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Case Report
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Absence of Median Nerve in Cubital Fossa - A Rare Anatomical Variation

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ABSTRACT

Introduction: during routine dissection of a formalin fixed male cadaver, an unusual course of median nerve (MN) was observed in right upper limb. MN was piercing the humeral head of pronator teres muscle in the arm itself and passing through it until its lower border in the mid forearm. The median nerve was not observed to be passing through the cubital fossa. We report this variation since it is very rare and is enlightening for the clinicians, surgeons and radiologists.
Key words: Anatomic Variation; Median Nerve; Median Nerve Entrapment; Nerve Compression Syndromes.

Introduction

The median nerve (MN) arises by two roots from the brachial plexus. Its medial root begins from the medial cord and lateral root from the lateral cord.1 MN is formed lateral to axillary artery in the axilla. The MN contains motor as well as sensory fibres which originate from C5- T1 spinal segments. MN descends downwards and runs in the medial aspect of arm. Then it enters cubital fossa (CF) where it runs on medial aspect of brachial artery. MN leaves CF admist humeral and ulnar heads of pronator teres (PT) muscle. In the forearm MN gives muscular branches to supply superficial flexor muscles and it gives anterior interosseous nerve to supply deep flexor muscles. Near the wrist, nerve passes underneath flexor retinaculum, traversing the carpal tunnel to emerge in the palm where it gives muscular branches to supply intrinsic muscles of hand and cutaneous branches. MN is more prone for entrapment near cubital fossa and carpal tunnel. Incidence of proximal MN entrapment is lesser than that of carpal tunnel syndrome.[2] Since the mechanism as well as diagnosis of proximal median nerve entrapment syndrome (PMNS) is more complicated, the thorough knowledge of anatomy of MN course, branching pattern and variations is very essential in clinical practice.

Case Report

During the routine cadaveric teaching of CF for under graduate medical students it was observed that MN was absent in the CF (Fig. 1). The other contents of CF were observed and found to be normal. To study the course of MN further exploration was done and the nerve was traced from its origin. The formation of MN in the axilla was normal by the union of medial and lateral roots and then descended downwards along the ulnar side of the arm. Just above the medial epicondyle it pierced the humeral head of PT (Fig. 1). After passing through the substance of PT, it came out from the muscle in the forearm at the distal border of it. Since the MN pierced the PT muscle proximal to elbow joint (Fig. 1) the nerve was not seen in CF. Beyond the distal border of PT it gave the anterior interosseous nerve (AIN). Remaining course of the MN and AIN was found normal. The other branches of the brachial plexus and vascular pattern of the limb was found normal.

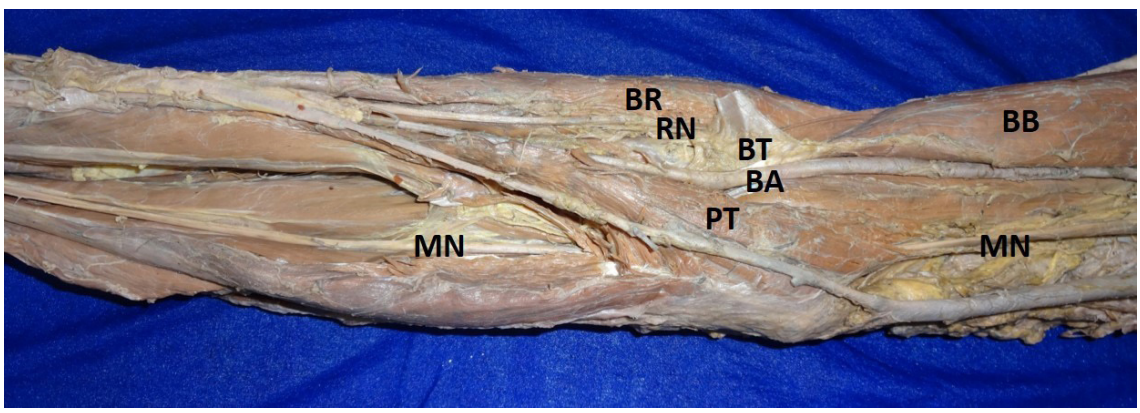

Figure 1. Right upper limb of male cadaver showing the variant course of the MN (MN- median nerve, BB – biceps brachii muscle, BR– brachioradialis muscle, PT– Pronator teres muscle, BT- biceps brachii tendon, RN- radial nerve, BA – brachial artery)

