

# Anomalies in the Infraclavicular Part of Brachial Plexus: A Cadaveric Study

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## ABSTRACT

**Objectives:** The objective of the present study was to study anomalies in the infraclavicular part of brachial plexus.

**Methods:** Total 50 upper extremities (25 adult cadavers) were dissected to observe the variations in the infraclavicular part of the lateral cord of brachial plexus. The variations were observed, and photographed in situ.

**Results:** In the first specimen, we observed formation of median nerve takes place by three roots out of which two lateral roots coming from lateral cord and one medial root was coming from medial cord of the brachial plexus. In specimen number 2 there was a communication between musculocutaneous nerve and median nerve. In specimen no 3, there was absence of medial root, so the median nerve was formed by continuation of lateral cord. In specimen no 4, the axillary artery was present anterior to the roots of median nerve. In specimen no 5, the musculo-cutaneous nerve originated at much higher level at first part of axillary artery and pierced coracobrachialis at much lower level than the usual one. In specimen no 6, one tributary of axillary vein was present anterior to the brachial plexus. During the study, we found two cases where medial root and lateral root met at

much lower level to form the median nerve than the usual level. Both were present in the left axilla.

**Conclusion:** These variations should be kept in mind during nerve block or entrapment syndromes or operations on the upper limb.

**Keywords:** Brachial Plexus, Spinal Nerves, Ventral and Dorsal Divisions, Cords.

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## INTRODUCTION

Normally the brachial plexus is formed by C5, C6, C7, C8 & T1 spinal nerves. The ventral rami of these spinal nerves unite to form the trunks. The trunk divides into ventral and dorsal divisions. The divisions unite and form the cords. These cords give various branches. The cords and its branches appear in the axilla that is the infraclavicular part of brachial plexus. Lateral cord gives its first branch lateral pectoral nerve and then divides into musculocutaneous and lateral root of median nerve. The medial cord gives its first branch medial pectoral and then gives its other branches (Williams PL, 1995).<sup>1</sup>

## OBJECTIVES

The objective of the present study was to study anomalies in the infraclavicular part of brachial plexus.

## MATERIALS AND METHODS

The present study was started in the Department of Anatomy at Dr. D. Y. Patil Medical College Kolhapur & continued in Subharti

Medical College Meerut. Total 50 upper extremities (25 adult cadavers) were dissected to observe the variations in the infraclavicular part of the lateral cord of brachial plexus. The variations were observed, and photographed in situ.

## RESULTS AND OBSERVATIONS

In the present study following variations related to infraclavicular part of lateral cord of brachial plexus were observed. All variations were unilateral.

In the first specimen, we observed formation of median nerve takes place by three roots out of which two lateral roots coming from lateral cord and one medial root was coming from medial cord of the brachial plexus (Fig 1). In specimen number 2 there was a communication between musculocutaneous nerve and median nerve (Fig 2). In specimen no 3, there was absence of medial root, so the median nerve was formed by continuation of lateral cord (Fig-3). In specimen no 4, the axillary artery was present anterior to the roots of median nerve (Fig 4).

