

## Case Report

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# A rare variation of the median nerve in its course and branching: A case report and literature review

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## Abstract

**Background:** The median nerve is vital for controlling hand movements. Thus, its variations are clinically important. In this report, we discuss a case of the median nerve with several anatomical variations.

**Case presentation:** While dissecting a male cadaver, we observed several variations in the formation of divisions and cords of the brachial plexus. Median and musculocutaneous nerves originated from a common branch of the lateral cord. Furthermore, the median nerve ran medially throughout the brachial artery.

**Conclusion:** Understanding these variations is crucial because they may affect the function of the upper limb. They can also present challenges during surgical procedures.

**Keywords:** Brachial plexus; Cadaver; Median nerve; Variation.

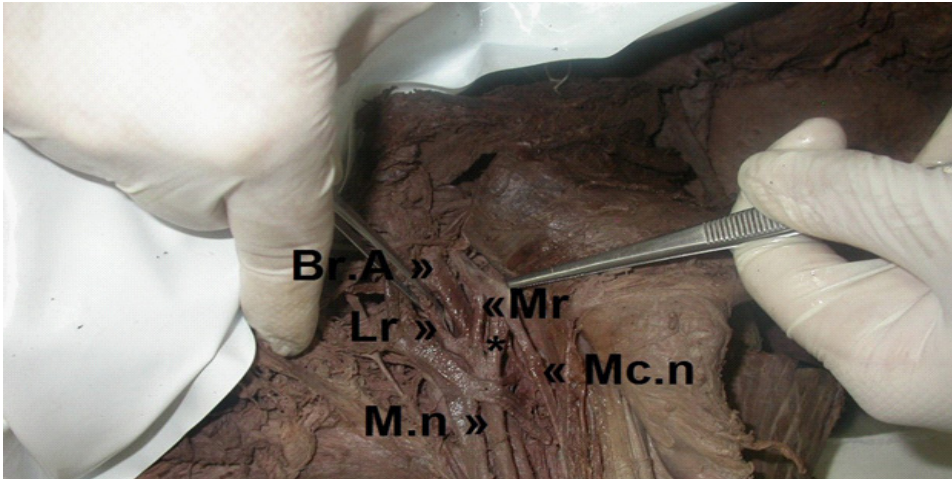
## Background

The median nerve (MN), also known as the 'laborer's nerve,' [1] controls the fine movements of the hand, as it supplies most of the superficial and deep flexors of the forearm. Thus, its variations may be of utmost clinical importance. MN usually originates from the medial and lateral brachial plexus cords and covers the third segment of the axillary artery. It is composed of nerve fibers from roots C6–T1, whereas in certain individuals, nerve fibers from C5 may also be present [2]. It then continues down the upper arm without branching and passes through the forearm between the two heads of the pronator teres. The MN passes between the flexor digitorum profundus and superficialis in the forearm. Next, the MN descends deeply to the flexor retinaculum in the hand and wrist, from which it gives out its terminal branches, which include the palmar digital branches on the medial side and the recurrent motor branches on the lateral side [3]. In this report, we present a case with several

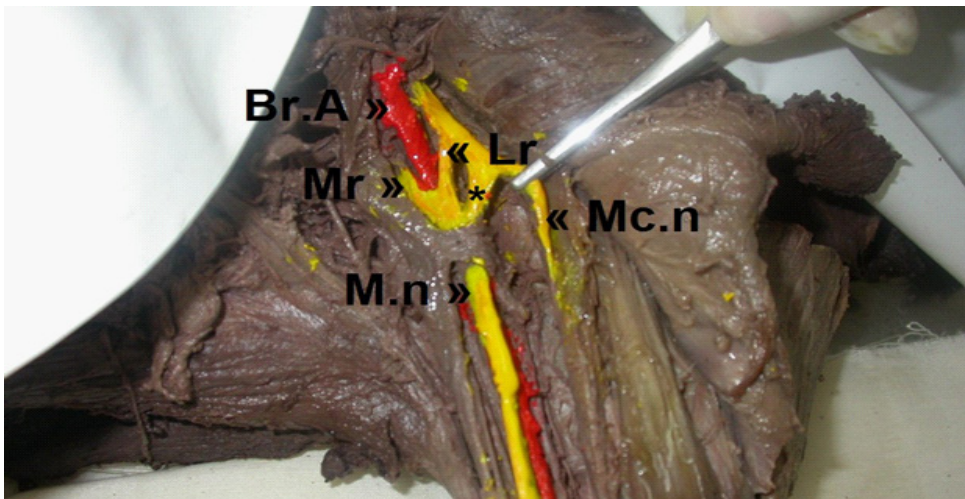
abnormalities in the path and branching of the MN, which may provide insights for clinicians dealing with this region.

