

## STUDY ON MODE OF TERMINATION OF MEDIAN NERVE

Pushpalatha M<sup>1</sup>, K. S. Jayanthi<sup>2</sup>

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**ABSTRACT:** Carpal tunnel syndrome (CTS) is a common focal peripheral neuropathy. Increased pressure in the carpal tunnel results in median nerve compression and impaired nerve perfusion leading to discomfort and paresthesia in the affected hand. Surgical division of the transverse carpal ligament is preferred in severe cases of CTS and should be considered when conservative measures fail. A thorough knowledge of the normal and variant anatomy of the median nerve in the wrist is fundamental in avoiding complications during carpal tunnel release.

**KEYWORDS:** Median nerve, Anatomic variation, Carpal tunnel, Transverse carpal ligament.

**INTRODUCTION:** Median nerve in the carpal tunnel terminates by dividing into medial and lateral branches. The lateral branch gives a muscular branch, which recurs around the distal border of the flexor retinaculum to supply the three thenar muscles (abductor pollicis brevis, flexor pollicis brevis and opponens pollicis). Then it breaks into digital branches contributed to both sides of the thumb and to the radial side of the index finger and common digital nerves proceed towards the interspaces between the index and middle fingers and the middle and to ring fingers respectively. The latter frequently receive a communication from ulnar nerve. Each common digital nerve divides into proper digital nerves for the adjacent sides of each finger while they lie in the palm, the nerve to the radial side of the index and middle finger gives a branch to the second lumbrical.<sup>(2)</sup>

**REVIEW OF LITERATURE:** R.J. last has mentioned that the median nerve passes deep to the flexor retinaculum into hand and terminates as a lateral and medial branch.<sup>(3)</sup>

Lanz U reported number of variations in the course of the median nerve in the carpal tunnel explored at operation, such as a) accessory muscular branches at the distal portion of the tunnel B) high division of median nerve c) accessory muscular branches proximal to the tunnel.<sup>(4)</sup> David A. Fuller has mentioned that the median nerve at wrist and palm divide into terminal motor and sensory branches with some anatomic variability and that it has major surgical implications.<sup>(5)</sup>

Michael J. Cousins, Philip o. Bridenough have mentioned that the median nerve block is applicable for surgery on the radial side of palm and three and half digits and for reduction of fractures, particularly the first metacarpal. He also mentions that variation in innervations necessitates multiple blocks.<sup>(6)</sup>

The median nerve normally divides into six branches at the distal terminus of the flexor retinaculum. The six branches include the recurrent motor branch that innervates the abductor pollicis brevis, flexor pollicis brevis, opponens pollicis before dividing into its terminal sensory branches. There are proper digital nerves to the radial and ulnar sides of the thumb and radial side of the index finger. These may emerge from the median nerve as a common digital nerve. The point of origin of the thenar branch is on the midpoint of a line drawn between the tubercle

of the scaphoid and the distal end of the flexion crease of the thumb metacarpophalangeal joint.<sup>(7)</sup>

Lanz classified the variations of the course of the median nerve into four groups: group I: extra ligamentous thenar branch (standard anatomy), group II: variations in the course of the thenar branch, group III: accessory branches of the median nerve at the distal portion of the carpal tunnel group IV: accessory branches proximal to the carpal tunnel.<sup>8</sup>

In a series of 110 patients who underwent open carpal surgery, Beris et al reported variations of median nerve at the wrist in 11 patients (10%), 5 cases were in Lanz group I (5.5%), 3 in Lanz group 2 (2.7%) and 2 cases in group 3 (1.8%).<sup>(9)</sup>

A high division of median nerve in which the radial branch passing through its own compartment of the carpal tunnel was described by Amadio.<sup>(10)</sup>

High bifurcation of the median nerve in the forearm has been reported by several authors. If care is not taken to do TCL division under direct vision it is possible to cut the ulnar part of the divided median nerve.<sup>1, 4 and 8</sup>

**MATERIAL AND METHOD:** The present study was done by dissecting the human cadavers available in the Department of Anatomy, Kempegowda Institute of Medical Sciences, Bangalore. The total numbers of 50 specimens were studied in the present work (25 right upper limbs and 25 left upper limbs).

