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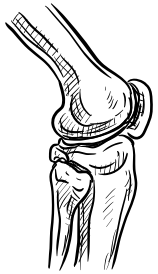


ANATOMY

FINAL | Lecture #7

وَإِن تَتَوَلَّوْا يَسْتَبْدِلْ قَوْمًا غَيْرَكُمْ ثُمَّ لَا يَكُونُوا أَمْثَالَكُم

اللهم استعملنا ولا تستبدلنا

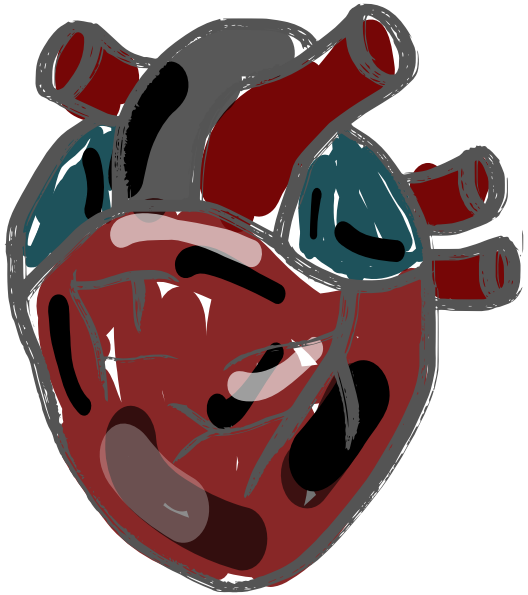
Nerve Injuries

Written by: Leen Mamoon

Reviewed by: Leen Mukahal

Color Code: Slides + Dr. doesn't mention | Slides + Dr. mentions | Extra from Dr.

Click to test your self in the previous lecture



You should study the previous lectures enough to make this lecture easy...

Nerve injuries

For each nerve, it is essential to identify the site of injury, as nerve damage leads to both motor and sensory deficits. Therefore, it is crucial to understand the muscles innervated by the affected nerve. In cases of paralysis, we must assess its functional consequences, along with the extent and distribution of sensory loss.

Brachial Plexus Injuries

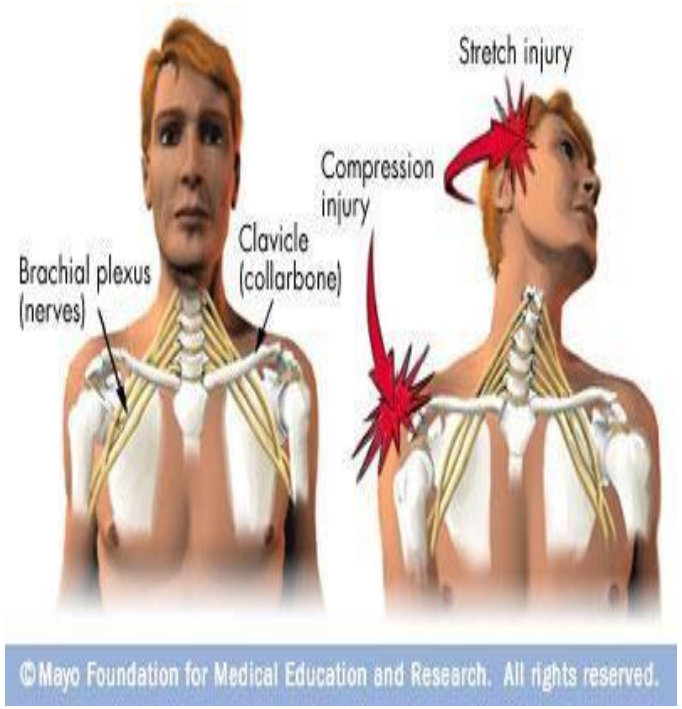
Note: The doctor mentioned the orgin of roots ,divisions and cords of the brachial plexus, You can refer to Lecture 2, Slide 20-24

- The roots, trunks, and divisions of the brachial plexus reside in the lower part of the posterior triangle of the neck (**The divisions are located specifically behind the clavicle)**
- whereas the cords (3) and most of the branches of the plexus lie in the axilla
- Complete lesions involving all the roots of the plexus are rare
- Incomplete injuries are common and are usually caused by traction or pressure
- individual nerves can be divided by stab wounds.

Upper Lesions of the Brachial Plexus (Erb-Duchenne Palsy)

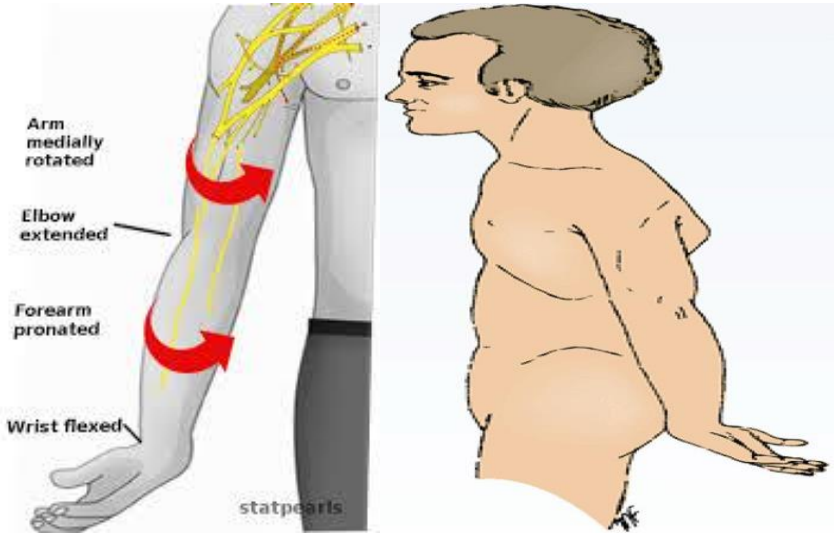
- Upper lesions of the brachial plexus are injuries resulting from excessive displacement of the head to the opposite side and depression of the shoulder on the same side
- This causes excessive traction or even tearing of C5 and 6 roots of the plexus
- It occurs in infants during a difficult delivery *or in adults after a blow to or fall/ **trauma** on the shoulder.
- The suprascapular nerve, the nerve to the subclavius, and the musculocutaneous and axillary nerves all possess nerve fibers derived from C5 and 6 roots and will therefore be functionless
- The following muscles will consequently be paralyzed : the supraspinatus (abductor of the shoulder) and infraspinatus (lateral rotator of the shoulder); -**recall the suprascapular nerve is effected-**
- the subclavius (depresses the clavicle)

*** During a normal cephalic delivery, the baby is delivered head-first. However, in some cases, the arm may emerge first. If excessive traction is applied to the baby's arm to assist in delivery, this forceful displacement can cause an upper trunk injury.**



- the biceps brachii (supinator of the forearm, flexor of the elbow, weak flexor of the shoulder) and the greater part of the brachialis (flexor of the elbow) and the coracobrachialis (flexes the shoulder
- and the deltoid (abductor of the shoulder) and the teres minor (lateral rotator of the shoulder)
- Thus, the limb will hang limply by the side, medially rotated by the unopposed sternocostal part of the pectoralis major
- the forearm will be pronated because of loss of the action of the biceps **and extension**
- The position of the upper limb in this condition has been likened to that of a porter or waiter hinting for a tip
- In addition, there will be a loss of sensation down the lateral side of the arm (**Because the musculocutaneous nerve terminates at the lateral cutaneous of the forearm)**& **skin over deltoid**

The axillary nerve is responsible for abduction of the arm, injury to this nerve results in the loss of abduction and sensory loss over the deltoid muscle.



This condition is commonly referred to as “porter” or “policeman’s pose” or “waiter’s hinting tip”. In this position, the affected individual holds their arm in a specific way: one hand rests on the thigh while the other arm extends outward, mimicking the action of signaling for a car or giving the “thumbs-up” gesture, similar to a person signaling for a ride or directing traffic.
In this case, the arm is positioned with extension, adduction, medial rotation, and pronation.
The pronator muscles are stronger than the supinator muscles (biceps brachii work during flexion), which is why pronation occurs in this condition

Lower Lesions of the Brachial Plexus (Klumpke Palsy)

- Lower lesions of the brachial plexus **(which originates from C8 and T1)** are usually traction injuries caused by excessive abduction of the arm, as occurs in the case of a person falling from a height clutching at an object to save himself or herself
- The first thoracic nerve is usually torn.
- The nerve fibers from this segment run in the ulnar and median nerves to supply all the small muscles of the hand
- The hand has a clawed appearance **(including the thumb)** caused by hyperextension of the metacarpophalangeal joints and flexion of the interphalangeal joints.

