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Case Report

BILATERAL RARE NEURO VASCULAR VARIATIONS OF UPPER LIMB– A CASE REPORT

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ABSTRACT
Axillary artery is the direct continuation of subclavian artery at the outer border of 1st rib. In the axilla this artery forms the central axis around which cords of brachial plexus are arranged. Variations in branches of axillary artery are not uncommon. Axillary artery continues as Brachial artery at the lower border of teres major, occasionally it may bifurcate in the middle of arm thus forming superficial radial artery. Variations in the branches of brachial plexus, particularly communications between musculocutaneous nerve and the median nerve were extensively studied owing to their surgical importance. Absence of musculocutaneous nerve is comparatively rare entity that poses difficulty in interpretation of cause of muscle weakness in injury to median nerve as it supplies the muscles of front of arm directly instead of musculocutaneous nerve. Neurovascular entrapment of median nerve and brachial artery by musculoaponeurotic slip from brachialis is a clinically important finding as it can result in compression neuropathy of median nerve and vascular compression symptoms.

Key Words: *Axillary Artery, Superficial Radial Artery, Musculocutaenous Nerve, Median Nerve, Brachilias*

INTRODUCTION
The Axillary artery can be considered as the central axis of the axilla around which veins & brachial plexus are arranged. This artery is direct continuation of the subclavian artery, the change in name occurring as the vessel crosses the 1st rib. The Axillary artery is described as having 3 parts in relation to the pectoralis minor muscle. The axillary artery usually gives rise to 6 branches. The first part of the artery gives superior thoracic artery. The second part gives lateral thoracic and thoracoacromial branches. The third part gives subscapular artery, anterior and posterior circumflex humeral arteries. It is very common to find the variations in the branching pattern. Sometimes many of the branches may originate from a common stem or arise separately (Hollinshed, 1958). Variations in the branches of 1st part of the axillary artery is less common when compared to other 2 parts. In the present case an unusual branch was bilaterally observed from 1st part of axillary artery closely related with anterior divisions of upper & middle trunks of Brachial plexus (Figure1 &3).

The axillary artery becomes brachial as it crosses the tendon of teres major and it ends by dividing into radial and ulnar arteries in the ante cubital fossa. The named branches of brachial artery before its termination are profunda brachii, nutrient artery, superior and inferior ulnar collateral arteries. Higher bifurcation of brachial artery is a common variation reported by many authors. It may be unilateral or bilateral. In the present case it is unilateral. Anatomical variations of the radial artery are of clinical importance in creating native arteriovenous fistula for hemodialysis.

Normally, the lateral cord gives its first branch to the pectoralis major muscle, named the lateral Pectoral nerve and then it divides into the musculocutaneous nerve and the lateral root of the median nerve. The musculocutaneous nerve is normally the terminal branch of lateral cord of brachial plexus and it pierces the coracobrachialis muscle. Before it pierces the coracobrachialis, it supplies the muscle. After piercing the coracobrachialis, it descends in between the biceps muscle and brachialis muscle and supplies the

