

Comparing Evidence-Based Practice and Current Practice Patterns of Physical and Occupational Therapists across the Globe after Carpal Tunnel Release

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Abstract

Introduction: The adoption of evidence-based practice (EBP) principles is ad-vacated by many professional organizations. This survey investigated the current practice patterns of prescribed interventions following carpal tunnel release by physical and occupational therapists.

Purpose of the study: The aims of this investigation is to assess the current utilization of physical and occupational interventions after carpal tunnel release (CTR) surgery and compare with the evidence described in the literature.

Methods: An Internet-based survey with 15 items was designed to address the study aims outlined above using the Google database online electronic survey program. Current knowledge and scientific evidence, systematic reviews (Meta-analyzes and randomized or quasi-randomized controlled trials studies) for the post-surgical approach after CTR were summarized. The questionnaire results were compared to the scientific evidence.

Results: A great variability in the intervention after CTR by occupational and physical therapists of 21 different countries is described in the literature.

Conclusion: There is not enough evidence to support a superior treatment approach for occupational and physiotherapist after CTR and there exists a large variability in the approach after CTR by therapists.

Keywords: Carpal tunnel decompression; Splint; Median nerve; Median neuropathy, Carpal tunnel syndrome release

Introduction

Since Phalen popularized the diagnosis and treatment of carpal tunnel syndrome (CTS) in the 1950s Phalen et al. has been continued debate over the optimal management of the condition regarding conservative treatment, surgical approach, and post-surgical intervention [1,2].

Postoperative rehabilitation is usually focused on resolution and restores functional recovery following surgery. Although studies and support evidence regarding hand rehabilitation conditions has grown throughout the last decade, evidence and guidelines for the use of specific interventions after CTR (carpal tunnel release) are limited. Studies suggest postsurgical treatment intervention should combine different methods of scar treatment and numerous strategies for controlling edema as well as passive, assisted and active mobilization, strengthening, and functional exercises and the gradual progression of activities. However, no clinical practice guidelines exist regarding the optimal post-surgical approach [3-8]. None of the studies that addressed the effectiveness of the variety of interventions have been described with high quality evidence. Different investigations regarding carpal tunnel syndrome provides us with an overview of the effectiveness of various rehabilitation treatments focus on optimize results following CTR compared with no treatment, placebo, or another non-surgical intervention. No evidence-based practice survey has been performed to assess the current practice patterns of occupational and physical therapists around the globe after carpal tunnel release [3-8].

Objective

The aims of this research study was to assess the practice patterns of physical and occupational therapists around the globe regarding CTR post-operative interventions compared to the current scientific evidence described in the literature.

Methods

Development of the survey

In order to assess the current practice patterns of physical and occupational therapists regarding interventions after CTR, an internet-based survey was de-signed to address the study aims outlined above using the Google database online electronic survey program. A total of 78 occupational and physical therapists were contacted between September and December 2016 through social networks. Therapists were invited to participate voluntarily on the survey and were directed to a Web site link containing the electronic survey. No incentives were provided to participants.

Knowledge and scientific evidence

Systematic reviews, meta-analyzes and randomized or quasi-randomized con-trolled trials (RCTs) studies that compare postoperative rehabilitation treatment with another rehabilitation treatment were compiled to develop the survey questions and compare the reported practice patterns [9]. We did not gather study evidence from any studies that solely addressed pre-surgical interventions, Re-ports that compared surgery with rehabilitation interventions, and reports that

assessed interventions that were not viewed to be rehabilitation cure, for in-stance, postoperative analgesia.

Figure 1 report the search strategy, quantity of reviews retrieved and the number of reviews excluded. Using the keyword carpal tunnel syndrome 1,599 studies was identified. After reading title and abstracts, we identify 35 duplicated articles in the first analysis. 1,550 studies were withdrawn because they did not much the inclusion criteria. Twelve full text articles were accepted as they match the criteria. Three of them did not did not address post - surgical recovery rehabilitation techniques as they did not match the inclusion criteria. Nine articles with a total of 586 patients met all eligibility criteria and were used to develop the survey questions and compare the practice patterns. Current knowledge and scientific evidence regarding the post-surgical approach following CTR are summarized in **Table 1**.