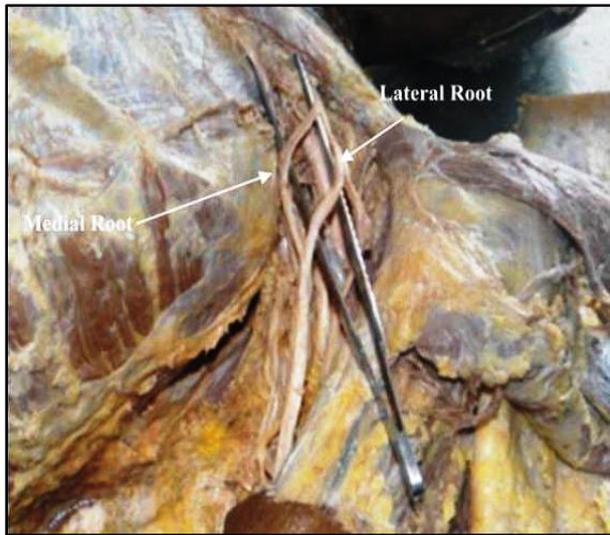


Figure 1: Formation of median nerve by three roots

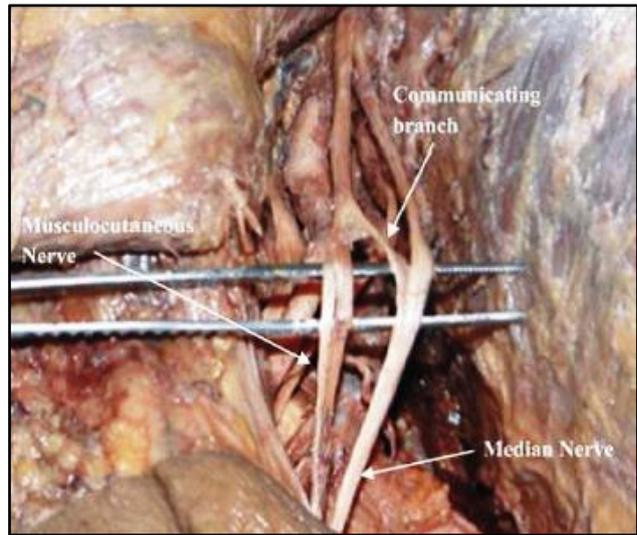


Figure 2: Communication between musculocutaneous nerve & median nerve

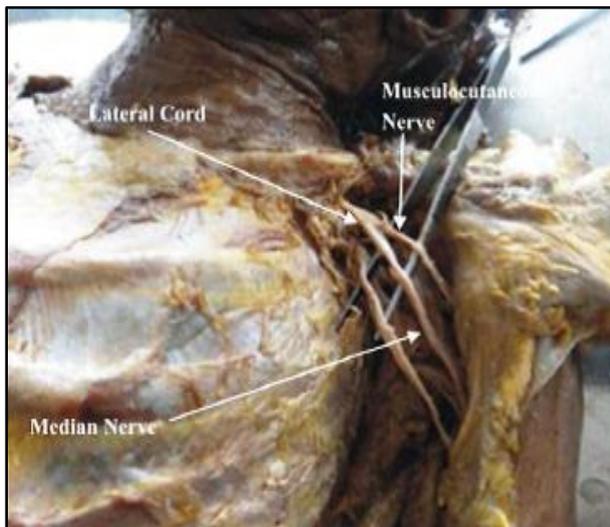


Figure 3: Median nerve is the Continuation of lateral cord



Figure 4: Axillary artery is present anterior to the roots of median nerve

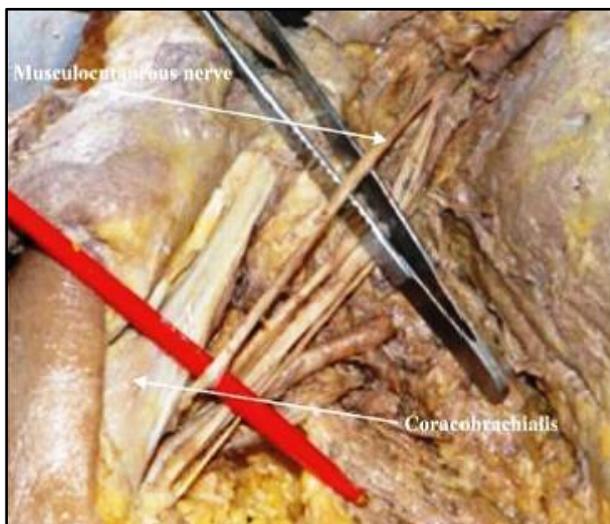


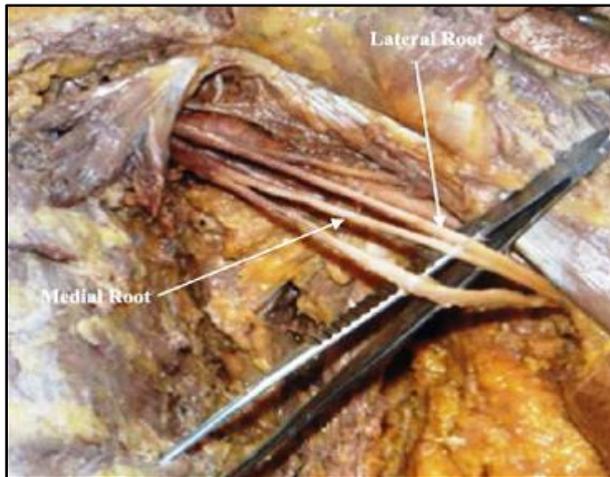
Figure 5: Musculocutaneous nerve originates at higher level and pierces coracobrachialis at much lower level



