**LAB 3**

**CASE REPORT:**

34 y/o male presented to his physician with paresthesia's in the left 4th and 5th digits 3-4 months prior with no history of trauma. He reported left forearm numbness but denied neck pain. He noted weakness in his left hand and dropping objects. He is now disabled but had worked as a bricklayer.

On examination atrophy was noted in the hypothenar eminence and first dorsal interossei. He had significant decrease in intrinsic strength with clawing of the ring and little fingers. Sensation was absent in the ulnar distribution both palmar and dorsal aspects of the fourth and 5th digits and hand.

**THE ANTERIOR ARM**

The arm extends from the shoulder to the elbow. The anterior side is also referred to as the flexor side and has three muscles. The posterior side is also referred to as the extensor side and has the triceps muscle.

1. Humerus – the humerus is the bone of the arm. Close to the head of the humerus are its greater and lesser tubercles separated from one another by the intertubercular (bicipital) groove in which lies the tendon of the long head of the biceps brachii. The **anatomical neck** separates the head and the tubercles. Distal to the tubercles is the surgical neck, the area where the bone narrows to become the diaphysis (body). This region is called the surgical neck because it is the site of most frequent fracture of the proximal end of the humerus. Anterolaterally lies a roughness called the **deltoid tuberosity**. Observe the shallow radial (spiral) groove for the radial nerve that extends inferolaterally on the posterior aspect of the body. The trochlea fits into the trochlear notch of the ulna. Just proximal to the trochlea are the coronoid fossa and the olecranon fossa for accommodating corresponding parts of the ulna. Adjoining the lateral part of the trochlea is the capitulum. Note the medial and lateral epicondyles; medial associated with the trochlea and lateral with the capitulum. From the epicondyles run the medial and lateral supracondylar ridges.

Because they are in contact with the humerus (surgical neck – axillary nerve; radial groove – radial nerve; and medial epicondyle – ulnar nerve), the axillary, radial, and ulnar nerves may be injured in fractures of the humerus.