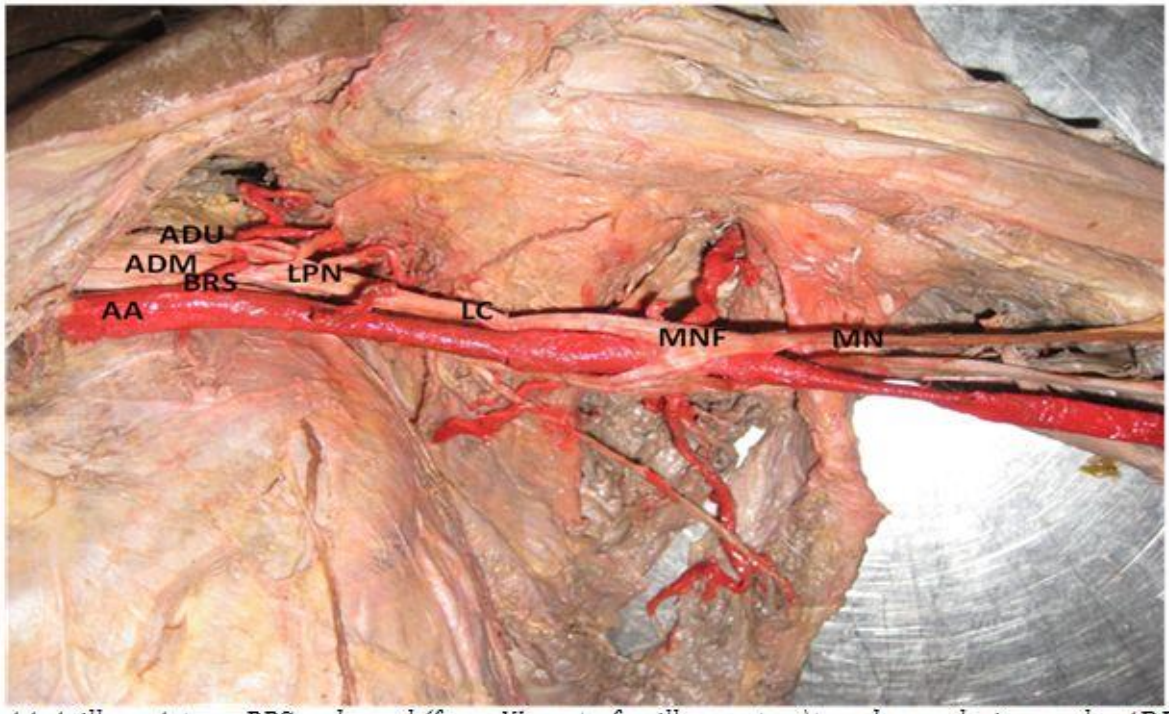
above muscles and descends as lateral cutaneous nerve of forearm. Number of variations in the course and distribution of the musculocutaneous nerve have been reported .The median nerve is normally formed by two roots, the lateral root and the medial root from the corresponding cords of the brachial plexus. It descends crossing the brachial artery from lateral to medial side and descends without giving any branch in the arm. The present case reports bilateral absence of musculocutaneous nerve where median nerve by its direct branches innervates muscles of anterior compartment of arm. Injury to such median nerve results in unexpected.

CASES

During routine dissection of(Ist M.B;B.S students batch 2011-2012) a elderly male cadaver aged 65 yrs at pinnamaneni Siddhartha institute of medical sciences & research foundation Gannavaram, Krishna District, AP (INDIA),the following variations were observed.

Observations with Bilaterality

An unusual branch from 1st part of axillary artery was observed associated with variation in branching pattern of lateral cord with bilateral similarity. It was noticed that an unusual branch originated from superior aspect of 1st part of axillary artery opposite to superior thoracic artery. The course of above said artery was upwards and backwards between the anterior divisions of upper & middle trunks, descends deep to subscapularis muscle to supply the same. On both sides lateral pectoral nerve takes origin from anterior divisions of upper &middle trunks and lateral cord continues as median nerve after its formation from medial and lateral roots of corresponding cords without giving rise to musculocutaneous nerve. The median nerve gives direct muscular branches to biceps,coraco brachialis & brachialis .The nerve to brachialis continues as lateral ante brachial cutaneous nerve (Figure 1&2).



AA-Axillary Artery, BRS— branch(from 1st part of axillary artery)to subscapularis muscle, ADU – Anterior Division of Upper Trunk, ADM - Anterior Division of Middle Trunk, LPN – Lateral Pectoral Nerve, LC-Lateral Cord, MNF-Median Nerve Formation, MN-Median Nerve.

Figure 1: variant branch from 1st part of axillary artery & rare origin of lateral pectoral nerve & absence of musculocuteaneous nerve –left axilla.