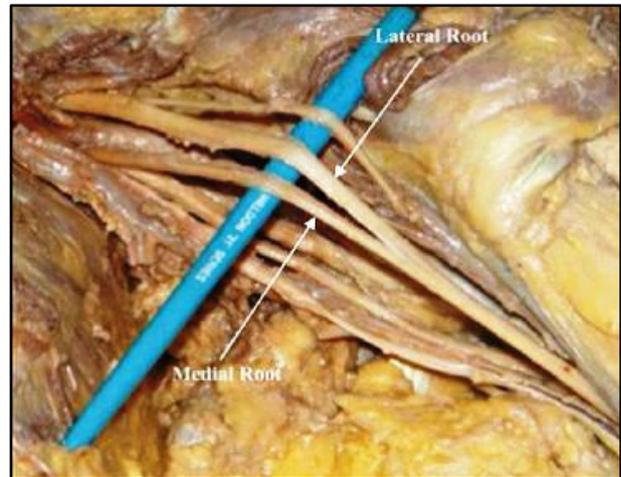
Figure 6: Tributary of axillary vein present anterior to the brachial plexus

In specimen no 5, the musculo-cutaneous nerve originated at much higher level at first part of axillary artery and pierced coracobrachialis at much lower level than the usual one (Fig 5). In specimen no 6, one tributary of axillary vein was present

anterior to the brachial plexus (Fig 6). During the study, we found two cases where medial root and lateral root met at much lower level to form the median nerve than the usual level. Both were present in the left axilla (Fig 7 & Fig 8).



**Figure 7: Medial root and lateral root meet at much lower level to form median nerve**



**Figure 8: Medial root and lateral root meet at much lower level to form median nerve**

## DISCUSSION

Variations of the brachial plexus regarding its origin, level of junction and separation of cords, composition of fiber bundle, relation with subclavian and axillary artery and absence of communication between its branches are common and are being reported by several authors (Kerr AT, 1918; Linnel EA, 1921).<sup>2,3</sup> Chauvan et al.<sup>4</sup>, reported a case of communication between median and musculocutaneous nerve. Arora et al.<sup>5</sup> reported variations of median and musculocutaneous nerves in 55 year old female cadaver. They observed that, the three roots contributed the formation of median nerve in right upper limb, musculocutaneous nerve was absent. Muscles of forearm received their nerve supply from median nerve and the lateral cutaneous nerve of forearm was derived from the median nerve. Abhaya et al.<sup>6</sup> reported a variation of musculocutaneous nerve having bilaterally symmetrical dual origin. In this case higher origin was reduced to thin nerve arising from lateral cord and supplying coracobrachialis muscle, while lower origin was supplying biceps and brachialis muscles and then continuing as lateral cutaneous nerve of forearm. Pandey et al.<sup>7</sup> studied upper limbs of 172 cadavers to know the variations of brachial plexus. They observed that, total prevalence of the variations was 12.8%. These variations were divided into three groups.

1. Abnormal location of cords (posteromedial or anteromedial to axillary artery): 2.3%.
  2. Absence of posterior cord: 3.5%.
  3. Abnormal formation and course of median nerve: 7%.
- In the present study, the total prevalence of brachial plexus variations was 36%. The prevalence of brachial plexus variations noted by previous workers in their studies was as follows:
- 1) Choi et al.<sup>8</sup>, 2002: 46.4%
  - 2) Pandey et al.<sup>7</sup>, 2007: 12.8%
  - 3) Joshi et al.<sup>9</sup>, 2008: 37.4%

So the findings of the present study nearly match with that of Joshi et al.<sup>9</sup> 37.4%. Though the variations mentioned here may not alter the functioning of limbs of individuals; it is important to keep these in mind during surgical and anaesthesiological procedures.

## CONCLUSION

The prevalence of variations in formation and branching pattern of infraclavicular part of brachial plexus is 36%. Knowledge of variations in brachial plexus is important in surgeries like radical

mastectomy. Also in fracture shaft humerus communication between median and musculocutaneous nerve may get damaged during surgery. Knowledge of these variations is important for neurologists, orthopedicians and traumatologists as this may give rise to variable clinical presentations depending upon the type of variations.

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