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ANATOMICAL VARIATIONS IN FORMATION OF MEDIAN NERVE – A CADAVERIC STUDY

Anatomy

Dr. Gunjan Rai Assistant Professor, Department Of Anatomy, Institute Of Medical Sciences, Banaras Hindu University, Varanasi

Dr. Soumya Khanna* Assistant Professor, Department Of Anatomy, Institute Of Medical Sciences, Banaras Hindu University, Varanasi *Corresponding Author

Prof. Royana Singh Professor, Department Of Anatomy, Institute Of Medical Sciences, Banaras Hindu University, Varanasi

ABSTRACT

The median nerve is the nerve which supply muscles of forearm and hand. It is formed in the axilla by the union of lateral root and medial root in relation to third part of axillary artery . The present study is to note the variations in formation of median nerve and its relation with axillary and brachial artery. The study was conducted on 28 cadavers. The surgeons while performing the surgeries in arm and shoulder region should keep in mind about these variations.

KEYWORDS

Axillary Artery, Lateral Root, Medial Root, Axilla

INTRODUCTION

Median nerve is formed by lateral root of median nerve from the and medial root of median nerve that comes from lateral cord (root value C5,C6,C7) and medial cord (root value C8,T1) of brachial plexus respectively. The formation of median nerve occurs anterolaterally to the third part of axillary artery, the medial root of median nerve crosses axillary artery anteriorly to join with lateral root of median nerve (Grays Anatomy 38th edition). After travelling some distance the median nerve crosses axillary artery anteriorly and lies medial to the brachial artery and ultimately lies most medial in the cubital fossa). Knowledge of variations in median nerve is very important for surgeons to prevent any post operative complications.

The aim of the study was to note the variation in the formation of median nerve in respect to root and its relation to axillary artery and brachial artery .

MATERIALS AND METHODS

The study was conducted in the routine dissection of upper limb of 28 formalin preserved cadavers from the year 2017 to 2019 at Institute of Medical Sciences ,BHU, Varanasi and Heritage Institute of Medical Sciences , Varanasi .The brachial plexuses were dissected and the variations in formation of median nerve and its communications with other nerves as well as relationship with the axillary artery and brachial artery were observed and photographs were taken.

OBSERVATION AND RESULTS

Following aspects of variations were noted for median nerve.

1. Number of roots forming median nerve.
2. Level of joining of medial root of median nerve and lateral root of median nerve.
3. At formation site relation with axillary artery or Brachial artery
4. Communication with musculocutaneous nerve

NUMBER OF ROOTS FORMING MEDIAN NERVE-

In 43 out of 56 upper limb specimens, the percentage of median nerve formation by two roots of right limb specimens came out to be 67.85% and that of left limbs were 85.71%. In rest of the specimens median nerve is formed by three roots. The percentage of three roots in right limb specimens were 32.14% and that of left limb was 14.28%.

A rare formation of three roots was observed in one of the right limb specimen in which lateral root splits into two branches and the branch which was close to the medial root of median nerve joins with it to form a single trunk which again joins with the other branch of lateral root of median nerve .

In two specimen lateral root of median nerve first split into two and the medial one join the medial cord and the other one join the medial root of median nerve which comes from that cord. (Figure 1)

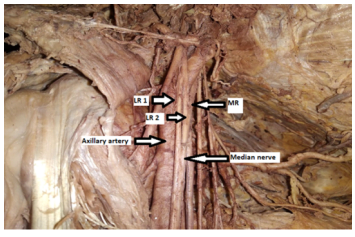

Figure 1: Lateral root of median nerve first split into two (LR 1, LR 2) and join the medial root (MR) of median nerve to form median nerve and lateral part (LR1) again join the median nerve. (right arm)

Formation of Median Nerve

Number Of Roots Forming Median Nerve	Number Of Upper Limb Specimens(N=56)	Total	Total
	Right Limb (28)	Left limb (28)	
2roots	19 (67.85%)	24 (85.71%)	43
3 Roots	09 (32.14)	4(14.28%)	13
Total	28		56

LEVEL OF JOINING OF MEDIAL AND LATERAL ROOTS-

Out of 56 specimens, 2 cases show low joining of medial root of median nerve with lateral root of median nerve (figure 2).

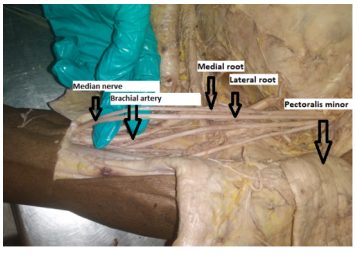

Figure 2 : Low joining of lateral and medial root of median nerve to form median nerve (left arm)

RELATION WITH AXILLARY ARTERY/ BRACHIAL ARTERY -

The course of median nerve in relation to axillary artery is normally anterolateral and in our study the distribution on right and left side were 75% and 89.28% respectively. In 17.85 % of right limb specimen median nerve was medial to axillary artery . On the other hand in left limb median nerve was running medial to the axillary artery in 10.71%.