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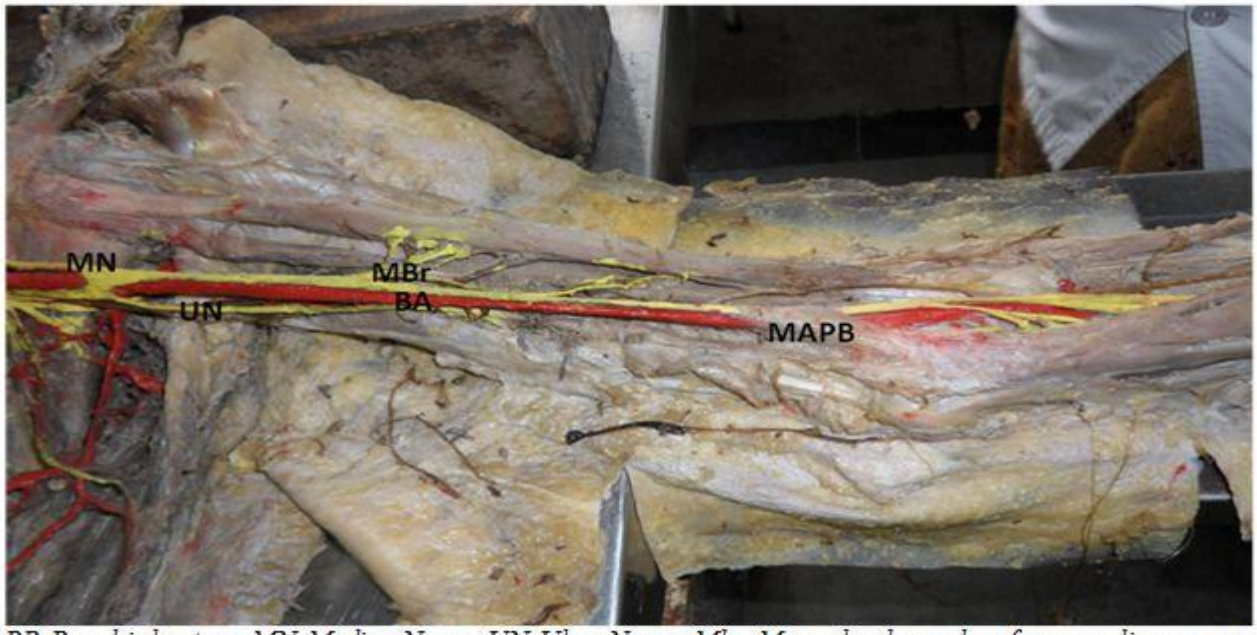
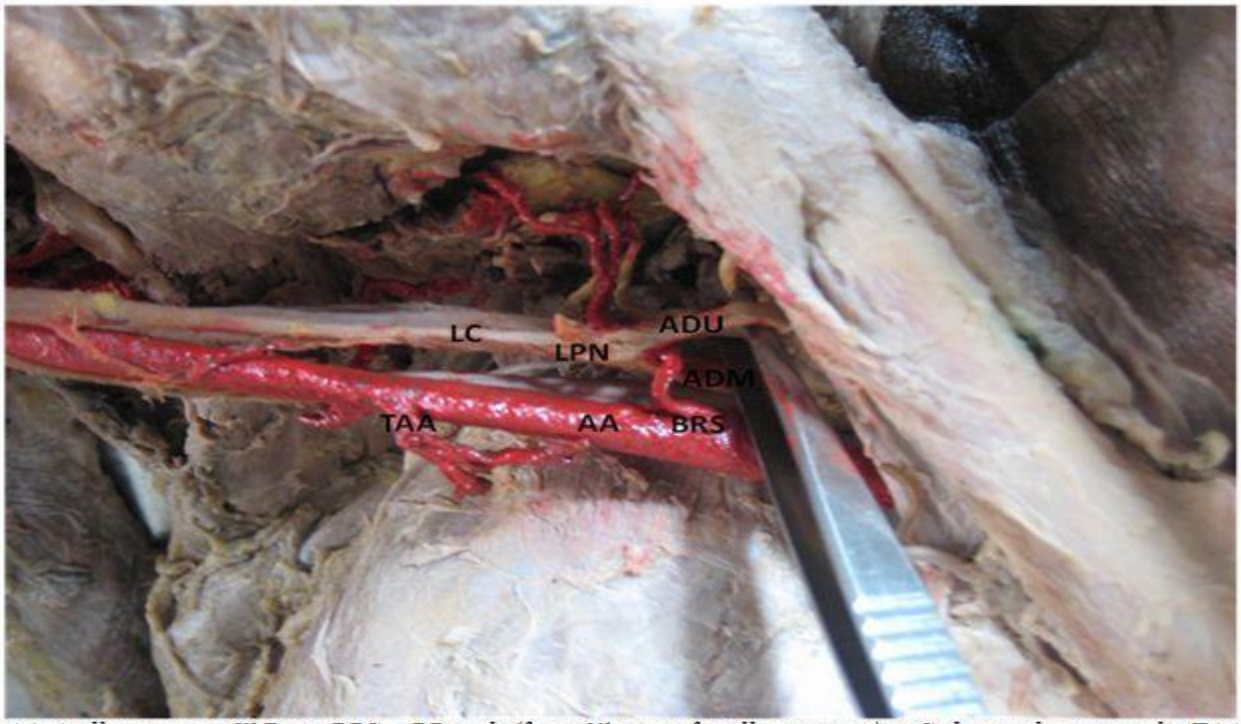


