

Case report

Variation in Formation of Median and Musculocutaneous Nerves and their Unusual Branches -- A case study

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Abstract

Anomalies of brachial plexus are of interest to the anatomist, clinician, anaesthesiologist and surgeons. During dissection of nerves of axillary region in case of a 65-year-old male cadaver it was found that the lateral cord of left sided brachial plexus traversed through the coracobrachialis muscle where it provided musculocutaneous nerve and lateral root of median nerve. After passing through the muscle, the lateral root gave a branch to coracobrachialis and finally joined with the medial root to form median nerve as usual. There was also an additional communicating branch between the musculocutaneous nerve and the lateral root of median nerve below the nerve to coracobrachialis.

Key Words: brachial plexus, median nerve, musculocutaneous nerve.

Keynotes: Unusual formation & communications between median and musculocutaneous nerve.

Introduction

The median nerve is formed in the axilla by the union of lateral and medial roots. The lateral cord of the brachial plexus divides into the lateral root of the median nerve and the musculocutaneous nerve and the medial root originates from the medial cord of the brachial plexus^{1, 2}. In the arm, the musculocutaneous nerve passes through the coracobrachialis muscle and innervates the coracobrachialis, biceps brachii and brachialis muscles and continues as the lateral cutaneous nerve of the forearm^{1, 2}. Commonly observed variations among the peripheral nerve are in the branching and fusion of the different branches of brachial plexus and there may be some unusual clinical symptoms due to these variations of brachial plexus³.

Material and Method

An uncommon course and distribution of lateral cord along with median & musculocutaneous

nerves were observed during routine educational dissection of a 65-year-old male cadaver in Calcutta National Medical College. Dissection was carried out bilaterally. Courses and branches of all peripheral nerves were traced carefully. The coracobrachialis muscle was cut along the course of musculocutaneous nerve. The larger segment reflected medially for better exposure of the lateral cord and its branches. Photographs of different structures were taken before and after cutting of coracobrachialis muscle.

Observations

In the left axilla of the cadaver, the undivided lateral cord of brachial plexus enters into the coracobrachialis muscle (Fig-1). Within the substance of the muscle it provided two branches- a) lateral root of median nerve & b) musculocutaneous nerve (Fig-1 & 2). Both of them pierced the coracobrachialis muscle separately (Fig-2). The point of exit of the median nerve from

the coracobrachialis muscle was anterior and inferior to that of the musculocutaneous nerve (Fig-2). Subsequently, the lateral root of median nerve gave a small unusual branch to supply the coracobrachialis muscle (Fig-2). Finally, the lateral root of median nerve joined with medial root to form median nerve, anterior to the axillary artery (Fig-1 & 2). The musculocutaneous nerve after leaving the coracobrachialis gave a communicating

branch to median nerve and also provided a muscular branch to brachialis muscle (Fig-1 & 2). Biceps brachii muscle was also innervated by the musculocutaneous nerve (Fig-2). The further courses and distributions of both musculocutaneous & median nerves were according to normal anatomy. No abnormality was detected on right side in respect to formation, branching & distribution of brachial plexus.

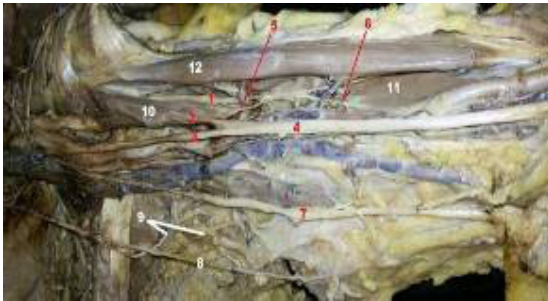


Fig-1: Formation of median nerve and its communication with musculocutaneous nerve.

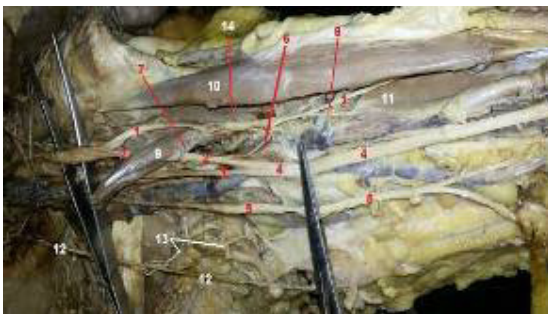


Fig-2: Branching pattern of lateral cord within the coracobrachialis muscle

Details of abbreviations used in the photographs:

Fig-1:

1. Musculocutaneous nerve.
2. Lateral root of median nerve.
3. Medial root of median nerve.
4. Median nerve.
5. Communicating nerve between musculocutaneous & median nerve.
6. Nerve to brachialis arising from musculocutaneous nerve.
7. Ulnar nerve.
8. Medial cutaneous nerve of forearm.

