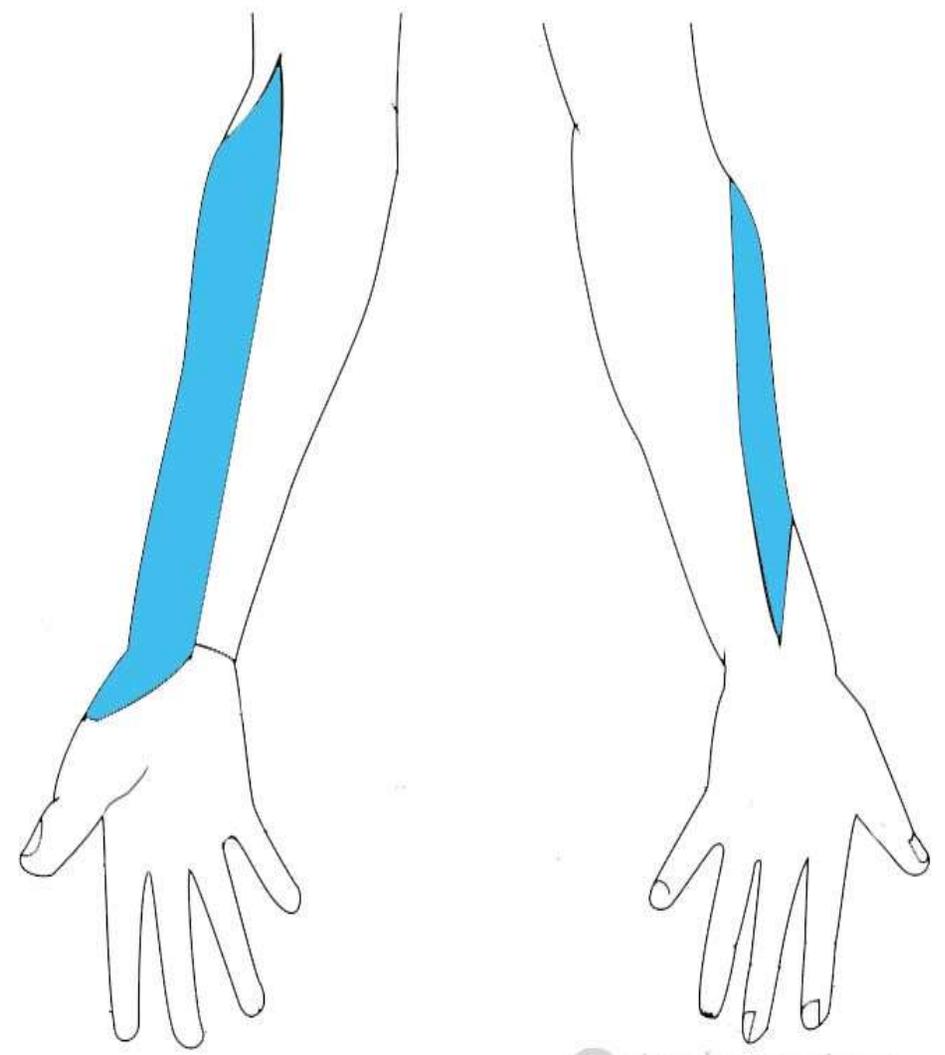
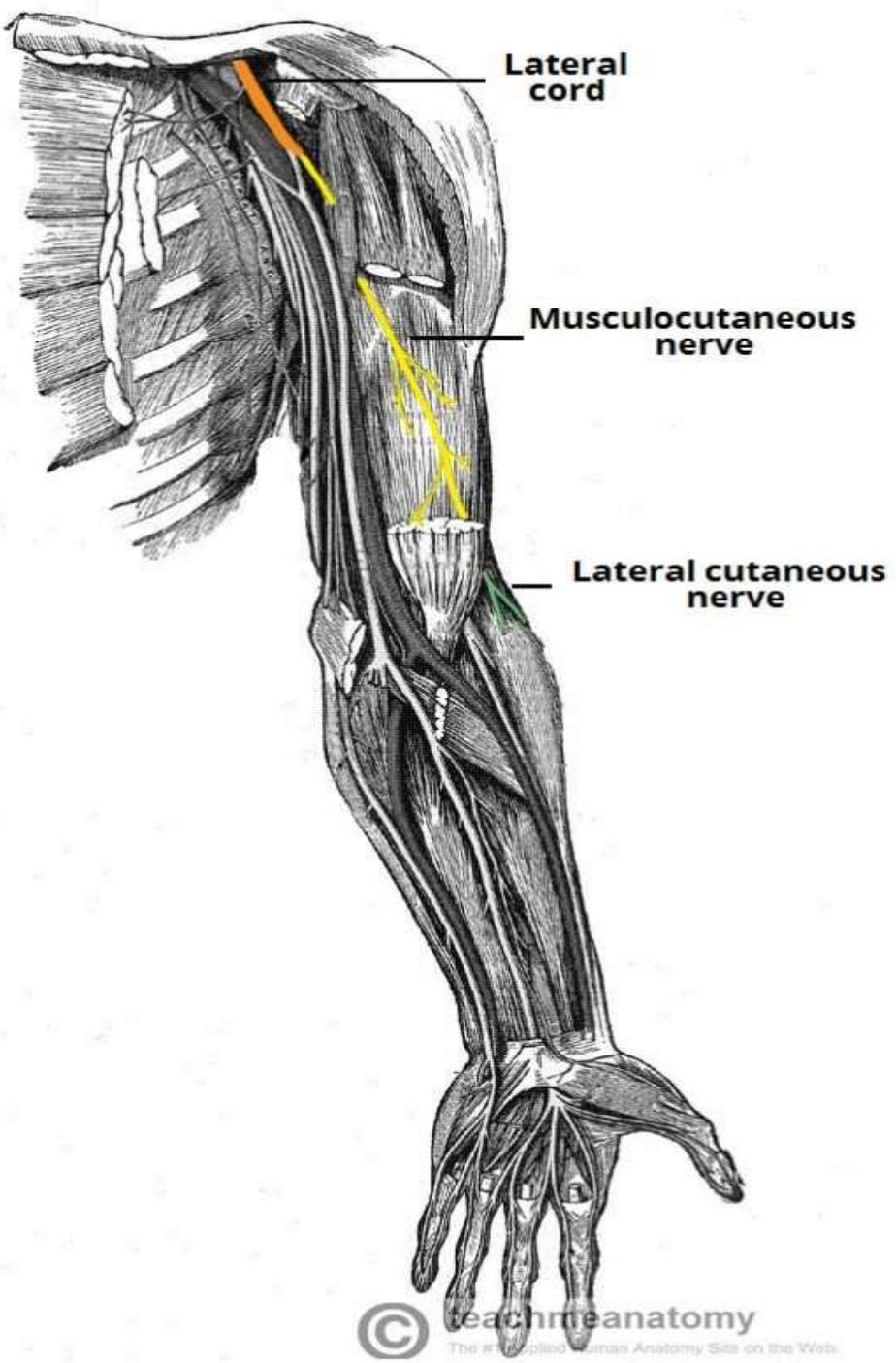
It ends as lateral cutaneous nerve of the forearm.

