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The Course and Outcomes of Carpal Tunnel Syndrome during COVID-19 Pandemic

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Article

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Abstract

Purpose: The COVID-19 pandemic was associated with limited access to healthcare. The aim was to investigate the course and outcomes of carpal tunnel syndrome (CTS) during this time.

Methods: We included 63 patients with CTS from one of our previous studies. Patients were contacted telephonically between August 2024 and March 2026. The mean time-interval between previous and the current assessment was 5.33 ± 0.60 years. Patients were interviewed regarding severity and treatment of CTS.

Results: 23 (36.5%) of patients underwent surgery. This group was characterized by the higher male proportion and the worse baseline Boston Carpal Tunnel Questionnaire (BCTQ) score. BCTQ improved in all patients but to the more extent in those who received surgery.

Conclusion: Pandemic was associated with low rate of surgery for CTS. Surgical treatment was associated with better outcome, although patients not treated surgically might also improve. Worse clinical symptoms and male gender may be associated with pursue of surgical therapy during its limited availability.

Introduction

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy, resulting from compression of the median nerve in the carpal tunnel. The main symptoms include numbness and pain in the affected wrist and hand, which are exacerbated during night. More advanced stages are associated with weakness and the loss of hand dexterity. Diagnosis is confirmed by nerve conduction studies, which may be also replaced or complemented by a high-resolution ultrasonography [1]. Additionally, a number of scales and questionnaires have been elaborated, which help to establish diagnosis such as Carpal Tunnel Syndrome-6 [2] or assess the severity such as Boston Carpal Tunnel Questionnaire (BCTQ) [3]. In CTS, the treatment of choice is surgical transection of transverse ligament (which forms the anterior wall of the carpal tunnel). In less advanced cases, conservative therapies, including physiotherapy, rehabilitation, wrist splint, perineural injections and others may alleviate the symptoms. The effect is, however, often only temporary with up to two-thirds of patients turning to surgical intervention after initial conservative treatment [4]. Studies investigating the natural course of CTS are not numerous. They observed patients over short period of time, or the recruited cohorts were small [5, 6]. One well-powered study with longer follow-up was conducted at times when objective diagnosis (nerve conduction or ultrasound) was not done systematically and tools to assess the clinical severity were not available [7]. The reason for scarcity of data on natural course of CTS is probably a high availability of surgical therapy, which in majority of patients relieves the symptoms and makes further follow-up not necessary. The access to surgical procedures and other healthcare services has been however compromised during Covid-19 pandemic. The timeframes of pandemic coincided with our previous study on validation of the Polish language version of BCTQ, which recruited patients between April 2019 and December 2020 [8]. That study included the control visit after the patient underwent therapy to assess the reactivity of the

new language version. Although patients were contacted until the end of 2021 only one quarter of them received any therapy. Such limitation in the care created opportunity to do a long-term follow-up of a CTS-cohort in which the surgical release and other therapies were done less frequently, and the course of the disease was more natural than usual.

Patients and Methods

All experimental protocols were approved by the Ethics Committee of the Jagiellonian University (Permission No. 1072.6120.216.2022). All methods were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from all participants after being fully informed about the study prior to their participation. Guidelines outlined in the Declaration of Helsinki were followed.

Patients from the cohort recruited during the study on validation of Polish language version of BCTQ [8], who did not receive therapy for CTS during that study were contacted telephonically between August 2024 and March 2026. (The main inclusion criteria for that study were age ≥ 18 years; presence of at least one of the typical symptoms of CTS and confirmation of CTS with electrophysiology. The main exclusion criteria were treatment for CTS prior to inclusion, except for occasional pharmacotherapy, presence of peripheral neuropathy, diabetes, cervical radiculopathy, myelopathy, thoracic outlet syndrome, pregnancy and significant psychiatric conditions or cognitive impairment). We started contacting patients in the order in which they had been enrolled in the validation study, beginning with the first and ending with the last. Some patients, however, picked up the phone only during second call, which might follow the first one after a number of days, so the order of recruitment to the validation study was not strictly the same as the order of the calls. Phone consent to participate was obtained from 63 individuals (mean age 58,8 ±12,1 year, 9 men). 23 (mean age 59,3 ±13,4 years, 6 men) of them underwent the surgical release of the median nerve after the validation study was finished but before our call (op-group). Remaining 40 (mean age 58,5 ±11,6 years, 3 men) were in the non-op group. The flow of this and the previous study is presented on the figure 1.