In this condition, a characteristic sign is claw hand, which becomes more pronounced due to the involvement of both the ulnar and median nerves

- The extensor digitorum is unopposed by the lumbricals and interossei and
  extends the metacarpophalangeal joints

- the flexor digitorum superficialis and profundus are unopposed by the lumbricals and interossei and flex the middle and terminal phalanges, respectively

- In addition, loss of sensation will occur along **C8 affects** the medial side of the arm. (the doctor said that the C8 affects the medial side of the forearm 🤔) / **T1 affects the lower part of the arm. / (Note that the intercostobrachial nerve (T2) supplies the axilla)**

- If the eighth cervical nerve is also damaged, the extent of anesthesia will be greater and will involve the medial side of the forearm, hand, and medial two fingers.

- Lower lesions of the brachial plexus can also be produced by the presence of a cervical rib or malignant metastases from the lungs in the lower deep cervical lymph nodes.

In the case of a cervical rib, an additional rib arises from C7 in addition to the rib that arises from T1. This extra rib can apply pressure on the lower trunk of the brachial plexus, potentially causing symptoms similar to Klumpke's palsy.

If the cervical rib causes significant problems, such as compression of nerves, surgery is often performed to remove it and alleviate the pressure.

Long Thoracic Nerve

- The long thoracic nerve, which arises from C5, 6, and 7 and supplies the serratus anterior muscle, (**its function to pull the medial border of scapula to the ribs, however in the case of nerve injury, the scapula sticks out, even you can slide your fingers between the medial border of of scapula and ribs)**

- can be injured by blows to or pressure on the posterior triangle of the neck or during the surgical procedure of radical mastectomy **which involves the removal of breast tissue and sometimes lymph nodes from the axilla,**

- Paralysis of the serratus anterior results in th inability to rotate the scapula during the movement of abduction of the arm above a right angle

- **the second test :** The patient therefore experiences difficulty in raising the arm above the head

- The vertebral/ **medial** border and inferior angle of the scapula will no longer be kept closely applied to the chest wall and will protrude posteriorly, a condition known as winged scapula **(it either affects one side or two sides [Two wings]**

First test
When a patient is asked to push against a wall, scapular winging occurs

If the patient is asked to raise their arm and place their hand behind their head at a 90-degree angle, the deltoid and supraspinatus muscles are responsible for initiating the movement. However, for movements above 90 degrees, the serratus anterior plays a crucial role in the scapular rotation, which is necessary for completing the movement.

Axillary Nerve

- The axillary nerve which arises from the posterior cord of the brachial plexus (C5 and 6), can be injured by the pressure of a badly adjusted crutch pressing upward into the armpit

- The passage of the axillary nerve backward from the axilla through the quadrangular space makes it particularly vulnerable here to downward displacement of the humeral head in shoulder dislocations or fractures of the surgical neck of the humerus.

- Paralysis of the deltoid and teres minor muscles results

So instead of abduction, we will have adduction ←

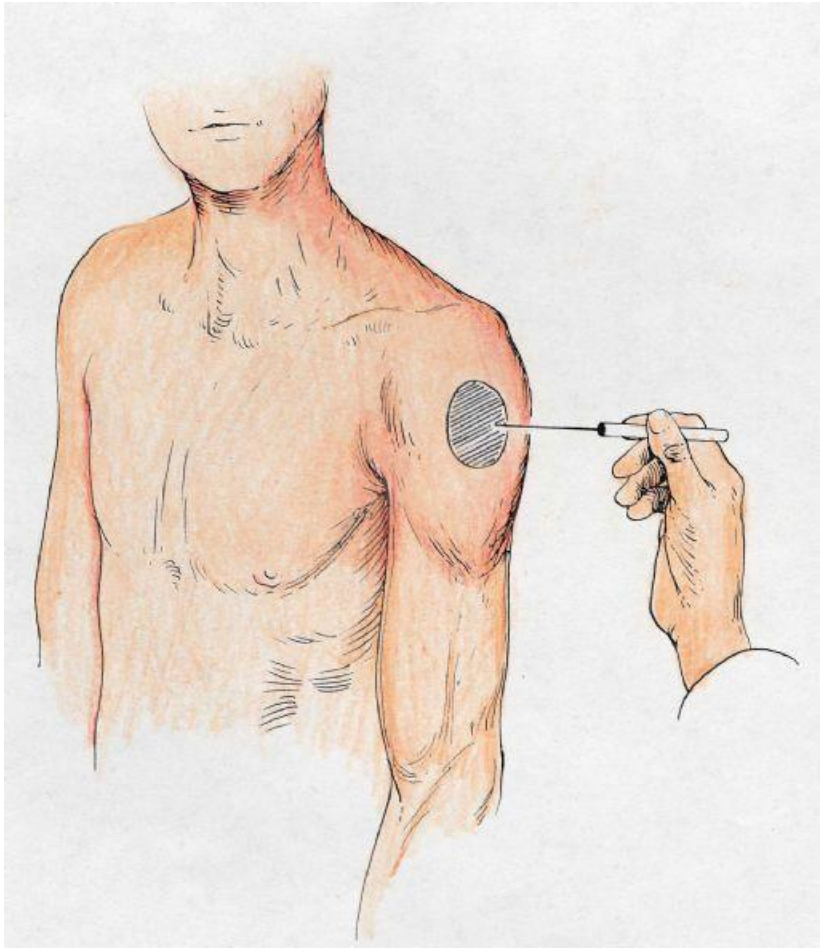
The deltoid muscle is involved in lateral and medial rotation of the arm, but other muscles also contribute to these movements. The middle fibers of the deltoid are primarily responsible for abduction of the arm, which is the most important function.

- The cutaneous branches of the axillary nerve, including the upper lateral cutaneous nerve of the arm, are functionless, and consequently there is a loss of skin sensation over the lower half of the deltoid muscle

- The paralyzed deltoid wastes rapidly, and the underlying greater tuberosity can be readily palpated

- Because the supraspinatus is the only other abductor of the shoulder, this movement is much impaired.

- Paralysis of the teres minor is not recognizable clinically.



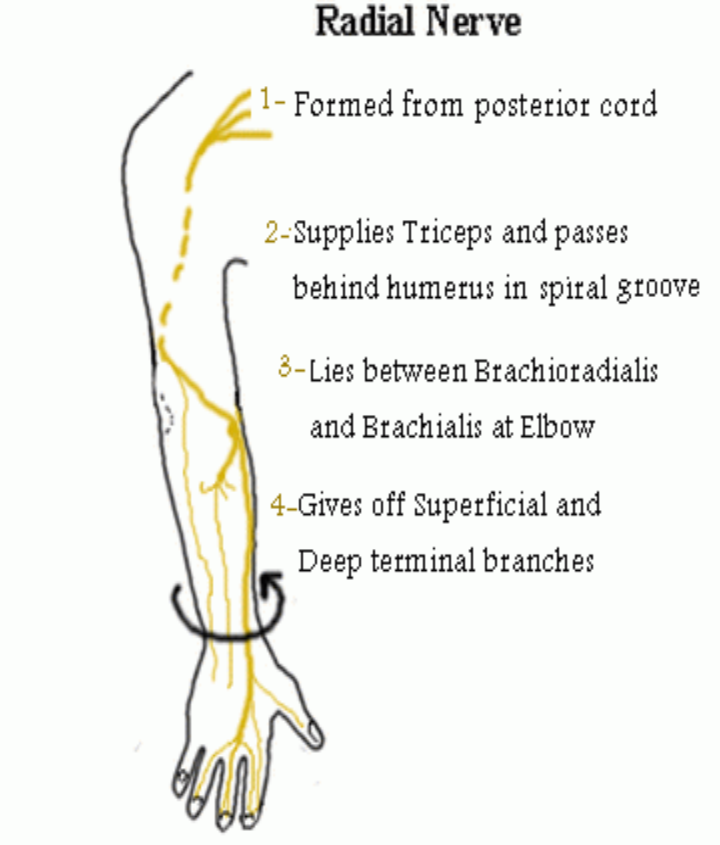
Radial Nerve

- The radial nerve which arises from the posterior cord of the brachial plexus, characteristically gives off its branches some distance proximal to the part to be innervated.

- In the axilla it gives off three branches:
- the posterior cutaneous nerve of the arm, which supplies the skin on the back of the arm down to the elbow
- the nerve to the long head of the triceps
- and the nerve to the medial head of the triceps **(which are responsible for arm extension)**

***Note*: The doctor focused on all the details in the upcoming slides. To make things easier for you, first go to the tables on slides 24 &25 read it, memorize it. Then, go through slides 12 -23.**

- In the spiral groove of the humerus it gives off four branches:
- the lower lateral cutaneous nerve of the arm, which supplies the lateral surface of the arm down to the elbow
- the posterior cutaneous nerve of the forearm, which supplies the skin down the middle of the back of the forearm as far as the wrist
- the nerve to the lateral head of the triceps
- and the nerve to the medial head of the triceps and the anconeus.



