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RESEARCH ARTICLE

VARIATION IN MEDIAN NERVE FORMATION ASSOCIATED WITH ANOMALOUS HIGHER ORIGIN OF PROFUNDA BRACHI ARTERY

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INTRODUCTION

The Brachial plexus (BP) is formed by union of the ventral rami of the lower four cervical (C5–C8) and first thoracic (T1) spinal nerves, and supplies motor, sensory, and sympathetic nerve fibers to the upper limb. The fourth cervical ventral ramus frequently gives a branch to the fifth and the first thoracic ventral ramus often receives a contribution from the second thoracic ventral ramus (Cigdem et al., 2006). Median nerve is formed by union of two roots, lateral root (LR) and medial root (MR) coming from lateral and medial cord of brachial plexus respectively. Formation of median nerve occur in front or lateral to axillary artery in axilla (Richard Wayne et al., 2005 and Williams et al., 1995). The medial root of the nerve crosses from lateral to medial anterior to third part of the axillary artery superficially. In the arm the median nerve crosses anterior to the brachial artery from lateral to medial side, and enters the cubital fossa along with the brachial artery. The axillary artery gives three branches from its third part, namely anterior circumflex, posterior circumflex and subscapular artery. Lateral thoracic is a branch from second part of the axillary artery. Profunda brachii artery is a large branch from the posterior aspect of the brachial artery, which

ABSTRACT

A variation in the formation of median nerve (MN) was observed during routine dissection of brachial plexus (BP) which was performed on adult male cadaver in the department of Anatomy, Dr. Rajendra Prasad Government Medical College. It was formed by the fusion of three roots, two from the lateral cord and one from the medial cord of the BP. Higher origin of profunda brachi artery was noted from the axillary artery. Fusion of the medial root and lateral root was occurred in front of profunda brachi artery lateral to axillary artery. The variations in the formation of the MN is of great importance for the relationship of the nerve both itself and neighbourhood structures. The roots constituting the MN could be a cause to pressure symptoms on axillary artery and its branches depending on their locations. Surgeons who perform procedures involving neoplasm or repairing trauma need to be aware of these variations especially in post traumatic evaluations and peripheral nerve repair.

runs in the spiral groove (Maytree et al., 2013). Formations and anomalies of the nerves of the upper limb have been described by many authors (Vollala et al., 2005; Saralaya et al., 2009). Nerve variations of the upper limb are very important in routine surgery and during radical neck dissections where these variations are more prone to injury (Gacek et al., 1990). These variations may also help in interpretation of a nervous compression having unexplained clinical symptoms.

Case Report

During routine dissection classes of first year MBBS students in the Department of Anatomy, Dr Rajendra Prasad Government Medical College, a variant formation of median nerve was observed in the left axilla and arm of adult male cadaver. The cadaver studied did not show any gross anomalies or evidence of surgical procedures on the skin around the area dissected. The MN was formed by the fusion of three roots, two from the lateral cord (LC) called as LR1 (First lateral root = Distal lateral root = Main lateral root) and LR2 (Second lateral root = Proximal lateral root = Variant lateral root) and one from the medial cord (MC) called as MR of the BP (Fig.1). Higher origin of profunda brachi artery was noted from the

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axillary artery. The LR2 and MR formation was noted in front of profunda brachi artery. There may be compression of profunda brachi artery noted. Then MN passed antero-lateral to the axillary artery and then brachial artery to the distal part of arm. The further course of the median nerve did not show any deviation from standard pattern. No variation was found in the formation, course and branches of median nerve in the right axilla and arm.

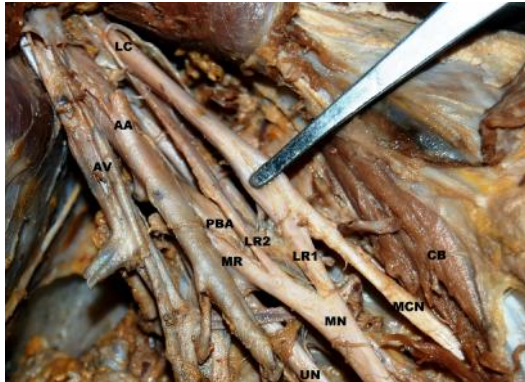


Figure 1 Dissection of the anterior compartment of left axilla showing variant formation of median nerve and higher origin of profunda brachi artery

(MCN:musculocutaneous nerve; CB:coracobrachialis muscle; MN: median nerve; UN: ulnar nerve; LC: Lateral cord of brachial plexus; LR1: First lateral root of the median nerve; LR2: Second lateral root of median nerve; MR: medial root of median nerve; PBA: Profunda brachii artery; AA: Axillary artery; AV: Axillary vein)

DISCUSSION

Anatomical variations of BP are important because variant nerves with abnormal origins, course and distributions are more susceptible to trap neuropathies and injuries during neck dissections. During breast cancer surgery and BP blockage with local anesthetics, and repairing of BP lesions these variations should be remembered (Cigdem *et al.*, 2006). Median nerve as reported in literature, is associated with several variations which include abnormal communications with other nerves such as musculocutaneous and ulnar nerves (Chauhan *et al.*, 2002; Bhanu *et al.*, 2010) splitting of the median nerve (Sundaram *et al.*, 2008) and unusual innervations of flexor muscles of arm by the median nerve (Nayak *et al.*, 2007). Sontakke *et al.*, (2011) described a case where median nerve was formed by three roots; two of them came from lateral cord and one from medial cord. The first root that arose from lateral cord joined the medial root in the axilla but the second one joined with the medial root in the arm to form the median nerve, however in the present study it has been observed that additional lateral root (LR2) arose from the lateral cord and joined with the medial root of median nerve in front of the profunda brachi artery which was originated from the axillary artery. Ramachandran *et al.* (2006) found three roots forming median nerve, but the third root was coming from musculocutaneous nerve; on the other hand Uzun and Seeling (2001) described a case in which median nerve was formed by the fusion of four branches, three of them coming from the lateral cord and one from medial cord.

Median nerve usually formed in the axilla. Nayak *et al.* (2006) observed a case where median nerve was formed just below the

midpoint of the arm. In their case medial and lateral roots of median nerve were very long and median nerve was formed just medial to brachial artery. Normally formation of median nerve comes in lateral relation of third part of axillary artery, as medial root crosses the axillary artery anteriorly to join with lateral root, lateral to axillary artery. Haviarova *et al.* (2001) reported a case where median nerve was formed posterior to axillary artery.

There are also reports where median nerve was formed medial to axillary artery (Chitra *et al.*, 2007; Suruchi *et al.*, 2007; Satyanarayana *et al.*, 2009). Pandey and Shukla (2006) reported median nerve formation medial to third part of axillary artery in 4.7% cases and the lateral root (inspite of medial) crossed the axillary artery anteriorly to join with medial root lying medial to axillary artery. In the present study the MN was formed by the fusion of three roots, two from the lateral and one from the medial cord of the BP. Higher origin of Profunda brachi artery was noted from the axillary artery. There may be compression of profunda brachi artery due to the accessory communication LR2 and MR passing in front of the artery.

CONCLUSION

Variations in the formation of the MN should be remembered during the surgical approaches and evaluation of the clinical symptoms. A well-informed clinician must know about the variations usually seen in the brachial plexus and its branches to correctly examine a clinical case and also to explain unusual clinical signs seen when one come across a lesion in a variant brachial plexus.

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