Study of Three Male Sudanese Cadavers for Unusual Observations

Abstract : knowledge of different variations is important for the clinicians and other medical disciplines for the diagnostic, interventional and surgical procedures**.** The aim of this study is to report any unusual observations of anatomical structures during the dissection of properly embalmed three male cadavers for academic year 2015-2016 undergraduate students, at the department of human anatomy at National University Faculty of Medicine. Cadaver (1) about 70 years old male was showed anatomical variations in musculocutaneus nerve formation. Cadaver (2) about 60 years old male shows that extensor carpi radialis longus inserted by two tendons. Cadaver (3) was showed high division of brachial artery into radial and ulnar arteries at the upper end of the arm. No additional variation were observed. The unusual observations should be reported due to their greater clinical significance.

Key words: Dissection, observations, variations, cadavers and brachial artery.

Introduction:

The musculocutaneus nerve give a twig to the shoulder joint and a branch to coracobrachiali, then it proceeds between the two conjoined parts of coracobrachialis, and then pass between biceps and brachialis, accompanied by many branches of the brachial artery and tributaries of the brachial veins. While lying in this intermuscular plane it supplies both muscles. At the lateral border of the biceps tendon continue as the lateral cutaneous nerve of the forearm. The musculocutaneous is the nerve of the flexor compart ment of the arm[(1)].

The musculocutaneous nerve pass under the coracobrachialis muscle and then continuing until its first branch to the biceps brachialis muscle. Just after this, it supplied another two branches, the lateral cutaneous nerve of the forearm and a branch to the brachialis muscle, and then it joined the median nerve approximately at the midpoint of the arm and the median nerve[(2)].

The MCN as a whole did not pierce corachobrachialis but instead gave a branch to it. After that the MCN, ran downwards and medially for about 4 cm, crossed the third part of axillary artery and joined the MN, 3.5 cm after its formation. The other two muscles of the front of the arm, biceps brachii and brachialis were supplied by the median nerve after it received the musculocutaneous nerve. The lateral cutaneous nerve of forearm also emerged from median nerve[(3)]. The musculocutaneous nerve gave out a communicating branch to join the median nerve just

proximal to the entrance of the musculocutaneous nerve into coracobrachialis. Subsequent courses of both the median and musculocutaneous nerves were found to be normal. The right side of the brachial plexus was also dissected and examined, and the course and distribution of the musculocutaneous and median nerves were found to be without any communication[(4)].

The extensor carpi radialis longus (ECRL) is a fusiform muscle, is partly overlapped by the brachioradialis, with which it often blends . As it passes distally, posterior to the brachioradialis, its tendon is crossed by the abductor pollicis longus and extensor pollicis brevis. It originated from the lateral supraepicondylar ridge of humerus and inserted in the dorsal aspect of base of 2nd metacarpal it innervated by radial nerve (C6, C7). The extensor carpi radialis longus muscle extend and abduct the hand at the wrist joint[5].

An additional belly of muscle having common origin with extensor carpi radialis longus muscle was found on the medial side of ECRL muscle, having a long tendon which started from the small belly of the muscle, it ended by getting inserted into the upper and medial aspect of dorsal surface of base of second metacarpal bone[6].

The extensor carpi radialis longus was giving two tendons in the second compartment of extensor retinaculum before its insertion while passing deep to the abductor pollicis longus, while the Extensor carpi radialis brevis was absent[7]. A rare variation of the extensor carpi radialis longus muscle was observed in a 49-year-old male cadaver during routine dissections. An accessory slip of the extensor carpi radialis longus muscle with a short belly part arising from the ulnar side and a long, thin tendon extending to the radial side of the wrist crossing over the main tendon was found inserted in the dorum and lateral side of first metatarsal bone[8].

The brachial artery continues on from the axillary and ends at the level of the neck of the radius by dividing into the radial and ulnar arteries. It is superficial (immediately below the deep fascia) along its whole course, except where it is crossed, at the level of the middle of the humerus, by the median nerve which passes superficially from its lateral to medial side, somtime the nerve crosses deep to the artery. Fairly frequently the artery divides into its two terminal branches in the upper arm. The branches of the artery are; the profunda brachii, superior ulnar collateral, nutrient to the humerus and inferior ulnar collateral[9].

