



STUDY OF MEDIAN NERVE AND ITS VARIATIONS, COMMUNICATIONS AND RELATIONS IN THIRTY FOUR FORMALIN PRESERVED CADAVERIC HUMAN BRACHIAL PLEXUSES

Anatomy

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KEYWORDS

BACKGROUND

Brachial plexus is a principle somatic nerve plexus supplying the upper limb situated in the posterior triangle of the cervical region and in the axillary region. The plexus is a result of union of anterior rami of inferior four cervical nerves (C5, C6, C7 and C8) and the anterior ramus of the first thoracic nerve (T1), with variable contribution from C4 and T2.

In normal anatomy, the brachial plexus is described to have roots, trunks, divisions, cords and terminal nerves [Bannister et al]¹ and median nerve is one of the nerve of Brachial plexus.

Variations involving the median nerve are not uncommon and have been linked with factors influencing the mechanism of limb muscles and peripheral nerves development during embryonic life.

Knowledge of variations in anatomy is important to anatomists, radiologists, anesthesiologists and surgeons, and has gained more importance due to the wide use of computer imaging in diagnostic medicine.

MATERIAL & METHODS

The study was conducted in the Department of Anatomy, SARASWATHI INSTITUTE OF MEDICAL SCIENCES.

Case sample

Thirty-four human brachial plexuses (15-20 formalin preserved adult cadavers)

Instruments and chemicals used:

1. Scalpel
2. Blunt forceps
3. Fine forceps
4. Scissors
5. Bone cutter
6. Calipers
7. Scale
8. Gloves
9. Facemask
10. Acetone
11. Colored Paints (Yellow, Black & Red)
12. Painting Brush

Method:-

The brachial plexus was dissected on both sides in approx. 15-20 formalin preserved adult cadavers. Lateral side of the neck, axilla and arm was dissected to expose the entire extent of brachial plexus. The various components of brachial plexus were delineated by careful fine dissection. Adequate care was taken to preserve its relations to important surrounding structures. The brachial plexus was studied systematically, noting the median nerve, its variations, communications and relations.

OBSERVATIONS

The observations recorded in the present study pertained to the

dissection of human brachial plexus and studying Median nerve and its variations, communications and relations.

Median nerve (Table 1)

The median nerve was formed by the union of lateral and medial roots arising from the lateral and medial cords respectively, in majority of cases (53.3%). In the next pattern of formation in order of frequency (23.3%), the lateral root originated from the anterior division of common trunk whereas the medial root was found to arise from the medial. Further in 6.7% cases, the median nerve comprised of a single root arising from the lateral cord and the medial root was absent.

Table 1 Formation of medial nerve

S.No.	Manner	Right	Left	Total
1.	Formed by the union of a lateral root and a medial root which arise from the lateral and medial cords respectively	66.7%	40.0%	53.3%
2.	Lateral root arises from the anterior division of common trunk. The medial root arises from the medial cord	13.3%	33.3%	23.3%
3.	Median nerve arises as single root from the lateral cord. Medial root is absent	13.3%	-	6.7%
4.	There are two lateral roots arising from the lateral cord. The medial root arises from the medial cord	-	6.7%	3.3%
5.	Lateral root is formed by the anterior division of middle trunk. The medial root arises from medial cord.	-	6.7%	3.3%
6.	Lateral root is formed by the anterior division of middle trunk. The medial root of median nerve arises from C8 root	-	6.7%	3.3%
7.	Median nerve arises as single root from the anterior division of common trunk. There is no contribution from medial cord.	6.7%	-	3.3%
8.	Median nerve arises as a single root from the anterior division of single cord	-	6.7%	3.3%



- 1-scalenus anterior muscle(SC)
- 2-phrenic nerve
- 3-C4 contribution
- 4-C5,5-C6,6-C7
- 7-CT (common trunk)
- 8-SSN(suprascapular nerve)
- 9-MC(medial cord)
- 10-anterior division of CT
- 11-MCN(musculocutaneous nerve)
- 12-lateral root of median nerve
- 13-medial root of median nerve
- 14-median nerve
- 15-ulnar nerve
- 16-subclavian nerve



9-musculocutaneous nerve, 10-middle trunk,11-lower trunk
12-ulnar nerve, 13-medial root of median nerve ,14-lateral root of median nerve



1-C5,2-C6,3-C7,4-C8,5-T1(first thoracic root),6-UT(upper trunk),7-(middle trunk)8-(lower trunk)9-Ulnar nerve,10-median nerve,11-musculocutaneous nerve ,12-coracobrachialis muscle ,13-subclavian artery,14-axillary artery

Communications between musculocutaneous and median nerves (Table 2)

In 30 brachial plexus studied (15 cadavers), there were 8 communications between musculocutaneous and median nerves. In one cadaver, these were bilateral.

