Revision:

- The function of extensor digitorum:
  It extends the medial 4 fingers and the wrist.
- The 4 tendons of the extensor digitorum flatten over the proximal phalanges of the medial 4 fingers to form extensor expansion (extensor hood) in some books.
- The extensor expansion divides into 3 divisions:
  - One is central
  - Two are laterals.
- Extensor expansion receives:
  - Interosseous muscle on each side (palmar interossei and dorsal interossei)
  - Lumbrical (worm-like) muscle on the lateral side.
- The function of extensor expansion when these small muscles attached to it:
  1- Flexion of metacarpophalangeal (MCP) joints.
  2- Extension of interphalangeal joints
Main function: writing position

Arteries:
Brachial artery divides at opposite neck of radius into two branches:
1- Ulnar artery (larger)
2- Radial artery (smaller)

- They both reach the wrist.

Ulnar artery (larger):
- It passes above flexor retinaculum and divides into 2 branches:
  1- Superficial branch (larger)
  2- Deep branch (smaller)
- Both of them will go to the hand.
  From medial to lateral pisiform (insertion of flexor carpi ulnaris) >>> ulnar nerve >>> ulnar artery

Radial artery (smaller):
- It is located on the floor of snuffbox.
- In the snuffbox it divides into:
  1- Small superficial branch.
  2- Large deep branch.
**Palmar arches:**
Palm is supplied by a connection between vessels called (anastomosis)
1- superficial palmar arch.
2- deep palmar arch.

**Superficial Palmer Arch:**
- It is contributed from:
  1- (mainly) superficial branch of ulnar artery (direct continuation of it).
  2- smaller superficial branch of radial artery.
- It is located at the distal level of the hyper extended thumb.
- It gives palmar branches over the metacarpals.
  Each one of these branches passes between 2 fingers, where it divides to give:
  * one branch for the lateral side.
  * One branch for the medial side.
  So, each finger supplied by 2 palmar branches.

**Deep Arch:**
- It is union of radial and ulnar arteries.
- Mainly from deep branch of radial artery.
- Located at the proximal level of hyper extended thumb.

**Clinical Application:**
If there is a bleeding in a finger, you have to cut the bleeding holding your finger laterally and medially (don't hold it dorsal and palmar).
Because the dorsal and palmar sides of finger have only tendons and cutaneous nerves.
To do surgery in a finger, we put anesthetic medially and laterally (not dorsal and palmar) because the nerves accompanied with arteries.

**Nerves:**
1) **Median Nerve:**
- It is originated from medial cord and lateral cord of brachial plexus.
- It passes medially to radial artery.
- It supplies nothing in the upper arm.
- It has relations to the brachial artery in the upper arm (LAM):
  1- Lateral: in the upper part.
  2- Anterior: in the middle part.
  3- Medial: in the lower part.
- Then it passes within cubital fossa.
- It passes anterior to the medial epicondyle of the humerus.
- It passes between the 2 heads of pronator teres muscle.
• Then it passes deep to the flexor digitorum superficialis and above the flexor digitorum profundus (sandwich of nerves).
• Then it continues to reach the flexor retinaculum, there, it is located deep to Palmaris longus and lateral to flexor digitorum superficialis and profundus.
• It passes bellow the bridge (flexor retinaculum), then it continues to reach the hand.

**Branches:**
1- anterior interosseous nerve.
2- palmar branch.

**Anterior interosseous nerve:**
• It took its name because it passes anterior to the interosseous membrane.
• It originates within pronator teres muscle.
• It disappears behind pronator quadrates. (It goes from pronator teres to pronator quadratus).
• It supplies the deep muscles (deep layer of anterior compartment of the forearm).
• It is accompanied with anterior interosseous artery
• Both anterior interosseous artery and anterior interosseous nerve passes behind pronator quadratus.

**Remember:**
One of the ulnar artery's divisions is common interosseous artery which gives the anterior interosseous artery.

**Palmar branch:**
• It passes above the flexor retinaculum.

**Notes:**
- Palmar divides into:
  1- medial third.
  2- lateral two thirds
- Fingers divide into:
  1- medial one and half (ring + little) >>> innervated by ulnar nerve.
  2- lateral three and half.
• It supplies the skin of the lateral two third of the palm and lateral three and half fingers.
What does medial nerve supply?
• The elbow joint.
• The wrist joint.
• The inferior radioulnaris joint.

Remember:
There are two joints between radius and ulna:
1. Superior radioulnar joint.
2. Inferior radioulnar joint.

