

## CARPAL TUNNEL SYNDROME RELATED TO WORK ON COMPUTER

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ISSN 0350-364X

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DOI: 10.5457/423

**Introduction:** Carpal tunnel syndrome (CTS) is a collection of characteristic symptoms and signs that occurs following compression of the median nerve within the carpal tunnel. The prevalence of electrophysiologically confirmed CTS in working populations is generally higher than in the general population. The aim was to present association between carpal tunnel syndrome and the excessive use of computer mouse and keyboard in young adult with presence of Martin-Gruber anastomosis.

**Case report:** We presented the development of carpal tunnel syndrome in 17-year-old male, following the repetitive movement of the right wrist, due to excessive use of the computer mouse and keyboard. During the neurological examination, we found pronounced hypotrophy of the first interosseous dorsalis space (weakness of m. adductor pollicis), and mild hypotrophy of the thenar muscle. Nerve conduction velocities of n. ulnaris and n. medianus on the right hand were normal, but with prolonged value of distal latency on the n. medianus, which indicates the presence of coexisting Martin - Gruber anastomosis (communication branch from n. medianus to n. ulnaris).

**Conclusion:** Up to date evidence of studies were insufficient to conclude that computer work (mouse and keyboard) causes CTS. But it is certain that the presence of MGA, in this case of CTS, lead to partial sparing of thenar muscles, and caused hypotrophy of the first interosseous dorsalis muscle, innervated by the ulnar nerve.

**Key words:** Carpal tunnel syndrome, computer work, Martin-Gruber anastomosis

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**Received:**  
18.04.2016.

**Accepted:**  
04.05.2016.

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**Competing interests:**

The authors declare no competing interests.

**INTRODUCTION**

Carpal tunnel syndrome (CTS) is a collection of characteristic symptoms and signs that occurs following compression of the median nerve within the carpal tunnel [1]. Estimates of CTS prevalence and incidence vary widely in the literature. The prevalence of electrophysiologically confirmed CTS in working populations is generally higher than in the general population. Prevalence proportions in general populations range from 1-5% [2,3], while Dale et al. (2013) in the recent study on US working populations reported the prevalence of 7.8% [4]. CTS is a neuropathy caused by entrapment of the median nerve at the level of the carpal tunnel, delimited by the carpal bones and by the transverse carpal ligament [5]. In typical cases, features of CTS include pain in the hand, unpleasant tingling, pain or numbness in the distal distribution of the median nerve (thumb, index, middle finger and the radial side of the ring finger) [6], and a reduction of the grip strength and function of the affected hand [7]. Symptoms tend to be worse at night, and clumsiness is reported during the day with activities requiring wrist flexion [8]. Sinanović et al. [9] described an atypical clinical presentation of carpal tunnel

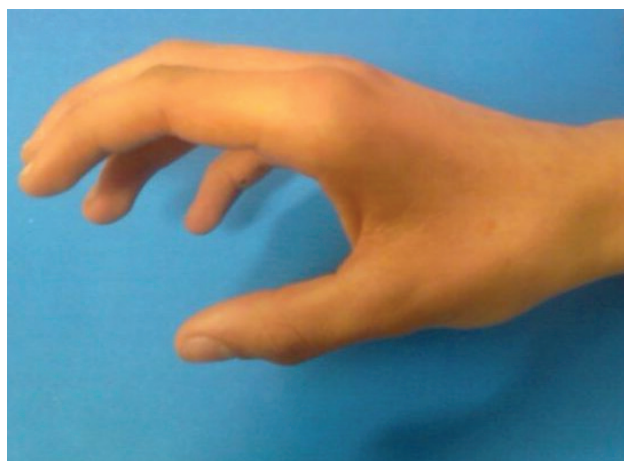
syndrome, due to a presence of Martin-Gruber anastomosis (MGA), with atypical clinical picture (sensory and motor failure) in the field of innervation of n. ulnaris and n. medianus.

The aim of this paper is presentation of case with association between carpal tunnel syndrome and the excessive use of computer mouse and keyboard in young adult with presence of Martin-Gruber anastomosis.