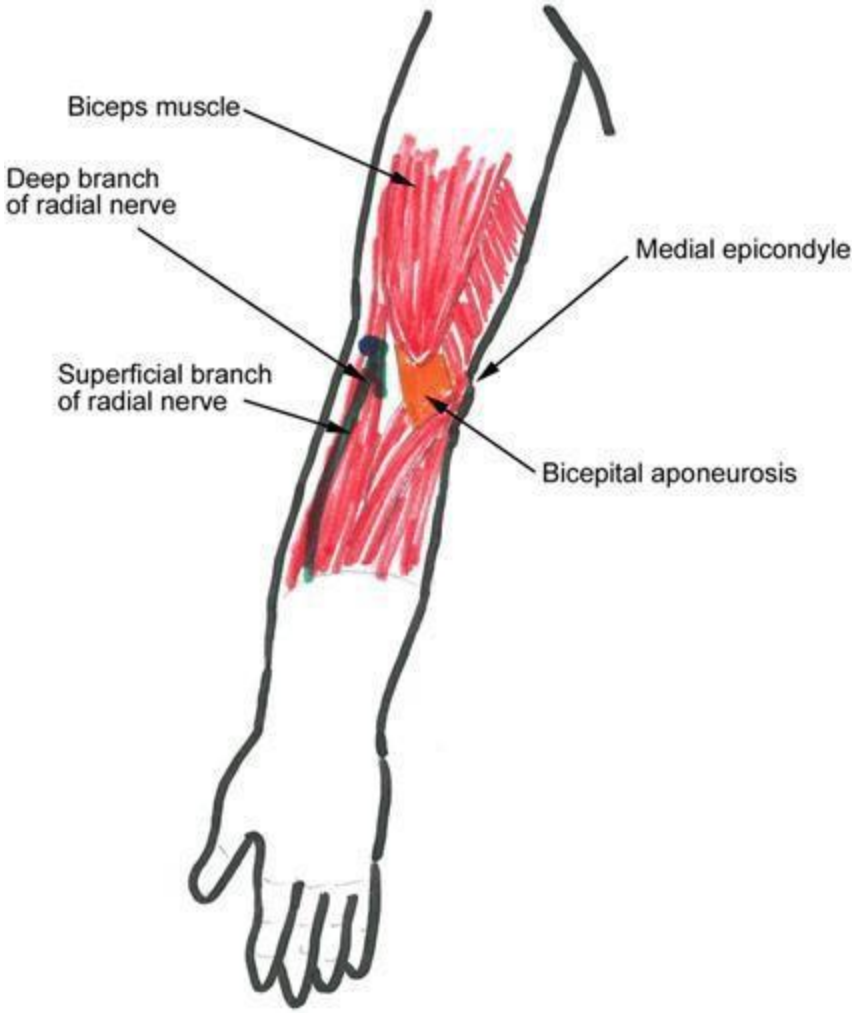
- In the anterior compartment of the arm above the lateral epicondyle it gives off three branches:
- the nerve to a small part of the brachialis
- the nerve to the brachioradialis
- and the nerve to the extensor carpi radialis longus

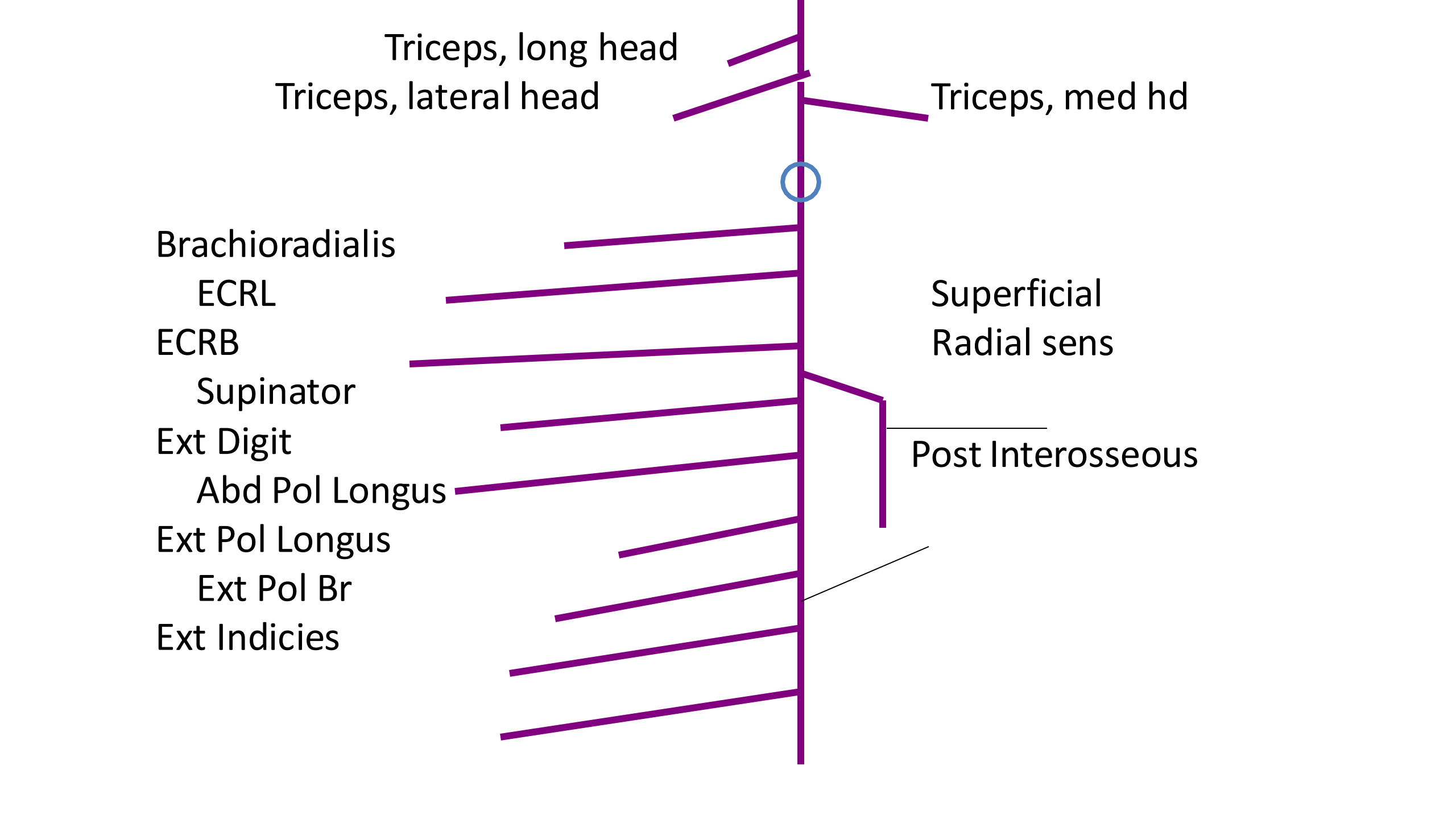
- In the cubital fossa it gives off the deep branch of the radial nerve and continues as the superficial radial nerve

- The deep branch supplies the extensor carpi radialis brevis and the supinator in the cubital fossa and all the extensor muscles in the posterior compartment of the forearm.