A higher division of brachial artery was observed, with the artery dividing in the arm just below to teres major muscle into its terminal branches, the radial artery laterally and ulnar artery medially, the artery had passed superficial to the median nerve before its division [10].

In a 45 year male cadaver unusual variation of right brachial artery branching was observed. The brachial artery was showed a high division in to radial and ulnar arteries in upper third of arm, then radial artery passed through the apex of the fossa, lying medial to median nerve, while the ulnar artery cross deep to the deep head of the pronator teres muscle[11]. Gourassas 2003 presented a case-report of a patient with a failed radial coronary angiography approach, due to the abnormality in high division of brachial artery [12]. Normal brachial artery was found in 42 specimens accounting for 84%. Variations presents in 8 specimens (16%), (10%) presented with bifurcation of brachial artery into radial, ulnar and radial recurrent arteries, (2%) presented with double profunda brachii artery, (2%) showed high origin of radial artery and (2%) presented with high division of brachial artery in the proximal third of arm (2%)[13].

Material and methods:

The present study was conducted on three properly embalmed male cadavers were completely dissected for academic year 2015-2016 at the department of human anatomy at National University Faculty of Medicine. The skin, superficial fascia, deep fascia and

muscles were separated using a scalpel and forceps and the anatomical variations of the structures with their relation to the surrounding structures were examined.

Observational results:

During dissection of cadaver (1) figures (1) variation in musculocutaneus nerve was encountered in the left upper limb. The musculocutaneus nerve was originated from the lateral cord of brachial plexuses normally then it was pierced the coracobrachialis muscle and innervates it and then passing down between the brachialis and biceps brachii for one cm where it was joined the median nerve on its lateral side at the upper part of the arm, they became as one nerve after 4cm from the formation of the median nerve, the lateral root of median relatively thin than usual. After 2 cm from receiving the musculocutaneus nerve the median nerve give arises to the lateral cutaneus nerve of the forearm. The MSC nerve innervate the biceps brachii from its lateral side at the site of junction with median nerve. The musculocutaneus nerve in the right upper limb has normal course and distributions.

During dissection of cadaver (2) figures (2) (3) the left upper limb was showed anatomical variation in the extensor carpi radialis longus gave additional tendon, which they passed together deep to abductor pollicis longus and extensor pollicis brevis, the main tendon entered into the second compartment of extensor retinaculum where it was lateral to additional tendon and extensor carpi radialis brevis tendon to appear in the dorsum. Finally it was ended by getting inserted into the upper and medial aspect of dorsal surface of base of second metacarpal bone. The additional tendon pass deep to the main tendon close to the extensor carpi radialis brevis tendon on its lateral side they was inserted on the dorsal aspect of base of third metacarpal bone. On the right upper limb does not show any variations.

Another important variation was observed during the dissection of the cadaver (3) figure (4) the brachial artery of the right upper limb showed a high division into radial and ulnar arteries at the upper end of the arm, in the lower arm the radial artery cross superficial to the median nerve and has normal course in the forearm. The ulnar artery pass deep to the median then on the medial side in the cubital fossa they pass together between the heads pronator teres, the ulnar artery has normal course in the forearm. On the left side the brachial artery was normal.

Figure (1): cadaver (1) left upper limb showed a variation in musclocutaneus nerve

Fig (1) showed these structures; CBM (coracobrachialis muscle) MCN (musculocutaneus nerve) MN (median nerve) BM (biceps brachii muscle) UN (ulnar nerve) MCN/F (medial cutaneus nerve of the forearm LCN/F (lateral cutaneus nerve of te forearm.