**CASE REPORT**

We present the development of carpal tunnel syndrome in 17-year-old male, following the repetitive movement of the right wrist, due to excessive use of the computer mouse and keyboard. He complained at the weakness in his right hand that developed about a year ago. He noticed that he could "barely eating the nails" with right hand. In the mean time, the wasting of the muscle has developed, particularly in the area between thumb and index finger, at dorsal side of the right hand. Numbness was not present. The patient attending the secondary school and he points out that he often works for

a computer lately, and using a mouse. There were no similar cases in the family. During the neurological examination, we found pronounced hypotrophy of the first interosseous dorsalis space (weakness of m. adductor pollicis), and mild hypotrophy of the thenar muscle (Figure 1). Myotatic reflexes were normal and symmetrical on the upper and lower extremities. Muscle strength of other muscles was normal. Romberg sign were negative. Pathological reflexes were not present. However, due to sensory testing, we detected the discrete hypoesthesia on distal dorsal part of the index finger. Electromyography (EMG) has shown the reduced muscle potentials in the m. adductor pollicis, m. abductor dig. min.dex. and mild changes in m. opponens pollicis. Nerve conduction velocities of n. ulnaris and n. medianus on the right were normal, but with prolonged value of distal latency on the n. medianus, which indicates the presence of coexisting Martin - Gruber anastomosis (communication branch from n. medianus to n. ulnaris).



**Figure 1.** Hypotrophy of the first dorsal interosseous space in the patient with carpal tunnel syndrome with presence of Martin – Gruber anastomosis

## DISCUSSION

Over the past years there have been a vast number of studies investigating the relationship between carpal tunnel syndrome and occupational activities. This association between computer work and CTS was examined in reviews from 2008 by Thomsen et al. [10] and from 2014 by Mediouni et al [11]. Both reviews concluded that there was insufficient epidemiological evidence that computer work causes CTS, although some particular work circumstances involving computer mouse use may be associated with CTS. In this case we present a schoolchild with carpal tunnel syndrome, and frequent work on computer, as the only risk factor for CTS, because of repeated flexion and extension of the wrist. In the 1990s the US National Institute of Occupational Safety and Health carried out a large systematic review of musculoskeletal disorders and workplace factors and included carpal tunnel syndrome as an outcome [12]. They concluded that there was evidence of a positive association with

work that involved highly repetitive movements of the hands, and a similar association with work involving forceful movements of the hands. Similar study in UK has shown that the carpal tunnel syndrome is a „prescribed“ diseases for people who perform repeated palmar flexion and dorsiflexion for at least 20 hours/week over the least 12 months in the 24 months prior to the onset of symptoms [13]. However, in the systematic review of carpal tunnel syndrome and the use of computer mouse and keyboard, Thomsen et al. (2008) concluded that the evidence of studies were insufficient to conclude that computer work (mouse and keyboard) causes CTS. As a consequence, this condition cannot be recognised as an occupational injury because of computer work. A large and unbiased prospective study is needed to establish further evidence [14]. Further, this is not typical case of carpal tunnel syndrome, due to presence of hypotrophy of the first interosseous dorsalis muscle, which is innervated by the ulnar nerve. But, based on electroneurography findings, the presence of a prolonged distal latency, a near normal proximal median nerve latency, in a case of carpal tunnel syndrome should arouse suspicion of a coexisting Martin-Gruber anastomosis [15]. The presence of such an anastomosis lead to partial or total sparing of thenar muscles from the effects of compression of their nerve supply in a case of carpal tunnel syndrome, and also explains in this case the hypotrophy of the first interosseous dorsalis muscle, innervated by the ulnar nerve.

## CONCLUSION

We presented the development of atypical carpal tunnel syndrome (CTS) in 17-year-old male, following the repetitive movement of the right wrist, due to excessive use of the computer mouse and keyboard due to the presence of Martin-Gruber anastomosis, which was diagnosed by careful electromyoneurographic examination. There is insufficient epidemiological evidence that computer work causes CTS, and up to date evidence of studies were insufficient to conclude that computer work (mouse and keyboard) causes CTS. However, frequent computer mouse device users could be risk of developing median nerve entrapment neuropathy at the wrist. In this presented case it is certain that the presence of MGA, in this case of CTS, lead to sparing of thenar muscles, and caused hypotrophy of the first interosseous dorsalis muscle, innervated by the ulnar nerve.

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