- The superficial radial nerve is sensory and supplies the skin over the lateral part of the dorsum of the hand and the dorsal surface of the lateral three and a half fingers proximal to the nail beds

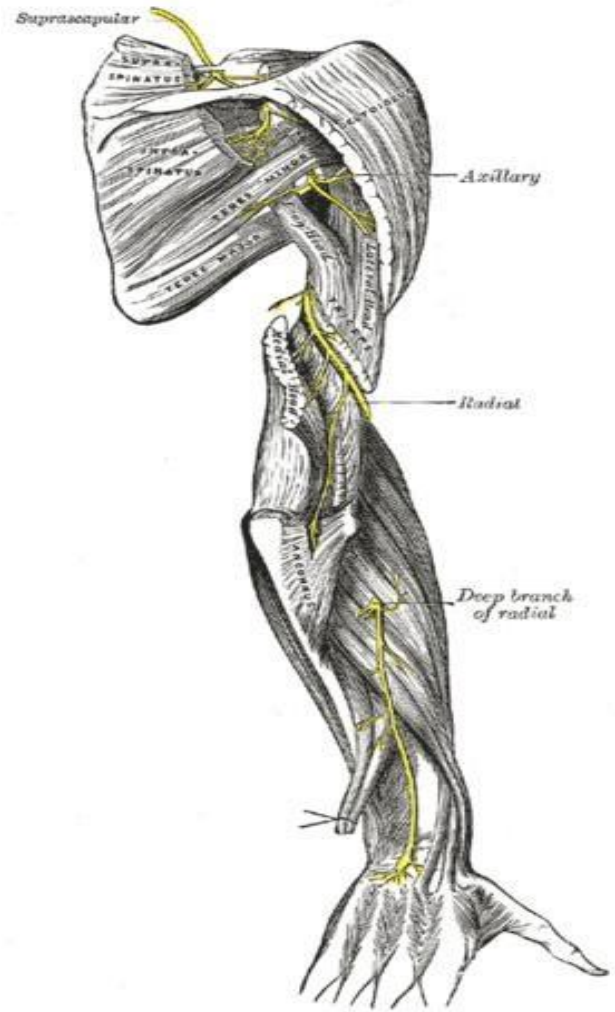
- The radial nerve is commonly damaged in the axilla and in the spiral groove




Triceps, long head
Triceps, lateral head
Triceps, med hd
Brachioradialis
ECRL
ECRB
Supinator
Ext Digit
Abd Pol Longus
Ext Pol Longus
Ext Pol Br
Ext Indicies
Superficial
Radial sens
Post Interosseous

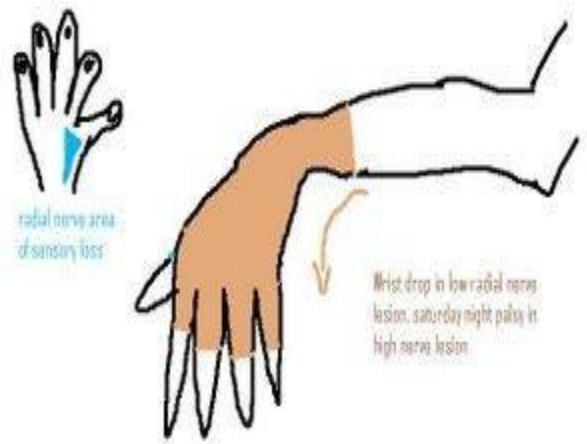
Injuries to the Radial Nerve in the Axilla

- In the axilla the nerve can be injured by the pressure of the upper end of a badly fitting crutch pressing up into the armpit or by a drunkard falling asleep with one arm over the back of a chair
- It can also be badly damaged in the axilla by fractures and dislocations of the proximal end of the humerus.
- When the humerus is displaced downward in dislocations of the shoulder, the radial nerve, which is wrapped around the back of the shaft of the bone, is pulled downward, stretching the nerve in the axilla excessively.
- The clinical findings in injury to the radial nerve in the axilla are as follows



Motor

- The triceps, the anconeus, and the long extensors of the wrist are paralyzed
- The patient is unable to extend the elbow joint, the wrist joint, and the fingers. Wristdrop / **Hand drop**, or flexion of the wrist
- occurs as a result of the action of the unopposed flexor muscles of the wrist
- Wristdrop is very disabling because one is unable to flex the fingers strongly for the purpose of firmly gripping an object with the wrist fully flexed
- If the wrist and proximal phalanges are passively extended by holding them in position with the opposite hand, the middle and distal phalanges of the fingers can be extended by the action of the lumbricals and interossei, which are inserted into the extensor expansions.
- The brachioradialis and supinator muscles are also paralyzed, but supination is still performed well by the biceps brachii



Radial nerve lesion - Wrist drop, make sure by checking that there is no ulnar or median nerve palsy...which you can see if you get them to rest their hands on a pillow - and one will see that they are unable to straighten their fingers, because the flexor action of the lubricals supplied by the ulnar and median nerve, are unopposed by the failed radial nerve supplied muscles.

How do you know if it is a high or low lesion?

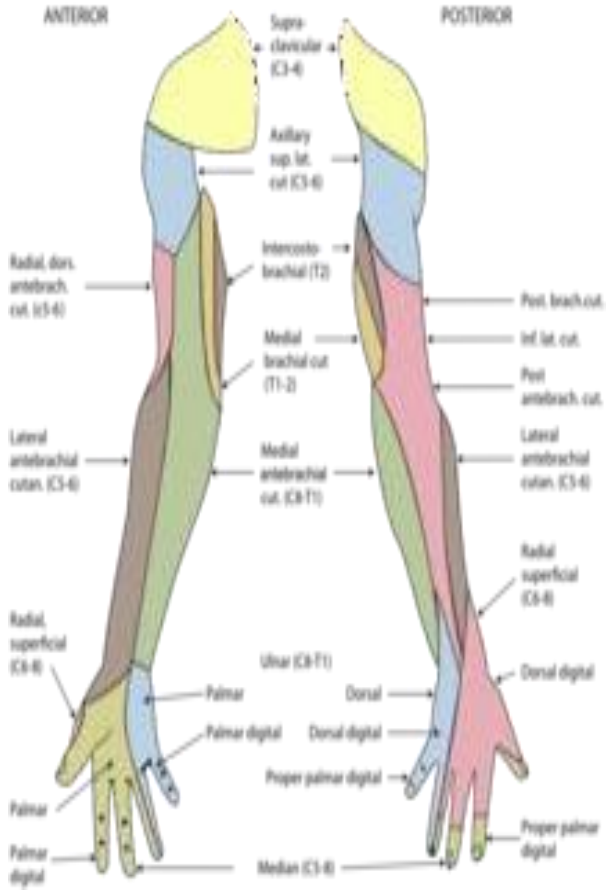
Test for the triceps reflex (C7) which if present will indicate that the lesion is below the spinal groove of the humerus, and if it is absent implies the lesions is higher up in the axilla - what we then call a saturday night palsy -- the reflex arc is conserved in a lower lesion.

One can confirm that it is radial by ensuring there are no ulnar or medial nerve lesions, or just to rule them out- quick tests of thumb up to ceiling, stop me from pushing it down (Abd.Pol.Brevis for median) and the push on first finger, stop me from pushing that in - (first dorsal interosseus for ulnar nerve).

If you were delineating between median or ulnar,
the thumb would be weak = median,
the first finger would be weak = radial

Sensory

- A small loss of skin sensation occurs down the posterior surface of the lower part of the arm and down a narrow strip on the back of the forearm.
- A variable area of sensory loss is present on the lateral part of the dorsum of the hand and on the dorsal surface of the roots of the lateral three and a half fingers
- The area of total anesthesia is relatively small because of the overlap of sensory innervation by adjacent nerves.
- Trophic changes are slight.



Injuries to the Radial Nerve in the Spiral Groove

It's similar to the axilla injury except some heads of triceps are innervated.

- In the spiral groove of the humerus, the radial nerve can be injured at the time of fracture of the shaft of the humerus, or subsequently involved during the formation of the callus

- The pressure of the back of the arm on the edge of the operating table in an unconscious patient has also been known to injure the nerve at this site.

- The prolonged application of a tourniquet to the arm in a person with a slender triceps muscle is often followed by temporary radial palsy.

- The injury to the radial nerve occurs most commonly in the distal part of the groove, beyond the origin of the nerves to the triceps and the anconeus and beyond the origin of the cutaneous nerves.

- The clinical findings in injury to the radial nerve in the spiral groove are as follows
- Motor: The patient is unable to extend the wrist and the fingers, and wristdrop occurs
- Sensory: A variable small area of anesthesia is present over the dorsal surface of the hand and the dorsal surface of the roots of the lateral three and a half fingers.
- Trophic changes: These are very slight or absent

