

Bifid Median Nerve: Report of Two Cases

M. Artico², L. Cervoni¹, G. Stevanato³, V. D'Andrea⁴, and F. Nucci¹

¹Department of Neurological Sciences, Ist Chair of Neurosurgery, "La Sapienza" University of Rome, ²Chair of Human Anatomy, Faculty of Pharmacy, "La Sapienza" University of Rome, ³Division of Neurosurgery, Municipal Hospital of Treviso, and ⁴IIIrd Surgery Clinic "La Sapienza" University of Rome, Rome, Italy

Summary

The median nerve divides into its terminal branches at or proximal to the distal edge of the flexor retinaculum. An anatomy of the median nerve within the carpal tunnel is reported in two separate cases. Emphasis has been given to the value of direct vision when incising the flexor retinaculum in order to avoid injury of the median nerve.

Keywords: Median nerve; anomalous innervation.

Introduction

Anomalies of the median nerve in the carpal tunnel are uncommon, 8%–12% of cases [6, 11, 13]. The variations of the median nerve relative to the transverse carpal ligament were described by Poisel [11] and Tountas [13]. Poisel, in a study of 100 cadaveric hands, noted that 46% of variations were extraligamentous, 31% subligamentous, and 23% transligamentous. Tountas, in a study of 92 cadaveric hands, reported that 82% of variations were extraligamentous, 8.7% subligamentous, and 8.7% transligamentous. The importance of the anomalies is due to the clinical relevance of median nerve anatomy during surgical treatment of carpal tunnel lesions [9].

We report two cases of transligamentous variation in the course of a bifid median nerve within the carpal tunnel.

Case Reports

Case 1. The patient, a 55-year-old woman, was evaluated for nocturnal paraesthesia, tingling and hypo-aesthesia on the radial surface of the right thumb. Clinical evaluation was suggestive of median nerve compression neuropathy at the wrist. Electrodiagnostic studies confirmed the diagnosis of carpal tunnel syndrome. On surgical exploration of the median nerve, a variation in the course of the median nerve within the carpal tunnel was observed (Fig. 1).

It was evident that the median nerve was already split into two divisions of equal diameter. The radial half divided into one motor branch for the thenar muscles and two sensory nerves to the thumb and index finger. The ulnar half divided into two common nerves supplying the index, middle and ring fingers. The nerves emerged from within the carpal tunnel and perforated the ligament in its course to the thenar musculature. Both nerves showed evidence of compression by the flexor retinaculum. The flexor retinaculum was sectioned.

Two months later, she no longer demonstrated Tinel's sign and had a full range of movement of the thumb.

Case 2. The patient, a 48-year-old woman, was evaluated for nocturnal paraesthesia, tingling and hypo-aesthesia of the right hand. Clinical evaluation was suggestive of median nerve compression neuropathy at the wrist. Electrodiagnostic studies confirmed the diagnosis of carpal tunnel syndrome. On surgical exploration of

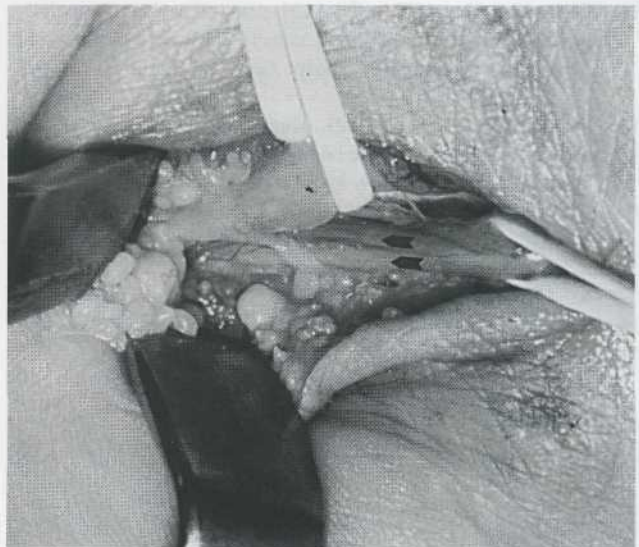
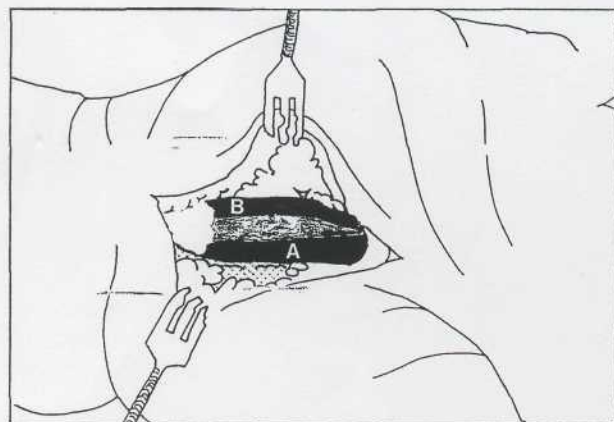