1. The brachial fascia and intermuscular septa – the arm is enclosed in a sheath of deep fascia known as the brachial fascia. Two fascial intermuscular septa extend from the sheath of brachial fascia, and are attached to the medial and lateral supracondylar ridges of the humerus. The medial and lateral intermuscular septa divide the arm into anterior and posterior fascial compartments, each containing compartment) contains three muscles (biceps, brachialis, and coracobrachialis), their nerves and vessels. The posterior fascial compartment (extensor compartment) contains one muscle (triceps), its nerve and vessels.
2. Muscles of the Anterior Arm
   1. **Biceps Brachii Muscle** – as the name indicates it has two heads of origin.
      1. Origin – short head – tip of the coracoid process of the scapula. It originates as a conjoined tendon with the origin of the coracobrachialis muscle. Origin – long head – supraglenoid tubercle of the scapula. The tendon of the long head crosses the head of the humerus within the capsule of the glenohumeral joint and descends in the intertubercular (bicipital) groove of the humerus.
      2. Insertion – radial tuberosity on the radius bone. The biceps brachii also inserts via the **bicipital aponeurosis**, a triangular, membranous band which runs from the biceps tendon across the cubital fossa into the deep fascia over the flexor muscles in the medial side of the forearm. The bicipital aponeurosis affords protection for the brachial artery and median nerve in the cubital fossa, as well as lessening the pressure of the biceps tendon on the radial tuberosity during pronation and supination of the forearm.
      3. Innervation – Musculocutaneous nerve
      4. Actions – flexion and supination of the forearm. The biceps is a powerful supinator (accounting for about 60% of supination strength).
      5. Blood Supply – muscular branches from the brachial artery.
   2. **Brachialis Muscle** – lies deep to the biceps muscle on the anterior side of the humerus. The brachialis is the **main flexor of the forearm** at the elbow.
      1. Origin – distal ½ of the anterior surface of the humerus
      2. Insertion – ulnar tuberosity of the ulna.
      3. Innervation – Musculocutaneous nerve
      4. Action – flexes the forearm at the elbow joint – Does NOT play a role in pronation or supination.
      5. Blood Supply – muscular branches from the brachial artery
   3. **Coracobrachialis Muscle** – important mainly as a landmark; the musculocutaneous nerve pierces it.
      1. Origin – tip of the coracoid process of the scapula. It originates as a conjoined tendon with the origin of the short-head of the biceps brachii muscle.
      2. Insertion – middle 1/3 of the medial surface of the body of the humerus.
      3. Innervation – musculocutaneous nerve
      4. Actions – flexes the arm at the shoulder and aids in adduction of the arm.
      5. Blood Supply – muscular branches of the brachial artery.
3. **Cubital Fossa –** triangular space on the anterior surface of the elbow. The cubital fossa is bounded superiorly by an imaginary line connecting the medial and lateral epicondyles of the humerus, medially by the pronator teres muscle, and laterally by the brachioradialis muscle. The floor of the fossa is formed by the brachialis and supinator muscles. The roof is formed by the deep fascia that is strengthened by the bicipital aponeurosis. The cubital fossa contains the biceps tendon, brachial artery, and its terminal branches (radial and ulnar arteries), and parts of the median and radial nerves.
4. Arteries of the arm (**Brachial Artery)** – the brachial artery provides the main arterial supply to the arm. The brachial artery begins at the inferior border of the teres major muscle as a continuation of the axillary artery. It runs inferiorly and laterally on the medial side of the biceps brachii muscle and then turns anterior at the cubital fossa, where it ends opposite the neck of the radius. Under cover of the bicipital aponeurosis, the brachial artery divides into the **radial** and **ulnar arteries**. As the artery is passing inferiorly it accompanies the median nerve, which crosses anterior to the artery in the middle of the arm. In the cubital fossa the bicipital aponeurosis covers and protects the median nerve and brachial artery and separates them from the **median cubital vein**. The named branches of the brachial artery are: **profunda (deep) brachii artery**, **nutrient humeral artery**, and the **superior** and **inferior ulnar collateral arteries**.
   1. Profunda Brachii Artery – the largest branch of the brachial artery with the most proximal origin. It accompanies the radial nerve in its posterior course in the radial (spiral) groove, then divides into radial and middle collateral branches, which help to form the anastomoses of the elbow.
   2. Nutrient Humeral Artery – arises at about the middle of the arm and enters the nutrient canal on the anteromedial surface of the humerus. We will not see this artery in the lab.
   3. Superior Ulnar Collateral Artery – arises near the middle of the arm and accompanies the ulnar nerve posterior to the medial epicondyle of the humerus. It anastomoses with the posterior ulnar recurrent branch of the ulnar artery.
   4. Inferior Ulnar Collateral Artery – arises from the brachial artery about 5 cm proximal to the elbow joint, passes inferomedially and anterior to the medial epicondyle. It anastomoses with the anterior ulnar recurrent branch of the ulnar artery.

* The arterial anastomoses of the elbow region provide a functionally and surgically important collateral circulation. The brachial artery may be clamped or ligated distal to the inferior ulnar collateral artery without producing tissue damage. **Arterial blood pressure** is taken using a sphygmometer consisting of an inflatable cuff and a mercury manometer. The cuff is place around the arm and inflated with air until it compresses the brachial artery against the humerus and eventually occludes it. A stethoscope is placed over the artery in the cubital fossa, just medial to the biceps tendon. As the pressure is reduces, blood begins to spurt through the artery. The first audible spurt indicates the **systolic blood pressure**.
* Brachial artery injury, for example during a fracture of the elbow, can cause necrosis of muscle due to ischemia. Necrotic muscle is replaced by fibrous scar tissue which causes the involved muscles to become permanently shortened. This produces a flexion deformity of the wirst and fingers called **Volkmann’s ischemic contracture**.

1. Veins of the arm – the two deep brachial veins accompany the brachial artery. In the extremities, for every artery there are two deep veins. The two vein system is referred to as **venae comitantes**. The two brachial veins begin at the elbow by union of the venae comitantes of the radial and ulnar arteries, and end at the axillary vein.