Injuries to the Deep Branch of the Radial Nerve

Finger drop

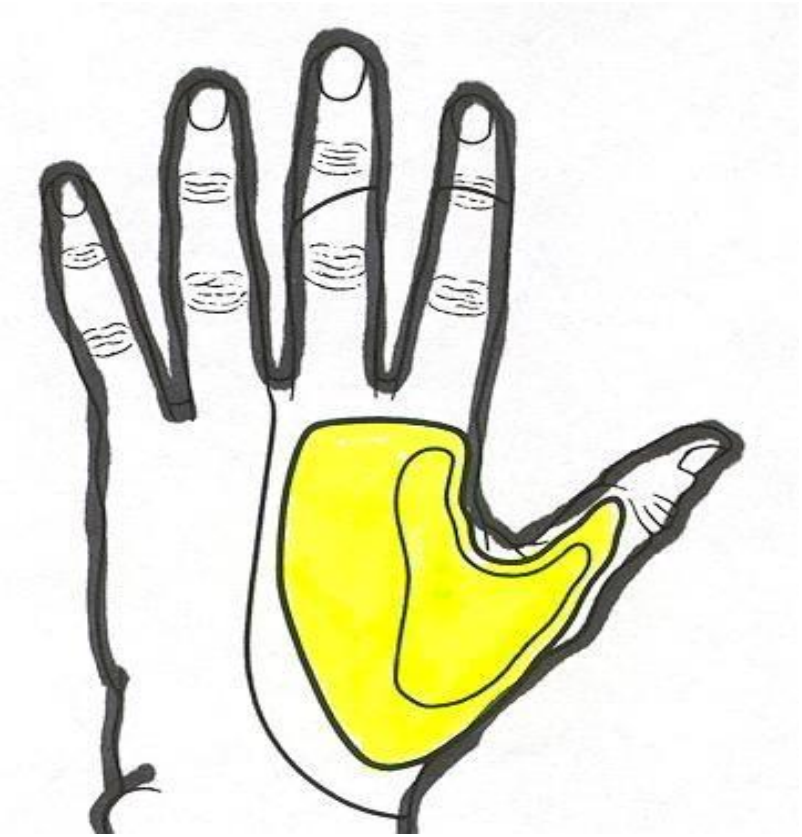
- The deep branch of the radial nerve is a motor nerve to the extensor muscles in the posterior compartment of the forearm.
- It can be damaged in fractures of the proximal end of the radius or during dislocation of the radial head.
- The nerve supply to the supinator and the extensor carpi radialis longus will be undamaged
- and because the latter muscle is powerful, it will keep the wrist joint extended, and wristdrop will not occur.
- No sensory loss occurs because this is a motor nerve

Injuries to the Superficial Radial Nerve

- Division of the superficial radial nerve, which is sensory, as in a stab wound

- results in a variable small area of anesthesia over the dorsum of the hand and the dorsal surface of the roots of the lateral three and a half fingers

Lateral two third of dorsum in addition to the proximal phalanx



Region	Branches	Functions
Axilla	1. Posterior cutaneous nerve of the arm 2. Nerve to long head of triceps 3. Nerve to medial head of triceps	- Triceps (partial innervation) - Cutaneous sensation to posterior arm
Spiral Groove of Humerus	1. Lower lateral cutaneous nerve of the arm 2. Posterior cutaneous nerve of the forearm 3. Nerve to lateral head of triceps 4. Nerve to medial head of triceps and anconeus	- Further triceps innervation - Sensory innervation to posterior forearm
Lateral Anterior Compartment of Arm	1. Nerve to small part of brachialis 2. Nerve to brachioradialis 3. Nerve to extensor carpi radialis longus (ECRL)	- Brachioradialis: weak elbow flexion - ECRL: wrist extension & radial deviation
Cubital Fossa	1. Deep branch (motor) 2. Superficial branch (sensory)	- Deep branch: Innervates posterior forearm extensors - Superficial branch: Sensory to dorsum of hand

Region	Motor Effects	Sensory Effects
Axilla	- Paralysis of all radial nerve muscles (triceps, brachioradialis, supinator, and extensors of wrist & fingers) - Wrist drop (loss of wrist and finger extension)	- Loss of sensation over the posterior arm, posterior forearm, and dorsal surface of lateral three and a half fingers
Spiral Groove of Humerus	- Wrist drop (loss of wrist and finger extension) - Triceps partially affected but still functional	- Small area of anesthesia over the dorsal surface of the hand - Dorsal surface of the lateral three and a half fingers
Lateral Anterior Compartment of Arm	- Similar to spinal groove injury, but triceps is spared	- Sensory loss similar to spinal groove injury
Cubital Fossa	- Weakness in extensor muscles of the posterior forearm - No wrist drop (because extensor carpi radialis is intact)	- Small area of anesthesia over the dorsum of the hand and the dorsal surface of the lateral three and a half fingers

Musculocutaneous Nerve

- The musculocutaneous nerve is rarely injured because of its protected position beneath the biceps brachii muscle

- it is injured high up in the arm, the biceps and coracobrachialis are paralyzed and the brachialis muscle is weakened (the latter muscle is also supplied by the radial nerve).

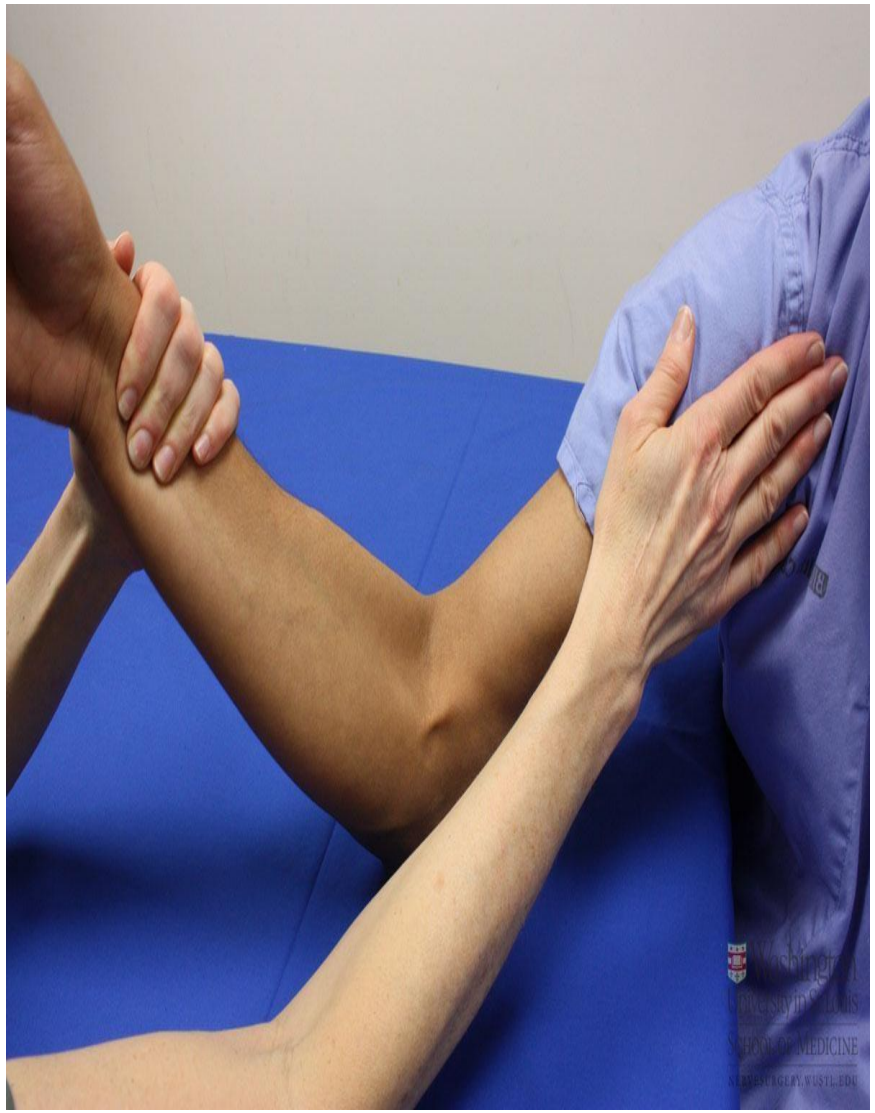
- Flexion of the forearm at the elbow joint is then produced by the remainder of the brachialis muscle and the flexors of the forearm.

- When the forearm is in the prone position, the extensor carpi radialis longus and the brachioradialis muscles assist in flexion of the forearm

In case of injury, we will have extension instead of flexion. Also we mentioned that biceps is important in screwing but since there is an injury, we will have pronation

وَمَا كَانَ رَبُّكَ نَسِيًّا ﴿٦٤﴾

- There is also sensory loss along the lateral side of the forearm.
- Wounds or cuts of the forearm can sever the lateral cutaneous nerve of the forearm, a continuation of the musculocutaneous nerve beyond the cubital fossa
- resulting in sensory loss along the lateral side of the forearm.



Median Nerve

- The median nerve which arises from the medial and lateral cords of the brachial plexus, gives off no cutaneous or motor branches in the axilla or in the arm.
- In the proximal third of the front of the forearm, by unnamed branches or by its anterior interosseous branch, it supplies all the muscles of the front of the forearm except the flexor carpi ulnaris and the medial half of the flexor digitorum profundus, which are supplied by the ulnar nerve
- In the distal third of the forearm, it gives rise to a palmar cutaneous branch, which crosses in front of the flexor retinaculum and supplies the skin on the lateral half of the palm
- In the palm the median nerve supplies the muscles of the thenar eminence and the first two lumbricals and gives sensory innervation to the skin of the palmar aspect of the lateral three and a half fingers, including the nail beds on the dorsum.

