



## Rare Branching Pattern of Brachial Plexus- A Case Series

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### ABSTRACT

**Introduction:** The musculocutaneous nerve is one of the branches from the lateral cord of brachial plexus. This nerve is solely devoted to the flexor compartment of arm hence it is called as nerve of arm. Numerous studies have been reported about the variations of this nerve but the real prevalence is still unknown, whereas, it may be hypothetical.

**Case report:** This study shows a rare branching pattern where a thin nerve takes origin from the medial fasciculus of brachial plexus which then pierces the coracobrachialis and lies between the biceps brachii and brachialis. The nerve then pierces the biceps to supply the skin over the lateral surface of forearm. The median nerve took over the muscular branches of musculocutaneous nerve by giving off the branches to both biceps and brachialis.

**KEY WORDS:** Brachial plexus, musculocutaneous nerve, Median nerve.

### INTRODUCTION

Brachial plexus is a complex structure. Hence it is very important for a clinician and students to understand the normal anatomy and also the variations in the formation of the brachial plexus. We can assess individual nerve by electromyography and nerve conduction studies. These tests help the clinicians for the assessment of the nerve involved for any clinical or surgical condition.<sup>1</sup>

The musculocutaneous nerve takes origin from the lateral cord, C5-C7 of the Brachial plexus. Then it pierces the Coracobrachialis muscle which it supplies, then it lies between the biceps brachii and brachialis. After supplying all three muscles of the flexor compartment of arm, it runs lateral to the biceps brachii and becomes cutaneous thus named as musculocutaneous nerve. The cutaneous branch then follows the cephalic vein and supplies the skin on the lateral side of the forearm. This study is useful as many surgical procedures in the upper limb such as flap dissections, peripheral nerve repairs, post traumatic surgical evaluations require the knowledge of the normal as well as the variations of the structures. Even peripheral nerve stimulation is a common practice in anaesthesia hence the knowledge of such variation plays significant role.<sup>2</sup>

For students learning point of view, it is important to know the normal as well the variations in the formation of brachial plexus which helps them to gather knowledge about normal anatomy and for future applications.

Several studies have been carried out about the variability of the musculocutaneous nerve but very few similar findings were found in the past.

This is a rare case report on the unilateral absence of Musculocutaneous nerve which was noted during routine dissection and the median nerve took over the territory of musculocutaneous nerve.

### CASE REPORT

This variation was observed in a cadaver in the right upper limb among the 30 upper limbs of 15 cadavers preserved in 10% formalin during the routine undergraduate teaching. The dissection was performed meticulously following all the steps. The trajectory of the nerve was analysed.

The median nerve took over the musculocutaneous nerve. Interestingly, a branch from the medial cord of median pierces the coracobrachialis then it runs in between the biceps brachii and brachialis below. The lateral cord has not given any branch to the muscles of arm. It has given off the lateral root of median nerve and lateral pectoral nerve. This nerve then pierces the biceps brachii proximal to the cubital fossa and continues as the lateral cutaneous branch to supply the skin over lateral aspect of forearm. Separate muscular branches from the median nerve supplying the biceps brachii and the brachialis were observed.

## PICTURES



**Figure-I:** a muscular twig from the medial root of median nerve which is piercing the coracobrachialis muscle.



**Figure-II:** lateral cutaneous nerve of forearm



**Figure-III:** muscular branches from median nerve to the biceps brachii muscle.

## DISCUSSION

Complete absence of musculocutaneous nerve is a rare variation. Though Musculocutaneous nerve variation is found to be common and several studies had been conducted but complete absence is a rare finding. In our study, we have found that the lateral cord has not given any branch to the muscles of arm which is a rare variation.

Several literatures describe the variations of musculocutaneous nerve at different levels.

Communications between musculocutaneous and median nerve is of 5 types; <sup>1</sup>

Type-I, No communication between the two nerves. The musculocutaneous nerve pierces the coracobrachialis then supplies the brachialis and biceps brachii.

Type-II, few fibres of medial root of median nerve joins the musculocutaneous nerve.

Type-III, few fibres of lateral root of median nerve joins the musculocutaneous nerve.

Type-IV, the fibres of musculocutaneous nerve join the lateral root and after some distance joins the median nerve.

Type-V, the musculocutaneous nerve is absent and entire fibres come from median nerve. In this type musculocutaneous nerve does not pierce the coracobrachialis.

In our study, we found a branch from the medial root of median nerve that pierces the coracobrachialis. So, it does not come under the classification. Hence shows a rare variation.

Sarkar A et al (2014) reported bilateral absence of musculocutaneous nerve. On left side, the Coracobrachialis supplied by a branch of lateral cord of brachial plexus which is corroborative of our study. Brachialis and Biceps brachii were supplied by Median nerve separately and then the nerve to Brachialis continuous as lateral cutaneous nerve of forearm whereas on right side, Nerve to Coracobrachialis arises from lateral root of Median nerve which gives 2 branches for biceps brachii, one for Brachialis then it becomes lateral cutaneous nerve of forearm which differs from our findings.<sup>3</sup>



Azimi A et al (2015) reported a case where lateral cord of the plexus gives off the musculocutaneous nerve and then the root continues as the lateral root of Median nerve.<sup>4</sup>

H. T. Nasrabadi et al (2017) reported a variation where Musculocutaneous nerve did not pierce the coracobrachialis and joined with the Median nerve. They also reported a thin branch arising from the anterior surface of the coracobrachialis muscle.<sup>5</sup>

Priya et al (2019) reported a case of the absence of musculocutaneous nerve in 5% of dissected limbs. Median nerve was found to be formed by 3 roots and they also found communications of 2 nerves in 13.33% cadavers.<sup>6</sup>

Ishi Jain (2021) has reported communication between Median and Musculocutaneous nerve in 5% specimens but they found musculocutaneous nerve was present in all the 120 specimens.<sup>7</sup>

The explanation of such variation may be due to the defects in the factors which are responsible for the development of the limb buds and the corresponding nerves. The regional expression of five HOX D genes is responsible for the development of forelimb muscles. It occurs from the mesenchyme of paraxial mesoderm. The motor axons reach the base of the upper limb buds to form the brachial plexus on both the sides. Several factors such as neurtin-1, neurtin-2, brain-derived neurotropic growth factor etc supports growth to happen in the right path. This kind of variation may be due to the result of failure of transmission of signals between the neuronal growth factors and mesenchymal cells during the fission of brachial plexus cords.<sup>5</sup>

## Conflicts of interest

There is no conflicts of interest to report.

## Acknowledgement

The authors are thankful to the noble soul for donating bodies for medical education and research. The first author conceived the study and the second author helped in the literature review.

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*Cite this Article: Mrinmayee Deb Barma, Harshvardhan Ahlawat (2022). Rare Branching Pattern of Brachial Plexus- A Case Series. International Journal of Current Science Research and Review, 5(10), 4026-4028*