9. Branches of medial cutaneous nerve of arm.

10. Coracobrachialis muscle.
11. Brachialis muscle.
12. Biceps brachii muscle.

Fig-2:

1. Musculocutaneous nerve.
2. Lateral root of median nerve.
3. Medial root of median nerve.
4. Median nerve.
5. Ulnar nerve.
6. Communicating nerve between musculocutaneous & median nerve.

7. Nerve to coracobrachialis arising from lateral root of median nerve.
8. Nerve to brachialis arising from musculocutaneous nerve.
9. Coracobrachialis muscle (cut & reflected).
10. Biceps brachii muscle.
11. Brachialis muscle.
12. Medial cutaneous nerve of forearm.
13. Branches of medial cutaneous nerve of arm.
14. Nerve to Biceps brachii muscle.

Discussion

Abnormal communications between median and musculocutaneous nerve have been reported in many articles^{4,5}. Le Minor (1990) has classified the variations of median and musculocutaneous nerves in man into five types. The present study has a similarity with type III where the lateral root of the median nerve from the lateral cord runs in the musculocutaneous nerve and leaves it after a distance to join the main trunk of the median nerve⁶. Venieratos and Anagnostopoulou (1998) reported three types of communications between median and musculocutaneous nerves considering the coracobrachialis muscle as the reference point- a) In type-I: the communication was proximal to the entrance of the musculocutaneous nerve into the coracobrachialis muscle, b) In type-II: the communication was distal to the muscle and c) In type-III: the nerve and the communicating branch did not pierce the muscle.⁷ The present study corresponds with type II variety.

Regarding the communication between musculocutaneous nerve and lateral root of median nerve variable prevalence rate was observed in different literatures. It was 63.50% in study of Loukas M (2005)⁸, 12.8% in study of Pandey SK

(2007)⁹, 6% in study of Anyanwu GE (2009)¹⁰, 4.6% in study of Ray A (2013)¹¹.

The lateral cord piercing the coracobrachialis muscle was a rare finding in this study. Munjamkar P reported an abnormal formation of median nerve in the middle third of the arm and lateral cord is directly piercing the coracobrachialis muscle in the arm region of a 55 years old Indian male cadaver.¹² Abhaya A (2003) during dissection observed in the infra-clavicular part of brachial plexus of right upper limb of an 80 years old Indian male, that the lateral cord pierced the coracobrachialis muscle from its medial side, lateral to axillary artery at 92 mm from the tip of coracoids process.¹³

Chauhan and Roy (2002) advocated the interpretation of the nerve anomalies of the upper limb and communication between the musculocutaneous and median nerve as a remnant from the phylogenetic point of view, because the communication persist in monkeys and in some apes¹⁴. According to Kosugi K (1986) the variation could arise from circulatory factors at the time of fusion of the cords of the brachial plexus¹⁵. In man, the forelimb muscles develop from the mesenchyme of the para-axial mesoderm during fifth week of embryonic life¹⁶. So, any alterations in signalling between mesenchymal cells and neuronal growth cones can lead to major abnormalities¹⁷.

Though rare, an isolated lesion of the musculocutaneous nerve may occur in injuries to the upper arm and shoulder, e.g. fracture of the humerus, and in patients with neuralgic amyotrophy. There is marked weakness of elbow flexion, because biceps brachii and much of brachialis are paralysed¹. The presence of communication between musculocutaneous nerve and median nerve may lead to atypical and

infrequent presentation of paresis or paralysis of the flexor musculature and thenar muscles^{14, 18}.

For axillary lymph node and radical neck dissection the level of formation of the median nerve and its relation with the axillary vessels is important. In atypical neural presentations and communications, injury to the median nerve and/or the roots may occur, with subsequent debility of the brachial flexors. Lesions of the communicating nerve may give rise to incomprehensive patterns of weakness that may impose a diagnostic predicament. Lesion of musculocutaneous nerve proximal to the anastomotic branch between musculocutaneous nerve and median nerve may lead to atypical and infrequent presentation of paresis or paralysis of the flexor musculature and thenar muscles.^{14, 18} Padur AA et al (2016) found that coracobrachialis has dual nerve supply by musculocutaneous nerve and by an additional branch for lateral cord.¹⁹

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Precise knowledge of variations in median and musculocutaneous nerves may prove valuable in traumatology of the arm, in diagnosing and treating post traumatic peripheral neuropathies as well as in plastic and reconstructive repair operations and also during the axillary nerve block during anaesthesia²⁰.

Conclusion

A comprehensive knowledge of any uncommon course of median and musculocutaneous nerves and their branching pattern or communication have immense value in anaesthesia, surgery and in orthopaedics.

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