

An Unusual Third Root of the Median Nerve from the Musculocutaneous Nerve: A Case Report

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ABSTRACT

Nerve variations in the brachial plexus, particularly the median nerve, are clinically significant due to their implications in surgeries and nerve compression syndromes. This case report details an anatomical variation observed during the routine dissection of a 72-year-old male cadaver. A third root of the median nerve originating from the musculocutaneous nerve was found in the right upper limb. This finding aligns with previous studies on brachial plexus variations and underscores their importance in surgical planning and nerve repair procedures. Knowledge of such anomalies is crucial for preventing iatrogenic injuries and improving outcomes in reconstructive surgeries.

Keywords: Prosection; Brachial plexus; Median nerve; Musculocutaneous nerve

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INTRODUCTION

Nerve variations have been documented in the brachial plexus, most commonly observed in the anterior divisions. The median nerve is one of the branches of the brachial plexus, formed by the union of two roots: the lateral root and medial root coming from the lateral and medial cord, respectively. It runs through the anterior compartments of the arm and forearm before terminating its path in the hand and digits. Median nerves are associated with several variations, including abnormal communication with musculocutaneous and ulnar nerves, as well as several roots [1,2]. The present report demonstrates the median nerve variation with a third root in the right upper limb. The nerve variations of the upper limb are very important in routine surgery and during radical neck dissections where these variations are more subjected to iatrogenic injury. These variations

may also help in the interpretation of nerve compression with unexplained clinical symptoms. As concomitant nerve injuries are also common in limb trauma, identification and knowledge of such nerve variations will help restore sensory and motor function in reconstructive surgeries and aid rehabilitation processes.

CASE PRESENTATION

During routine prosection in the dissection lab at the Medical University of the Americas, Nevis, a third root of the median nerve was observed in the right upper limb of a 72-year-old American male cadaver. The cadaver was obtained through the body donation program. The lateral and medial roots of the median

nerve were of normal origin, as branches of the lateral and medial cords, respectively. However, a third root of the median nerve in the right upper limb was observed to take its origin from the

musculocutaneous nerve and join the median nerve at the level of the mid-shaft of the humerus (Figures 1 and 2). The rest of the branches at the origin in this area were normal.



Figure 1: LRMN- Lateral root of the median nerve, MRMN- Medial Root of the median nerve, MCN- Musculocutaneous nerve, MN- Median nerve, CBM- Coracobrachialis muscle, AA- Axillary artery.

DISCUSSION

Variations in the nerve roots and branches of the brachial plexus are crucial for clinical and surgical considerations. The variations in the brachial plexus, particularly in the formation of the medial and lateral cords and the distribution of its branches, have been extensively studied and reviewed by Kerr [3] and Walsh [4]. Typically, the lateral root of the median nerve originates from the lateral cord, while the medial root comes from the medial cord of the brachial plexus. These roots surround the third part of the axillary artery. The median nerve is formed by the union of the lateral and medial roots, either anterior or lateral to the axillary artery. According to Moore and Dalley [5], the formation of trunks, divisions, or cords can sometimes be absent, and the lateral and medial cords may receive fibers from anterior divisions either proximal or distal to their usual formation level.

Ahmet et al. observed a variation in the formation of the median nerve in a 66-year-old male cadaver during the dissection of 20 adult cadavers' upper extremities. They noted an unusual root to the median nerve with anastomosis from the musculocutaneous nerve to the median nerve in the proximal part of the left arm. Another unusual root also came from the musculocutaneous nerve after piercing the coracobrachialis muscle and then joining the median nerve [6]. Venieratos D, et al. [7] classified the

communication between the musculocutaneous and median nerves into three types based on the communication sites:

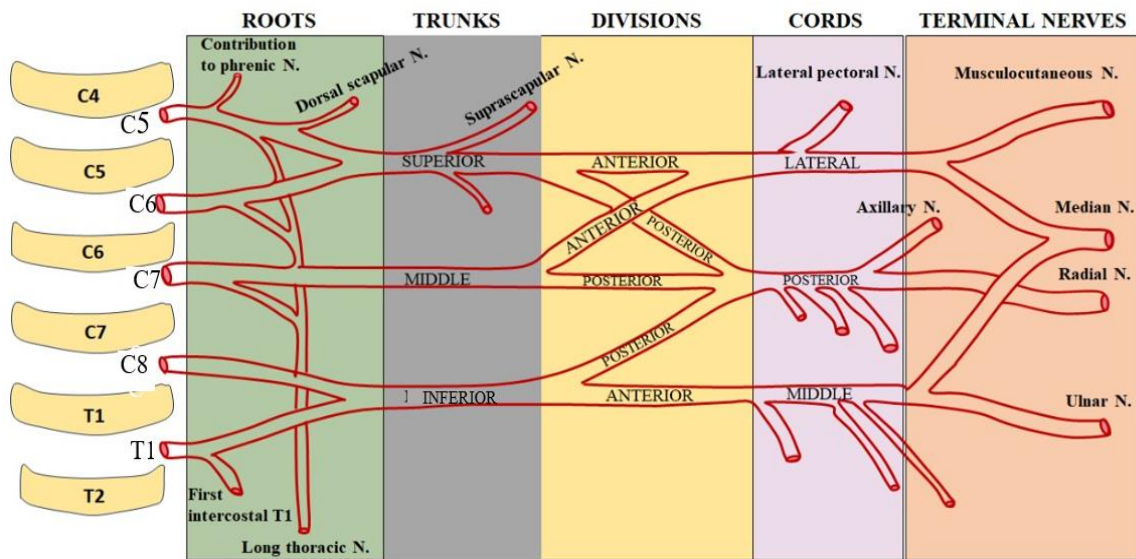
- Type I: Communication proximal to the musculocutaneous nerve entering the coracobrachialis.
- Type II: Communication distal to the muscle.
- Type III: The nerve and the communicating branch do not pierce the muscle.