## Case report

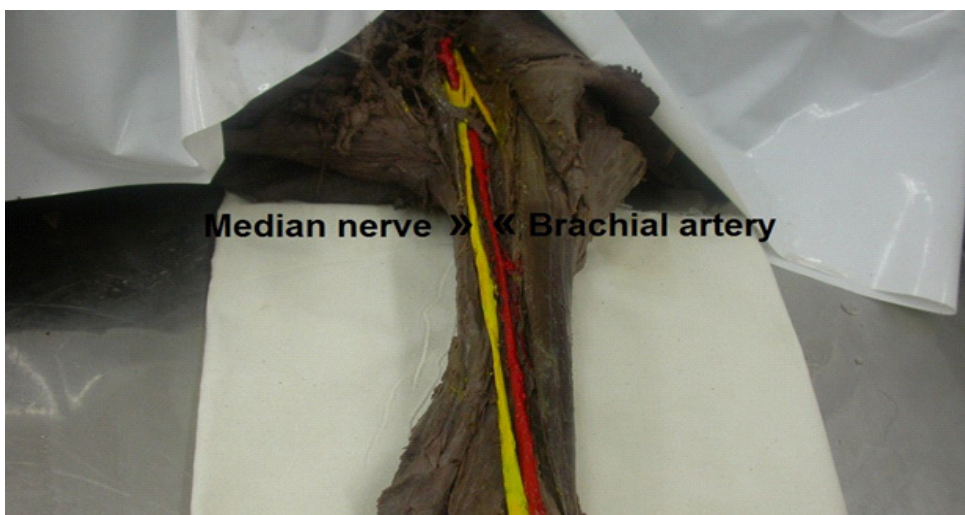
While dissecting the left brachial axillary cavity of a 60-year-old man, 168 cm tall and weighing approximately 70 kg, in the dissection hall of the Faculty of Medicine of Alborz University of Medical Sciences, which was fixed by Grant's method [4] in 10% formalin and dissected according to Cunningham's manual of dissection [5], several variations were observed in connection with the MN. There was a communicating branch between the lateral root of the MN and the musculocutaneous nerve (MCN) (Figure 1). Meanwhile, there was an additional communicating branch between these two nerves, which was more distal than the previous variation (Figure 2). Notably, the MN ran medially throughout the brachial artery, deviating from its typical anatomical course (Figure 3).



**Figure 1:** The median nerve had a common trunk with the MCN in its lateral root. There is also another communicating branch between these two nerves. Brachial artery (Br. A). The medial root of the median nerve (Mr). The lateral root of the median nerve (Lr). Musculocutaneous nerve (Mc.n). The median nerve (M.n). The communicating branch between the median and the musculocutaneous nerves (\*).



**Figure 2:** The median and the musculocutaneous nerves are yellow-colored, and the brachial artery is depicted in red. The communicating branch between the median and the musculocutaneous nerves (\*). Brachial artery (Br. A). The medial root of the median nerve (Mr). The lateral root of the median nerve (Lr). Musculocutaneous nerve (Mc.n). The median nerve (M.n).



**Figure 3:** The median nerve ran entirely on the medial side of the brachial artery despite it usually descending on the lateral aspect of the artery, then passing anteriorly and, in some cases, posteriorly to the brachial artery, and then descending on its medial side until reaching the cubital fossa.

## Discussion

Anatomical variations in the brachial plexus, such as the anastomotic branches between the MN and MCN, are not rare [6]. There have also been several attempts to classify the communicating branches between the MN and MCN. In 1998, Venieratos D et al. examined the relationship between these two nerves in 129 dissected corpses. They presented three different groups of patterns according to the location of their connection to the coracobrachialis muscle [7]. Communication in the first group occurred proximal to the MCN's entrance into the coracobrachialis muscle, but in the second group, it occurred distal to the muscle. In the third group, neither the connecting branch nor the nerve penetrated the muscle. In this case report, the results align with a similar pattern found in the first group.

Furthermore, after dissecting 453 axillae, Maeda et al. [8] discovered that 18.8% of them had MCN communicating branches to MN [9]. In Ballesteros' study, the arms of 53 cadavers were dissected, and in 17% of them, a communicating branch from the MCN to the MN existed [10]. In this study, the communicating branch was from the MCN to the MN.

Other types of MN variation have been reported in the forearm and carpal regions, such as high division in the MN proximal to the carpal tunnel, also referred to as a bifid MN, which was reported by Spagnoli et al. and was linked to carpal tunnel syndrome (CTS) [11]. Amadio et al. [12] also documented high bifurcation of the MN in 9 cases of carpal tunnel decompression surgery [12]. There have also been other reports of bifurcation of the MN in patients with CTS [13-15]. Trifurcation of the MN has also been observed in some cases. Lonie S et al. reported an MN trifurcation in a 32-year-old man diagnosed with CTS [16].

Furthermore, less than 50% of the 100 hands examined by Stancić et al. [17] fit the MN anatomy previously reported in the literature. To reduce the possibility of improper decompression surgery, they proposed that awareness of these abnormalities should be applied before surgery [17]. Therefore, it is believed that research in the field of pure anatomy has reached a dead end, and these cases open a new horizon in this matter. These cases are paramount in clinical practice and the safety and success rate of surgical procedures [18-21]. The instance reported by Hagemann et al. illustrates this point where an MN to MCN transfer was abandoned because of a neuroanatomical variation [22].

## Conclusion

We report a case with several variations in the MN in its course and branching. Surgeons should be aware of these variations to maximize the success rate of surgical operations and ensure patient safety. Familiarity with the path of peripheral nerves is crucial for explaining sensory and motor loss during injuries and the occurrence of musculoskeletal diseases. In addition, it can aid in diagnostic methods such as electromyography (EMG).

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