

# Prevalence of Absence of Musculocutaneous Nerve among the Nepalese Cadaver

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**Abstract- Backgrounds:** The Brachial plexus is a somatic plexus formed by the anterior rami of C5 to C8, and most of the anterior ramus of T1. It originates in the neck and consists of root, trunk, divisions and cords. The cords are lateral, medial and posterior cords. One of the terminal branches of the Lateral cord of the brachial plexus is the Musculocutaneous nerve. The musculocutaneous nerve is derived from the anterior rami of 5<sup>th</sup> to 7<sup>th</sup> cervical spinal nerve. It pierces the coracobrachialis muscle and descends down between the biceps brachii and brachialis muscles laterally and its continuation in the forearm is called as the lateral cutaneous nerve of the forearm. The muscles of the anterior compartment of arm i.e., Coracobrachialis, Biceps brachii and Brachialis are supplied by the Musculocutaneous nerve. Sometimes the musculocutaneous nerve may arise from the Median Nerve, Lateral root of the Median Nerve or it may be absent unilaterally or bilaterally. **Materials and Methods:** All together 26 cadavers with intact upper limbs (n=52 limbs) were taken under consideration given for dissection to the MBBS 1<sup>st</sup> year student at Department of Anatomy, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal. The data collected were of three consecutive years.

**Results:** Out of the 52 limbs studied, variation of musculocutaneous nerve was seen in 6 (11.53%) limbs. Normal origin and course of the musculocutaneous nerve was observed in the remaining 47 (90.38%) limbs. In 4 (7.69%) limbs of left side unilateral variation was seen where the musculocutaneous nerve was arising from the lateral root of the median nerve. In 2 (3.84%) limbs i.e. right & left bilateral origin of the musculocutaneous nerve from the Median nerve was observed. Out of 26 cadavers (7 F & 19 M), 3 (5.76%) upper limbs of female cadavers one unilateral and one bilateral showed the absence of Musculocutaneous nerve. In contrast to this 3 (5.76%) upper limbs of male cadavers showed only unilateral absence which all were encountered on the left side only.

**Conclusions:** So the variations in the course and origin of the musculocutaneous nerve is of much importance especially for the anaesthesiologists, neurologists, orthopedicians and surgeons. So this study will provide an evidence of anatomical variations to them.

**Index Terms-** Brachial Plexus, Musculocutaneous nerve, Median nerve.

## I. BACKGROUNDS

The Brachial plexus is a somatic plexus formed by the anterior rami of C5 to C8, and most of the anterior ramus of T1. It originates in the neck and consists of root, trunk, divisions and cords. The superior trunk is formed by the root C5-C6, middle trunk by the root C7 and inferior trunk by C8-T1. Each of the trunk divides into two divisions anterior and posterior division. The three cords of the plexus that is lateral, medial and posterior cords arise from the divisions of the trunk. These cords are named as lateral, medial and posterior with respect to the axillary artery<sup>1</sup>.

One of the terminal branches of the Lateral cord of the brachial plexus is the Musculocutaneous nerve which is derived from the anterior rami of 5<sup>th</sup> to 7<sup>th</sup> cervical spinal nerve. It passes laterally from the lateral root of median nerve and lies between the coracobrachialis muscle and the axillary artery. At this point it gives one or two branches to the coracobrachialis muscle, after penetrating the coracobrachialis it lies between the biceps brachii and brachialis muscle and then after it descends downward as the lateral cutaneous nerve of the forearm<sup>2</sup>. The median nerve is formed by the lateral and medial cords of the brachial plexus and passes in the arm ventral to the brachial artery. Generally the median nerve does not give any branches to the muscles of arm, it only gives articular branches to the elbow joint and vascular branches to the brachial artery<sup>3</sup>.

## II. MATERIALS AND METHODS

The present study was conducted during the normal practical routine of dissection of upper limbs in the cadaver for the MBBS 1<sup>st</sup> year students at the department of Anatomy of Nobel Medical College, Biratnagar, Nepal. 26 well embalmed cadavers (n=52) of known sex (7 Female and 19 Males) without any gross damage to the upper limbs were considered for the study.

Inclusion criteria:

1. Well embalmed cadavers
2. Intact upper limbs
3. Known sex

Exclusion criteria:

1. Dry cadavers, difficult to dissect
2. Damaged upper limbs
3. Unknown sex

Exposure of the cord of the brachial plexus of the cadavers was performed according to the standard procedures of Cunningham's manual of dissection volume I. All the dissection procedures was done by keeping the cadavers on supine position on the dissecting table. Bilateral exposure of the arm was done to expose the nerve.

The following parameters were recorded from the study:

1. Unilateral absence of Musculocutaneous nerve
2. Bilateral absence of Musculocutaneous nerve

3. Frequency of variation of Musculocutaneous nerve on the basis of gender.

### III. RESULTS

In the present study out of 26 cadavers ( 7 F + 19 M) only in six cadavers variation of Musculocutaneous nerve was observed.