During the call, patients were asked if they were operated and if they had received other forms of therapy for CTS. When the study was already advanced, we realized that the use of nocturnal splint is reported less frequently than expected and we started to ask about this option specifically. A number of patients confirmed then use of splint only when specifically asked. The use of splints is reported but it is most probably lower than it really was. Finally, the previously validated Polish language version of BCTQ [8] was filled out during the call.

The baseline scores of the two subscales of BCTQ, the Symptom Severity Scale (SSS) and the Functional Status Scale (FSS) and the neurophysiological severity grade of CTS (SG-CTS) were taken from the database of the validation study. SSS is an 11-item and FSS an eight-item scale. Each item is scored from one to five, where five means worse outcome. The final score of each subscale is the sum of

responses divided by the number of items. SG-CTS is a six-point scale, which is based on the measurement of conduction of mainly the median nerve. A score of six indicates no CTS, whereas a score of one indicates extremely severe CTS [9].

Statistical analysis:

In the whole sample as well as within both groups, we compared the SSS and FSS scores from the baseline (validation study) and from the follow-up (current study). Demographic variables, interval between both BCTQ assessments as well as SG-CTS, SSS and FSS at baseline were compared between both groups. Analysis was made using Student's t-test as well as with Mann-Whitney U test, Wilcoxon signed-rank test, and Chi-square test of independence where appropriate. Data are presented as mean and standard deviation. Data distribution was assessed using Shapiro-Wilk test. The level of significance was set at $p<0,05$. Calculations were made with TIBCO Software Inc. Statistica (data analysis software system), Version 14.

Results

22 patients from non-op group and 12 patients from op-group received rehabilitation, massage, physiotherapy or (in one case) transcutaneous electrical nerve stimulation. In 6 patients from non-op group and in one patient from op-group it was accompanied by use of nocturnal splint. The splint was also the only therapy in one patient from the non-op group. One patient from op-group had perineural injection (without ultrasonographic guidance). The proportion of men was higher and the interval between baseline and follow-up measurements was slightly longer in the op-group. The op-group showed also higher baseline SSS and a trend towards higher baseline FSS. Other demographic and clinical data were not different (Table 1).

Table 1
Demographic and clinical data of Op- and Non-op groups

sex	**Non-op group n = 40**		**Op-group n = 23**		**p**	
	3 men (7,5%)		**6 (26,1%)**		**0.042**	**χ^2**
	mean	sd	mean	sd		
age	58.54	11.64	59.34	13.43	0.805	t
Interval	5.21	0.56	5.54	0.62	0.037	U
SG-CTS	3.28	0.75	3.13	0.82	0.388	
Baseline SSS	2.65	0.68	3.20	0.81	0.0049	t
Baseline FSS	2.33	0.91	2.77	0.98	0.077	

Op-group - operated group, Non-op group - not operated group, sd - standard deviation, SG-CTS - neurophysiological severity grade of carpal tunnel syndrome, SSS - Symptoms Severity Scale, FSS - Functional Status Scale, χ2 - Chi-square test of independence, t - Student's t-test, U - Mann Whitney U test

In the op-group, three patients had SG-CTS of 2, 17 had of 3, and three of 5. In the non-op group, three had of 2, 27 had of 3, six had of 4, and four of 5.

The higher proportion of men in op-group was the reason to look for demographic and clinical differences between genders in our sample. Due to the limited number of male patients (n = 9), the corresponding data were presented descriptively only: the mean age of female patients was 65,3 ± 12,5 years and of male patients 57,8 ± 12,0. SG-CTS among female patients was 3,22 ± 0,67 and the scores of SSS and FSS were 2,62 ± 0,63 and 1,43 ± 0,93 respectively. SG-CTS among male patients was 3,22 ± 0,79. The SSS and FSS scores were 2,89 ± 0,79 and 2,56 ± 0,95.

In the whole group, SSS decreased between baseline and follow-up, from 2,85 ± 0,77 to 1,68 ± 0,77, p = 0,000 and FSS from 2,49 ± 0,95 to 1,73 ± 0,81, p = 0,000 (Wilcoxon test). The mean time interval between baseline and follow-up was 5,33 ± 0,60, ranging from 4,30 to 6,73 years. Both subscales decreased also in the non-op group, SSS from 2,65 ± 0,68 to 1,88 ± 0,85, p = 0,000 and FSS from 2,33 ± 0,91 to 1,91 ± 0,89, p = 0,031 as well as in the op-group, SSS from 3,20 ± 0,81 to 1,31 ± 0,42, p = 0,000 and FSS from 2,77 ± 0,98 to 1,43 ± 0,54, p = 0,000 (Wilcoxon test).

The post-hoc comparison revealed that the reduction in SSS and FSS scores was greater in the op- than non-op group (1,89 ± 0,93 vs. 0,77 ± 1,06, p = 0,000; 1,34 ± 1,23 vs. 0,42 ± 1,04, p = 0,002 respectively).