Figure (2): cadaver (2) the forearm and hand showed a variation in ECRL

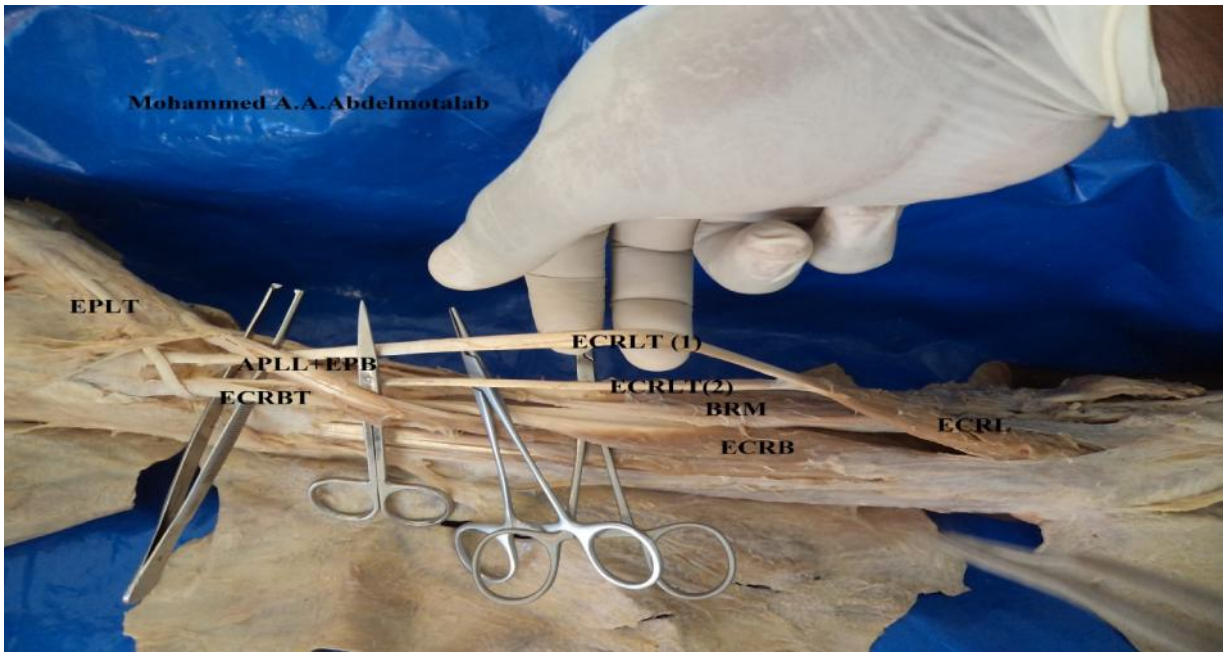

Fig (2) showed these structures; ECRL (extensor carpi radialis longus muscle), ECRLT 1(extensor carpi radialis longus muscle main tendon), ECRLT 2 (extensor carpi radialis longus muscle additional tendon), BRM (brachioradialis muscle), ECRB(extensor carpi radialis brevis), APLL(abductor pollicis longus tendon), EPB(extensor pollis brevis tendon, EPLT(extensor pollicis longus tendon).

