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Which kinesiotaping technique is effective? Comparision of two different techniques in patients with carpal tunnel syndrome

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Abstract

Background & Objective: Although different kinesiotaping (KT) techniques can be applied in the treatment of carpal tunnel syndrome (CTS), to our knowledge, there is no study in the literature showing the superiority of these techniques over each other. The aim of this study is to compare the effectiveness of KT techniques applied to the dorsal surface and palmar surface of the forearm in patients with CTS. *Methods:* Forty six patients (70 wrists) diagnosed with CTS were randomized into 3 groups. Fabricated night splint was applied to the first group, KT was applied to the palmar surface of the wrist to the second group, and KT was applied to the dorsal surface of the wrist to the third group. Clinical, electrophysiological and ultrasonographic evaluations before treatment and at the end of 3-week treatment were compared. *Results:* In the comparison pre- and post-treatment, the changes in pain evaluated with Visual Analog Scale, and median motor nerve distal latency were significant in all groups, the change in median nerve sensory conduction velocity was significant in Groups 1 and 2, the change in median motor nerve conduction velocity was significant in only Group 2, the change in The Boston Carpal Tunnel Questionnaire (BCTQ)-Symptom Severity Status was significant in Group 1 and Group 3, the change in BCTQ-Functional Severity Scale and median nerve cross-sectional area was significant in only group 1. When the changes in treatment between the groups were compared, no statistically significant difference was found in any of the parameters.
Conclusion: While splinting and different KT methods provided various benefits in CTS patients, they were not statistically superior to each other.

Keywords: Carpal tunnel syndrome, kinesiotaping, splinting

INTRODUCTION

Carpal tunnel syndrome (CTS) is an entrapment neuropathy characterized by paresthesia, pain, muscular atrophy, and weakness in the hand as a result of compression of the median nerve under the carpal tunnel in the wrist.[1] Clinical evaluation, electrophysiological examination, and ultrasonographic (USG) evaluation can be used in its diagnosis.[1] The main goal in the treatment of CTS is to reduce symptoms and increase hand functionality. Daily activity modifications and support of the wrist in a neutral position are frequently used in its treatment. Repetetive movements, such as wrist flexion/extension, can increase carpal tunnel pressure and thus CTS symptoms.[2] The main goal of splinting is to prevent conditions that increase carpal tunnel pressure.[3-5] Other treatment options are nonsteroidal anti-inflammatory drugs, exercise, kinesiotaping (KT), steroid injection, and surgery.[6-7]

Kinesiotape is an elastic band used to treat sports injuries and various other conditions. It is a treatment method developed to support and assist muscle structure that can be used in sports injuries, bursitis, tendinitis, lymphedema, and entrapment neuropathies.[7]

It is seen that the KT method contributes to the treatment through various mechanisms. It regulates the function of weak muscles and reduces excessive edema under the skin, and impaired circulation, by activating the blood and lymphatic circulation systems. It reduces pain, facilitates the movement of fascia and

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tendons by reducing abnormal muscle tension, and increases proprioception through cutaneous mechanoreceptors.[8]

There are various studies in the literature comparing the effectiveness of splinting and KT methods in CTS patients, and the results of these studies are contradictory.[8-12] There are various techniques in KT application in CTS.[7] When the studies on the subject were examined, it was seen that neural technique, inhibitory technique and field correction techniques were generally used and applied to the volar surface of the wrist and forearm.[8-10] There are also studies of CTS in which KT is applied to the dorsal aspect of the wrist.[13,14] However, to the best of our knowledge, there is no study examining the superiority of these application sites over each other.

The aim of this study was to evaluate the effects of splinting and CT methods applied to the dorsal and palmar surfaces of the wrist and forearm on symptom severity, functional status, electrophysiologic and ultrasonographic evaluation parameters in patients with CTS.

METHODS

Patients

A total of 46 patients (70 wrists), who applied to our hospital between May 2022 and November 2022, and were diagnosed with CTS were included in this study.

The subjects were informed about the study and their written informed consent was obtained. The study protocol was approved by the Local Ethics Committee. The study complied with the principles of the Declaration of Helsinki.

Inclusion criteria included: 1) Age over 18 years, 2) Paresthesia and/or pain symptoms in the hand in the region corresponding to the median nerve distribution, 3) Symptoms last longer than 3 months, 4) Diagnosis of mild or moderate CTS on electrophysiological examination.