We stratified also the non-op group into to sub-group which improved (26 patients, two men) and which did not (14 patients, one man). Improvement was defined as the decrease in summarized score of SSS and FSS. The sub-group which improved was characterized by higher SSS and FSS scores at baseline,

which was not parallelled by more severe neurophysiologic abnormalities. Both sub-groups did not differ regarding the frequency of the use of conservative therapy. This analysis is presented in the Table 2.

Table 2
Differences between patients from the Non-op group who improved and who did not

Conservative therapy*	**Improved n = 26 (2 men)**		**Not improved n = 14 (1 man)**		**p**	
	13		**10**		**0.191**	**χ^2**
	mean	sd	mean	sd		
age (years)	58.43	10.75	58.74	13.56	0.788	U
Interval (years)	5.25	0.57	5.15	0.56	0.712	
SG-CTS	3.15	0.61	3.50	0.94	0.349	
Baseline SSS	2.83	0.65	2.32	0.62	0.031	
Baseline FSS	2.57	0.97	1.88	0.57	0.026	

SG-CTS - severity grade of carpal tunnel syndrome, SSS - Symptom Severity Scale, FSS - Functional Status Scale, χ2 - Chi-square test of independence, U - Mann–Whitney U test

*rehabilitation, massage, physiotherapy, nocturnal splint, transcutaneous electrical nerve stimulation

Discussion

In this study only 36,5% of patients underwent surgery. Taking into consideration the long-term follow-up (mean 5,33 years), such rate is lower than in respective, previous studies [7, 10, 11]. Moreover, the non-op group contained 31 patients with the electrophysiologic severity grade of CTS of 2 or 3, in whom the operation should be considered as the therapy of choice. Such results were most probably caused by the Covid-19 pandemic, which limited the access to healthcare services and in particular to surgical procedures.

Our data confirms nonetheless the previous findings of better outcomes after surgical treatment than after conservative therapy [7, 12, 13]. Despite the surgery was delayed in our group (as mentioned in the methods, it was performed after the previous follow-up during the study on validation of the Polish-language version of BCTQ finished [8]) it retained its therapeutic efficacy. This result is in accordance with the study of Twardowska et al. [14], which showed that surgical decompression alleviates the CTS even five years after the symptom onset. (Although, the improvement may be weaker than after earlier decompression [7]). Despite guidelines recommend surgery for advanced cases [15], our analysis revealed that both groups did not differ regarding the electrophysiologic severity of CTS. On the other hand, patients who underwent surgery had worse initial SSS score. Moreover, among our patients the male gender seems to be associated with more frequent surgical decompression. (Owing to the small number of male patients this finding should be however interpreted with caution). We believe that during

pandemic, subjective complaining reflected with SSS might motivate patients to make effort to receive surgery. The male gender in turn may have been associated with the urge towards nerve release due to more frequent association of CTS with professional, manual work. This speculation corresponds to the mean age of men in our group, which was over seven years below the usual age of male retirement in Poland, which is 65. (The mean retirement age of women is 60 and our female sample was over five years older). Such gender difference was not observed in big sample of patients investigated long before pandemic, when the surgery was more easily accessible [7].

Our data showed also improvement, albeit smaller, among patients who did not receive surgery. Previous studies usually showed comparable improvement after decompression and after conservative treatment in the short-term follow-up (up to one year). Longer observation however, frequently revealed partial recurrence of symptoms after conservative therapies and sustained improvement after surgery [4, 13, 16, 17]. Our observational study may partially reflect those data, however in our non-op group significant proportion of patients did not use any therapy. Moreover, the post-hoc analysis revealed lack of association between the use of conservative therapy and improvement in the non-op group (Table 2). Thus, the improvement observed in the non-op group should in significant part be attributed to the natural course of the disease. Such finding was observed previously in the long-term follow-up of untreated patients [5, 18]. It is also possible that, during the COVID-19 pandemic, conservative treatment was administered less systematically and less intensively, which might limit its efficacy.

Surprisingly, among patients who did not undergo surgery, more severe clinical symptoms (as reflected by SSS) were associated with improvement. To our knowledge, such finding has not been described previously. Indeed, the signs of more advanced disease, such as longer disease duration, a positive Phalen's test, and visible thenar wasting should predict the poor prognosis (lack of improvement) [4]. Partial explanation may be the previously described weak or complete lack of correlation between subjective symptoms and objective severity of the disease [19, 20]. The observed decrease in the SSS score may therefore not always reflect reduction of the median nerve compression within the carpal tunnel but in many cases rather degeneration of sensory nerve fibers with loss of their function and decrease of subjective complaining.

