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Original article

Idiopathic carpal tunnel syndrome in male patients

Igor Sladojević[1], Tatjana Bućma[2], Ostoja Savić[3]

[1]University of Banja Luka, Faculty of Medicine, Banja Luka, Republic of Srpska, Bosnia and Herzegovina
[2]Institute for Physical Medicine and Rehabilitation "Dr Miroslav Zotović", Banja Luka, Republic of Srpska, Bosnia and Herzegovina
[3]University Clinical Center of Republic of Srpska, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

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Corresponding author:
Igor Sladojević, PhD
Save Mrkalja 14,
78000 Banja Luka
igor.sladojevic@med.unibl.org

Summary

Introduction. The carpal tunnel syndrome (CTS) in male patients, due to anatomical characteristics and the perception of CTS-related symptoms, remains undetected for a long time. Men respond less well to CTS treatment, and early detection enables conservative treatment of mild and moderate CTS. The aim of this paper was to examine the average age, the frequency of bilateral CTS and its correlation with the age, and to determine the grade of electrophysiological damage of the median nerve in male patients with idiopathic CTS diagnosed by electromyoneurography.

Methods. The retrospective study included 83 male patients, aged from 32 to 81 years, with complaints of unilateral CTS on the right, dominant hand. All patients underwent EMNG for confirmation of CTS and the degree of median nerve damage. Statistical analysis was performed by methods of descriptive statistics, t-test, Wilcoxon signed rank test, and Pearson's correlation coefficient. The value of $p < 0.05$ was considered statistically significant.

Results. The average age of patients was 55.84 years. The bilateral CTS was confirmed in 88.4%, most often of a moderate degree and more pronounced on the right, dominant hand (p=0.001). In cases of bilateral CTS, age did not correlate with the grade of CTS changes in both hands. The changes in the dominant hand were more pronounced in patients older than 51 years.

Conclusion. Male patients with idiopathic CTS usually have bilateral CTS, with more pronounced changes on dominant hand. Bilaterality of CTS and the degree of median nerve damage are not connected with age.

Keywords: carpal tunnel syndrome, median nerve, men

Introduction

Carpal tunnel syndrome (CTS) is the most common nerve entrapment syndrome. While other nerve entrapment syndromes are more frequent in older adults and men, CTS is more common in women [1, 2]. Women are more likely to experience carpal tunnel syndrome even though they have no comorbidities, because of a narrower wrist and tendon diameter similar to men's

[3], with greater differences between men and women at the outlet and the middle portions of the carpal tunnel and lesser differences at the inlet [4]. There are numerous risk factors for CTS among which are age, pregnancy (mostly during the third trimester), menopause, obesity, renal failure, diabetes mellitus, rheumatoid arthritis, hypothyroidism, exposure to vibration and activities that require forceful gripping and repetitive movements in the wrist [5, 6]. Also, there are some studies about possible genetic causes of CTS, but the results are not conclusive [7]. Since none of these factors is confirmed as primary, the etiology of CTS remains idiopathic [8].

The frequency of CTS differs from study to study- some report that CTS is four times higher in women, while others show a similar ratio between men and women [2, 9, 10]. Women may have a finer perception of CTS-related symptoms than men, who attend their first examination when the CTS symptoms become more severe [9]. A neurophysiological study by Padua et al found that men had more severe nerve impairment than women, although initially, men had complained of just minor discomfort and pain [9]. Possible explanation for this could be the loss of function of sensory nerve fibers. A study by Cirakli et al. found no statistically significant association between CTS and gender [11]. CTS appears to be more severe in the elderly [12] and occurs more frequently in the dominant hand [13]. Due to stronger hands, male patients show less impairment than females.

Bilateral CTS is more frequent than unilateral and there is a wide range of CTS frequency (between 22-87 %), but most studies cite a rate of about 60 % [9]. A study by Bagatur and Zorer suggests that CTS is a bilateral disorder and there is a correlation between the duration of symptoms and the bilateral occurrence of CTS [14]. The results of this study point out that patients with unilateral symptoms should be closely monitored due to the development of this median nerve mononeuropathy in asymptomatic hands. Also, mononeuropathy may start as a bilateral condition or begin as a unilateral condition and progress to bilateral neuropathy [15].

Many clinicians report that men with CTS respond less well to treatment [16]. In cases where a surgical treatment is needed, men have a worse post-surgical outcome than women [17]. Since the conservative treatment is still possible only in mild and moderate cases of CTS, the aim of our study was to analyze the average age, unilateral or bilateral presentation of CTS on the electromyoneurographic study, and grade of severity of symptoms in male patients with idiopathic CTS on their first examination in electromyoneurography cabinet.