Exclusion criteria included: 1) Diagnosis of severe CTS on electrophysiological examination, 2) Local steroid injection related to CTS in the last 3 months, 3) History of a surgical operation for CTS, 4) Those who recieved regular medical treatment or physical therapy programs for CTS in the previous month, 5) Patients with polyneuropathy, cervical radiculopathy, proximal median neuropathy, 6) Inflammatory rheumatic diseases (rheumatoid arthritis, SLE, gout, etc.) 7) Alcoholism, 8) History of trauma or fracture in the affected extremity in the last 3 months, 9) History of malignancy, 10) Progressive and non-progressive central or peripheral nervous system diseases, 11) Lactation and pregnancy, 12) Patients with limited mobility that may prevent using splints on their wrists and patients with rashes or open wounds on the skin of the hand, wrist, forearm that may prevent KT.

Only the affected hands of the patients were included in the study. If a person had bilateral CTS, both hands were included in the study, The same treatment was applied bilaterally, and assessments were made for both hands separately.

The G* power (V3.1.7) program was used for the sample size. Similar to the literature, it was found that at least seventeen wrists were required for each group with significance level α=0.05, 80% statistical power, and effect size d=1.0 to detect a 3 point difference in the VAS scores among groups.[8,10,15] We assigned at least 20 wrists per group to compensate for those who dropped out.

Outcome measurements

Demographic characteristics of the patients, duration of CTS-related symptoms, CTS severity by electrophysiological measurement (mild/moderate), and pain levels were noted with the visual analog scale (VAS). The VAS scores from 0 (no pain) to 100 (most severe pain), the higher the score, the higher the degree of pain.

The Boston Carpal Tunnel Questionnaire (BCTQ) was used to assess patients' symptom severity and functionality. The BCTQ was a scoring system proposed by Levine *et al*. in 1993 for the clinical standardization of CTS patients, and its Turkish validity and reliability study was conducted.[16,17] It includes 19 questions and consists of symptom severity and functional capacity subscores. A higher score indicates greater influence.

ENMG evaluation

Medelec Synergy 10 channel (Oxford, U.K.) EMG device was used for electrophysiological examination. In nerve conduction studies, for the diagnosis of CTS and follow-up parameters, median motor nerve distal latency (DML), median motor nerve conduction velocity (MCV), median motor nerve combined muscle action potential (CMAP) amplitude at wrist level, second finger wrist segment median nerve sensory conduction velocity (SCV), and second finger wrist segment median nerve sensory action potential (SNAP) amplitude were noted.

Mild CTS: Only sensory abnormalities on electrophysiological testing.

Moderate CTS: Normal CMAP with prolongation of DML and sensory latencies.

Severe CTS: Inability to receive SNAP or low-amplitude or absent CMAP with prolonged DML and sensory latency. Fibrillations, changes in the interference pattern, and motor unit potentials are frequently observed in needle EMG.[18]

Sonographic evaluation

The wrists of all patients to be included in the study were evaluated ultrasonographically, and the median nerve areas were noted. Median nerve ultrasound (USG) was performed with the USG device (Logiq P5 brand, GE L11 linear probe) in our clinic, while the patient was lying in the supine position. The transducer was placed perpendicular to the median nerve and the median nerve cross-sectional area (MNCSA) was measured in the axial plane. MNCSA was noted by marking the hyperechoic ring of the median nerve seen at the level of the hook of the hamate bone, pisiform bone, and radioulnar joint (Figure 1).

Randomization

Randomization was performed by a clinical secretary who was not included in the study using the opaque envelope method, and patients were randomly divided into three groups. The first group was given a soft fabricated splint with volar support that kept the wrist in a neutral position and the patients were asked to wear the splint continuously at night for 3 weeks. The second and third groups were treated with KT on two different surfaces. Before the treatment, proper skin cleaning of the area where the tape will be applied was requested. Patients with hair on the application surface were asked to shave them, not to use creams or similar substances, and to have dry skin. Neural and field correction techniques were applied together as application techniques. Kinesio tape (Kinesio Tex Gold) was used as the material.