The most frequent site of communication between musculocutaneous and median nerves was found to be distal to the entrance of musculocutaneous nerve into coracobrachialis (50%). However in 37.5% cases the musculocutaneous nerve as well as communicating branch did not pierce the coracobrachialis. The least frequent site of communication was seen to be proximal to the entrance of nerve into coracobrachialis (12.5%).

Table 2 Sites of communications between musculocutaneous and median nerves

S.No.	Site	Frequency
1.	Proximal to entrance of musculocutaneous nerve into coracobrachialis (Type I)	12.5%
2.	Distal to entrance of musculocutaneous nerve into coracobrachialis (Type II)	50%
3.	Musculocutaneous nerve as well as communicating branch not piercing the coracobrachialis (Type III)	37.5%

Relationship of median nerve of brachial artery (Table 3)

The median nerve was seen to descend in the arm and was placed lateral to the brachial artery in the proximal part of the arm. At the mid arm the nerve was seen crossing the artery from lateral to medial side.

Table 3 Relationship of Median Nerve to Brachial Artery

S.No.	Relationship	Right	Left	Total
1.	Nerve crosses anterior to artery from lateral to medial side	86.7%	86.7%	86.7%
2.	Nerve crosses posterior to artery from lateral to medial side	6.7%	6.7%	6.7%

In majority of cases (86.7%), the median nerve was found to cross anterior to the brachial artery from lateral to medial side. However, in 6.7% cases the median nerve was found to cross posterior to the brachial artery. Further, in another 6.7% cases, the brachial artery displayed high level of termination (in the mid arm) dividing into radial and ulnar arteries; and the radial artery was found to cross anterior to median nerve running from lateral to medial side.



DISCUSSION

The present study was aimed at investigating the anatomy of median nerve in terms of variation, communications and relations.

The origin of median nerve was formed by union of a lateral root and a medial root arising from the lateral and medial cords respectively, in 53.3% cases of present series, a pattern reported in over 86% cases in an earlier study. [Kerr AT et al]². Further, in 23.3% cases, the medial root originated from the medial cord whereas the lateral root was seen arising from the anterior division of common trunk. This mode of origin of the lateral root from the common trunk can be viewed indirectly as arising from the lateral cord. Interestingly, median nerve was formed by a single root in 13.3% cases and this root originated either from the lateral cord or from the anterior division of common trunk or from the anterior division of single cord. In the specimen displaying origin of median nerve in the form of single root arising from anterior division of the common trunk (formed by the union of upper and middle trunks) it is logical to conclude that the median nerve receives contribution from the upper and middle trunks only. Similar observation has been reported earlier [Tsikaras PD et al]³. In another 3.3% cases, the median nerve was seen comprising of three roots; two arising from lateral cord and one from medial cord. This observation has been documented earlier [Sargun MF et al]⁴.

Although in majority of cases the medial root of median nerve took origin from the medial cord, it originated from C8 root alone in 3.3% cases. It is also worth noticing that in 6.7% cases, the lateral root of median nerve arises from the anterior division of middle trunk.

Considering the site of communication between musculocutaneous and median nerves with reference to coracobrachialis muscle, it is observed that most frequently (50% cases), it lies distal to the entrance

of nerve into muscle. The frequency of this site of communication referred to as Type II is similar to an earlier report [Venieratos D et al]⁵. However the frequency of type III communication seen in 37.5% cases of the present series is much higher than reported earlier [Venieratos D et al] [Buch et al]^{5,6}.

Awareness of possible nerve communication between musculocutaneous and median nerves assumes relevance in traumatology of shoulder joint [Seradge H et al], as well as relation to repair operations [Haeri GB et al]⁸. The variation of type II when coexistent with entrapment of musculocutaneous nerve may mimic features of carpal tunnel syndrome.

The relationship of median nerve to the brachial artery reveals that the nerve crosses posterior to brachial artery in 6.7% cases of present series is quite in agreement with an earlier report [Williams PL et al]⁹. Interestingly, in a rare case of high level of termination of brachial artery in the mid arm, the radial artery crosses anterior to median nerve in the arm.

CONCLUSIONS

Although in majority of cases the median nerve is formed by the union of two roots (lateral and medial), it may comprise of either a single root or three roots in rare instances. Most frequently, the site of communication between musculocutaneous and median nerves is found to be Type II (distal to entrance of the musculocutaneous nerve into coracobrachialis) and median nerve crosses anterior to the brachial artery from lateral to median side in majority of cases.

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