* The two main superficial veins of the arm are the **cephalic** and **basilic** veins. The **cephalic vein** is located along the anterolateral surface of the biceps brachii muscle. Superiorly the cephalic vein passes in the deltopectoral groove, piercing the fascia of the deltopectoral triangle and emptying into the axillary vein. The **basilic vein** is located on the medial side of the inferior part of the arm. Near the junction of the middle and inferior thirds of the arm, the basilica vein passes deep to the brachial fascia and empties into the brachial vein. The **median cubital vein** is the communication between the basilic and cephalic veins in the cubital fossa; it lies anterior to the bicipital aponeurosis. This is the vein typically used to draw blood.

1. Nerves of the arm – the four nerves of the arm (median, ulnar, musculocutaneous, and radial) are terminal branches of the brachial plexus.
   1. **Median Nerve** – this major nerve is formed in the axilla by the union of a lateral root from the lateral cord and a medial root from the medial cord of the brachial plexus. The nerve runs on the lateral side of the brachial artery until it reaches the middle of the arm, where it crosses to its medial side and contacts the brachialis muscle. The median nerve descends into the cubital fossa. This nerve has no branches in the axilla or in the arm except when the musculocutaneous nerve doesn’t exist. In that case the median nerve will send muscular branches to the muscles of the anterior arm.

* Injury to the median nerve proximal to the elbow results in loss of sensation on the lateral portion of the palm, the palmar surface of the thumb, flexion of the wrist and fingers, and important movements of the thumb are lost or severely affected.
  1. **Ulnar Nerve** – larger of the two terminal branches of the medial cord of the brachial plexus. It passes anterior to the triceps on the medial side of the brachial artery; at the middle of the arm it pierces the medial intermuscular septum and descends between it and the medial head of the triceps muscle. The ulnar nerve enters the forearm by passing between the medial epicondyle of the humerus and the olecranon process of the ulna. Posterior to the medial epicondyle of the humerus, the ulnar nerve is superficial and easily palpable (hitting the ulnar nerve here has resulted in the term “funny bone” – ha-ha). The ulnar nerve has no branches in the arm, but supplies one and one-half muscles in the forearm.
* Injury to the ulnar nerve in the arm results in impaired flexion and adduction of the wrist and impaired movement of the thumb, ring, and little fingers. Characteristic clinical sign of ulnar nerve damage is inability to adduct or abduct the medial four digits.
  1. **Musculocutaneous Nerve** – this nerve is one of the terminal branches of the lateral cord of the brachial plexus. It pierces the coracobrachialis muscle and then continues between the biceps brachii and brachialis muscles, supplying all three of them. At the lateral border of the distal biceps tendon it becomes the lateral antebrachial cutaneous nerve (AKA lateral cutaneous nerve of the forearm).
* Injury to the musculocutaneous nerve in the axilla results in flexion of the elbow joint and supination of the forearm being greatly weakened.
  1. **Radial Nerve** – this nerve is one of the terminal branches of the posterior cord of the brachial plexus. It enters the arm posterior to the brachial artery, medial to the humerus, and anterior to the long head of the triceps brachii muscle. the radial nerve passes inferolaterally with the profunda (deep) brachii artery around the body of the humerus in the radial (spiral) groove. At the lateral border of the numerus, the nerve pierces the lateral intermuscular septum and continues between the brachialis and brachioradialis muscles to the lateral epicondyle of the humerus, where it divides into the deep and superficial branches. After the deep branch of the radial nerve emerges from the supinator muscle, it is called the **posterior (dorsal) interosseous nerve**. The deep branch of the radial nerve is entirely muscular and articular in its distribution, while the superficial branch supplies sensory fibers to the dorsum of the hand and fingers**.**
* Injury to the radial nerve proximal to the origin of the triceps results in paralysis of the triceps brachii, brachioradialis, supinator, and extensors of the wrist, thumb, and fingers, as well as loss of sensation to the skin supplied. Characteristic clinical sign of radial nerve injury is **wrist drop**, i.e., inability to extend or straighten the wrist.

**Question:** Based on what you have just learned, are you suspicious of any of these structures being involved with the above case report? If so, what structures and why?