The KT method was applied to the 2nd group: 2.5 cm wide I-bands extending from the 1st carpometacarpal joint to 5 cm below the lateral epicondyle and an I-band half the length

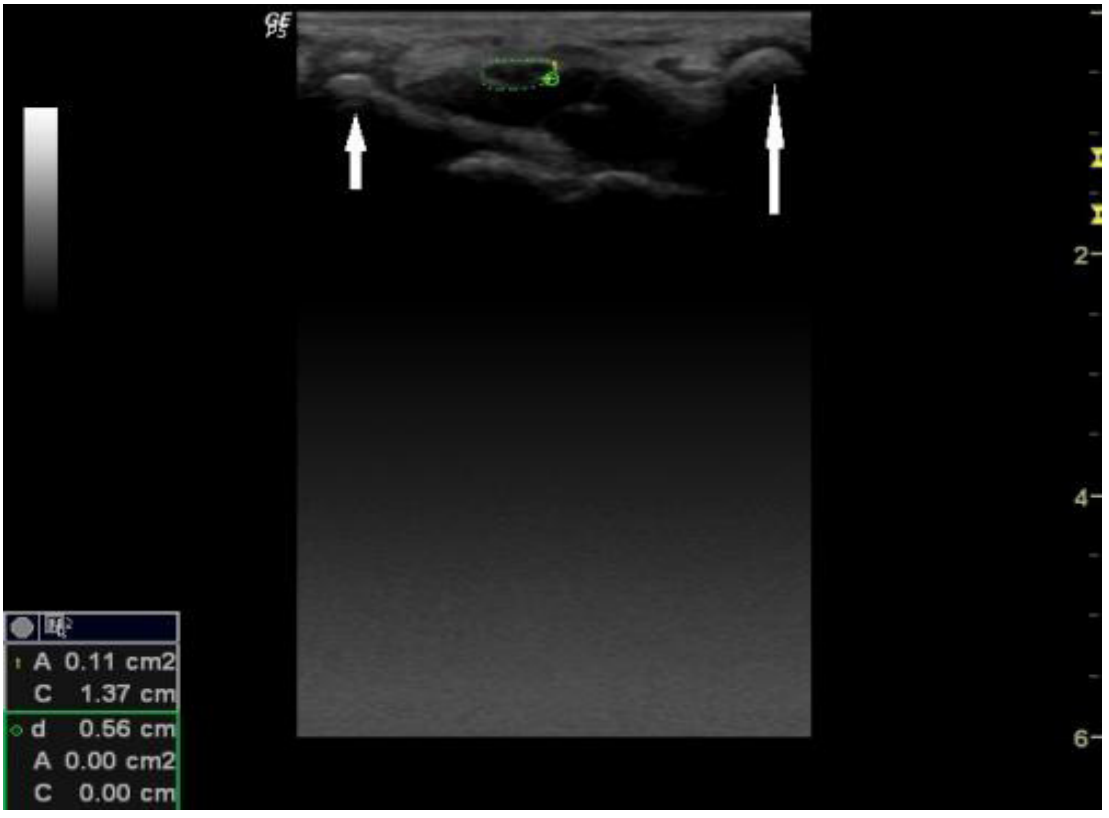

Figure 1. Ultrasonographic measurement of median nerve area.

of the wrist circumference and 5 cm wide. The application was performed with the wrist in 30° extension, forearm in supination and elbow in extension. A 50% stretch was applied along the median nerve from the middle of the 2nd and 3rd metacarpal to 5 cm below the lateral epicondyle and the last 3 cm of the tape was glued without stretching. The same procedure was performed for the ulnar nerve from the middle of the fourth and fifth metacarpal to 5 cm below the medial epicondyle. The middle 1/3 of the I band was glued to the volar surface of the wrist with 50% tension and without tension on the ends on both sides (Figure 2A).

The CT procedure was applied to the 3rd group: With the wrist and metacarpophalengeal (MCP) joints in neutral position, 30 cm and 10 cm I tapes were applied to the 3rd and 4th MCP joints. The long tape was applied from the dorsum of the hand to the wrist with an average of 50% stretching and from the wrist to the forearm without any stretching (0%) and adhered to the end 5 cm below the medial epicondyle. The middle 1/3 of the I band to be applied to the dorsal surface of the wrist was slightly stretched and adhered to the ends on both sides without stretching (Figure 2B).

The KT procedure was repeated once a week for three weeks by the same person. Patients were taped five days a week. Two days a week the tape was removed and they were given the opportunity to shower, etc. During treatment, patients were instructed to avoid excessive sweating and excessive exposure to water.

Median nerve and tendon gliding exercises were explained to all three groups and recommended to be performed twice a day as a home program. Activities that trigger the disease were explained and avoidance of these activities was recommended.