**Chemicals used for study:** Amyl acetate 10% as a solvent is used for coating nerves followed by quick fix to make nerves smooth and shining.

All the above specimens were preserved in 10% formal saline.

**METHOD:** Dissection method was employed for the study on the flexor aspect of the forearm. H shaped incision was made from 3cms proximal to elbow joint to the wrist joint, the vertical incision was continued up to the third metacarpophalangeal joint. A horizontal incision was made along the roots of fingers. The skin flaps were reflected medially and laterally. Superficial fascia and deep fascia were removed in forearm and hand.

The superficial flexor tendons were cut proximal to the flexor retinaculum. The median nerve and its branches were traced and cleaned in the forearm and palm. Superficial palmar arch, its digital branches were removed.

After cleaning, the following points were examined and recorded.

- Level of termination of the median nerve.
- Mode of termination of the median nerve in hand.

Photograph was taken under good lighting using zoom camera.

The data obtained was recorded in order. The data on the median nerve obtained in present study was analyzed and compared with that of the previous workers.

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## OBSERVATION AND RESULTS:



**Photograph 1**

Termination of the median nerve in the hand into 5 branches  
Two proper digital nerves for either side of thumb  
One proper digital nerve to radial side of index  
One common digital to second web space  
One common digital to third web space



**Photograph 2**

Median nerve terminates by dividing into medial and lateral branches just distal to the flexor retinaculum.



**Photograph 3**

Median nerve terminates in the palm by dividing into 3 branches distal to the flexor retinaculum, medial most branch to 3rd web space, middle to 2nd web space, lateral most to thumb and index fingers.



**Photograph 4**

Median nerve becomes superficial in lower 1/3rd of the forearm into medial and lateral branches 3-4cms proximal to the proximal border of the flexor retinaculum



**Photograph 5**

Median nerve terminates 3-4cms distal to flexor retinaculum by dividing into medial and lateral branches.

Level of termination	Number of branches	
	2 branches	5-6 branches
In Forearm	4	Nil
In Hand	46	4

**Table 1: Illustrates level and mode of termination**

**DISCUSSION:** As the embryonic somites migrate to form the extremities, they bring their own nerve supply, so that each dermatome and myotome retains the original segmental innervation. Throughout somite migration some of the nerves come into close proximity and fuse in a peculiar pattern, forming a plexus early in fetal life.<sup>(11)</sup>

In one extreme case, a missing median nerve in the hand was reported by O'Neil et al. In this case, the median nerve was terminated in the forearm and all hand muscles were supplied by the ulnar nerve. This is a report of muscle response obtained with needle examination and not of dissection finding.<sup>(12)</sup>

**CONCLUSION:** The findings emphasize the importance of approaching the median nerve from the ulnar side when opening the carpal tunnel.<sup>(13)</sup> Median nerve is also called as the laborer's nerve as it supplies the flexors of forearm and palm, which are important for grasping, holding, pronation etc. its lesion or injury will cause physical disability affecting work ability of a person.

Surgical techniques with short incisions and endoscopic procedures demand a thorough knowledge of the anatomy and variations of the structures of the wrist.<sup>1</sup>

Anatomic variations of the median nerve occur frequently and may lead to diagnostic confusion and present surgical risks if not recognized. Successful diagnosis and treatment of

median nerve entrapment syndromes require awareness of possible involved sites and a detailed knowledge of related anatomy.<sup>1</sup>

Anomalies in the peripheral nerves and their connections are clinically important. The median nerve is one of the branches of the human brachial plexus.<sup>(12)</sup>

The aim of this study is to report variations in termination of median nerve. Our paper may provide additional information for the previously found variations in termination of median nerve. Such anatomical variations are important to note during clinical approaches where these branches are prone to damage.

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**AUTHORS:**

1. Pushpalatha M.
2. K. S. Jayanthi

**PARTICULARS OF CONTRIBUTORS:**

1. Associate Professor, Department of Anatomy, BMCRI, Bangalore.
2. Professor, Department of Anatomy, Vydehi Medical College.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Pushpalatha M,  
Associate Professor,  
Department of Anatomy,  
BMCRI, Bangalore-02.  
E-mail: sathyaspus@yahoo.com

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