**THE FLEXOR FOREARM**

1. The forearm extends from the elbow to the wrist and contains two bones, the **radius** and **ulna**, which are parallel in the anatomic position. In pronation the radius lies across the ulna. The radius is the moveable bone of the forearm while the ulna remains stationary.

* A very strong fibrous sheet called the **interosseous membrane** joins the radius and ulna.

1. **Bones of the forearm** – the ulna is more firmly connected to the arm bone or humerus, whereas the radius is broadened distally to be more fully in contact with wrist bones. (It may help to think of the radius and hand as a unit when considering muscle actions.) Also note that the head of the ulna is at its distal end, whereas the head of the radius is at its proximal end.
2. **Radius** – the proximal end of the radius has a disc-shaped **head**, a smooth **neck**, and a **tuberosity** distal to the neck. The **body** (shaft) of the radius increases in size from proximal to distal. The medial aspect of the body has a sharp **interosseous border** for attachment of the interosseous membrane. The distal end has a median **ulnar notch** into which the distal end of the ulna fits. Laterally, the distal end of the radius tapers into a **styloid process**.
3. **Ulna** – The ulna is the longer and medially located bone of the forearm. The proximal end of the bone has the **olecranon process**, **coronoid process** and the **trochlear notch** between them. At the distal end lies the **head**. The lateral side of the coronoid process has a small **radial notch** for the head of the radius. Inferior to the radial notch is the **supinator fossa**, bounded posteriorly by a **supinator crest**. The anterior surface of the coronoid process is rough and ends distally in the **tuberosity of the ulna** onto which the brachialis muscle inserts. The **body** of the ulna has a prominent lateral edge, the **interosseous border**, where the interosseous membrane attaches. The distal end of the ulna is composed of a **head** and a **styloid process**, which projects distally about 1 cm proximal to the styloid process of the radius (this is clinically important).
4. **Bones of the Wrist and Hand**
5. The **Carpus** – eight small bones of the wrist are called the carpal bones; arranged in proximal and distal rows, each with four bones.
   * Proximal Row (Lateral to Medial) consists of the **scaphoid, lunate, triquetrium, pisiform**.
   * Distal Row (Lateral to Medial) consists of the **trapezium, trapezoid, capitate,** and **hamate** (which has a prominent halmus or hook).
   * The carpus has and anterior concavity known as the carpal groove, which is converted into an osseofibrous carpal tunnel by the flexor retinaculum (attached to the scaphoid and trapezium bones laterally and to the pisiform and hook of the hamate medially). The carpal tunnel is completely filled with tendons and the median nerve. Compression of the median nerve in the carpal tunnel produces **carpal tunnel syndrome**.
   * The scaphoid and the trapezium lie in the floor of the **anatomical snuff box**. The scaphoid is the **most frequently fractured carpal bone** and one of the most frequently fractured bones in the body.
6. **Metacarpus** – there are five metacarpal bones in the hand extending from the carpus to the digits and numbered 1-5 starting from the lateral side.

* The **heads** of the metacarpals are the distal ends forming the knuckles of the hand. The proximal ends are the **base** and articulate with the carpal bones.

1. **Phalanges** – each phalanx consists of a body, a proximal base, and a distal head. The thumb (digit 1) has two phalanges, and each finger has three phalanges for a total of fourteen phalanges.
2. **Elbow Joint** – this is a hinge type of synovial joint formed by the distal end of the humerus with the proximal ends of the radius and ulna. The elbow is uniaxial and its movements consist of **flexion** and **extension**. The elbow joint consists of three different articulations:

* Humeroradial- articulation between the capitulum of the humerus and the head of the radius.
  + Allows flexion and extension. The humeroradial joint is considered a hinge joint.
  + Anatomically is a ball-and-socket joint.
  + The radial head butts up against the capitellum.
  + The capitellum acts as a buttress for lateral compression.
  + Absorbs lateral compression and other rotational forces during throwing or other rapid forearm movements
* Humeroulnar- articulation between the trochlea of the humerus and trochlear notch of the ulna.
  + allows flexion and extension of the elbow joint. It is considered a hinge joint.
  + The trochlear notch offers good structural stability.
  + The trochlea is asymmetrical in shape.
  + In the extended position, this asymmetry creates an angulation of the ulna laterally, resulting in a valgus position. This angulation is termed the **carrying angle**. 10-15° in males and 15-20° in females.
* Proximal radioulnar- articulation between the head of the radius and the radial notch of the ulna.
  + Pivot Joint that allows pronation and supination of the forearm.

