



A rare nerve variation: duplication of the digital nerves in the index finger

Nadir bir sinir varyasyonu: İşaret parmağındaki digital sinirlerin duplikasyonu

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Bu yazıda, sol el işaret parmağında digital sinir sayısında anatomik varyasyon görülen 36 yaşında erkek hasta sunuldu. Hastanın işaret parmağında II. bölge fleksör yaralanması nedeniyle tendoplasti amacıyla yapılan ameliyat sırasında, birer tane olması gereken ulnar ve radial taraf digital sinirlerin proksimal falanks seviyesinde ikişer adet olduğu görüldü. Her iki taraf digital sinirlerin metakarpofalangeal eklem seviyesinde dallanarak, dört digital sinir halinde distale kadar devam ettiği ve bunlardan birinin proksimal falanks seviyesinde kesik olduğu gözlemlendi. Radial tarafta bulunan iki digital sinirden devamlılığı bozulmuş olanına nörorafi yapıldı. Hastanın altı aylık izlemi sonunda işaret parmağı distalinde duyunun tamamen döndüğü görüldü. Digital sinirlerdeki bu tür varyasyonların fark edilmemesi yetersiz onarımla sonuçlanabilir.

Anahtar sözcükler: Parmak/inervasyon/anatomi ve histoloji; parmak yaralanması.

We present a 36-year-old male patient who had an anatomic variation in the number of digital nerves in the index finger of the left hand. During flexor tendoplasty for a zone II flexor tendon injury in the index finger, duplication of the radial and ulnar digital nerves was detected at the level of the proximal phalanx, making a total of four digital nerves. Both radial and ulnar digital nerves gave off branches at the level of the metacarpophalangeal joint that ran to the distal index finger. One of digital nerves on the radial side was cut at the level of the proximal phalanx and was treated with neuroorrhaphy. Complete sensory recovery in the distal area of the index finger was achieved within a follow-up of six months. Such variations in the digital nerves may lead to insufficient repair if they are gone unnoticed.

Key words: Fingers/innervation/anatomy and histology; finger injuries.

Modern knowledge on the sensory innervation of the hand draws on the 1918 study of Stopford.^[1] The sensory mapping of the hand was provided by this study.^[1,2]

The digital nerves supply the fibrous sheaths of the long flexor tendons, digital arteries (vasomotor) and sweat glands (secretomotor). Distal to the base of the distal phalanx, each digital nerve gives off a branch which passes dorsally to the nail bed. The main nerve frequently trifurcates to supply the pulp and skin of the terminal part of the digit.^[3] In addition to the two digital nerves on the volar side of the digit, a sensory branch arising from either of these, turning dorsally

at the level of the proximal phalanx and joining with the dorsal branch of the radial nerve can also be observed.^[4]

In this study, a case with a variation of the digital nerve is discussed.

Case report

Zone-II flexor injury of the index finger was diagnosed in a 36-year-old male patient who presented late to our clinic with left hand injury following an occupational accident. During the physical examination, reduced sensation on the distal regions of the radial side, without sensory deficits at the levels of

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Submitted / Başvuru tarihi: 19.02.2009 **Accepted / Kabul tarihi:** 07.07.2009

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the proximal and middle phalanges, was noted. During the operation performed for tendoplasty, a total of four digital nerves, two on each side of the finger, were observed at the level of the proximal phalanges while, in fact, single digital nerves on the ulnar and radial sides are normally expected. When the dissection was extended, we observed that each digital nerve on either side divided into two branches at the level of the metacarpo-phalangeal joint and traveled distally as four digital nerves. One of these nerves was cut-off at the level of the proximal phalanx. Neurorrhaphy was performed on one of the two digital nerves on the radial side that was severed (Figure 1). At six months follow-up, sensation on the distal part of the index finger was restored.