- From a clinical standpoint, the median nerve is injured occasionally in the elbow region in supracondylar fractures of the humerus.
- It is most commonly injured by stab wounds or broken glass just proximal to the flexor retinaculum
- here it lies in the interval between the tendons of the flexor carpi radialis and flexor digitorum superficialis, overlapped by the palmaris longus.

The median nerve can be injured at the supratrochlear region of humerus because it passes through the cubital fossa. In humeral injuries at the cubital fossa, the median nerve is at risk. Another common site of injury is at the wrist joint, specifically in the space behind the palmaris longus tendon. During surgery, mistakes can occur where the median nerve is accidentally injured instead of cutting the palmaris longus tendon.

Injuries to the Median Nerve at the Elbow

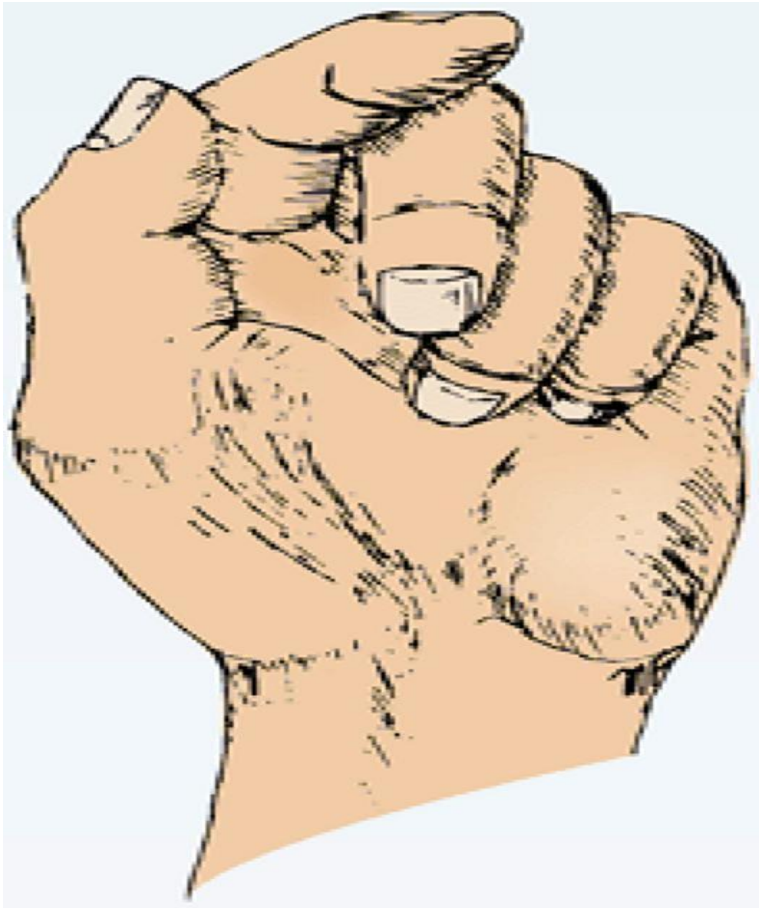
- Motor
- The pronator muscles of the forearm and the long flexor muscles of the wrist and fingers, with the exception of the flexor carpi ulnaris and the medial half of the flexor digitorum profundus, will be paralyzed

- As a result, the forearm is kept in the supine position; wrist flexion is weak and is accompanied by adduction.

- The latter deviation is caused by the paralysis of the flexor carpi radialis and the strength of the flexor carpi ulnaris and the medial half of the flexor digitorum profundus.

- No flexion is possible at the interphalangeal joints of the index and middle fingers, although weak flexion of the metacarpophalangeal joints of these fingers is attempted by the interossei

- When the patient tries to make a fist, the index and to a lesser extent the middle fingers tend to remain straight, whereas the ring and little fingers flex
- The latter two fingers are, however, weakened by the loss of the flexor digitorum superficialis.
- Flexion of the terminal phalanx of the thumb is lost because of paralysis of the flexor pollicis longus
- The muscles of the thenar eminence are paralyzed and wasted so that the eminence is flattened.
- The thumb is laterally rotated and adducted. The hand looks flattened and apelike



Ape hand

- **Which is extension of wrist joint, adduction of thumb, and ulnar deviation. This is due to paralysis of forearm muscles (it supplies all forearm muscles except one and a half muscle that is supplied by ulnar nerve. It also supplies sensation lateral two thirds of palm, in addition to 3 and half finger (palmar and dorsal)**

Sensory

- Skin sensation is lost on the lateral half or less of the palm of the hand and the palmar aspect of the lateral three and a half fingers
- Sensory loss also occurs on the skin of the distal part of the dorsal surfaces of the lateral three and a half fingers
- The area of total anesthesia is considerably less because of the overlap of adjacent nerves.

Vasomotor Changes

- The skin areas involved in sensory loss are warmer and drier than normal because of the arteriolar dilatation and absence of sweating resulting from loss of sympathetic control.

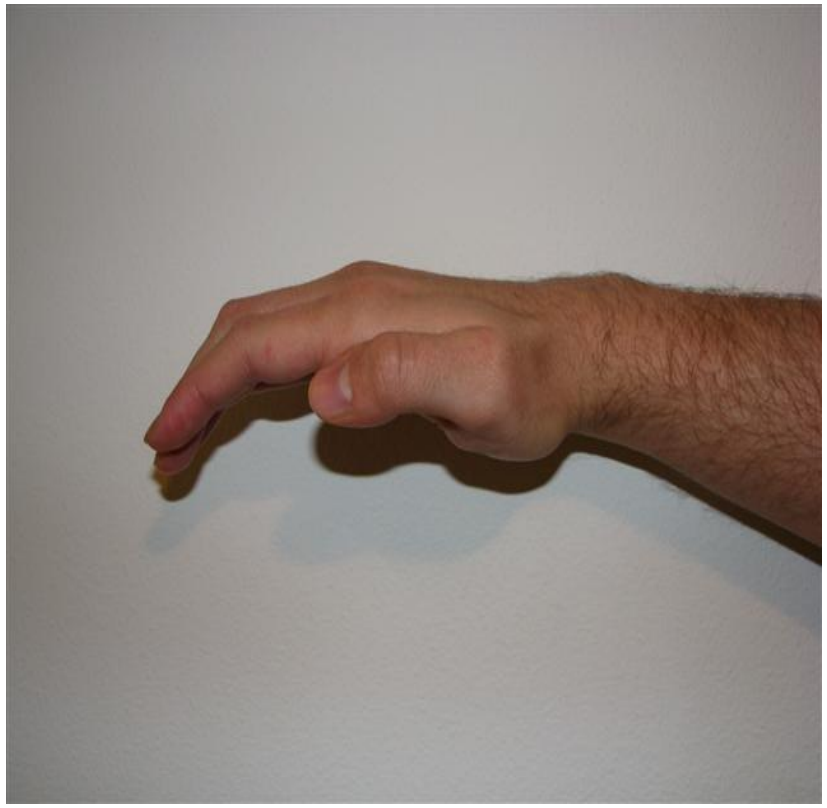
- Trophic Changes **In the skin of the distribution of the nerves**
- In long-standing cases, changes are found in the hand and fingers
- The skin is dry and scaly, the nails crack easily, and atrophy of the pulp of the fingers is present.

!!!!!!Note: The doctor went through the next slides really fast, so he didn't really explain them in detail due to time constraints . I'm a bit worried because we don't know if they'll be on the exam or not! So just to be safe, it might be a good idea to review them on your own

Injuries to the Median Nerve at the Wrist

- Motor:
- The muscles of the thenar eminence are paralyzed and wasted so that the eminence becomes flattened. The thumb is laterally rotated and adducted
- The hand looks flattened and apelike.
- Opposition movement of the thumb is impossible
- The first two lumbricals are paralyzed, which can be recognized clinically when the patient is asked to make a fist slowly, and the index and middle fingers tend to lag behind the ring and little fingers.
- Sensory, vasomotor, and trophic changes: These changes are identical to those found in the elbow lesions.
- Perhaps the most serious disability of all in median nerve injuries is the loss of the ability to oppose the thumb to the other fingers and the loss of sensation over the lateral fingers. The delicate pincerlike action of the hand is no longer possible.

