

A unique case with splitting of the median nerve by the ulnar artery

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Abstract

Variations of the median nerve and ulnar artery have been well documented in the literature. In the present case, splitting of the median nerve by the ulnar artery is presented. Our literature searches revealed that there was no article, to our knowledge, describing such splitting. We think that this variation should be kept in mind during surgical and diagnostic procedures.

Keywords: median nerve, ulnar artery, variation, upper limb.

Introduction

Anatomical variations of the median nerve are not uncommon. They are usually detected incidentally at the time of imaging studies, operations, or dissection studies. Additionally, several types of median nerve variations have been reported in the literature [1]. Cases of a split median nerve have also been documented. There have also been reports of a split median nerve accompanied by a persistent median artery [2] or abnormal muscles [3].

In the present case, splitting of the median nerve by the ulnar artery is presented.

Materials, Methods and Results

The variation was found during routine anatomical dissection, approved by the medico-legal and ethic committee, of a 50-year-old formalin-fixed male cadaver. His cause of that was cardiovascular ischemic disease. While dissecting of the left upper extremity,

showing no signs of accidental, surgical trauma, or necropsy, we encountered splitting of the median nerve by the ulnar artery (Figure 1).

The median nerve was formed by roots coming from the medial and lateral cords of the brachial plexus, and continued down the arm in the medial bicipital groove together with the brachial artery and the ulnar nerve. The median nerve had no branch in the arm and crossed the brachial artery anteriorly to run medial to it. The median nerves arise from the cubital fossa and passed between the two heads of the pronator teres muscle. In the proximal third of the forearm, it split into two unequal branches. These branches continued distally approximately 3 cm in length and then reunited to form the common trunk of the median nerve. The brachial artery splitted into the radial and ulnar arteries under the bicipital aponeurosis. After passing through the pronator teres muscle the ulnar artery then continued distally and splitted the median nerve (Figure 1).

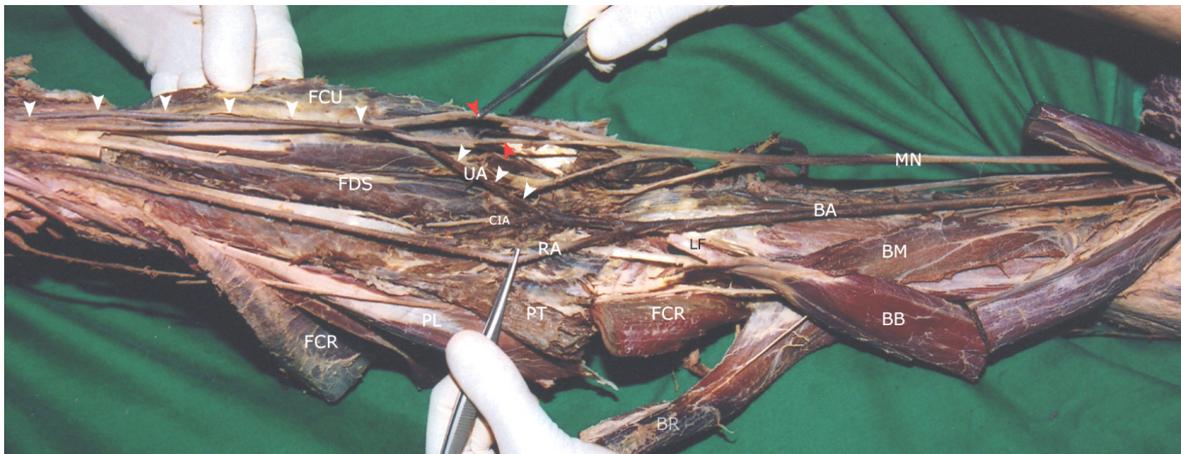


Figure 1 – Photograph of the upper limb of our case. The median nerve was splitted by the ulnar artery. BA: brachial artery, BB: biceps brachii muscle, BM: brachialis muscle, BR: brachioradialis muscle, CIA: common interosseous artery, FCR: flexor carpi radialis muscle, FCU: flexor carpi ulnaris muscle, FDS: flexor digitorum superficialis muscle, LF: lacertus fibrosus, MN: median nerve, PL: palmaris longus muscle, PT: pronator teres muscle, RA: radial artery, UA: ulnar artery, white arrow heads: ulnar artery, red arrow heads: split median nerve.

The median nerve seemed to be formed a ring around the ulnar artery. After splitting, the ulnar artery continued down the forearm as normal in every aspect.

Discussion

Cases of a split median nerve have been encountered during surgical procedures, anatomical dissections, preoperative sonographic or MR imaging studies [4]. Occurrence of the split median nerve is uncommon (1–3%) [5]. Lanz U [6] studied on 246 hand specimens and classified the median nerve variations as follows: I – variation in the course of the thenar branch; II – accessory branches at the distal portion of the carpal tunnel; III – high divisions of the median nerve; and IV – accessory branches proximal to the carpal canal. Occurrence of the high division of the median nerve has been reported as most typically on the distal third of the forearm [5]. However, in the present case splitting level was the proximal third of the forearm.

The coexistence of the split median nerve with other anomalies has also been documented in the literature. These coexistences were appeared to be quite frequent. An abnormal insertion of a muscle and persistent median artery could be listed under these variations [5]. Srivastava SK and Pande BS [7] reported that the median artery originated from ulnar artery split the median nerve. Ebied AM [3] reported splitting of the median nerve by abnormal palmaris longus muscle tendon during carpal tunnel surgery. This abnormal tendon was responsible for his patient's classical carpal tunnel symptoms. Sañudo JR *et al.* [2] described a high division of the median nerve, which forms a ring around persistent median artery after passing through the pronator teres muscle. In the present case, aforementioned ring was observed but it was around the ulnar artery.

Development of arteries of the upper limb has been proposed in five stages [8, 9]. During development of the arteries in the upper limb an axial system consisted of axillary, brachial, and interosseous arteries develops first while other branches develop later from the axial system. In stage 2, median artery branches from the anterior interosseous artery, while the ulnar artery branches from the brachial artery in stage 3. Formation of a superficial brachial artery from axillary artery and its continuation as radial artery marks the stage 4. Regression of the median artery and an anastomosis between the brachial artery and superficial brachial artery with regression of the proximal segment of the latter gives rise to definitive radial artery. It was demonstrated by Müller *et al.* (cited by Kosugi K and Morita T [10]) that the nerve plate of the embryo

becomes perforated by a number of vessels. To explain the present anomaly it might be supposed that the ulnar artery, a remnant or enlargement of an aforementioned embryological vessels due to hemodynamic persistence, might be perforated the median nerve.

Variations of the median nerve have significant clinical implications. We think that it is important for the surgeon to be aware of the existence of median nerve variations preoperatively in order to plan the surgery. In some cases, a split median nerve has forced surgeons to convert endoscopic procedure to open release [11]. Physicians must have vigilance during imaging studies in order not to misinterpret such variations as pathologic features. Additionally, irritation of the median nerve from pulsation of the ulnar artery could also be probable and therefore it should not be overlooked in diagnostic procedures.

Conclusions

Our literature searches revealed that there was no article, to our knowledge, describing the splitting of the median nerve by the ulnar artery. We think that this variation is worthy of note for anatomists as well as for physicians who dealing with diagnostic and surgical procedures.

References

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