Methods

A total of 126 male patients were referred to the Cabinet for electromyoneurography of the Department for neurorehabilitation IIA, Institute for physical medicine and rehabilitation "Dr. Miroslav Zotović", Banja Luka, Bosnia and Herzegovina, in the period 2019–2021, to have their first electromyographical study due to complains on unilateral CTS. In all patients the right hand was dominant. The finding of electroneurography (ENG) was performed and interpreted in all patients on device Nicolet EDX (Natus Medical Inc.) by the same doctor. The diagnosis of CTS was based on the Clinical Diagnostic Criteria for CTS Research proposed by the American Association of Electro-Diagnostic Medicine, the American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation [19]. Inclusion criteria were: patients over 18 years of age, who underwent ENG on both hands and were diagnosed with idiopathic CTS. Excluding criteria were: the existence of a systemic disease of the peripheral nervous system, injury to the bone or soft tissue structures of the carpal tunnel area or

injury to the median nerve (which would be the basis of secondary CTS), C6-C8 cervical radiculopathy of brachial plexopathy, and any contraindication for ENG study.

The following data were used in this research: age, distal motor latency (DML) on both sides, and conduction velocity of sensory nerves on both sides. The obtained parameters were scored according to the Padua et al scale [19]:

1. Extreme CTS: absence of motor and sensory response (SNAP and CMP);
2. Severe CTS: absence of the sensory response (SNAP) – a segment of carpus-finger and abnormal DML;
3. Moderate CTS: slowing of digit-wrist conduction and abnormal DML;
4. Mild CTS: slowing of median digit-wrist conduction and normal DML;
5. Minimal CTS: standard negative hands with abnormal comparative or segmental (< 7–8 cm) tests;
6. Negative CTS: normal finding with all tests (including both comparative and segmental tests).

The software used for data processing was SPSS software (SPSS Inc), version 25, using methods of descriptive statistics, t-test, Wilcoxon signed rank test, and Pearson's correlation coefficient.

Results

Out of 126 referred patients, 83 met the criteria for inclusion in the study. The average age of patients was 55.84 years (the youngest patient had 32, and the oldest was 81 years). Age distribution of patients showed the highest frequency in the age group 50–59 years (Figure 1).

Most patients (84.4 %) had bilateral CTS, and in 15.6 % of patients CTS was unilateral. There was no statistically significant difference in the age of patients with unilateral (M=53.15, SD=13.03) and bilateral CTS (M=56.06, SD=11.85; t(81)=-0.798, p=0.427). The magnitude of differences in the means (mean difference = -2.903, 95% CI -10.13 to 4.331) was very small (eta squared= 0.0078).

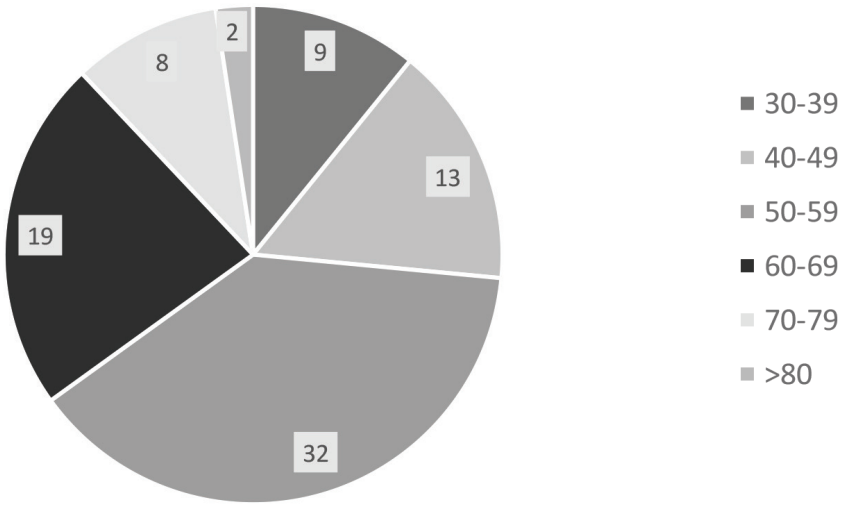

Figure 1. Age distribution of patients

The distribution of CTS grades in bilateral cases showed that, in both hands, changes had been most commonly moderate (grade 3) and rarely minimal (grade 5). In regard to the arm side, changes were more pronounced on the right hand (Figure 2).