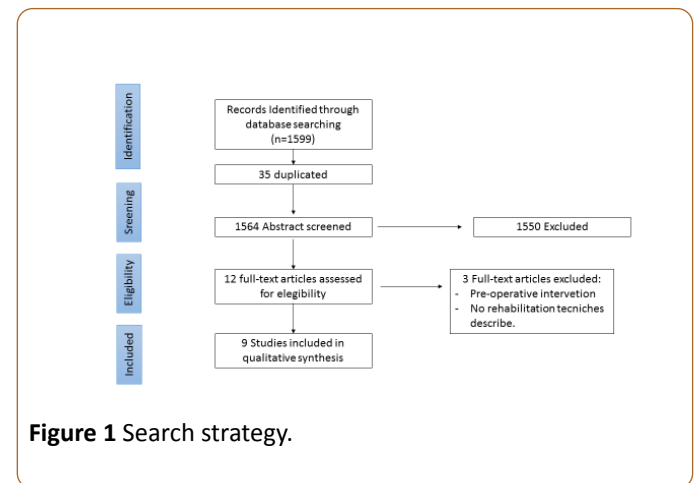


Figure 1 Search strategy.

Table 1 Evidence to support development of questions and comparison to clinical practice.

Study	Participants	Interventions	Outcomes	Results/Conclusion
Sawan et al. [12]	45	Compared continuous ultrasound in conjunction with nerve and tendon gliding exercises versus laser therapy plus nerve and tendon gliding exercises versus nerve and tendon gliding exercises alone	Visual analogue scale for pain intensity, pinch dynamometer for muscle strength, motor and sensory distal latencies for median nerve	Continuous ultrasound accompanied with nerve and tendon gliding exercises is considered more effective when compared either to Laser therapy with nerve and tendon gliding exercises or nerve and tendon gliding exercises only
Alves et al. [13]	58	Group 1 – low-level laser therapy (LLLT); group 2 – placebo laser therapy (PLT).	Palmar pain, pillar pain, paresthesia, nighttime pain, pain or discomfort at the site of the scar and Tinels test, as well as time taken to return to activities of daily living or to work	The patients submitted to low-level laser therapy after surgical release of the flexor retinaculum in the wrist benefited from the treatment and obtained better functional results than those from the control group
Gordon et al. [14]	21	The control group underwent open carpal tunnel release surgery (CTRS) only. The stimulation group underwent CTRS followed by 1 h of electrical stimulation of the median nerve.	Axonal regeneration, Purdue Pegboard Test, Semmes Weinstein Monofilaments, and Levine's Self-Assessment Questionnaire.	1 h ES of the median nerve after surgical decompression accelerates axonal regeneration to promote complete muscle reinnervation
Li et al. [15]	124	Electrical stimulation versus control or versus decimeter wave therapy versus no treatment control group		Benefits in the use of electrostimulation in the post-surgery of carpal tunnel treatment

Bhatia et al. [17]	102	Used of a palmar plaster of Paris splint or a bulky wool and crepe bandage postoperatively	Pain	No statistically significant differences between the two groups
Finsen et al. [19]	82	Postoperative immobilization or no immobilization after CTS release.	Pain, grip and key pinch.	Four weeks of postoperative immobilization confers no detectable benefit.
Martins et al. [20]	52	2 weeks immobilization and no immobilization after CTS release	Two-point discrimination test and pain	Wrist immobilization in the immediate post-operative period have no advantages when compared with no immobilization.
Cebesoy et al. [22]	40	Group 1 used a splint (exercises given 3 wk postoperatively) and group 2 was given a bulky bandage (exercises provided immediately) after open release.	Questionnaire of Levine for Clinical Assessment of Carpal Tunnel Syndrome	No statistical significance was found regarding symptom severity scale scores preoperatively and at the first postoperative month (P=.632 vs P=.353). At the third month, scores were lower in favor of group 2 (P=.023).
Hochberg [23]	62	Evaluate and compare the effects of CCT and conventional ice therapy	pain, edema (wrist circumference), and narcotic use.	CCT is more effective than conventional ice therapy in providing efficient pain blockage and reduction of edema in postoperative management of carpal tunnel surgery.
Total N=586				

The survey was piloted among the author's co-workers to check for question clarity and necessary edits were completed following the pilot test. The survey consisted of a total of 15 questions. The first five questions addressed demo-graphic information of the respondent; the next ten questions asked the frequency of use of the different intervention techniques described in the literature [10,11]. All the items were multiple choice questions. Questions were developed with consideration of the current evidence regarding the post-surgical treatment of carpal tunnel syndrome. Demographic analysis of the responses was performed.

Survey administration

The survey was administered through social networks (Facebook and Twitter). In an effort to maximize the response rate, an invitation to participate in the survey was distributed on three different occasions with one-week interval between invitations. A link to the survey site database was included in the invitation.

