

the Arm

-the arm extends from the shoulder joint (proximal), to the elbow joint (distal)

- it has one bone ; the humerus which is a long bone

- muscles in the arm :

*brachialis muscle

*Biceps brachii (anterior to the brachialis)

*coracobrachialis (medially to the brachialis)

*triceps (posterior to the brachialis)

-the arm is divided by the bone and intermuscular septa into posterior and anterior compartments.

**intermuscular septa : it's a connective tissue attached to the supracondylar ridge of the bone medially and laterally, and it lies between muscles in a deep fascia.

-what's in the anterior compartment ? biceps brachii

-what's in the posterior compartment? – triceps

-what's on the medial side?- coracobrachialis

contents of the anterior fascia compartment:

- Muscles: Biceps brachii, coracobrachialis, and brachialis
- Blood supply: Brachial artery
- Nerve supply to the muscles: Musculocutaneous nerve, radial nerve.

**brachialis muscle has a double(dual) nerve supply: musculocutaneous + radial nerve.

Other muscles that have a double nerve supply:

- subscapularis(upper + lower subscapular)
- pectoralis major(medial + lateral pectoral nerve)

**some nerves pierces the muscle, like medial pectoral nerve, musculocutaneous nerve(pierces coracobrachialis).

- Structures passing through the compartment:
Musculocutaneous, median, and ulnar nerves; brachial artery and basilic vein. The radial nerve is present in the lower part of the compartment

Muscles of the anterior fascial compartment:

1***biceps brachii** : two origins : short head: coracoid process

short head: Supraglenoid tubercle of scapula

Insertion : radial tuberosity, bicipital aponeurosis(makes the roof of the cubital fossa)

Nerve supply: Musculocutaneous nerve

Action : screwing(flexion and supination), *biceps is the only muscle that does flexion and supination* , flexion of the elbow joint, weak flexion of shoulder joint it's weak in shoulder joint because it's origin is in the coracoid process above the shoulder joint

2*Coracobrachialis:

origin: coracoid process of scapula

insertion: middle of the shaft of humerus medially

*insertion of coracobrachialis is considered a landmark in anatomy because there are many anatomical changes of the arm are located at the level of insertion of coracobrachialis (mid of the shaft) like :

1) insertion of deltoid muscle meets the insertion of coracobrachialis

2) the ulnar nerve which pierces the medial intermuscular septum is at the level of the insertion of coracobrachialis

3) formation of axillary vein is at the level of the insertion of coracobrachialis

4) median nerve crosses the brachial artery at the level of the insertion of coracobrachialis (the median nerve was lateral to the brachial artery before the level of insertion of coracobrachialis then it becomes medial to it)

Action: flexes the arm, weak adductor

3*Brachialis:

origin: anterior surface of the lower half of the humerus

insertion: ulnar tuberosity (coronoid process of ulna)

action: flexion of elbow joint, it's the prime mover in the flexion of the elbow before the biceps

nerve supply: musculocutaneous nerve, Radial Nerve. (it has double nerve supply***)

Brachial Artery:

-is a continuation to the axillary artery, starts at the lower border of teres major and ends at the neck of the radius where it gives two terminal branches:

*radial (laterally) and ulnar (medially)

-it's the blood supply to the arm

-gives branches to the muscles

-it's superficial from the medial side so we can feel its pulsation medially

Relations:

Anteriorly overlapped from the lateral side by the coracobrachialis and biceps

The medial cutaneous nerve of the forearm lies in front of the upper part

the median nerve crosses its middle part from lateral to the brachial artery to medial side

posteriorly: The artery lies on the triceps, the coracobrachialis insertion, and the brachialis

Medially: The ulnar nerve and the basilic vein

Laterally: The median nerve and the coracobrachialis and biceps muscles.

