

A Variation in the Formation of the Median Nerve in a female cadaver

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SUMMARY

A complete knowledge of the normal confirmation and variation of brachial plexus, its branches and cords with which they are related is of paramount importance for anatomists, surgeons anesthesiologist and radiologists. During routine anatomical dissection of the Right and Left side of axilla of about 60 years old female cadaver, on the left side of the body, the medial root of median nerve and lateral root of median nerve meet with each other high in the upper portion of arm near the lower portion of lateral wall of left side of axilla in relation to axillary artery which is usual in most of the routine cases. while on the right side, medial root and the lateral root of median nerve joined with each other in the lower portion of the arm in relation to brachial artery to form median nerve. To our knowledge, the association of this type of origin of median nerve in relation with brachial artery is unusual and has not been cited in recent medical literature. This particular disposition of the origin of median nerve could help to explain in some cases, that why injury of the high origin and lower origin of median nerve may lead to unexpected presentation of weakness of forearm flexors and thenar muscles.

Key words: Brachial plexus, variation, median nerve, brachial artery.

INTRODUCTION

Walsh was the first to describe brachial plexus variations reporting two brachial plexus anomalies in 350 brachial plexus dissections¹. Since then numerous description of the variation of brachial plexus and its cords have been reported^{2,3,4,5,6,7,8}. The amount of variation identified has been such that, as early as 1918, Kerr had already described 29 types of brachial plexus. However most of the studies conducted on the brachial plexus anatomy and variations have focused mainly on variation of the entire brachial plexus⁹.

The median nerve is functionally one of the most important terminal branches of the brachial plexus¹⁰. Classically, the median nerve is thought to be formed in front of the axillary artery by the union of one lateral and one median root, originating from the lateral and medial cords of brachial plexus, respectively¹¹. However, various studies have been conducted on the variation of this nerve and of the relation of this nerve with the axillary artery^{12,13} showing that traditional view of the anatomy of the median nerve is not always true.

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In this paper, the authors describe a variation in the formation of median nerve, with a usual high origin on left side and low origin in the lower portion of arm in relation of brachial artery in female cadaver that was found on a routine dissection. This constellation of variation is not found in recent medical literature.

CASE REPORT

During routine dissection of axilla and arm on either side of 60 year old female cadaver, following the recommendations of a Cunningham's Manual of Practical Anatomy¹⁴. The median nerve was formed in the anterior and medial aspect of the axillary artery by the confluence of two roots. The lateral root originated, as usual, from the lateral cord, whereas the medial root received a major contribution from the medial cord to form median nerve, but this contribution is usual on left side side in the lower portion of lateral wall of axilla in relation to axillary artery (**Fig. 1**). But on the right side lateral root also originated from lateral cord and medial root from medial cord to make contribution to form median nerve in front of brachial artery in the lower portion of the front of arm (**Fig 2**). This was unusual case of origin of median nerve in the same female cadaver with variation in its formation.



Fig. 1. variation of median nerve showing Left axilla 1(lateral root of lateral cord),2 (medial root of medial cord),3(Axillary artery), 4(Median nerve),5 (Musculocutaneous Nerve), 6(Ulnar Nerve)



Fig. 2. Variaton of Median nerve showing Right Axilla 1(Lateral root of Lateral cord),2(Medial root of Medial cord),3(Brachial Artery),4(Median nerve),5(Musculocutaneous nerve),6(Coracobrachialis muscle)

DISCUSSION

In the literature review that the authors conducted there was a partially similar variation was described in a cadaver with three anomalous in the origin and pathway of the median nerve¹⁵. In this case, one of the anomalous connections consisted of one anastomosis between the lateral cord and the medial cord, as the latter gave off the medial root of median nerve, that is to say the abnormal communication originated slightly more proximal than our case.

Like most of the human anatomic variations, the variations encountered by the authors may be plausibly attributed to random factors influencing the mechanism of formation of the limb muscles, the peripheral nerves and the vascular system during

embryonic life^{16,17}. As it is known, the limb muscles develop from the mesenchyme of seemingly local origin, while the axons of the spinal nerves grow distally to reach the muscles and skin. Thus a lack of coordination between these two processes may have lead to the variation encountered in thi.s study¹⁶.

There is mounting evidence that the connections between the musculocutaneous nerve and the median nerve are as frequent as 20.2%¹⁶. And also that the fibers that cross these anastomoses play a significant role in the innervation by the median nerve, namely pronator teres, flexor carpi radialis and thenar muscles, distal muscle belly of index of flexor digitorum superfiicialis and even to contribute to the formation of the of the lateral digital nerves¹⁸. Consequently, it is plausible that the communication herein described represents a rarer form of communication between the lateral cord, or the musculocutaneous nerve that it originates and the median nerve. This disposition of fibers could help explain why, in some cases injury of the lateral cord proximal to to the place of origin of the lateral root of the lateral cord and the medial root of the median nerve, or lesions upstream the lateral cord may lead to the unexpected presentation of weakness of fore arm flexors and thenar muscles^{19,20}. According to double crush theory of nerve compression (YAO, 2006),²¹ this may make individuals with this variation more liable to develop median nerve compression syndromes downstream (e.g. carpal tunnel syndrome) and inversely make the surgical treatment of more distal compressions less likely to be effective^{21,22}. However, more studies are needed to confirm this hypothesis.

CONCLUSION

Finally, the knowledge of this particular high and lower origin of median nerve formed by medial root of median nerve and lateral root of lateral cord may be of clinical importance for surgeons, radiologists and anaesthesiologists working in the axilla, shoulder or upper arm region in order to prevent potential iatrogeny and to facilitate interpretation of clinical findings.

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