Results

Our study identified variability in the management of the intervention after CTR by occupational and physical therapists in different countries.

A total of 78 questionnaires were returned. It is impossible to determine the response rate because survey participation was solicited via the Internet through social media. Of the respondents, 61.5% (48) were physical therapists and the remaining 38.5% (30) were occupational therapists representing 21 different countries. The highest country represented was Spain with 31% (24). The majority of respondents 54% (42) indicated that they were employed in private practice. Twenty-seven percent (21) respondents indicated that they had been practicing between 2-5 years and 76% (59) reported that they treated less than ten patients that received carpal tunnel release in a month.

Regarding the different therapeutic interventions used by therapists in the first two weeks after CTR, sensory reeducation and exercises were the reported treatments for 44.9% (35) of the participants. Sixty-nine (54) respondents indicated that patient education was an essential part of therapeutic process but only 30.8% (24) instruct the patients regarding an orthotics weaning program. Regarding modalities, ice therapy was the technique used by 44% (35) respondents. Seventy-six percent of the respondents (59) used neural mobilization and 85% (66) prescribed home exercises as part of their rehabilitation program (**Table 2**).

Table 2 Questions (n=15; results are expressed as percentage of total answers per item).

Question	Participants	
	Reply	[n (%)]
General Information		

Where does your clinical practice usually take place?	Private practice	42, (54%)
Years of experience	2-5 yrs	21, (27%)
How many patients after carpal tunnel release do you treat in a month?	<10	59, (76%)
Country	Spain	24, (31%)
Profession	Physical Therapist	48, (62%)
Intervention Techniques		
Regarding intervention techniques immediately post operator: Indicate the different techniques you used in the first two weeks post- op	Sensory reeducation exercises	35, (45%)
Intervention techniques used after two weeks post operator: Indicate the different techniques you used after two weeks post- op.	Patient education	54, (69%)
Does your intervention plan include an orthotics weaning program after carpal tunnel syndrome release?	I use an orthosis weaning program	24, (31%)
Please, if your intervention plan does include an orthosis wearing program and Indicate your use of orthotics (please check all that apply):	I use both custom and pre-fabricated orthotics	18, (23%)
Indicate your typical instruction for the wearing frequency and duration of the orthotics.	Night only	20, (26%)
In case your intervention plan includes an orthotics weaning program, what joints are included in the orthosis?	Only wrist joint	23, (30%)
Indicate which of the following physical modalities are used in the postoperative period of carpal tunnel syndrome. (Please check all that apply):	Ice therapy	35, (45%)
In strengthening intervention after carpal tunnel release, Which muscles do you strengthen? Please indicate all that apply.	Wrist flexors	43, (55%)
In your use of Joint Mobilization techniques, please indicate where and what grades of mobilization you use.	Neural mobilization	59, (76%)
For the intervention after carpal tunnel release, I implement patient education in these areas:	Home exercise	66, (85%)

Discussion

Main objective of this investigation was to assess the current attitudes and opinions of physical and occupational therapists around the globe regarding therapeutic interventions following CTR compared to the current scientific evidence described in the literature.

Sawan et al. in comparison tendon and nerve gliding exercises together with continuous ultrasound, and when put next it with nerve and tendon glides workout routines plus laser cure versus nerve and tendon gliding exercises alone. Between the ultrasound (US) and exercise groups and between the laser therapy and exercise groups No significant differences were found. No, blind participant and using one of a kind systems in the same crew, prevents us from knowing the influence of each and every of the strategies used as a unique treatment. In our survey, US were applied by 26% of the responders while 76% reported performing neural mobilization gliding exercises.

Alves et al. conducted a quasi-randomized trial to know the effects of low-level laser therapy after CTR. Outcomes assessed in this study were: palmar, pillar, and nighttime pain, digits paresthesia, uncomfot at the site of the scar, Tinel test and time taken to return to movements of daily living or to work [12,13]. The investigation concluded that the group deal with low-degree laser remedy after surgical unlock of the flexor retinaculum have better functional results than these of

the control group. However there have been no statistically huge variations with low-degree laser remedy versus placebo in CTS symptoms and no differences between organizations within the return to work outcome at three months post-surgery. In our current practice survey, only 10% of occupational therapists and physical therapists used laser therapy as part of their treatment after CTR.