2) Ulnar nerve:
• It is originated from medial cord of brachial plexus.
• In the upper part of the upper arm it is anterior.
• In the midshaft: it pierces the medial intermuscular septum.
• In the lower part: it is in the posterior compartment.
• It then passes posterior to the medial epicondyle of the humerus.
• It does not enter the elbow.
• It passes between 2 heads of the flexor carpi ulnaris and supply it.
• Then it passes behind flexor digitorum superficialis.

Keep in your mind:
There are 2 nerves deep to flexor digitorum superficialis
(ulnar nerve / median nerve)
• It then descends on the medial side, reaching pronator quadratus where it gives dorsal branch to the dorsal skin of hand.

- It is lateral to the flexor carpi ulnaris and medial to ulnar artery.
- It passes above the flexor retinaculum reaching the pisiform which is medial to it.
- Before reaching the flexor retinaculum, it gives 2 branches:
  1- palmar branch to the palmar skin of the hand.
  2- dorsal branch to the dorsal skin of the hand.

- After entering the palm it divides into (both are muscular (supplies muscles)):
  1- superficial branch.
  2- deep branch.
All small muscles of the hand are innervated (supplied) by ulnar nerve except five (5) that supplied by median nerve.

What does it supply?
- Elbow joint.
- Skin of hand.
- One and half muscle (flexor carpiulnaris / flexor digitorum profundus)
- Medial one and half fingers.

Keep in your mind:
The structures of the wrist joint from medial to lateral:
Pisiform (inserts on it flexor carpiulnaris) → ulnar nerve → ulnar artery → Palmaris longus (median nerve is located behind it) → brachioradialis (brachial artery is medial to it) → Radial artery → flexor carpiradialis.

3) Radial nerve:
- It is originated from posterior cord of brachial plexus so it is extensor.
- It passes medially to the surgical neck of humerus.
- Then it passes posterior.
- Then between 2 heads (medial and lateral) of triceps.
- It is accompanied with profundus brachii artery.
- Then it pierces the lateral intermuscular septum to be into the anterior compartment of the upper arm.
- It passes anterior to the lateral epicondyle of humerus (becomes within the cubital fossa).

Keep in your mind:
The structures located in the cubital fossa from medial to lateral:
Median nerve → brachial artery and its branches → tendon of biceps → radial nerve.

- When it reaches the lateral epicondyle, it divides into 2 branches:
  1- Deep branch.
  2- Superficial branch.

Note: Before it divides we call it "stem"
- At the distal part of the anterior compartment of the upper arm it passes between brachioradialis and extensor carpiradialis longus.

Radial nerve it supplies structure before reaching it.
**What does the stem supply?**
- Elbow joint.
- Brachioradialis.
- Extensor carpiradialis longus.

**Superficial branch:**
- It is anterior to lateral epicondyle under brachioradialis.
- It goes back below the tendon of brachioradialis.
- At the distal end it passes deep to the tendon of brachioradialis to give the skin of the palm.
- It will be on the dorsal aspect of the hand and on the dorsal aspect of the wrist (there is extensor retinaculum >>> extra information) then it will go to the skin of the hand.

**What does superficial branch of radial nerve supply?**
- Skin of lateral 2/3 of posterior part of hand.
- Skin of proximal phalanges of the lateral 3 and 1/2 fingers.
- Lateral third of the dorsal aspect.
- Posterior of the wrist.

**Deep branch (posterior interosseous nerve):**

***we call it posterior interosseous nerve when it goes out from the supinator***
- It winds around the neck of the radius.
- Then it goes through supinator (which is like meet rolls around proximal quarter of radius) passing between its layers.
- It continues from the anterior compartment to the posterior compartment.
- Then it passes posterior to the interosseous membrane and accompany with posterior interosseous artery branch from ulnar artery.

**What does deep branch of radial nerve supply?**
- All posterior compartment of the forearm except 2 muscles by the stem (brachioradialis / extensor carpiradialis longus)
- Wrist joint.

**It does not supply the skin of the hand**
### Clinical applications:

1. If there is a fracture in the radius → then posterior compartment muscles could be involved except brachioradialis and extensor carpiradialis longus.
2. If there is a fracture in the lateral epicondyle of humerus → then the stem could be injured.
3. If there is a fracture in midshaft of humerus →
4. If there is a fracture of medial epicondyle → then ulnar nerve (the most damaged) and median nerve could be injured.

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I'm sure it is not a perfect "cheat" :p ☻☻☻ But I really tried not to cheat

Thank you all

Love you all

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