Adduction of thumb



Carpal Tunnel Syndrome

- The carpal tunnel, formed by the concave anterior surface of the carpal bones and closed by the flexor retinaculum, is tightly packed with the long flexor tendons of the fingers, with their surrounding synovial sheaths, and the median nerve
- Clinically, the syndrome consists of a burning pain or pins and needles along the distribution of the median nerve to the lateral three and a half fingers and weakness of the thenar muscles
- It is produced by compression of the median nerve within the tunnel
- The exact cause of the compression is difficult to determine, but thickening of the synovial sheaths of the flexor tendons or arthritic changes in the carpal bones are thought to be responsible in many cases
- no paresthesia occurs over the thenar eminence because this area of skin is supplied by the palmar cutaneous branch of the median nerve, which passes superficially to the flexor retinaculum.
- The condition is dramatically relieved by decompressing the tunnel by making a longitudinal incision through the flexor retinaculum.

Carpal tunnel syndrome differs from a median nerve injury. In carpal tunnel syndrome, the palmar branch of the median nerve, which supplies sensation to the lateral two-thirds of the palm, is not affected because it does not pass through the carpal tunnel. As a result, sensation in this area remains intact.

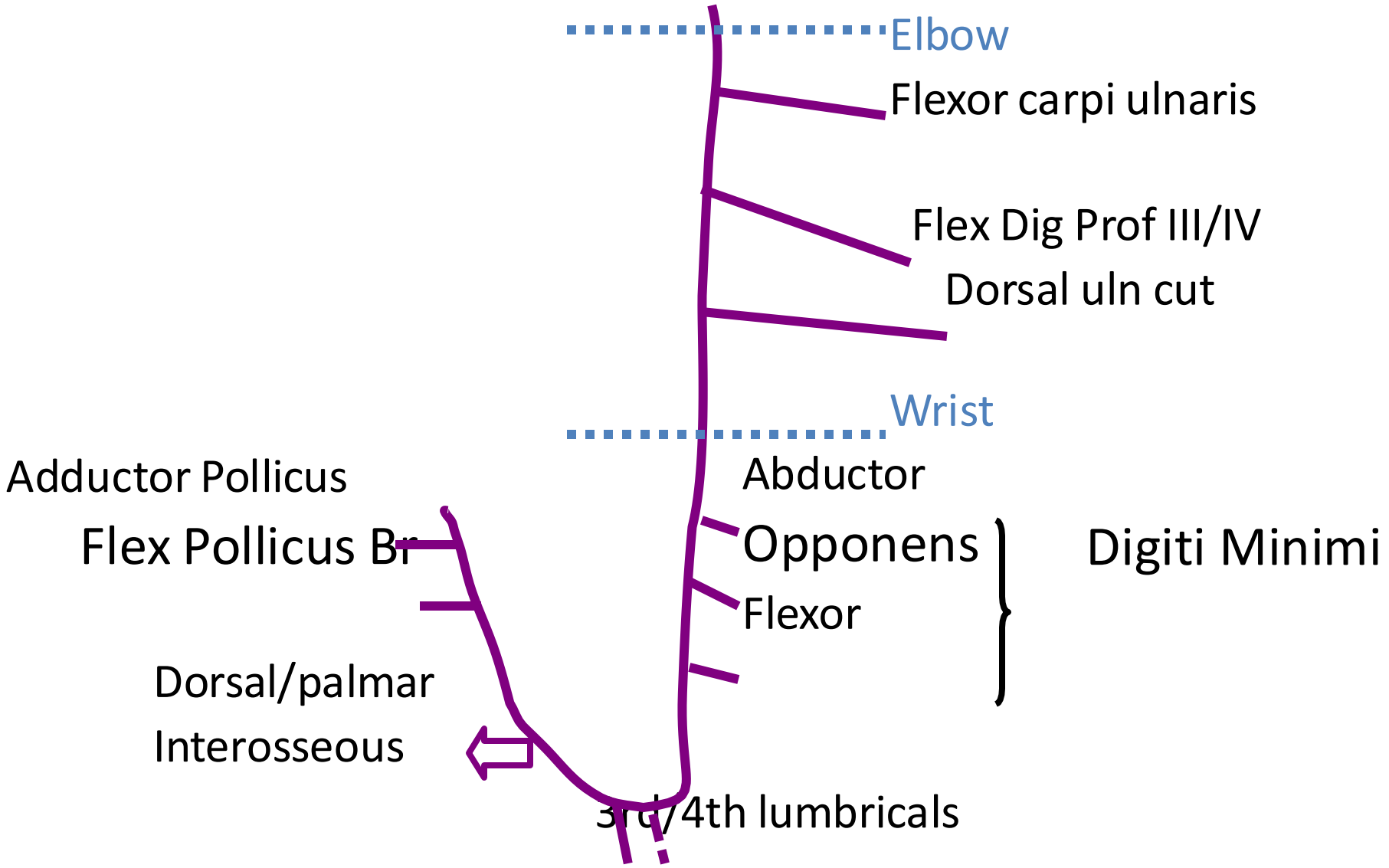
Ulnar Nerve

It supplies 14 muscles in the hand and 1.5 muscles in the forearm supplying little and ring finger

- The ulnar nerve which arises from the medial cord of the brachial plexus (C8 and T1), gives off no cutaneous or motor branches in the axilla or in the arm
- As it enters the forearm from behind the medial epicondyle, it supplies the flexor carpi ulnaris and the medial half of the flexor digitorum profundus
- In the distal third of the forearm, it gives off its palmar and posterior cutaneous branches.
- The palmar cutaneous branch supplies the skin over the hypothenar eminence; the posterior branch supplies the skin over the medial third of the dorsum of the hand and the medial one and a half fingers
- Not uncommonly, the posterior branch supplies two and a half instead of one and a half fingers
- It does not supply the skin over the distal part of the dorsum of these fingers.

- Having entered the palm by passing in front of the flexor retinaculum, the superficial branch of the ulnar nerve supplies the skin of the palmar surface of the medial one and a half fingers
- including their nail beds; it also supplies the palmaris brevis muscle
- The deep branch supplies all the small muscles of the hand except the muscles of the thenar eminence and the first two lumbricals, which are supplied by the median nerve
- The ulnar nerve is most commonly injured at the elbow, where it lies behind the medial epicondyle,
  and at the wrist, where it lies with the ulnar artery in front of the flexor retinaculum
- The injuries at the elbow are usually associated with fractures of the medial epicondyle.
- The superficial position of the nerve at the wrist makes it vulnerable to damage from cuts and stab wounds.

Ulnar nerve


Elbow
Flexor carpi ulnaris
Flex Dig Prof III/IV
Dorsal uln cut
Wrist
Adductor Pollicus
Flex Pollicus Br
Abductor
Opponens
Flexor
Digiti Minimi
Dorsal/palmar
Interosseous
3rd/4th lumbricals

Injuries to the Ulnar Nerve at the Elbow

✓ **At the medial epicondyle injury**

- Motor
- The flexor carpi ulnaris and the medial half of the flexor digitorum profundus muscles are paralyzed
- The paralysis of the flexor carpi ulnaris can be observed by asking the patient to make a tightly clenched fist
- Normally, the synergistic action of the flexor carpi ulnaris tendon can be observed as it passes to the pisiform bone
- the tightening of the tendon will be absent if the muscle is paralyzed
- The profundus tendons to the ring and little fingers will be functionless, and the terminal phalanges of these fingers are therefore not capable of being markedly flexed
- Flexion of the wrist joint will result in abduction, owing to paralysis of the flexor carpi ulnaris
- The medial border of the front of the forearm will show flattening owing to the wasting of the underlying ulnaris and profundus muscles

- The small muscles of the hand will be paralyzed, except the muscles of the thenar eminence and the first two lumbricals, which are supplied by the median nerve.
- The patient is unable to adduct and abduct the fingers and consequently is unable to grip a piece of paper placed between the fingers
- the extensor digitorum can abduct the fingers to a small extent, but only when the metacarpophalangeal joints are hyperextended.
- It is impossible to adduct the thumb because the adductor pollicis muscle is paralyzed
- If the patient is asked to grip a piece of paper between the thumb and the index finger, he or she does so by strongly contracting the flexor pollicis longus and flexing the terminal phalanx (Froment's sign).