All clinical, electrophysiological, and ultrasonographic evaluations were performed pre- and post-treatment (at the end of the three weeks) by the same investigator who was blinded to the treatment options.

Statistical analaysis

Statistical Package for Social Sciences (SPSS 25.0 for Windows) was used in the analysis of the data. With the Kolmogorov-Smirnov test, it was evaluated whether the continuous variables showed normal distribution or not. In descriptive statistics, mean (standard deviation [SD]) or median (minimum-maximum) in continuous variables, frequency and percentages (%) in nominal and categorical variables were used to present data. Statistically significant differences between the groups were investigated with Kruskal Wallis, Mann-Whitney U, and ANOVA test. χ^2 and Fisher's exact tests were used to analyze

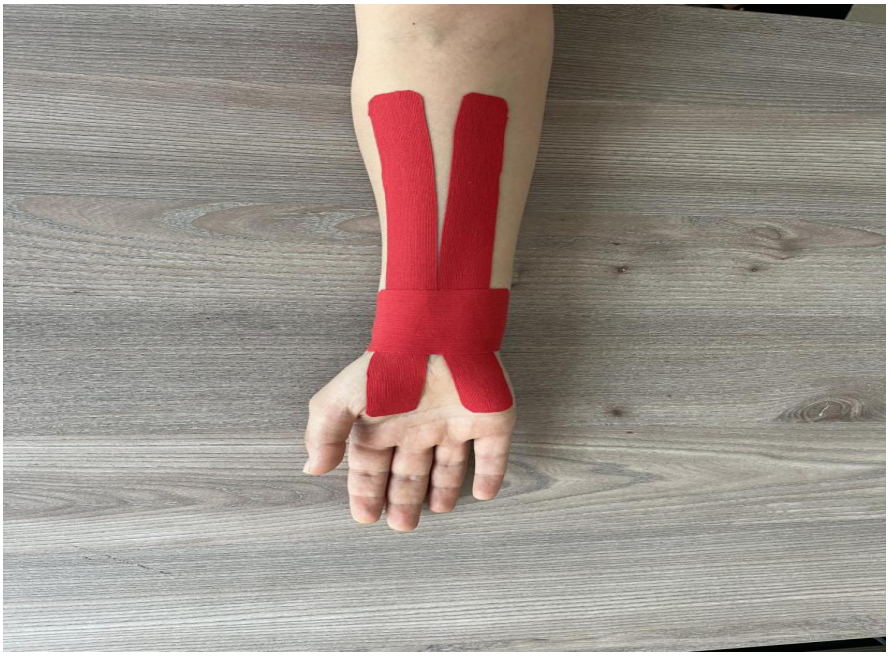

Figure 2A. Kinesiotape application to the volar surface of the forearm for carpal tunnel syndrome.

Figure 2B. Kinesiotape application to the dorsal surface of the forearm for carpal tunnel syndrome.

the significance of the difference for nominal variables. In addition, Wilcoxon signed-rank test was used for repeated measurement within the group. Values of $p<0.05$ were considered statistically significant.

RESULTS

This study included 70 wrists of 46 patients. They were divided into 3 groups: those who used splint at night (Group 1, 23 wrists of 16 patients), those who applied KT to the palmar surface (Group 2, 22 wrists of 15 patients), and those who applied KT to the dorsal surface (Group 3, 25 wrists of 15 patients). Since 6 patients (9 wrists) could not continue treatment, 40 patients (61 wrists) were evaluated in the study.

The mean age of the 40 patients was 52.95 (SD 9.48) years, 32 (80%) of them were female and 8 (20%) were male. The patients in the groups were similar to each other in terms of demographic characteristics ($p>0.05$), except that the mean age of Group 3 was older. Table 1 presents the distribution and comparison of the demographic characteristics of the groups.

The duration of symptoms before treatment, the most prominent symptom, and the severity of CTS defined in EMG were similar between the groups. The distribution and comparison of the disease characteristics of the groups according to the groups are shown in Table 2.