Limitations

The small sample limited our inquiry into the long-term course of CTS. For example, we could not compare the efficacy of particular conservative therapies. Furthermore, lack of electrodiagnosis and / or ultrasound limited the reliability of our follow-up. Finally, our op-group did not contain data regarding the time-point of the surgery. (After initial reckoning we realized that most of the patients did not remember the exact date of decompression and we did not collect this data systematically). The knowledge about time interval between the diagnosis and surgery would allow us to better assess the impact of Covid-19 pandemic on the course of CTS.

Conclusions

Restricted accessibility of healthcare services during Covid-19 pandemic reduced the proportion of patients who underwent surgery for CTS. Male patients and patients with subjectively more severe clinical symptoms, but not with more profound electrophysiologic changes received surgery more frequently. Surgical nerve release was associated with better outcome, however group treated conservatively and without any treatment also improved. Among patients who did not undergo surgery more severe clinical symptoms were associated with improvement. On the contrary, conservative treatment seems not to have effect on the outcome.

Declarations

The study on validation of the Polish Version of BCTQ has been registered on clinicaltrials.gov under the number NCT03782558 on 19th Dec 2018.

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The authors have no relevant financial or non-financial interests to disclose.

Data availability statement:

The data that support the findings of this study (including detailed results of nerve conduction studies and scans of questionnaires) are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request. Request may be sent per e-mail: jakub.antczak@uj.ed.pl. Data are located in controlled access data storage at Jagiellonian University Medical College.

Author contributions:

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Agnieszka Fryźlewicz, Gabriela Rusin, Piotr Koceniak, and Jakub Antczak. The first draft of the manuscript was written by Agnieszka Fryźlewiczm and Jakub Antczak, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Figures

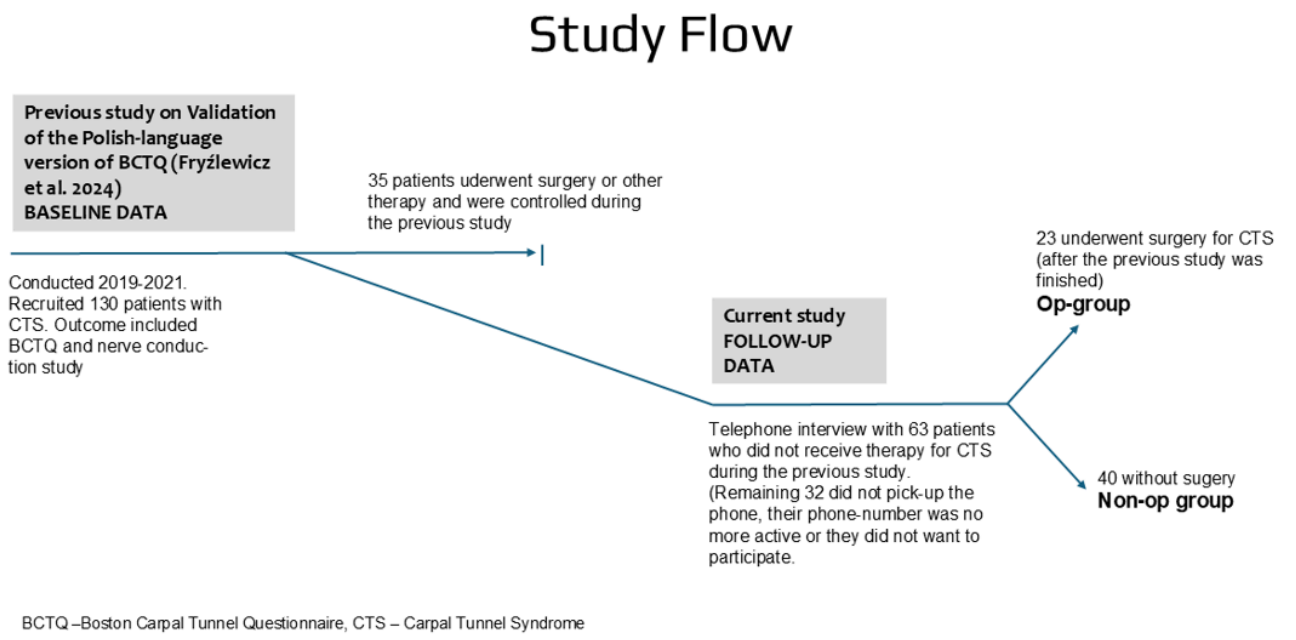


Figure 1

The flowchart of the current study and the previous study on validation of Polish version of BCTQ [8]