

Split Median Nerve: Case Report of a Variant at the Carpal Tunnel

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ABSTRACT: Anomalies of median nerve have been described and can be classified into four types: (a) motor branch variations, (b) distally arising accessory branch, (c) high division of median nerve, (d) proximally arising accessory branch. During routine dissection of upper limb for MBBS students in the Department of Anatomy, Bangalore Medical College and Research Institute, Bangalore, a variation in the median nerve was observed while it entered the carpal tunnel. Variable anatomy of median nerve could help to avoid incomplete decompression at operations for carpal tunnel entrapment & in repair of traumatic injuries of wrist. During endoscopic carpal tunnel release, the split median nerve at the wrist may cause common digital nerve injury, thereby forcing the surgeon to have a better knowledge of variation in median nerve anatomy at the carpal tunnel.

INTRODUCTION

The median nerve emerges about 5 cm above the flexor retinaculum from behind the lateral edge of the flexor digitorum superficialis, and becoming more superficial just above the wrist, it lies between the tendons of the flexor digitorum superficialis and flexor carpi radialis, projecting laterally from under cover of the tendon of palmaris longus (if present). The nerve then passes deep to the flexor retinaculum accompanied by the median branch of the anterior interosseous artery.

One of its branches, the anterior interosseous nerve, passes beneath the pronator quadratus, supplying a branch which enters its deep surface, and ends by supplying the distal radio-ulnar, radio-carpal and carpal joints. The palmar cutaneous branch of the median nerve commences a short distance above the flexor retinaculum; it pierces the deep fascia or proximal edge of the retinaculum and divides into lateral and medial branches (Gray's Anatomy, 36th edition, 1980, pp. 1098-1099).

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The median nerve shows lot of variants in the region of the carpal tunnel. Anomalies of median nerve have been described and can be classified into four types: (a) motor branch variations, (b) distally arising accessory branch, (c) high division of median nerve, (d) proximally arising accessory branch. The classical description of five terminal sensory and motor branches of median nerve is not constant (Lanz, '77). Hence, the knowledge about the possible variations in median nerve is important.

MATERIALS AND METHODS

During routine dissection of upper limb for MBBS students in the Department of Anatomy, Bangalore Medical College and Research Institute, Bangalore, a variation in the median nerve of a left upper limb of a male cadaver aged 50-70 years was observed while it entered the carpal tunnel.

RESULTS

The median nerve split 4.5 cm proximal to flexor retinaculum. From the larger lateral branch, a palmar

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cutaneous branch arose a short distance above the flexor retinaculum, lay superficial to it and supplied the skin over the thenar eminence. The two branches went below flexor retinaculum, the larger lateral branch further divided into medial and lateral supplying the thumb and radial aspect of index finger and gave muscular branches to thenar muscles and first lumbrical. The smaller medial branch supplied the second lumbrical and divided into two common digital branches for the second and third interdigital clefts, further giving proper branches to the adjoining sides of the index, middle and ring fingers.

DISCUSSION

In a case study, median nerve split 5 cm proximal to flexor retinaculum. This split portion of median nerve continued distally as a common palmar digital nerve, which passed anterior to the long flexor tendons & just proximal to the web space between middle & ring finger, divided into two proper palmar digital nerves, one medial & one lateral in position. The lateral branch split again into two & transmitted the common palmar digital branch of ulnar artery through the gap between them, just before reunion a branch is given off, which supply the medial side of middle finger. Further distally both rami reunited, from the reunited portion a branch was given off, which supplied the medial side of the middle finger. Lateral side of ring finger was supplied by medial branch of proper palmar digital nerve. In this case superficial palmar arch was incomplete (Sundaram *et al.*, 2008).

Cases of a split median nerve were observed during surgical interventions or anatomical dissections, more rarely during pre-operative ultrasound or MRI with an incidence of 1-3% (2-8% according to Lanz's study '77). The division occurred at different levels but most typically within the distal third of forearm (Krol *et al.*, 2005).

During surgery, a bifid median nerve, each branch in a separate carpal tunnel, was observed where each tunnel also had two superficial and two deep flexor tendons. Both nerve branches were completely divided and there was no median artery (Berry *et al.*, 2003).

Split median nerve was associated with a median artery in 3/359 cases (Eiken, *et al.*, '71), 8/913 cases (Tountas *et al.*, '87), and in 2/354 cases (Ahn *et al.*,

2000). The median nerve divided abnormally proximally by an accessory first lumbrical (Schultz *et al.*, '73) and by muscle belly of flexor digitorum superficialis to the middle finger and an accessory palmaris longus tendon (Crandall and Hamel, '79). A bifid nerve with two separate compartments for the radial and ulnar elements was observed (Amadio, '87). A bifid nerve with similarly-sized trunks, the most radial of which travelled within an accessory ligamentous compartment beneath the flexor retinaculum proper was reported (Szabo, and Pettey, '94). Also reported were high division of the nerve separated by median arteries (Kornberg *et al.*, '83; Stancic *et al.*, '95; Winkelman, '80).

In routine procedure, sensory conduction velocity of median nerve is measured by placing the recording electrode 3 cm proximal to the distal wrist crease (Misra and Kalita, '99: 31). In split median nerve, the electrode may be placed 5 cm proximal to the distal wrist crease & an additional recording can be done, which will be of diagnostic value in the treatment of median nerve entrapment syndrome.

CONCLUSION

During endoscopic carpal tunnel release, split median nerve at the wrist may cause common digital nerve injury, thereby forcing the surgeon to convert endoscopic to open release. Variable anatomy of median nerve could help to avoid incomplete decompression at operations for carpal tunnel entrapment & in repair of traumatic injuries of wrist. Therefore, the knowledge of the variations in the median nerve as it enters the carpal tunnel is essential.

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