### Motor

To coracobrachialis , biceps and brachialis

### sensory

**lateral cutaneous nerve of the forearm:** supplies the skin of the lateral side of the forearm



**Sensory innervation**

## **Long Thoracic nerve Injury**

Paralysis of Serratus anterior muscle

Winging of scapula



# **Brachial plexuses injury**

# Upper trunk lesion (C5, 6) (Erb-Duchenne palsy or paralysis)



## Causes

**CAUSES REED ONLY But know it to help you in solving clinical scenarios**

1- During Labour :

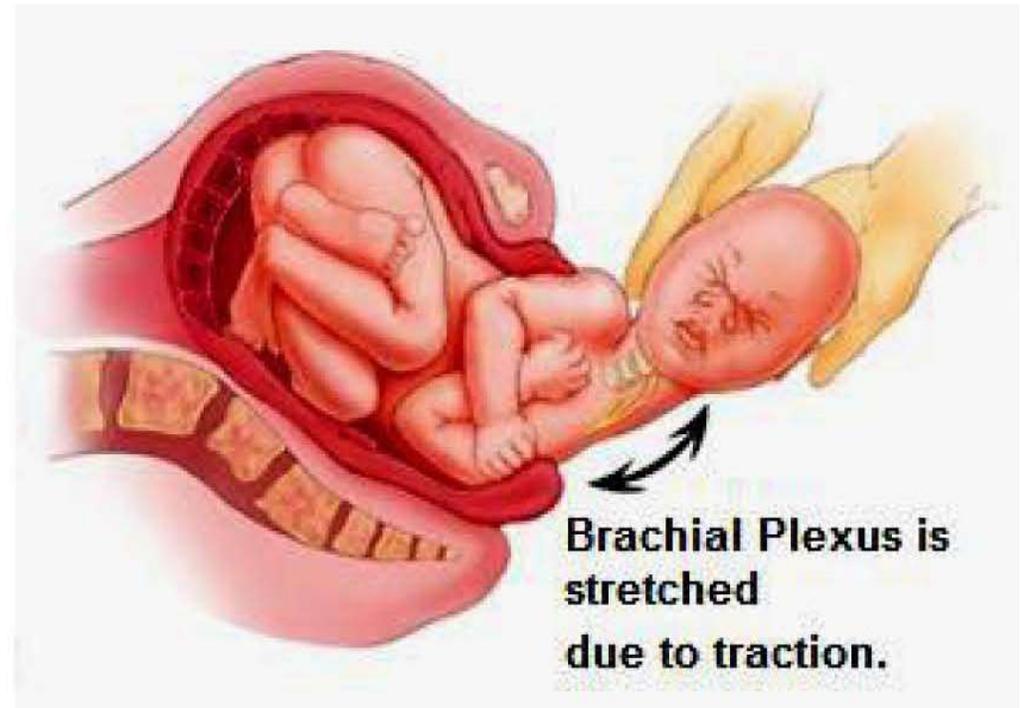
- Pressure of a forceps used in difficult labour.
- Traction of the head in breech presentation.

2- Violent falls on the side of the head and shoulder

3- blow at the root of the neck

## Affected Nerves:

- Suprascapular.
- Nerve to subclavius.
- Musculocutaneous.
- Axillary.



## Manifestation

### The deformity : police man's tip position

The upper limb is adducted and medially rotated with extended elbow and pronated forearm



**Lower trunk lesion (C8, T1)  
(Klumpke's palsy or paralysis).**

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**CAUSES REED ONLY But know it to help you in solving clinical scenarios**

**Causes:**

Excessive abduction of the arm as Birth difficulty.

**Affected nerves:**

1<sup>st</sup> thoracic nerve

**Motor effect : paralysis of**

All intrinsic muscles of the hand mainly lumbricals and interossei

**The deformity**

Complete claw hand



A 40 years old female has a fracture of right medial epicondyle . Clinical examination revealed radial deviation of the right forearm and sensory loss from medial 1/3 of the right hand and medial 1 1/2 fingers .

What is the injured nerve ?

A 40 years old female has a fracture of right **medial epicondyle** . Clinical examination revealed **radial deviation of the right forearm** and **sensory loss from medial 1/3 of the right hand and medial 1 1/2 fingers** .

What is the injured nerve ?

A 32-year-old man is involved in a motor vehicle accident.

The patient has multiple injuries including a displaced fracture of the left humerus midshaft . He complains of an inability to open his left hand and loss of sensation of lateral 2/3 of the dorsum of his left hand

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Thank  
you