There was no statistically significant difference between the groups in any measurements pre-and post-treatment. In the comparison pre- and post-treatment, the change in VAS and median DML measurements was significant in all 3 groups ($p=0.001$, $p=0.036$, <0.001 respectively), the change in median SCV values was significant in Groups 1 and 2 ($p=0.020$ and $p=0.007$ respectively), the change in median MCV values was significant in only Group 2 ($p=0.034$), the change in BCTQ-Symptom Severity Scale (SSS) was significant in Group 1 and Group 3 ($p=0.001$, $p=0.003$), the change in BCTQ-Functional Severity Scale (FSS) and MNCSA was significant in only Group 1 ($p=0.023$, $p=0.048$). In the comparison of pre-and post-treatment, no significant change was found in the median SNAP and CMAP values in any of the 3 groups.

When the changes pre- and post-treatment were compared between the groups, no statistically significant difference was found in any of the evaluated parameters ($p>0.05$). Table 3 shows the distribution and comparison of the measurement results of pre and post-treatment pain, ENMG and USG findings, symptom severity, and functional status.

DISCUSSION

In this study investigating the effects of splinting

Table 1: Demographic characteristics of the patients

	All Patients n=40	Group 1 n=13	Group 2 n=14	Group 3 n=13	p
Age (years) mean (SD)	52.95 (9.48)	52.69 (8.61)	48.71 (10.80)	57.76 (6.75)	**0.009***
Gender n (%)					
Woman	32 (80.0)	10 (76.9)	11 (78.6)	11 (84.6)	0.689#
Man	8 (20.0)	3 (23.1)	3 (21.4)	2 (15.4)	
BMI (%) median (min-max)	30.22 (22.1-41.2)	29.51 (26.6-37.1)	27.17 (22.1-40.8)	28.36 (24.1-41.1)	0.063*
Dominant hand n (%)					
Right	40 (100)	13 (100)	14 (100)	13 (100)	-
Left	0 (0)	0 (0)	0	0	
Hand with CTS n (%)					
Right	11 (27.5)	5 (38.5)	3 (21.4)	3 (23.1)	0.385#
Left	8 (20)	1 (7.7)	5 (35.7)	2 (15.4)	
Bilateral	21 (52.5)	7 (53.8)	6 (42.9)	8 (61.5)	
Working Status n (%)					
Not working	35 (87.5)	11 (84.6)	11 (78.6)	13 (100)	0.226#
Active working	5 (12.5)	2 (15.4)	3 (21.4)	0 (0)	

SD: standard deviation; BMI: body mass index; *:Kruskal Wallis Test; #: Chi-square Test
p<0.05 values were accepted as statistically significant

and 2 different types of KT on CTS, significant changes were observed in median SCV, MCV, BCTQ-SSS, BCTQ-FSS and MNCSA parameters in various groups post-treatment compared to pre-treatment. Significant changes were observed in VAS and median DML in all 3 groups. Changes in median SNAP and CMAP values were not significant in all 3 groups. In the comparison of the changes obtained pre- and post- treatment between the groups, the amount of change in any of the evaluated parameters was not statistically significant between the groups.

In our study, the decrease in VAS after treatment was found to be significant in all 3 groups, but no significant difference was observed in the intergroup comparison of the amount of change. In a study in which 45 wrists with CTS were evaluated and KT, placebo KT and splinting were compared, a decrease in pain level assessed by VAS was found in all 3 groups, but similar to our study, this difference was not significant between the groups.[10] In this study, the evaluation was performed at the end of 4 weeks of treatment.[10] In another study examining the effects of KT and splinting on CTS on 50 wrists, VAS-day and VAS-night were evaluated separately. In the KT

Table 2: Distribution and comparison of disease characteristics according to groups

	Group 1 n (hands)=20 median (min-max), n(%)	Group 2 n (hands)=20 median (min-max), n(%)	Group 3 n (hands)=21 median (min-max) n(%)	*p
Symptom duration (months)	39.9 (3.0-144.0)	56.5 (1.0-204.0)	72.4 (1.0-180.0)	0.223
The most prominent symptom				
Pain	8 (40)	11 (55)	7 (33.3)	0.284
Numbness	10 (50)	7 (35)	9 (42.9)	
Tingling	2 (10)	2 (10)	2 (9.5)	
Weakness	0	0	3 (14.3)	
CTS severity				
Mild	13 (65)	8 (40)	11 (52.4)	0.286
Moderate	7 (35)	12 (60)	10 (47.6)	

*: Among Group Comparisons-Kruskal-Wallis Test
p<0.05 values were accepted as statistically significant

Table 3: Distribution and comparison of pain, electrophysiological and ultrasonographic findings, symptom severity, and functional status results pre- and post-treatment