Kishore et al. described cases where the musculocutaneous nerve did not pierce the coracobrachialis muscle. In one instance, after giving a branch to the brachialis, the musculocutaneous nerve joined the median nerve [8].

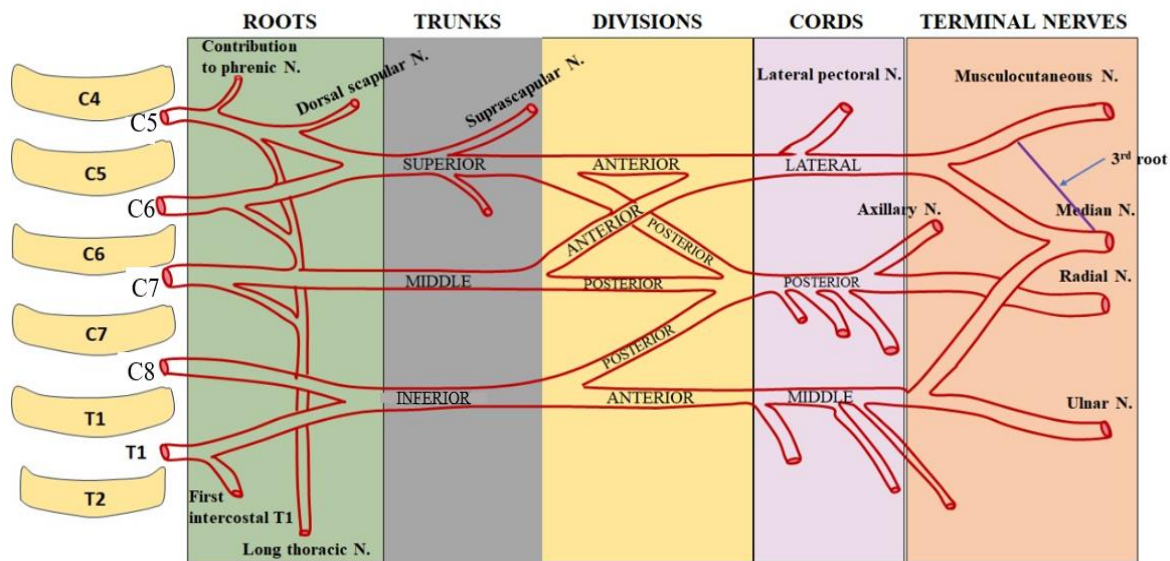
Budhiraja et al. found variations in the formation of the median nerve in 196 upper limbs. They reported three roots participating in the formation of the median nerve in 22.4% of the limbs, with the third root arising from the lateral cord in 14.2% and from the musculocutaneous nerve in 8.16%. Four roots were involved in 3.57% of cases, with the third and fourth roots originating from the lateral cord and musculocutaneous nerve, respectively. The median nerve formed in the arm in 17.3% of cases, medial to the axillary artery in 6.12%, and anterior to the axillary artery in 1.53% [2].

A third root of the median nerve was seen originating from the right musculocutaneous nerve and joining the median nerve at the level of the mid-shaft of the humerus in this unusual case of median nerve formation. It is usual for the variation to be unilateral, as observed in this cadaver. The variation observed in this cadaver highlights the complexity and diversity of neural interconnections in the upper limb. These findings are consistent with previous reports in anatomical literature but provide further reinforcement of these variations that can aid in surgical planning, especially neurotization of neural

and muscular lesions, shoulder reconstructive surgeries, or any anesthesiologic procedures involving nerve blocks. The potential for nerve damage due to supracondylar humerus fracture, procedures like radical neck dissection, or axillary surgery necessitates a thorough understanding of these variations. The nerve impairment can lead to adduction of the wrist, loss of pronation of the forearm, weakness in wrist flexion, loss of thumb flexion, atrophy of the thenar muscles, and loss of sensory function in the corresponding areas [9].



Normal schematic diagram of Brachial Plexus



A schematic diagram showing 3rd root from musculocutaneous nerve joining the median nerve

Figure 2: A schematic diagram of brachial plexus and 3rd root from musculocutaneous nerve.

CONCLUSION

Variations in nerve branches such as this should be acknowledged by anatomists, radiologists, anesthesiologists, and surgeons for atypical clinical presentations, which may contribute to the explanation of diagnosis and surgical treatment procedures. This knowledge can prevent or minimize postoperative complications in and around those significant regions during surgery and reconstructive procedures. This case report, therefore, highlights the need for anatomical observation and reporting along with clinical vigilance to variations and anomalies, to enhance patient care in relevant medical specialties.

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