There's a triple relation between the median nerve and the ulnar nerve with the artery

****branches of the brachial artery:**

-the profunda brachii artery with radial nerve

-superior ulnar collateral artery

-inferior ulnar collateral artery

And the last two branches enter the anastomosis around elbow joint

**** anastomosis:** when arteries meet up together and sharing of blood occurs

When we want to hear the impulsion of the brachial artery, we put the stethoscope on the cubital fossa (medial sides of biceps tendon)

***nerves in the arm :** musculocutaneous, radial, ulnar (gives no branches in the arm), median (gives no branches in the arm)

***contents of cubital fossa:**

- medial nerve, the most medial structure in the cubital fossa
- biceps tendon
- brachial artery
- radial nerve, the most lateral structure in cubital fossa

musculocutaneous nerve:

pierces coracobrachialis

ends as a lateral cutaneous nerve of forearm

branch from lateral cord of brachial plexus

supplies coracobrachialis, biceps, brachialis

gives Articular branches to the elbow joint for sensory

*any nerve crosses any joint gives nerve supply to that joint

Contents of the Posterior Fascial Compartment of the Arm

1*triceps:

Origin : Long head: Infraglenoid tubercle

Medial head: below spinal groove

Lateral head: above spinal groove

-all three heads are supplied by radial nerve

Insertion: Olecranon process of ulna

Action : Extensor of elbow joint

it's blood supply is the profunda brachii artery

2*radial nerve:

-it branches from the posterior cord of the brachial plexus

- lies on the back of the humerus
- pierces the intermuscular septum and becomes in the anterior compartment
- supplies brachialis muscle, triceps, and anconeus(muscle located behind the elbow joint)
- comes above the lateral epicondylar
- it divides into superficial and *deep branch(pierces supinator muscle in the cubital fossa)
- the profunda brachii artery rises with it

3*ulnar nerve:

- it branches in the medial cord of brachial plexus
- on the medial side of axillary artery
- behind the mid –shaft of the humerus(level of insertion of coracobrachialis) the ulnar nerve is in the anterior compartment and at the mid shaft the ulnar nerve will descend medially and pierce the medial intermuscular septum and become in the posterior compartment below the medial epicondyle

4* Profunda Brachii Artery:

- branched from the brachial artery
- passes with the radial nerve in radial groove
- gives one ascending branch and two descending branches
- supplies all muscles in the its region

Superficial Sensory Nerves:

- supraclavicular nerves: coming from (c3,c4), above the clavicle, supplies the skin below the clavicle.

- upper lateral cutaneous nerve of the arm, coming from axillary nerve and going to the skin
- lower lateral cutaneous nerve of the arm, coming from radial nerve and going to the skin
- the medial cutaneous nerve of the arm, coming from T1
- the medial cutaneous nerve of the forearm coming from c8
- intercostobrachial nerves, coming from T2
- lateral cutaneous nerve of the forearm, coming from musculocutaneous nerve
- posterior cutaneous nerve of the arm, coming from radial nerve c8
- sensory nerves of the hand comes from c7

Dermatomes and Cutaneous Nerves :

*dermatomes: spinal nerves, their origin comes from the spinal cord, and going to the skin.

-clinical problem related to dermatomes:

Phrenic nerve comes from c3,c4,c5, it's motor to the diaphragm and sensory to the peritoneum below diaphragm, it gives dermatomes to the shoulder joint.

So, in patients involved in car accidents with trauma involving the left sided ribs, patients present with fracture lower ribs, rupture spleen, and pain in the left shoulder joint.. the blood usually accumulate under the left diaphragm causing irritation in the phrenic nerve which gives dermatome to the shoulder joint, we call this type of pain referred pain coming from one sensory area in the spinal cord to another one.

Superficial Veins in the upper limb:

Veins are commonly divided into two types:

1) *venae comitantes* (brachial veins), which are deep veins

2) superficial veins(under the skin), they can turn into varicose veins where they become dilated and tortuous.

* cephalic vein: starts from the dorsum of the thumb, continues laterally and ends at the axillary vein

*basilic vein: starts at the dorsum of the little finger, continues upwards to the cubital fossa, ends at the axillary vein.

~both of the veins above are connected through median cubital vein(in the middle between Cephalic and basilic), this vein is important in taking blood samples and inserting injections.

~ *venae comitantes* and basilica vein give us axillary vein at the lower border of teres major

~the superficial veins are connected to the *venae comitantes* by perforating veins(veins that connects superficial and deep veins) this connection is important for veinous drainage .

☺Best of luck☺

Razan Mansour