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Discussion

Study of variations in course of MN is important due to its diagnostic and surgical importance. MN is an important neural structure in the CF which has to be identified during surgical procedures in order to avoid injuries.[3] Injury to the MN can lead to loss of flexion of hand. Various studies have been done to study the course and variation in the MN. Hence our case will support such studies. Pronator syndrome or proximal MN entrapment syndrome, at the level of elbow is a common medical problem and was described for the first time in 1950s.[4] This syndrome is not as common as carpal tunnel syndrome and it is considered as an extremely rare diagnosis.[2] The causes for MN entrapment in the proximal part of forearm include morphological variations in PT muscle, presence of proximal arch of flexor digitorum superficialis muscle, lacertus fibrosus and presence of ligament of Struther.[4]

The knowledge of relation between MN and PT muscle is significant because clinical diagnosis of pronator syndrome is difficult. Neuropathy of pronator syndrome varies with site of compression of MN and often mistaken with the carpal tunnel syndrome.[4] Hence thorough clinical examination and investigations are required to distinguish the pronator syndrome from the carpal tunnel syndrome. Vymazalova *et al*.[5] have studied the variability in PT muscle in 68 limbs in which MN was passing between two heads in 85.35%, through ulnar head in 5.9% and no limb (0%) showed the nerve passing through humeral head. Though some authors.[6,7] have reported about the MN piercing the humeral head of PT, the present variation is a rare case and should be considered by the clinicians.

To treat the proximal MN entrapment, PT muscle has to be surgically dissected with care and the MN released. During dissection of PT, surgeons should be careful, considering the variant intramuscular course of MN.[2] MN is used in fascicle transfer to musculocutaneous nerve to restore elbow flexion in brachial plexus palsy in the newborn. In this procedure, MN is mobilized from the CF, where it is medially related to brachial artery.[8] Absence of MN in the CF will hinder such procedures. Hence pre-operative evaluation of course of MN could help the surgeons.

During the reconstruction of the central band of interosseous membrane in case of longitudinal instability of forearm persisting for a long time, the PT transfer is used. In such procedure, identifying the MN with relation to the PT is very essential.[9] Babbai-Ghajani *et al*.[10] have studied the ultra-sonographic reference values for the MN at the level of PT. They have concluded that the measurements obtained from their study will help in the diagnosis of MN entrapment. MN is supplied by a nutrient branch from anterior ulnar recurrent artery.[11] If the MN is running within the muscle substance, there may be compression of this nutrient branch of the artery, which may lead to nerve ischemia.

Shinichi Abe *et al*.[12] have studied the topographical relation between the PT muscle and MN. They have hypothesized three patterns (Pattern A, B and C) of morphological development in which the MN adopts its course between the two heads of PT muscle. In pattern A, the nerve passes between the two heads of PT in early developmental stage. In pattern B, the nerve pierces the muscle and in later developmental stage the muscle will be divided into two heads. In pattern C, the nerve will pass between two anlagen of muscles in early developmental stage, then muscle will fuse and finally nerve will pass piercing the muscle fibres. The course of MN in the present case follows the pattern C.[12]

Conclusion

Entrapment of MN by the PT muscle is the common cause for proximal MN entrapment syndrome. Hence the knowledge of variation in the course of MN in the upper part of fore arm is essential. This will help to differentiate the carpal tunnel syndrome and proximal MN entrapment syndrome. This rare type of variation is enlightening for orthopaedic surgeon and neurosurgeons during various surgical procedures related to MN or related structures in the CF.

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