	Group 1 n (hands)=20 median (min-max)	Group 2 n (hands)=20 median (min-max)	Group 3 n (hands)=21 median (min-max)	P value			
				*p	Group 1-2[a]	Group 1-3[a]	Group 2-3[a]
preT-VAS	72.5(20.0-100.0)	58.0(30.0-90.0)	60.0(20.0-100.0)	0.051	0,119	0,280	0,989
postT-VAS	55.5(0-90.0)	46.5(10.0-80.0)	37.1(0-90.0)	0.082	0,521	0,075	0,522
Ω Group exchange p	**0.001**	**0.036**	**<0.001**	0.179			
preT-Median SNAP (μV)	39.42(12.6-82.4)	32.42(12.0-77.9)	27.20(18.4-73.7)	0.363	0.595	0.997	0.683
postT-Median SNAP (μV)	41.91(12.0-124)	36.25(6.0-77.0)	34.22(14.7-71.1)	0.699	0.864	0.649	0.983
Ω Group exchange p	0.276	0.080	0.305	0.145			
preT-median SCV (m/s)	34.68(26.4-38.3)	34.98(21.3-90.7)	33.03(22.8-38.4)	0.285	1.000	0.541	0.925
postT- median SCV (m/s)	36.53(26.2-43.8)	38.53(22.2-92.0)	33.26(23.0-39.1)	0.056	0.919	0.084	0.355
Ω Group exchange p	**0.020**	**0.007**	0.601	0.308			
preT-Median CMAP (mV)	10.94 (4.10-52.0)	8.62(5.10-12.0)	7.43(4.20-10.8)	0.093	0.714	0.378	0.095
postT-Median CMAP (mV)	8.78(4.10-16.0)	11.47(6.0-67.0)	8.0(4.5-13.1)	0.446	0.765	0.693	0.595
Ω Group exchange p	0.381	0.191	0.073	0.906			
preT-median DML(ms)	3.60(2.5-4.7)	4.28(3.0-7.50)	3.98(2.9-7.7)	0.304	0.130	0.434	0.823
postT- median DML (ms)	3.46(2.6-4.7)	4.06(3.0-7.0)	3.65(2.8-5.1)	0.293	0.135	0.688	0.413
Ω Group exchange p	**0.045**	**0.010**	**0.030**	0.442			
preT-median MCV (m/s)	55.04(50.0-61.0)	55.59(45.0-62.0)	56.50(50.0-77.0)	0.943	0.952	0.709	0.923
postT- median MCV (m/s)	56.54(49.-69.0)	58.15(44.0-79.0)	54.99(50.0-64.0)	0.091	0.771	0.534	0.204
Ω Group exchange p	0.299	**0.034**	0.532	0.093			
preT-BCTQ-SSS	3.15(1.63-4.0)	2.57(1.18-3.81)	2.90(1.72-4.81)	0.223	0.217	0.672	0.862
postT-BCTQ-SSS	2.46(1.45-3.72)	2.60(1.18-4.0)	2.56(1.72-3.72)	0.800	0.924	0.945	0.998
Ω Group exchange p	**0.001**	0.440	**0.003**	0.057			
preT-BCTQ-FSS	2.49(1.0-5.0)	2.57(1.0-4.12)	2.63(1.0-4.75)	0.228	0.996	0.979	0.997
postT-BCTQ-FSS	1.85(1.0-3.87)	2.43(1.0-4.25)	2.22(1.0-4.75)	0.146	0.281	0.652	0.905
Ω Group exchange p	**0.023**	0.621	0.062	0.094			
preT-median nerve-CSA	0.13 (0.08-0.39)	0.14(0.10-0.29)	0.12(0.10-0.20)	0.839	0.993	0.952	0.756
postT-median nerve-CSA	0.11(0.09-0.17)	0.13(0.08-0.30)	0.12(0.10-0.19)	0.246	0.379	0.451	0.872
Ω Group exchange p	**0.048**	0.129	0.222	0.777			

VAS: Visual Analog Scale, SNAP: sensory nerve action potential, SCV: sensorial conduction velocity, CMAP: compaund motor action potential, DML: distalmotor latency, MCV: motor conduction velocity, BCTQ: Boston Carpal Tunnel Questionnaire, SSS: symptom severity scale, FSS: functional severity scale, CSA: Cross Section Area, preT: pre-treatment, postT: post-treatment