In patients with bilateral CTS, Pearson's coefficient of correlation did not show significant correlations between CTS grade and age (right hand r=-0.211, p=0.055; left hand r=-0.096, p=0.389). Wilcoxon signed rank test showed a statistically significant difference between CTS grades on the left and right hand (Z= -3.416, p=0.001). Kruskal-Wallis test showed a statistically significant difference in the CTS grades in the right (dominant) hand among analyzed age groups of patients that had bilateral carpal tunnel (Group 1:30-39 years N=7, Group 1: 40-49 years N=9, Group 3: 50-59 N=28, Group 4: 60-69 years N=18, Group 5: 70 years and older N=8) $\chi 2$ (4, N=70)= 13.636, p=0.009). Post hoc test revealed that the cause of statistical difference was a comparisson between two groups: 51–60 years and older than 70, and 61–70 years and older than 70. On the left, non-dominant hand, the difference among age groups did not reach a statistical difference ($\chi 2$ (4, N=70)= 8.668, p=0.07).

Discussion

CTS is a common disorder among women and people with known comorbidities. Damage to sensory fibers occurs first, as well as consequential sensory symptoms due to which patients report for examination. With time, the changes occur in motor fibers too, along with possible ascending degeneration of the nerve, causing irreversible changes in muscle structures. This all leads to hand dysfunctionality, a disorder of sensibility and proprioception, and with time weakness in muscle structures. Most studies describe such cases of CTS, while data on CTS among male patients are obscure. Also, studies on idiopathic CTS are very rare, especially those that describe bilateral CTS [15]. In this paper, we have analyzed only idiopathic male patients in our area. Authors worked on diagnosing this disease over many years and were concerned whether the patients in our area reported and were being sent to the diagnostic process in time, which influenced the timely treatment as well as the selection of treatment methods for this disease.

Idiopathic etiology of CTS in male patients has an incidence of 12.6% and 48.9% in female patients [20]. Although several studies

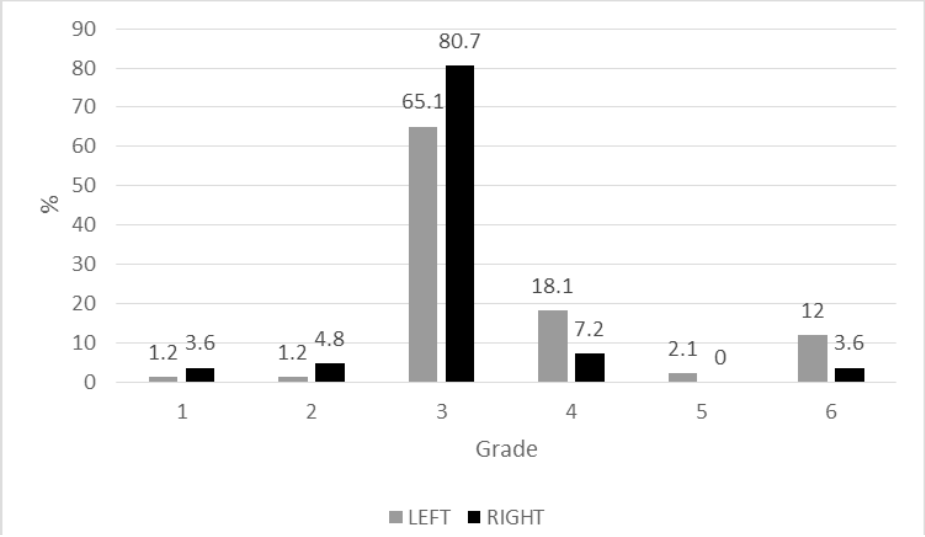

Figure 2. Distribution of CTS grades in bilateral cases in regard to arm side

show more prevalent CTS in female patients [10, 21], men have a greater tolerance to CTS symptoms than women and this could explain the difference in registered CTS prevalence [9].

In our sample, we have seen a peak incidence of CTS in the age group 50–59 years, while the lowest number of patients was in two age groups: 20–29 years and older than 80 years. Age distribution showed a gradually increasing incidence of CTS among male patients till the age of 59 and a gradual decrease in incidence after the age of 60. A South Korean study [22] also found the peak incidence in males aged 50–59 years, but in females the peak was at perimenopausal age- in the group 40–49 years. Bland and Rudolfer [12] report that the incidence is bimodal and has two peaks: at the age group 50–59, and over 80 years. We did not meet the second peak in this study, possibly because we had only two patients older than 80 years.