1. **Ligamentous Stability of the Elbow**

* Joint Capsule – it has both fibrous and synovial components. The capsule is thicker anteriorly than posteriorly. This orientation allows stability in extension, varus, and valgus. The capsule surrounds all three joints, making it very extensive with several redundancies.
* Ulnar Collateral Ligament (UCL) (aka Medial Collateral Ligament)- Primary stabilizing ligament to valgus force around the elbow. Some portion of the ulnar collateral ligament is taut in all joint positions. Greater number of valgus stresses imposed on the medial aspect of the elbow. This ligament has three bands:
* Anterior Oblique Band- it runs from the medial epicondyle of the humerus to the coronoid process of the ulna. It is the main restraint to valgus motion in elbow extension. It also restrains pronation of the ulna on the humerus.
* Posterior Band- runs from the medial epicondyle of the humerus to the olecranon process of the ulna. It is the main restraint to valgus motion when the elbow is flexed >60°
* Transverse Band- runs from the coronoid process of the ulna to the olecranon process of the ulna. This band helps support the medial capsule.
* Lateral (Radial) Collateral Ligament- varus stresses are rare at the elbow joint. Therefore this ligament is not as significant to the support of the joint as the UCL. The majority of the support comes from the structure of the joint itself. The ligament arises from the lateral epicondyle and inserts into the annular ligament around the radial head. It also helps support the annular ring. Notice that this ligament connects bone to ligament, not bone to bone as most ligaments do.
* Annular (Ring) Ligament- holds the radius up against the ulnar into the elbow joint. Allows pronation and supination (rotation) to occur the radioulnar joint.

1. **Muscles of the Flexor Forearm** – the flexor pronator group arises by a common flexor tendon from the medial epicondyle. This is called the common flexor origin. The deeper flexors originate from the anterior aspects of the bodies of the ulna and radius.

* All flexors are located on the anterior surface of the wrist and most are held in place by the **flexor retinaculum**.
* The eight muscles of the anterior aspect of the forearm are flexors, and can be considered in three functional groups: muscles that rotate the radius on the ulna (pronator teres and pronator quadratus); muscles that flex the hand at the wrist joint (flexor carpi radialis, palmaris longus, flexor carpi ulnaris); muscles that flex the digits (flexor digitorum superficialis, flexor digitorum profundus, flexor pollicis, longus).
* The anterior forearm muscles can be divided into three layers: a **superficial layer** (pronator teres, flexor carpi radialis, palmaris longus, and flexor carpi ulnaris – this is the flexor pronator group that arises from a common tendon attached to the medial epicondyle of the humerus); an intermediate layer (flexor digitorum superficialis); and a deep layer (flexor digitrum profundus, flexor pollicis longus, pronator quadratus).

Superficial Group

* 1. Pronator Teres (has two heads of origin: Humeral Head & Ulnar Head)

1. Origin: Humeral Head- medial epicondyle of humerus Ulnar Head- coronoid process of the ulna
2. Insertion: Middle lateral surface of the radius
3. Innervation: Median Nerve
4. Action: Pronates and flexes forearm
   1. Flexor Carpi Radialis
5. Origin: medial epicondyle of the humerus
6. Insertion: base of the 2nd metacarpal. The tendon of the flexor carpi radialis can be used as a guide to the radial artery which lies just lateral to it.
7. Innervation: Median Nerve
8. Action: flexes the hand at the wrist and radial deviation of wrist
   1. Palmaris Longus (this muscle is absent in approximately 20% of the population.)
      * 1. Origin: medial epicondyle of the humerus
        2. Insertion: anterior flexor retinaculum and palmar aponeurosis
        3. Innervation: Median Nerve
        4. Action: flexes the hand at the wrist and tightens the palmar aponeurosis
   2. Flexor Carpi Ulnaris (has two heads of origin; Humeral Head & Ulnar Head)
9. Origin: Humeral Head- medial epicondyle of the humerus, Ulnar Head- medial margin of the olecranon and the posterior border of the ulna
10. Insertion: pisiform bone. Halmus (Hook) of the Hamate Bone, 5th Metacarpal. The tendon the the flexor carpi ulnaris is a good guide to the ulnar nerve and artery, which are on its lateral side.
11. Innervation: Ulnar Nerve
12. Action: Flexes hand at the wrist and ulnar deviation of the wrist