Fig. 1. Finding at operation: the median nerve consisted of two parts of equal diameter (arrows)



a



b

Fig. 2. (a) Finding at operation: the median nerve consisted of two parts of equal diameter (arrows). (b) Matched line drawing. A, B bifid median nerve

the median nerve, a variation in the course of the median nerve within the carpal tunnel was observed (Fig. 2 a, b). It was evident that the median nerve was already split into two divisions of equal diameter. The radial half divided into one motor branch for thenar muscles and two sensory nerves to the thumb and index finger. The ulnar half divided into two common nerves supplying the index, middle and ring fingers. The nerves emerged from within the carpal tunnel and perforated the ligament in its course to thenar musculature. Both nerves showed evidence of compression by the flexor retinaculum. The flexor retinaculum was sectioned.

Two months later, she no longer demonstrated Tinel's sign and had a full range of movement of the right hand.

Discussion

The median nerve passes in the lower third of the forearm between the flexor digitorum profundus and sublimis and becomes more superficial quite close to the wrist. The nerve passes under the transverse carpal ligament and enters the palm. At the distal border of the ligament, it divides into two lateral (radial) and

medial (ulnar) portions. Except for an inconstant palmar cutaneous branch, the median nerve does not usually give off any branches during its course in the lower third of the forearm and wrist [3, 8].

Lanz [6] classified the anatomical variations of branching of the median nerve into four groups: Group 1: variation in the course of the thenar branch. It usually branches from the median nerve at the distal end of the transverse carpal ligament. It can be: 1) extraligamentous, when the motor branch curves back into the thenar musculature; 2) subligamentous, when the motor branch leaves the body of the nerve beneath the transverse carpal ligament and passes around the distal edge of the ligament to enter the thenar musculature; 3) transligamentous, when the motor branch leaves the body of the nerve and perforates the ligament in its course to the thenar musculature. Group 2: accessory branches of the median nerve at the distal carpal tunnel; Group 3: high division of the median nerve (it can be associated with a median artery of variable size); Group 4: accessory branches proximal to the carpal tunnel. When the volar ligament is perforated, the most dangerous type occurs.

Our patients had a bifid median nerve with a transligamentous course of the two branches. Both nerves showed evidence of compression by the flexor retinaculum. If this anomaly is found at the time of carpal tunnel release, decompression of both branches should be performed to avoid persistence of symptoms [10]. Papathanassiou [10] and Entin [1] describe single cases of the thenar nerve that arose from the medial surface of the median nerve and crossed laterally to supply the thenar muscles. These variations can certainly pose a surgical hazard during carpal tunnel release. Dual motor trunks were also described in a single report by some authors [2, 5, 7], but only Graham [4] reports that both trunks followed a transligamentous course, as in our cases.

In the variation observed in our cases, the location of nerves makes them particularly prone to injury when dividing the transverse carpal ligament and/or exploring the tunnel [4, 7, 12]. We also think that one needs to approach the median nerve from the ulnar side when releasing the carpal canal in order to carefully identify and protect the motor branch to thenar muscles.

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Correspondence: Luigi Cervoni, M.D., Department of Neurological Sciences, Neurosurgery, "La Sapienza" University of Rome, Viale dell' Università 30/A, I-00185 Rome, Italy.



Fig. 1. Bifid nature of the median nerve. The bifid nature of the median nerve is shown in the shaded area. The bifid nature of the median nerve is shown in the shaded area.

The median nerve is a branch of the brachial plexus. It is formed by the union of the ulnar and median roots of the brachial plexus. The median nerve is the most common nerve to be affected by carpal tunnel syndrome. The median nerve is the most common nerve to be affected by carpal tunnel syndrome.

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