In two right limb specimens (7.14%) there was low joining of medial

root and lateral root of median nerve and in those the median nerve was related medially to brachial artery (figure 2) .

At formation site relation with axillary artery or Brachial artery

Position Of Median Nerve	In relation to axillary artery		In relation to brachial artery	
	Right (28)	Left (28)	Right(28)	Left (28)
Anterolateral	21 (75%)	25 (89.28%)	0	0
Medial	5 (17.85%)	3 (10.71%)	2 (7.14%)	0
Posterior	0	0	0	0

It was noted that more variations were observed in right upper limb specimens.

Communication with musculocutaneous nerve-out of 56 cases in 10 cases there is communication between median and musculocutaneous nerve. In this three are bilateral and four are unilateral in right hand. Three of the unilateral right limb specimens , the musculocutaneous nerve do not pierce coracobrachialis (figure 3).

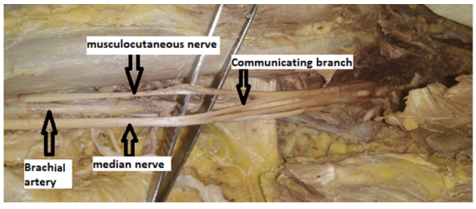

Figure 3 : Musculocutaneous nerve give a communicating branch to the median nerve and does not pierce coracobrachialis (right arm)

Communication with musculocutaneous nerve

	Musculocutaneous nerve piercing the coracobrachialis		Musculocutaneous nerve not piercing the coracobrachialis	
	Right (28)	Left (28)	Right (28)	Left (28)
Not communicating with median nerve	21(75%)	25(89.28%)	0	0
Communicating with median nerve	4(14.2%)	3(10.71%)	3(10.71%)	0

DISCUSSION-

The formation of median nerve by two lateral roots and one medial root was reported by Chauhan and Roy (2002).

The formation of median nerve by three roots, two from lateral cord and one from medial cord which is to similar to the present study is also reorted by Satyanarayana (2010).

Badawood and C.N. Mat Taib et al 2017 had reported the formation of median nerve from four roots In none of the specimens of the present study median nerve was getting formed from one root or four roots.

Normally formation of median nerve lie anterolateral to the third part of axillary artery. Chitra (2007) ,Satyanarayana et al (2009) reported median nerve formation medial to axillary artery. Pandey et al (2006) reported formation of median nerve medial to axillary artery in 4.7% cases. In our study it was found that median nerve formed medial to axillary artery in most of the variant cases.

In 2 specimen there is medial relation with brachial artery owing to the low joining of medial root and lateral root of median nerve to form median nerve. Nayak et al 2006 observed a case in which there is low joining of lateral root and medial root of median nerve which lies medial to brachial artery which is similar to our findings.

In second case variation of both musculocutaneous nerve and median nerve was noted in right upperlimb ,the lateral cord after giving a small twig to the medial root of median nerve ,continued as musculocuta neousnerve as a large trunk and it did not pierced the coracobrachialis and give muscular branch and one more branch as the lateral root of median nerve to form median nerve .Muscular branch again divide into two and supplied the muscles of anterior compartment of arm and another branch ran in between brachialis and long head of biceps and , it continues as lateral cutaneous nerve of fore arm. .

In left side of same cadver the relations of the nerves were normal but the median nerve received a twig from musculaocutaneous nerve after piercing the corachobrachialis muscle

Comparison of the incidence of communication between median nerve and musculocutaneous nerve with other authors

Author	Percentage
Venieratos and Anagnostopoulou (1998)	21%(16/79)
Choi et al.(2002)	46.4% (64/138)
Present study	17.85% (10/56)

Nayak et al gave an observation of musculocutaneous nerve not piercing corachobrachialais.

Budhiraja et al in 2011 observed low joining of lateral root and medial root in high number of cases (17.3%) . In our case it was 3.57% .

The variations observed can be accounted due to lack of synchro nization between the growth of paraaxial mesoderm and the axons of spinal nerve (Amrita et al 2015) .

CONCLUSION

In any operative procedures of the arm and the shoulder region a vivid anatomical knowledge of variations of median nerve with an emphasis on its relation with axillary / brachial artery and its communication with musculocutaneous nerve to avoid any iatrogenic injuries.

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