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Case Report

Anatomy Section

Anatomical Variation: Median Nerve Formation – A Case Vignette

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ABSTRACT

Variations in the arrangement and distribution of brachial plexus and its branches in the infraclavicular part are common and have been reported by several investigators since the 19th century. These variations are significant for the neurologists, surgeons, anesthetists and the anatomists. During routine anatomical dissection of the right axilla and infraclavicular region of a 45-year-old male cadaver, the medial root of the median nerve was found to receive a supplementary branch from the medial aspect of the terminal portion of the lateral cord of brachial plexus and the branch was passing infront of the axillary artery from lateral to medial side. The median nerve was formed by joining of the lateral and medial roots from the lateral and medial cords of brachial plexus, infront of brachial artery, lower down, at the junction of upper one-third and lower two-third of the arm, instead in the axilla. This variation could be one of the cause of pressure symptom which occurs on the axillary artery and also the injury which occurs on the lateral cord or upstream to the lateral cord, which may sometimes lead to an unexpected presentation of weakness of forearm flexors and thenar muscles.

Keywords: Brachial plexus, Infraclavicular, Median nerve, Supplementary branch

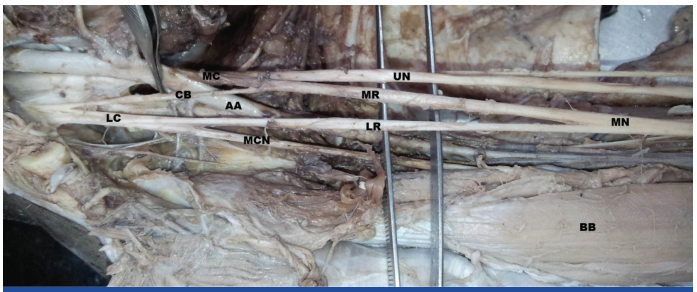
CASE REPORT

In this study, 30 upper limbs of 30 human cadavers were dissected in the Department of Anatomy, SMIMS, Gangtok, India. The brachial plexus was dissected as per Cunningham's practical manual guidelines. In the right upper limb of a 45-year-old male cadaver, we observed that the medial root of the median nerve received a supplementary branch from the medial aspect of the terminal portion of the lateral cord of brachial plexus and that branch was passing in front of the axillary artery, from lateral to medial side. The median nerve was formed in the anterior and medial aspect of the brachial artery by joining of lateral and medial roots from the lateral and medial cords of brachial plexus lower down, at the junction of the upper one-third and lower two-third arm instead of being in the axilla [Table/Fig-1]. The lateral root of the median nerve originated as usual, from the lateral cord and it crossed the brachial artery anteriorly from lateral-to-medial side and joined with medial root to form the median nerve in the middle of the arm. This variation was unilaterally seen on the right side.

DISCUSSION

The knowledge on variations in the course and branching of the brachial plexus assumes importance while neurotization of brachial-plexus lesions, shoulder arthroscopy through anterior gleno-humeral portal and shoulder-reconstructive surgeries are performed [1,2]. In the present case, a variation in the median-nerve formation was documented and also the median nerve's medial root had received a communicating branch from the lateral cord of brachial plexus, in the infraclavicular region. The communicating branch between the lateral cord and the medial root crossed obliquely downwards and medially in the narrow space, anterior to the axillary artery.

A similar case was reported during routine dissection which was done of left supraclavicular region and axilla of a preserved cadaver of a 69-year-old male, in which the medial root of the median nerve received a subsidiary branch from the lateral cord and this branch was placed between the axillary artery anteriorly and unusually high in deep brachial artey posteriorly, but the formation of median nerve was in its normal position [3]. In the present case, the median nerve was formed by joining of the lateral and medial roots from the lateral and medial cords of brachial plexus, lower down in the arm. Similar cases were also reported by Gupta C and Swanat SP [2,4]. The variation in the formation of the median nerve is of great clinical significance with respect to the relation of the nerve, for both itself and the neighbouring structures. The communicating branch from the lateral cord of brachial plexus to medial root of median nerve can cause pressure symptoms on axillary artery, depending on their locations. This can lead to ischaemic pain at different levels of arterial insufficiency, with postural motion of shoulder joints and complications with anterior surgical procedures carried out at the joint [5]. The anatomical variation in the median nerve has practical implication, since any injury caused to this nerve in the axilla or arm could cause unexpected paralysis of the flexor musculature of the elbow and hypoesthaesia of the lateral surface of the forearm. Knowledge on the variations of the brachial plexus is also important during nerve blocks which are formed on infraclavicular part of brachial plexus. Normal functioning of the



[Table/Fig-1]: Variation in the formation of median nerve
LC-Lateral cord, MC-Medial cord, CB-Communicating branch, AA-axillary artery, MCN-Musculocutaneous nerve, UN-Ulnar nerve, MR-Medial root, LR-Lateral root, MN-Median nerve, BB-Biceps brachii muscle

limbs may not be altered by these variations, but it is important to remember these variations during performance of surgical and anaesthesiological procedures [6].

Embryological Explanation

On the basis of embryological development, anomalous pattern of the median nerve can be explained. The upper limb buds lie opposite the lower five cervical and upper two thoracic segments. As soon as the buds form, the ventral primary rami of the spinal nerve penetrate into the mesenchyme of limb bud. Immediately, the nerves enter the limb bud and they establish intimate contact with the differentiating mesodermal condensations. The early contact between nerve and muscle cells is a pre-requisite for their complete functional differentiation [7].

The growth as well as the pathfinding of nerve fibres towards the target is dependent on concentration gradient of a group of cell surface receptors in the environment [8]. Several signaling molecules and transcription factors have been identified, which induce the differentiation of the dorsal and ventral motor horn cells. Misexpressions of any of these signaling molecules can lead to abnormalities in the formation and distribution of particular nerve fibres [7].

CONCLUSION

Anomalies of the nerve structures would be one of the sources of atypical clinical and electromyographic findings, which can lead to diagnostic errors. Therefore, variations in the formation of median nerve maybe of critical importance for surgeons and anaesthesiologists, while they carry out surgical procedures

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