Discussion

Following the World War I, Stopford mapped the sensory innervation of the hand and its variations by reviewing the cases with complete lesions of the median, ulnar and radial nerves and examining the effects of local anesthetics on hand.^[1,4] A similar study on the roles of the median, ulnar and radial nerves on the sensory map was carried out by Ming-Tzu in 1939.^[2,5] A thorough knowledge of sensory map is crucial for a successful hand surgery.

Jolley and colleagues^[6] conducted a study on 79 cadaveric hands and demonstrated the variations regarding the innervation of the thumb and index finger by the median nerve. Based on this work, the digital nerves supplying the ulnar side of the thumb and the radial side of the index finger arising from a common root was the most common type of variation (Type-1) (69%). In Type-2 variation, which was the least common one (6%), digital nerves to the thumb originated from a common root whereas the digital nerve to the radial aspect of the index finger traveled separately. In Type-3, which accounted for 25% of the variations, digital nerve to the radial side of the index finger and the digital nerves to the thumb were totally independent.^[6]

On the distal aspect of the proximal phalanx, each proper digital nerve gives off a dorsal branch that innervates the dorsal surfaces of the middle and distal phalanges.^[3,4] On the other hand, in a study on 30 cadavers, Bas and Kleinert^[7] reported that the dorsal branches of the proper digital nerves were given off more proximally in 62% of the cases (at the level of the A1 pulley). In our case, all proper palmar digital ner-



Figure 1. Appearance of four digital nerves in the index finger of the left hand in a 36-year-old male patient.

ves bifurcated at the level of the metacarpo-phalangeal joint, but in contrast to known variations, all four nerves ran distally, parallel to each other, towards the distal interphalangeal joint, rather than passing dorsally. We did not find any publications in the literature that reported a duplication of both of the sensory digital branches on the ulnar and radial sides in such a way.

Stober^[4] described, in one case, three palmar digital nerves of the same caliber at the level of the metacarpo-phalangeal joint. In that case, sensory deficit was noted only in the middle and on the volar side of the finger and this was attributed to severing of a single nerve at the level of the metacarpo-phalangeal joint. Similarly, sensory deficit in our patient, who had an injury at the level of the proximal phalanx, was confined to the distal aspect of the radial side. Absence of sensory loss on the radial sides of the proximal and middle phalanges was attributed to only one of the digital nerves on the radial side being severed. Total resolution of sensory loss at six months of neurorrhaphy indicates that the injured nerve innervated the distal region.

In the present case, dissection had to be extended for better visualization of the common digital nerves and to determine the courses of the nerves in the distal segments of the finger. This may cause a handicap in naming of a nerve as palmar or dorsal. Similar handicap existed in Stober's case as well.^[4] In both cases, duplicated nerves were presumed palmar digital nerves during preoperative examination based on the abnormal sensation.

In conclusion, surgeons should keep in mind the

possibility of a variation in sensory nerves while performing hand surgery.

References

1. Stopford JS. The variation in distribution of the cutaneous nerves of the hand and digits. *J Anat* 1918;53:14-25.
2. Wallace WA, Coupland RE. Variations in the nerves of the thumb and index finger. *J Bone Joint Surg [Br]* 1975; 57:491-4.
3. Johnson D, Ellis H. Pectoral girdle and upper limb. In: Standring S, editor. *Gray's anatomy: The anatomical basis of clinical practice*. 39th ed. Edinburg: Elsevier- Churchill Livingstone; 2005. p. 932-3.
4. Stober R. Abnormal innervation of the index finger. [Article in German] *Handchirurgie* 1981;13:266-7.
5. Ming-Tzu P. The cutaneous nerves of the Chinese hand. *Am J Phys Anthropol* 1939;25:301-9.
6. Jolley BJ, Stern PJ, Starling T. Patterns of median nerve sensory innervation to the thumb and index finger: an anatomic study. *J Hand Surg [Am]* 1997;22:228-31.
7. Bas H, Kleinert JM. Anatomic variations in sensory innervation of the hand and digits. *J Hand Surg [Am]* 1999; 24:1171-84.