The patients report to the doctor after a shorter or longer presence of subjective difficulties, whereas the length of the presence of the difficulties does not necessarily have to be in line with the severity of the electrophysiological finding. It is a chronic insidious disease, which gives subjective difficulties when the motoric functional changes have already occurred. Most of our patients had a bilateral CTS and more severe symptoms in the dominant hand at first presentation in the electromyoneurography cabinet. Since mononeuropathies may start bilaterally or turn from unilateral to bilateral condition, electrophysiological studies tried to find if there was the asymmetry of nerve sensitivity thresholds between dominant and non-dominant hand [23], but the results did not find any difference in thresholds. Neurophysiological abnormalities tend to lateralize to the dominant hand [12], therefore symptoms begin on the dominant hand and are more severe due to the greater use of this hand [24]. The dominant hand is more affected in both unilateral and bilateral CTS [25], which was also noticed in our sample. Some studies report that CTS is more severe in idiopathic patients [26], which might explain such a high incidence of bilateral CTS in our sample (84.4%). Padua et al. studied patients with idiopathic CTS and found that 87% had bilateral neuropathy [19]. In a study by Lewanska [11] 74.3% of patients had bilateral idiopathic CTS. In our patients, the most common grade of changes on both the left and right sides was moderate. Cirakli et al also found that a moderate degree of median nerve compression was most frequent [11].

There was a statistically significant difference in electrophysiological findings on the median nerve in the carpal tunnel in different age groups on dominant, right hands in patients with bilateral CTS. Such a difference was not seen in the non-dominant left hand. This means that age, together with the more frequent use of the dominant hand, is a factor influencing the severity of changes on the median nerve and the consequential clinical presentation of CTS, but only on the dominant hand. It seems that there is a cumulative effect of repetitive movements in the wrist, which makes changes on tendons within the carpal tunnel. Such tendons can easily make compression to the median nerve and cause CTS.

The main limitations of this study were the absence of a control group and a small sample of patients older than 80 years.

Conclusion

Although patients complain of unilateral symptoms, most develop bilateral CTS, with more pronounced changes on the dominant hand. The degree of median nerve damage in CTS, as well as the presence of bilateral symptoms, is not related to age. The patients most often report with a moderate degree of nerve damage, when there is still a possibility of conservative treatment.

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Ethical approval. The Ethics Committee of the Department for Physical Medicine and Rehabilitation "Dr Miroslav Zotović", Banja Luka, Republic of Srpska, Bosnia and Herzegovina (No. 116-01-3108-2/22), approved the study and informed consent was obtained from all individual respondents. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

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Idiopatski sindrom karpalnog kanala kod muškaraca

Igor Sladojević[1], Tatjana Bućma[2], Ostoja Savić[3]

[1]Univerzitet u Banjoj Luci, Medicinski fakultet, Banja Luka, Republika Srpska, Bosna i Hercegovina

[2]Zavod za fizikalnu medicinu i rehabilitaciju "Dr Miroslav Zotović", Banja Luka, Republika Srpska, Bosna i Hercegovina

[3]Univerzitetski klinički centar Republike Srpske, Banja Luka, Republika Srpska, Bosna i Hercegovina

Uvod. Sindrom karpalnog tunela (CTS) kod muških pacijenata, zbog anatomskih karakteristika i percepcije simptoma povezanih sa CTS, ostaje dugo vremena neotkriven. Muškarci slabije reaguju na liječenje CTS, a rano otkrivanje omogućava konzervativno liječenje blagog i umjerenog CTS. Cilj ovog rada bio je da se ispita prosječna starost, učestalost bilateralnog CTS i korelacija sa godinama života, te da se utvrdi stepen elektrofiziološkog oštećenja nervus medianus kod pacijenata muškog pola sa idiopatskim CTS dijagnostikovanim elektromioneurografijom.

Metode. Retrospektivnom studijom obuhvaćena su 83 pacijenta muškog pola, starosti od 32 do 81 godine, sa žalbama na simptome unilateralnog CTS na desnoj, dominantnoj šaci. Svim pacijentima je urađen EMNG radi potvrde CTS i stepena oštećenja nervus medianus. Statistička analiza je izvršena metodama deskriptivne statistike, t-testom, Wilcoxon testom ranga i Pirsonovim koeficijentom korelacije. Vrijednost $p< 0,05$ smatrana je statistički značajnom.

Rezultati. Prosječna starost pacijenata bila je 55,84 godine. Bilateralni CTS je potvrđen u 88,4%, najčešće umjerenog stepena i izraženije na desnoj, dominantnoj ruci ($p=0,001$). U slučajevima bilateralne CTS, godine života nisu korelirale sa stepenom CTS promjena na obje ruke. Promjene u dominantnoj šaci bile su izraženije kod pacijenata starijih od 51 godine.

Zaključak. Muškarci sa idiopatskim CTS obično imaju bilateralni CTS sa izraženijim promjenama na dominantnoj ruci. Bilateralnost CTS i stepen oštećenja nervus medianus nisu povezani sa godinama života.

Ključne riječi: sindrom karpalnog tunela, nervus medianus, muškarci