- The metacarpophalangeal joints become hyperextended because of the paralysis of the lumbrical and interosseous muscles, which normally flex these joints

- Because the first and second lumbricals are not paralyzed (they are supplied by the median nerve),

- the hyperextension of the metacarpophalangeal joints is most prominent in the fourth and fifth fingers

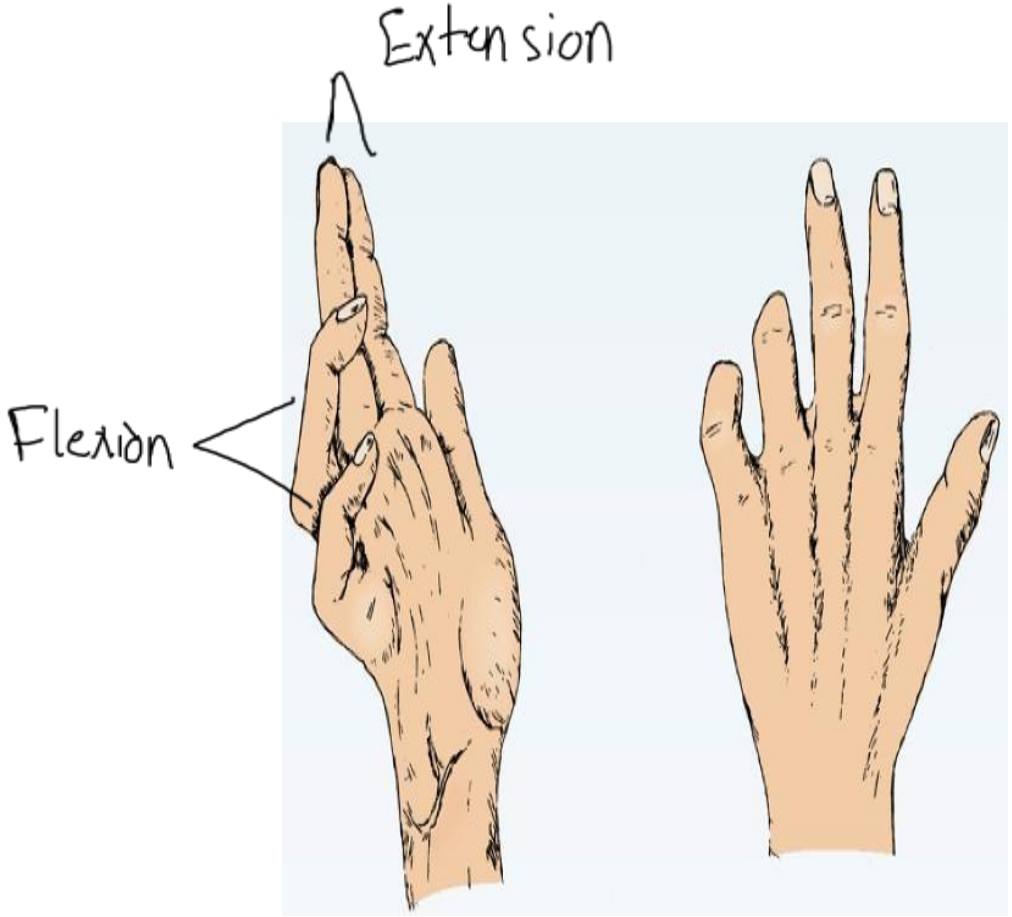
- The interphalangeal joints are flexed, owing again to the paralysis of the lumbrical and interosseous muscles, which normally extend these joints through the extensor expansion.

- The flexion deformity at the interphalangeal joints of the fourth and fifth fingers is obvious because the first and second lumbrical muscles of the index and middle fingers are not paralyzed

- In long-standing cases the hand assumes the characteristic claw deformity (main en griffe).

- Wasting of the paralyzed muscles results in flattening of the hypothenar eminence and loss of the convex curve to the medial border of the hand.

- Examination of the dorsum of the hand will show hollowing between the metacarpal bones caused by wasting of the dorsal interosseous muscles

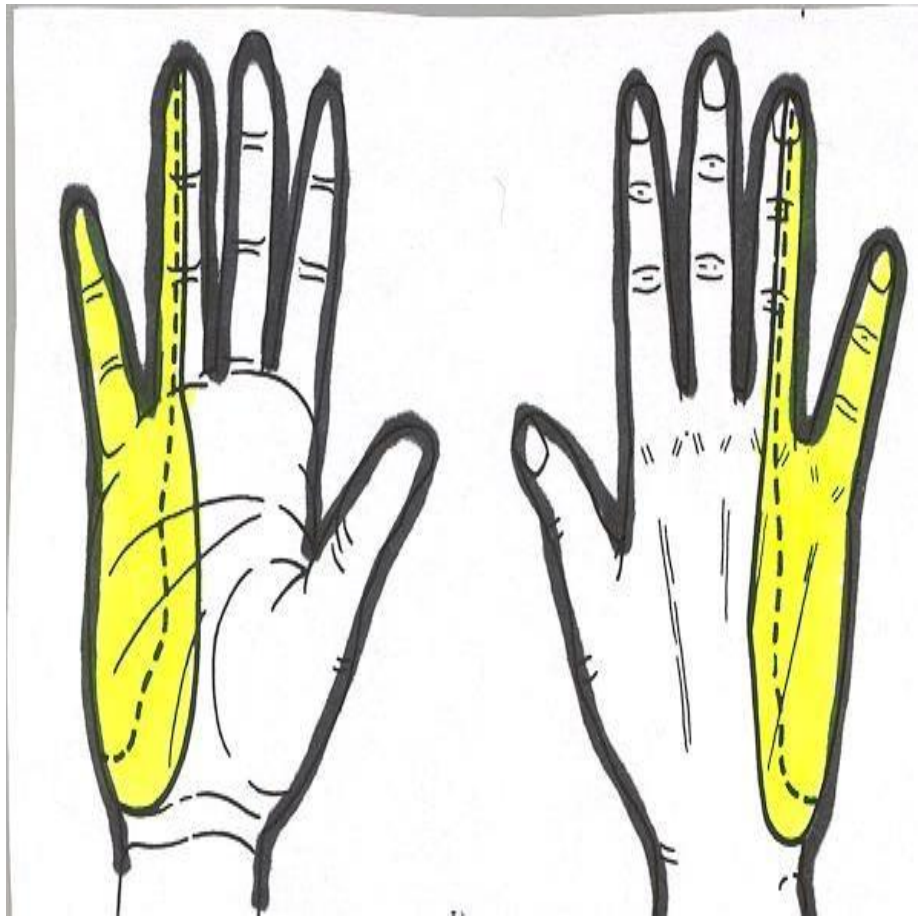


Claw hand
It is obvious in the fourth and fifth fingers more than the index and middle fingers because they are innervated by median nerve

وَإِلَيْهِ يُرْجَعُ ٱلْأَمْرُ كُلُّهُۥ فَٱعْبُدْهُ وَتَوَكَّلْ عَلَيْهِ

- Sensory
- Loss of skin sensation will be observed over the anterior and posterior surfaces of the medial third of the hand and the medial one and a half fingers.

- Vasomotor Changes
- The skin areas involved in sensory loss are warmer and drier than normal because of the arteriolar dilatation and absence of sweating resulting from loss of sympathetic control.



Palmar→ 1 and a ½ finger

Dorsal→ 1 and a ½ finger

Injuries to the Ulnar Nerve at the Wrist

- Motor:
- The small muscles of the hand will be paralyzed and show wasting, except for the muscles of the thenar eminence and the first two lumbricals

- The clawhand is much more obvious in wrist lesions because the flexor digitorum profundus muscle is not paralyzed, and marked flexion of the terminal phalanges occurs.

- Sensory:
- The main ulnar nerve and its palmar cutaneous branch are usually severed

- the posterior cutaneous branch, which arises from the ulnar nerve trunk about 2.5 in. (6.25 cm) above the pisiform bone, is usually unaffected

- The sensory loss will therefore be confined to the palmar surface of the medial third of the hand and the medial one and a half fingers and to the dorsal aspects of the middle and distal phalanges of the same fingers.

- Vasomotor and trophic changes:
- These are the same as those described for injuries at the elbow.
- It is important to remember that with ulnar nerve injuries, the higher the lesion, the less obvious the clawing deformity of the hand

Suicide

- Unlike median nerve injuries, lesions of the ulnar nerve leave a relatively efficient hand

- The sensation over the lateral part of the hand is intact, and the pincerlike action of the thumb and index finger is reasonably good

- although there is some weakness owing to loss of the adductor pollicis.

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1	Slide 2 Slide 31	Abduction	You can test yourself on the previous lecture! Adduction
V1 → V2			

رسالة من الفريق العلمي:

Click here, it’s extremely important!

يأت بها الله وإن بعد المنى وتقطعت الأسباب ، يأت بها الله وإن دنا اليأس وتوارت الآمال ، يأت بها الله غيثاً ورحمة وإن دنا الجدب وعزت النضرة ، يأت بها الله فجرا وإشراقاً و إن غاب النور واستبدت الحلكة ، يأت بها الله فرجاً من بعد كرب ويُسرًا من بعد عسر و سرورًا من بعد حزن .

“You Don’t grow when you’re comfortable”