Intermediate Group

1. Flexor Digitorum Superficialis (has two heads of origin; HumeroUlnar Head & Radial)
   * + 1. Origin: HumeroUlnar Head- medial epicondyle of the humerus, ulnar collateral ligament, and coronoid process of the ulna; Radial Head- anterior surface of the radius just distal to the radial tuberosity
       2. Insertion: Four long tendons into the middle phalanx of each of the 4 most medial fingers (2 through 5).
       3. Innervation: Median Nerve (C7, C8, T1)
       4. Action: Finger flexion at the metacarpophalangeal joints and proximal interphalangeal joints, also aids in hand flexion at the wrist

Deep Group

1. Flexor Digitorum Profundus
2. Origin: proximal 3/4ths of the anterior and medial aspects of the ulna and the ulnar half of the interosseous membrane
3. Insertion: Four long tendons at the base of the distal phalanx’s of the 4 medial fingers
4. Innervation: Lateral Part from Anterior Interosseous Nerve form Median Nerve and Medial Part from Ulnar Nerve
5. Action: Finger flexion at the distal interphalangeal joints, also aids in hand flexion at the wrist
6. Flexor Pollicus Longus (has two heads of origin; Radial Head & Humeral Head)
7. Origin: Anterior surface of the radius; it also arises from the interosseous membrane.
8. Insertion: Base of the distal phalanx of the thumb
9. Innervation: Anterior Interosseous Nerve from Median Nerve
10. Action: Flexion of the distal phalanx of the thumb and aids in thumb flexion
11. Pronator Quadratus
    * + 1. Origin: distal 1/4th of the anterior surface of the ulna
        2. Insertion: distal ¼th of the anterior surface of the radius
        3. Innervation: Anterior Interosseous Nerve from Median Nerve
        4. Action: pronates the hand
12. **Anterior Nerves of the Forearm** – the nerves of the forearm are the median, ulnar, and radial. Although the radial nerve appears in the cubital region, it soon enters the posterior fascial compartment. Aside from the cutaneous branches, the only nerves of the anterior forearm are the median and ulnar.
13. **Median Nerve** – enters the forearm with the brachial artery; lies on the surface of the brachialis muscle; passes between the two heads of the pronator teres muscle. Near the wrist the median nerve becomes superficial by passing between the tendons of the flexor digitorum superficialis and flexor carpi radialis muscles.
    1. Branches of the median nerve (no branches in the arm):
       1. articular branches to the elbow joint
       2. muscular branches to pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis.
       3. Anterior Interosseous Branch – arises in the distal part of the cubital fossa; passes inferiorly on the interosseous membrane with the anterior interosseous branch of the ulnar artery. The anterior interosseous nerve runs between the flexor digitorum profundus and the flexor pollicis longus to reach the pronator quadratus, supplying flexor pollicis longus, pronator quadratus, and the lateral half of the flexor digitorum profundus muscle. It passes deep to the pronator quadratus and ends by supplying the wrist joint.
       4. Palmar Cutaneous Branch – arises just proximal to the flexor retinaculum and becomes cutaneous between the tendons of the palmaris longus and the flexor carpi radialis muscle; supplies the skin of the lateral palm.

Clinical Note: Because this branch arises proximal to the median nerve entering the carpal tunnel there are no sensory deficits to the lateral palm in carpal tunnel syndrome.