Figure (3): cadaver (2) showed a Variation in ECRL

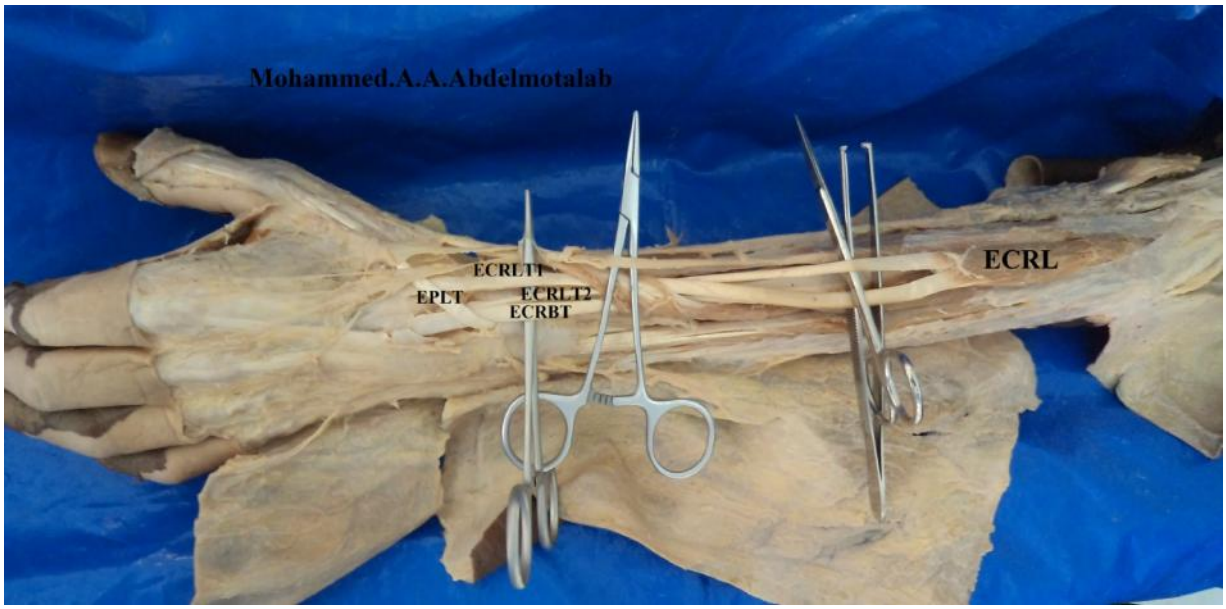

Fig (3) showed these structures; ECRL (extensor carpi radialis longus muscle), ECRLT 1 (extensor carpi radialis longus muscle main tendon), ECRLT 2 (extensor carpi radialis longus muscle additional tendon), ECRBT (extensor carpi radialis brevis tendon), EPLT (extensor pollicis longus tendon).

Figure (4): anterior arm of cadaver (3) showed with variation in brachial artery

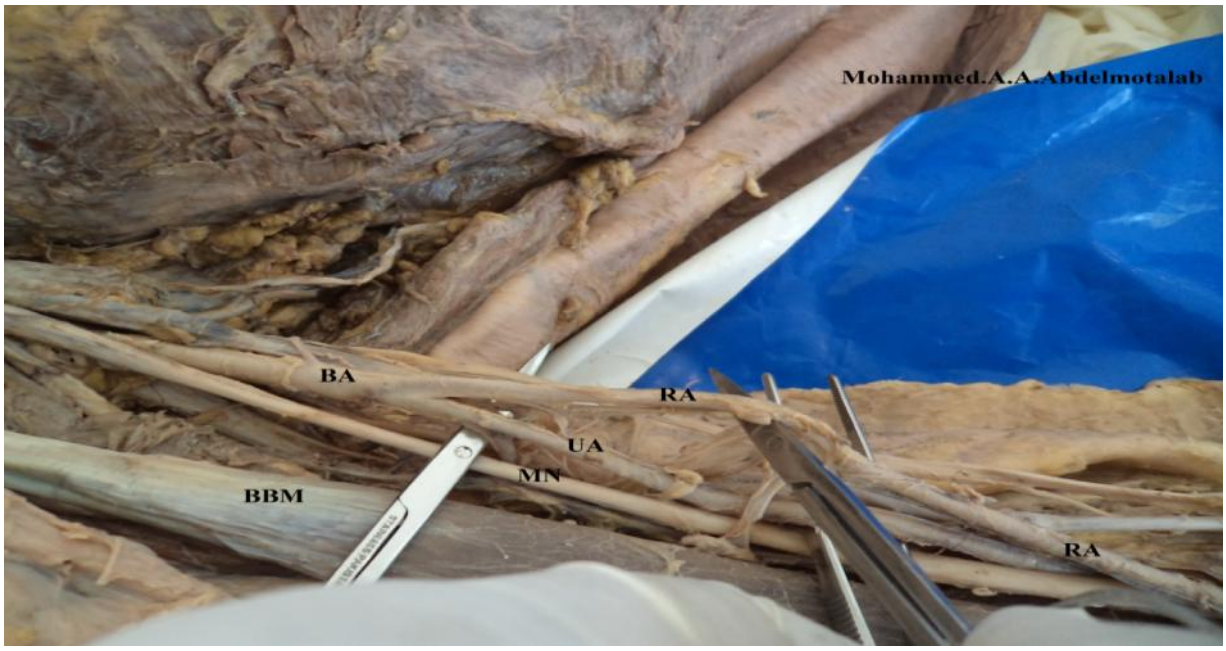

Fig (4) showed these structures; RA(radial artery& venae commitance) UA(urinary artery &venae commitance) MN (median nerve) BBM (biceps brachii muscle)