BR-Brachial artery, MN-Median Nerve, UN-UlnarNerve, Mbr-Muscular branches from median nerve, MAPB – MusculoAPoneuroticslip from Brachialis

Figure 2: muscles of front of arm innervated by median nerve & musculoaponeurotic slip from brachialis across median nerve & brachial artery- left upper limb



AA-Axillary artery 1st Part, BRS – BRanch (from 1st part of axillary artery) to Subscapularis muscle, TAA-Thoraco Acromial artery, ADU –Anterior division of Upper Trunk, ADM - Anterior division of Middle Trunk, LPN –Lateral Pectoral Nerve, LC-Lateral Cord.

Figure 3: variant branch from 1st part of axillary artery & rare origin of lateral pectoral nerve & absence of musculocuteaneous nerve –right axilla.

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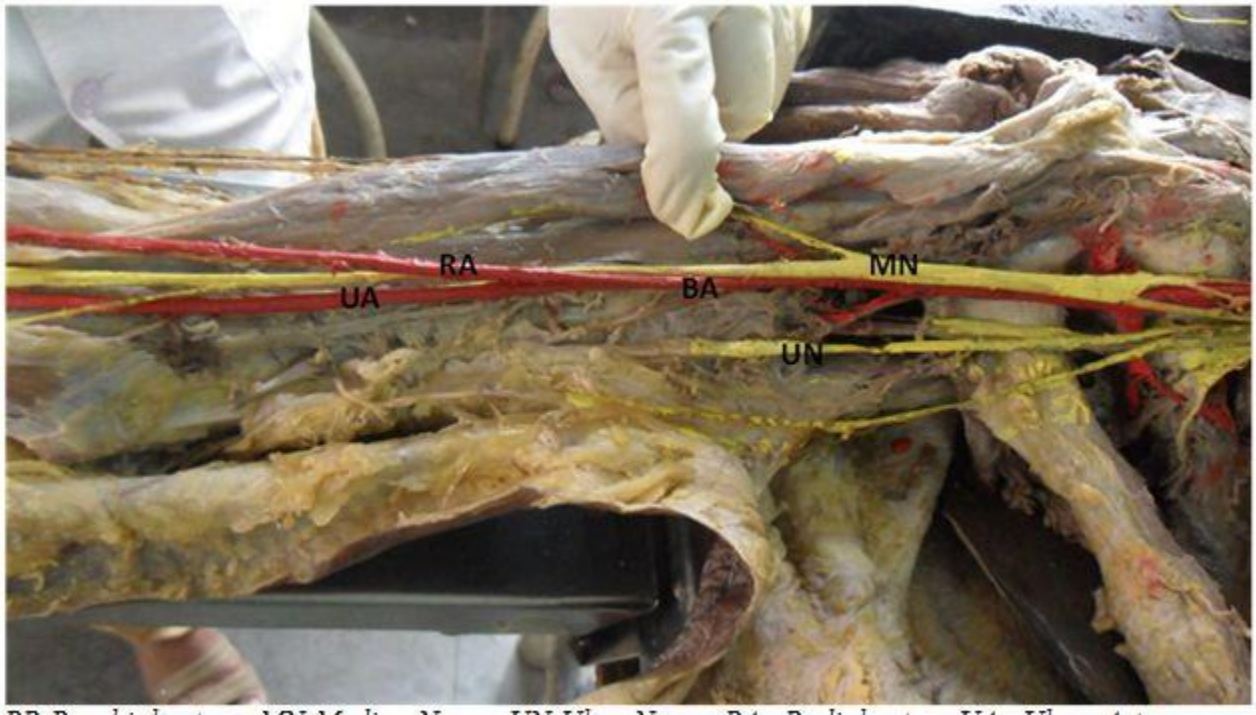
Other Unilateral Variations on Left Side

In addition to above bilateral observations, 3rd part of left axillary artery presented with common trunk for sub scapular & posterior circumflex arteries which is commonly found. The median nerve which is lateral to 3rd part of axillary artery continues to have the same relation with brachial artery upto cubital fossa without crossing it from lateral to medial side and both brachial artery and median nerve are enclosed by musulo aponeurotic slip from infero medial aspect of brachialis muscle. At the apex of cubital fossa median nerve passes between 2 heads of pronator teres and its muscular branches cross the brachial artery to reach the muscle, further course of the nerve was normal (Figure 2).