**TABLE:I**

S.N.	Variation in Musculocutaneous n	limbs (n=52)	percentage (%)
1.	PRESENT	47	90.38%
2.	ABSENT	6	11.53%

**TABLE:II: On the basis of Symmetry**

S.N.	Symmetry	n=52	percentage (%)
1.	UNILATERAL ABSENCE	4 (Left)	7.69%
2.	BILATERAL ABSENCE	2 (rt & lt)	3.84%

**TABLE: III: On the basis of Gender**

S.N.	GENDER	UNILATERAL	BILATERAL	N=52	PERCENTAGE(%)
1.	FEMALE	1	2 (rt &lt; )	3	5.76%
2.	MALE	3	0	3	5.76%

Out of the 52 limbs studied, variation of musculocutaneous nerve was seen in 6 (11.53%) limbs. Normal origin and course of the musculocutaneous nerve was observed in the remaining 47 (90.38%) limbs. In 4 (7.69%) limbs of left side unilateral variation was seen where the musculocutaneous nerve was arising from the lateral root of the median nerve. In 2 (3.84%) limbs i.e.right & left bilateral origin of the musculocutaneous nerve from the Median nerve was observed. Out of 26 cadavers (7 F & 19 M), 3 (5.76%) upper limbs of female cadavers one unilateral and one bilateral showed the absence of Musculocutaneous nerve. In contrast to this 3 (5.76%) upper limbs of male cadavers showed only unilateral absence on the left side only.

### IV. DISCUSSION

The anomalies of the formation of the brachial plexus and its terminal branches are common and the musculocutaneous nerve has the frequent variations which may run behind the coracobrachialis muscle and adhere for some distance in median nerve and passes behind the biceps brachii<sup>4</sup>.

From the previous studies it is conformed that there are five types of variations between the musculocutaneous nerve and median nerve according to Le Minors classifications,<sup>5</sup>

Type I: no any communicating fibers exists between the musculocutaneous nerve and the median nerve as described by the classics books. The musculocutaneous n pierces the coracobrachialis muscle and innervates the coracobrachialis, biceps and brachialis muscles.

Type II: some of the fibers of medial root of median nerve and lateral root of median nerve unite to form the median nerve,

some fibers run into the musculocutaneous nerve and after some distance it join to its proper trunk.

Type III: the musculocutaneous nerve is formed from the lateral cord and then it gives off receiving fibers to join the median nerve which is formed by the medial cord.

Type IV: the median nerve gives rise to the musculocutaneous nerve then it divides into three branches to innervate the coracobrachialis, biceps and brachialis muscles.

Type V: absence of the musculocutaneous nerve.

Three different types of communication between the median nerve and musculocutaneous nerve in relation to coracobrachialis as described by by Anagnostopoulou (1998).

Type I: musculocutaneous nerve and median nerve communicate with each proximal to entrance of musculocutaneous nerve into coracobrachialis.

Type II: merging of the nerves with each other distal to the coracobrachialis muscle.

Type III: neither the communicating branches nor the musculocutaneous nerve pierced the coracobrachialis muscle.

It is important to identify and palpate the musculocutaneous nerve at the time of shoulder surgery, as it is vulnerable to injury by the retractors placed below the coracoids process. It may be damaged during coracoids process grafting, shoulder dislocations and frequent arthroscopies<sup>6</sup> Injury to the musculocutaneous nerve causes paralysis of biceps brachii and coracobrachialis which may consequently leads to the weakness of elbow joint flexion and sensory impairment on the lateral aspect of the extensor compartment of forearm<sup>7</sup>.

Study done by Prasada Rao and Chaudhary et.al., showed that the frequency of absence of Musculocutaneous nerve in 8% of 24 upper limbs. However, study on large scale as done by Le

minor showed the absence of Musculocutaneous nerve in only 0.3-2%. Another case as reported by Parchand & Patil showed that there is complete merging of the musculocutaneous nerve into the median nerve, where they reported that the biceps brachii, coracobrachialis and brachialis were innervated by the branches from the Median nerve<sup>8</sup>. Study done over a period of four years on 170 limbs (85 rt & 85 Lt) from 85 embalmed cadavers by Joshi et.al., showed that the musculocutaneous nerve was absent in 5.5 % of the cases. The incidence of variations in the formation, branching and communicating pattern between the musculocutaneous nerve and median nerve was 37.05 %. In 5.5 % (rt:7.05%; Lt: 4.7%) the musculocutaneous nerve was found to be absent and inspite they observed that fused musculocutaneous and median nerve branches innervating the muscles of the anterior aspect of arms<sup>9</sup>. Similar study done by Bhattarai & Poudel (2009) on Nepalese cadaver reported the prevalence of variations of musculocutaneous nerve in 6.25% of the cadaver and its absence ranged from 1.7% to 15%<sup>10</sup>.

#### V. CONCLUSION

So the variations in the course and origin of the musculocutaneous nerve is of much importance especially for the Anaesthesiologists, Neurologists, Orthopedicians and Surgeons. So this study will provide an evidence of anatomical variations to them.

**Images: I (absent but innervated by the branch of Median nerve)**



**Image II (absent)**



**Image III (br from Median N)**



**Image IV (normal innervation)**



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