Any lesion that significantly reduces the size of the carpal tunnel may cause compression of the median nerve indicated by paresthesia (tingling), anesthesia (loss of tactile sensation), or hypoesthesia (diminished sensation). In cases of severe compression of the median nerve, there may be atrophy of the thenar muscles. To relieve symptoms of the carpal tunnel syndrome, transection of the flexor retinaculum (transverse carpal ligament) may be necessary.

* + 1. **Ulnar Nerve** – after passing posterior to the medial epicondyle of the humerus, the ulnar nerve enters the forearm by passing between the two heads of the flexor carpi ulnaris muscle. It descends deep to this muscle on the flexor digitorum profundus where it accompanies the ulnar artery near the middle of the forearm. It becomes relatively superficial in the distal part of the forearm. Near the pisiform bone it pierces the deep fascia and passes superficial to the flexor retinaculum.
       - 1. **Branches of the Ulnar Nerve**

articular branches to the elbow joint

muscular branches to supply flexor carpi ulnaris and the medial half of the flexor digitorum profundus.

Superficial branch (palmar cutaneous branch) supplies the skin of the medial palm and medial 1 ½ digits.

Dorsal cutaneous branch supplies the posterior surface of the medial part of the hand and medial 1 ½ digits.

**Ulnar Nerve Injury** may result in extensive motor and sensory loss to the hand. Patients may have difficulty in making a fist due to inability to flex their fourth and fifth digits at the distal interphalangeal joints. The appearance of the hand is then known as **claw hand**.

1. **Arteries of the Anterior Forearm** – the brachial artery ends opposite the neck of the radius in the inferior part of the cubital fossa by dividing into its terminal branches, the radial and ulnar arteries, which are the two main arteries of the forearm.
   * + 1. **Radial Artery** – the radial artery begins in the cubital fossa, just medial to the biceps tendon at the level of the neck of the radius. The course of the radial artery in the forearm can be represented by a line connecting the midpoint of the cubital fossa to a point just medial to the tip of the styloid process of the radius. The radial artery crosses the floor of the anatomical snuff box. The radial artery ends by completing the **deep palmar arch** in conjunction with the ulnar artery.
          1. Branches of the radial artery in the forearm

**radial recurrent artery** – arises from the lateral side of the radial artery and ascends between the brachioradialis and brachialis muscles, supplies these muscles and anastomoses with the **radial collateral artery** to participate in the anastomosis around the elbow.

Muscular branches – supply muscles on the lateral side of the forearm.

Superficial Palmar Arch – radial artery gives a **superficial palmar branch** that anastomoses with the terminal part of the ulnar artery. The superficial palmar branch supplies the thenar muscles.

Deep Palmar Arch – runs across the wrist deep to the flexor tendons to anastomoses with the deep branch of the ulnar artery.

* + - 1. **Ulnar Artery –** makes a gentle curve as it passes from the cubital fossato the medial side of the forearm. The ulnar artery passes with the median nerve between the ulnar and radial heads of the flexor digitorum superficialis. In the distal 2/3rds of the forearm, the ulnar artery lies lateral to the ulnar nerve. At the wrist the ulnar artery and nerve lie lateral to the tendon of the flexor carpi ulnaris.
         1. Branches of the ulnar artery in the forearm

Anterior ulnar recurrent artery – arises just inferior to the elbow and runs between the brachialis and pronator teres supplying these muscles, anastomoses with the inferior ulnar collateral artery, participating in the anastomoses of the elbow.

Posterior ulnar recurrent artery – arises distal to the anterior ulnar recurrent, passes posterior to the medial epicondyle to anatomoses with the superior ulnar collateral artery and participate in the elbow anastomoses.

Common interosseous artery – arises in the cubital fossa and divides into the anterior and posterior interosseous arteries.

muscular branches supply muscles on the medial side of the forearm.

Participates in both the superficial and deep palmar arches.

**Case Report Conclusion:**

Ulnar nerve entrapment.

Do you think the entrapment site is at the level of the elbow or above or do you think the nerve is entrapped at the wrist (Guyon’s canal)?

Support your answer.