Discussion:

Variations of musculocutaneus nerve have been reported by many authors. Sergio et al 2016 mentioned that the musculocutaneous nerve does not pierce the coracobrachialis muscle and then continuing until give branches to biceps brachii and then brachialis muscle and lateral cutaneus nerve of the forearm. After that it join the median nerve at the midpoint of the arm[(2)]. In this study the left musculocutaneus nerve of cadaver (1) fig (1) pierce the coracobrachilis muscle supplying it and joining the median after 1 cm of exit out of the muscle, then MSC nerve innervates the biceps brachii from its lateral side at the site of junction with median nerve, after 2 cm from receiving the musculocutaneus nerve the median nerve give arises to the lateral cutaneus nerve of the forearm.

The musculocutaneous nerve gave out a communicating branch to join the median nerve just proximal to the entrance of the musculocutaneous nerve into coracobrachialis [(4)]. In comparison to the current study finding the musculcutaneus nerve join the median nerve after 4cm from its formation, and there is no communication before that.

The communications between the musculocutaneus and median nerves classified into following five types: type I, there is no communication between the MN and the MCN, in type II, the fibers of the lateral root of the MN pass through the MCN nerve and join the MN in the middle of the arm, whereas in type III, the lateral root fibers of the MN pass along the MCN and after some distance, leave it to form the lateral root of the MN. In type IV, the MCN fibers join the lateral root of the MN and after some distance the MCN originates from the MN. In type V, the MCN is completely absent and its fibers pass through the lateral root and fibers to the muscles supplied by MCN branch out directly from the MN[(14)]. The current study variation of left musculocutaneus nerve in fig (1) does not similar to any of the Minor

categories types, but the lateral root of left median nerve were observed small than usual and this may or may not give an indication of traveling of some of its fibers through the musculocutaneus nerve.

Phalguni Srimani et al 2014 reported that the extensor carpi radialis longus muscle has an additional belly of muscle having common origin having a long tendon inserted into the upper and medial aspect of dorsal surface of base of second metacarpal bone[6]. In the present study observations the left extensor carpi radialis main tendon inserted in the base of the second metacarpal bone while the additional tendon ass deep to the main on to be inserted into the base of the third metacarpal bone in common with extensor carpi radialis brevis muscle as present in fig (2) and (3). The extensor carpi radialis longus was giving two tendons while the extensor carpi radialis brevis was absent[7]. The present study agree with their variations but disagree that the extensor carpi radialis brevis is absent. Jang & Lee 2003 mentioned that athin long tendon arising from the ulnar side of extensor carpi radialis longus muscle extending to the radial side of the wrist crossing over the main tendon was found inserted in the dorum and lateral side of first metatarsal bone[8]. This study found that the additional tendon of extensor carpi radialis longus muscle inserted in the base of the third metatarsal bone.

A higher division of brachial artery had been reported by K. Smitha 2013, the artery dividing in the arm just distal to teres major muscle [10]. This study was showed same observation in right upper limb of cadaver (3) fig (4). The brachial divided in to radial and ulnar arteries in upper third of arm at the the lower border of the teres major muscle, then radial artery passed through the apex of the fossa, lying medial to median nerve, while the ulnar artery cross deep to the deep head of the pronator teres muscle[11]. It similar to the finding of the present study, their course in the forearm is normal and there is no such variation were observed. Brachial artery variations can have both morphological and clinical significance.

Conclusion:

Knowledge of unusual variations is important in medicine, it may cause misinterpretation of angiographic images. Accidental puncture of superficially placed arteries may occur while attempting vena puncture. Abnormal origin of the radial artery may cause the failure of the radial approach of the coronary angiography and in the reconstructive surgery of the upper limb. Lesions of communicating nerves may give rise to difficulty diagnosis in clinical neurophysiology. So any unusual observations during the dissection of cadavers should be reported because it is essential not only to anatomists, but also to radiologists, orthopedists, vascular and plastic surgeons.

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