BR-Brachial artery, MN-Median Nerve, UN-UlnarNerve, RA –Radial artery UA –Ulnar Artery

Figure 4: higher bifurcation of brachial artery - Right Upper limb

Other Unilateral Variations on Right Side

Brachial artery which is the continuation of 3rd part of axillary artery bifurcates into radial and ulnar arteries at the level of insertion of coraco brachialis. The median nerve lies lateral to 3rd part of axillary artery and upper one third of Brachial artery after which it is crossed by radial artery from medial to lateral side, further course of the nerve was normal .The radial artery has a superficial course and its termination was normal (Figure 4).This variation is called higher bifurcation of Brachial artery.

DISCUSSION

De Garis (1928) reported that unnamed branch arises from superior aspect of axillary artery as its 2nd branch and supplies upper part of sub scapularis muscle and found this vessel in 13.5% of whites and19.6%of negros. According to Bergmann *et al.*, (1988) the first part of the axillary artery may, in rare cases, give rise to the subscapular artery or supply branch to the subscapular muscle. Any type of variation in branching pattern of first part of axillary artery were not found in study conducted by Samta gaur *et al.*,(2012) and in 2% cases posterior circumflex humeral artery a large trunk, arises along with subscapular artery.

Clemente (1985) reported the higher origin of radial artery which is one of the common variations of upper limb arteries. The higher origin of radial artery in present case was superficial throughout its course

from its origin in the arm to palm where it continued with the superficial palmar arch. The part of the radial artery arising in the arm is brachio-radial, in the present case it is superficial throughout its course, it is known as superficial brachio-radial artery (Rodriguez-Niedenfuhr *et al*., 2003).

The arterial anomalies in the upper limb are due to defects in embryonic development of the vascular plexus in the upper limb buds. This may be due to arrest at any stage of development of the vascular plexus showing regression, retention or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels (Hamilton *et al*., 1972).

The complex nature of brachial plexus makes it prone for innumerable variations of which communications between median nerve and musculocutaneous nerve were extensively studied.The present case is different because lateral cord of brachial plexus continues as lateral root of median nerve and does not give rise to any other branches. According to Kerr (1918) the lateral pectoral nerve may arise from lateral cord, from the anterior divisions of upper & middle trunks or in various ways from upper part of plexus by 1,2or 3 roots. In the present case lateral pectoral nerve arises by 2 roots from the anterior divisions of upper & middle trunks and is not reported any where in the recent studies.

The variations of the musculocutaneous and median nerve may be classified into five types by Le minor. In Type V: The musculocutaneous nerve is absent. The fibers of the musculocutaneous nerve runs within the median nerve along its course. In this type the musculocutaneous nerve does not pierce the coracobrachialis muscle (Le Minor, 1990). The present observation is similar to the above said type. Absence of the musculocutaneous nerve was also reported by Mane *et al*., (2011).

Bilecenoglu *et al*., (2005) described abnormal slip arising from brachialis muscle passing superficial to and causing entrapment of the nerve and the artery. According to Bilecenoglu *et al*., (2005) there are 7 possible compression sites for the median nerve and brachialis stands the 1st among them. An extra Musculoaponeurotic slip from brachialis is not uncommon.The additional slip may mechanically stabilize the ulnohumeral joint, but can cause compression neuropathy of median nerve and vascular compression symptoms due to entrapment of brachial artery (Bincy *et al*., 2008).

Conclusion

Clinical implications of the above mentioned variations occurs in cases where a person with such variations suffers from injury to median nerve at the axilla or in the arm and have unexpected paralysis of the flexor muscles of the arm and hypoesthesia of the lateral surface of forearm. Prior knowledge of such variations by surgeons repairing trauma of the arm or treating tumors may be helpful to avoid accidental injury to these nerves.

Variations assume significance during nerve block of infraclavicular part of the brachial plexus. Though the variations that we have mentioned here may not alter the normal functioning of the limb of the individual, it is important to keep these in mind in surgical and anaesthesiological procedures (SANNES, 2000).

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