Others studies such as Gordon et al. and Li et al. Tried to demonstrate the effectiveness of electrical stimulation and decimeter wave therapy respectively versus a control group [14,15]. Although both experiences concluded that there are benefits in the usage of electro stimulation in submit-carpal tunnel surgery rehabilitation, the measuring instruments used by the researchers did not give suitable to validate the outcome. Electro stimulation was report by 18% of responders in our survey.

Regarding the choice of immobilization types after CT surgery, Bury et al. found no useful effect from bulky dressing After open carpal tunnel liberate, when in comparison with splinting Instead, Bhatia et al. in order to see If a plaster slab might scale back postoperative pain making use of it at the first 48 h after surgical procedure, carried out a potential randomized single blind trial with 102 patients [16,17]. No statistically enormous difference was observed between the two groups in postoperative pain scores. Other studies in comparison the result of early mobilization with immobilization of the wrist following CTR. Cook et al. with 50

participants compared orthosis versus exercises during after surgery first 2 weeks [18]. They reported significant delays in return to ADL, poor grip and key pinch strength in the orthotics group. After surgery in first month, group of Orthosis reported more pain and scar tenderness compared with early mobilization group. This results are no in concordance with other studies were no differences between groups are describe after early mobilization [19]. Nonetheless, the dearth of an correct randomization and the longtime of immobilization (four weeks), should make us take into consideration the outcome with warning Martins et al. found no Big change between immobilization and early mobilization groups for discrimination test, operate or discomfort depth after open carpal tunnel unlock with 52 individuals [20]. In spite of the fact that some studies reported grip strength decreased by 19-25% when the wrist was immobilize no measurements as grip or pinch force were taken [21]. Other research conducted by Cebesoy et al. disagreed with the studies mentioned above and concluded that not only the use of orthosis is more expensive than a bulky dressing, also that there are no benefits for post-surgery immobilization [22]. In addition, they reported that 80% of participants in the orthosis group experienced discomfort compared to no discomfort reported in the mobilization group, which was found to be a statistically significant difference. However, the study did not provide specific data on the design or materials of the orthosis. In our survey, only 31% of responders used an orthosis-weaning program. The respondents reported immobilizing only wrist joint (30%) and prescribing the device to be used at night (25.6%).

Involving using ice therapy, we recognized one randomized trial that in comparison results of ice therapy commenced immediately post-surgery and continued for three days versus controlled cold therapy (CCT). Hochberg et al. evaluated and when compared the effects of CCT and traditional ice treatment on soreness, edema, and narcotic use [23]. The results showed that conventional ice therapy is less effective than CCT because after carpal tunnel surgery it reduce postoperative edema and provided efficient pain blockage. However neither the participants nor researcher have been blinded for the period of the experiment, which could have an effect on the outcome of the study. Ice therapy is used by 45% of occupational therapists and physical therapists who participated in this research survey.

Conclusion

The identification and monitoring of the different facets of the brain gauge enabled the recovery of Ms 'K' to be recorded, and the provision of a visual display to show the progress of her recovery was beneficial to Ms 'K'. The findings that the TOJ, timing perception, fatigue, plasticity and duration discrimination were outside normative levels was not unexpected and, with appropriate cognitive and physical rest these returned towards the normative range. The multi-parametric approach of cortical metrics was sensitive to the degree of recovery and the diversity of symptoms that Ms 'K' sustained from her head injury. Further research is warranted

to evaluate the Brain Gauge for the use of individual concussion recovery assessments.

Limitations of the study

Small sample size limits the generalizability of our findings. However, this is the first survey to attempt to determine global practice patterns of occupational and physical therapists following carpal tunnel release. This survey should be repeated to document further developments and even extended to a large population in collaboration with occupational therapies and physical therapies associations to compare these results in more countries and to discover potential for future collaboration and elaboration of international clinical practice guides.

Conclusions

In spite of the reduction of major symptoms after carpal tunnel surgery, there is very less and low-quality proof available to guide rehabilitation treatment following CTR and we found there is no consensus regarding clinical practice regarding the techniques and intervention used by therapists worldwide after CTR. Our study identified the variability in the management regarding the interventions employed after CTR by occupational and physical therapists in 21 different countries. This variability may be due to the limited detail provided by many of the research studies or because there is a lack of studies that tested the effect of a single technique without influence from the other, making difficult to interpret which technique or practice is the best one for the recovery of strength, sensibility, or return to work after the carpal tunnel release. To determine the effects of interventions in rehabilitation programs, further studies with larger samples and the detection of statistically important differences between groups are required.

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