*: among group comparisons-Kruskal-Wallis test; [a]: Mann-Whitney U test; Ω: within group comparisons-Wicoxon signed rank test

p<0.05 values were accepted as statistically significant

group, the amount of reduction in night pain was found to be statistically significantly higher than in the splint group.[15] In the study by Kaplan *et al*, only splint, splint and KT, splint and paraffin groups were compared and KT application added to the splint was found to be more effective in pain relief than splint alone in both 3rd week and 3rd month evaluations.[11] In these three studies, KT was attached to the volar surface as in our second group.[10,11,15] In another study investigating the KT experiences of patients with CTS, KT was attached to the dorsal surface of the wrist, first and fifth fingers for 2 weeks and was found to be effective in reducing pain.[13] Although it is seen to be beneficial in reducing pain, the fact that KT was applied at different times and in different application methods in the studies may be effective in obtaining different results. Further research is needed to determine which type of dorsal or palmar application is superior in reducing pain in CTS.

In this study, while BCTQ-SSS showed significant improvement in Groups 1 and 3, and BCTQ-FSS only in group 1, no significant difference was observed between the changes. In the study of Aktürk *et al*., in which KT and splinting were compared, KT was applied to the volar face 5 times and for approximately 25 days, and the change in both BCTQ-SSS and BSCTQ-FSS was found positive in both groups, and the change in the KT group was statistically significant in the intergroup comparison.[9] In the study of Külcü *et al*., although all BCTQ scales developed in both groups in both KT and orthosis groups, the change in the KT group was found to be statistically significant.[10] In the literature, there is a study showing the positive effects of KT applied to the dorsal aspect of the wrist on BCTQ-SSS and BCTQ-FSS. In that study, there was no control group, KT was applied twice in total, each for 3 days.[14] In addition to the difference in the number of participants in the studies, differences in the duration of KT and splint use, frequency and type of application may also be effective in obtaining different results.

Although the importance of USG evaluation in the evaluation of the median nerve and surrounding structures is emphasized in the literature, the number of studies comparing the development after treatment methods is limited.[11,19,20] In this study, the decrease in MNCSA between pre- and post- treatment was significant in group 1, while the amount of change between the groups was not significant in any of the 3 groups. Unlike our study, the amount of decrease in MNCSA was found to be significant in both the splint group and the KT group in the 3rd week and 3rd month evaluations in the study by Kaplan *et al*.[11] When the amount of change was compared, no significant difference was found.[10] The fact that splinting was applied in addition to CT in this study may be effective in obtaining different results.[10] Soyupek *et al*. showed a decrease in MNCSA with splint use, but this decrease was not statistically significant.[20] In this study, we think that the fact that USG evaluation was performed at 3 months was effective in obtaining different results.

When electrophysiologic examinations were evaluated, DML change post- treatment was found to be significant in all 3 groups and SCV was found to be significant in groups 1 and 2, but the difference was not significant when the changes between the groups were compared. In a study comparing the effects of splinting and KT in CTS, the change in DML and SCV was found to be statistically more significant in the KT group.[9] There is also a study showing that the change in median DML was more significant in the group receiving dorsal and volar KT in addition to exercise than in the group receiving only exercise.[21] In another study, a significant improvement in MCV values was found in the KT group and in the group in which KT and splint were applied together in the 3rd month evaluation compared to the group in which only orthosis was applied.[8] In our study, the change in MCV with treatment was found to be significant only in Group 2, but this difference was not significant in the intergroup evaluation. In a study investigating the effects of splinting and phonophoresis methods on CTS, electrophysiologic parameters did not show significant differences in any treatment method.[20] In this study, electrophysiologic evaluation was performed 3 months after treatment.[20] Differences in the type, duration and frequency of KT application and post-treatment evaluation time may have been effective in obtaining different results.

To our knowledge, this is the first study in the literature to compare different KT techniques in the treatment of CTS, which makes our study important. On the other hand, our study has some limitations. The small number of patients is one of them. Long-term clinical efficacy of treatment modalities may differ, so studies with longer follow-up periods are needed.

In conclusion; in our study, both splinting and KT methods applied to the palmar and dorsal surfaces of the forearm provided various

benefits, especially reduction in pain level, and this difference was not statistically significant in intergroup evaluations.

DISCLOSURE

Ethics: The study protocol was approved by Dışkapı Yıldırım Beyazıt Education and Research Hospital`s Local Ethics Committee (Approval date: 18.04.2022, No: 135/02).

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Conflict of interest: None

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