

THE EFFICIENCY OF A COMPLEX OF PHYSICAL FACTORS IN CONSERVATIVE TREATMENT OF CARPAL TUNNEL SYNDROME EVALUATED BY USING THE VISUAL ANALOGUE SCALE AND BOSTON CARPAL TUNNEL SYNDROME QUESTIONNAIRE

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ABSTRACT

Carpal tunnel syndrome (CTS) is the most common compression neuropathy. The aim of this study is to evaluate the effectiveness of a complex of physical factors and their influence upon the subjective complaints, clinical symptoms and functional status of patients with CTS, using the Visual Analogue Scale (VAS) and Boston Carpal Tunnel Questionnaire (BCTQ) and to reveal patient's own perception of physical health and comfort, associated with this syndrome. The results of an applied complex of physical factors are followed and discussed.

The article also gives a short characteristic of the tasks of the physiotherapist in the treatment of patients with carpal tunnel syndrome.

Keywords: *carpal tunnel syndrome, physical therapy, Boston Carpal Tunnel Questionnaire, Visual Analogue Scale*

INTRODUCTION

Compression neuropathies are focal lesions of peripheral nerves with a different etiology, caused by narrowing or mechanical stretching of the nerve trunk in a fibrous bone tunnel or by fibrous tissue. It is characterized by pain or loss of function resulting from chronic compression (15). The condition is rela-

tively common – about 10-20% of the cases in neurosurgical and neurological practices (4,9,10).

CTS is the most common compression neuropathy with a frequency 125-515/100 000 and is the result of compression of the median nerve of the transverse ligament of the wrist (1,3).

It is believed to be connected with professional strain on the wrist using a keyboard, vibration, strain of the upper limbs and others. In 2010, according to the National Health Interview Survey in the United States about five million workers were affected by CTS. This inevitably involves high costs of treatment and long periods of absence from work, which undoubtedly leads to serious economic losses (1,3,10).

Clinicians have not yet reached a consensus on the diagnostic criteria, the best methods to assess the performance of one or another type of treatment, as well as the most appropriate therapeutic approach.

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With the development of the concept of quality of life for patients with various diseases, the traditional model of “absence of disease” is transformed into “a state of complete physical, mental and social well-being” as formulated by the World Health Organization in 1948. Attention is shifted more and more from the clinical and instrumental assessments for a given disease to the patient’s own perception of physical health and comfort, associated with the pathological processes which affected him and in what direction will this feeling develop after a certain treatment, either surgical or conservative (2). In this sense, “patient-oriented” questionnaires are considered at this stage as possibly the most valid tools to assess the approach and the results of treatment of many diseases (11).

In recent years the scientific community recognizes the BCTQ, which is proposed by Levine and the Harvard Medical School Group of Boston in 1993, and is considered standard for patients with CTS (8). There is a great number of analyzes and comparative studies in scientific literature related to the reliability of the questionnaire, and the majority define it as more reliable in terms of diagnosis and determining the severity of CTS than any other similar tool. Literature abounds in studies in the diagnosis and treatment of CTS using the BCTQ. According to many authors it is almost mandatory to use it for CTS. The questionnaire analyses the symptoms associated with sensitivity (pain, numbness) as well as the degree of preservation of the functions of the hand in patients with CTS, and provides two types of data: “clinical symptoms” - SSS (Symptom Severity Scale) and “function” - FSS (Functional Status Scale) (5,7).

The BCTQ was tested with high reliability and can replace all other non-standard methods to assess the severity of CTS (7).

Though this questionnaire is widely used for evaluation and analyses concerning CTS in foreign countries and its efficacy is proven by great amount of science studies (5,7,8) there is no evidence of it being used in our country with that in view.

Regardless of the choice of physical treatment of CTS, the physiotherapist faces the following tasks:

1. Suppression of pain and other subjective complaints of the patient (hypoesthesia, paresthesia, grip difficulty).
2. Combat the swelling and improve the blood circulation in the affected limb.
3. Stimulation of the regenerative processes and improvement of nerve conduction.
4. Increasing muscle strength, improving sensitivity and restoring the impaired function of the affected limb.
5. Prophylaxis of the fibrotic processes and other possible complications.
6. Etiopathogenetic treatment.

As a rule, physiotherapeutic treatment requires to seek a synergistic effect from the combination of several physiotherapy procedures with a different mechanism of action (6).

The neurorehabilitation algorithm in diseases and injuries of the peripheral nervous system must include:

1. Performed physical factors – aimed at restoration of nervous excitability and conductivity, as well as impact on the sensory excitement symptomatology, the trophic disorders and the impaired motor function.
2. Kinesitherapy – to improve nerve conduction and excitability as well as to recover the motor function and prevent fibrotic and other possible complications (14).

Guided by the above analyses in the Department of Physical Medicine and Rehabilitation and Occupational Diseases we conducted a study on the effect of a complex of physiotherapeutical methods on patients with CTS.

AIM

The aim of this study is to evaluate the effectiveness of a complex of physical factors and their influence on subjective complaints, clinical symptoms and functional status of patients with CTS, using VAS and BCTQ and to reveal patient’s own perception of physical health and comfort, associated with the pathological processes which affected him.

MATERIALS AND METHODS

The study involved 12 patients – all women aged between 40 and 71 years (average age – 57.7) with

CTS with moderate stage of damage. All were diagnosed by a neurologist and therefore sent for physiotherapy. All were given a seven-day physiotherapy treatment under the following scheme:

1. A short (3-4 min) ultrasound in the projection of the carpal tunnel with intensity 0.2-0.3w/cm² in order to improve the effect of the subsequent iontophoresis because the thermal and mechanical effects of ultrasound were shown to enhance the absorption capability of the skin (12).

Table 1. Correlative coefficient of VAS before, immediately after physiotherapy and 1 month after the end of physiotherapy

One-Sample Test						
Test Value = 0						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Before	11.000	9	.000	4.40000	3.4951	5.3049
At the end of PT	5.000	9	.001	2.50000	1.3689	3.6311
1 month after PT	4.358	9	.002	2.10000	1.0099	3.1901

2. Galantamine iontophoresis – locally, positioning the positive electrode in the projection of the carpal tunnel with a duration of 10 to 18 minutes and an amperage 6-16mA.
3. Traditional kinesiotherapy program including massage, soft tissue mobilization, muscle relaxation techniques and stretching, joint mobilization techniques, active musculoskeletal exercises for strengthening the muscles of the forearm and the hand (13).

Protocol for monitoring the effects of the applied PT treatment:

1. Anamnestic data – paresthesia, pain, weakness and other subjective complaints of the patient, measured by visual analogue scale (VAS).
2. Filling in the BCTQ to assess the severity of the symptoms and the impaired function of the affected arm.

Evaluation (using 1. and 2.) was done before and immediately after the end of physiotherapy treatment course, as well as after the first month following the physiotherapy course.

RESULTS AND DISCUSSION

All 12 patients completed the study. Procedures were well tolerated, no side effects occurred.

The analysis of the results showed that the subjective symptoms of the patients significantly decreased statistically at the end of physiotherapy ($p < 0.01$) with a tendency for improvement during the first month after the treatment ($p < 0.02$), which can be explained by the proven prolonged effect of physiotherapy procedures and the created skin depot after Galantamine iontophoresis (12) (table 1).

Symptomatic improvement is apparent both in the results of the VAS (fig. 1 and tabl. 1), and the analysis of the first part of BCTQ (fig. 2).

DYNAMICS OF SUBJECTIVE ASSESMENTS OF PATIENTS ACCORDING TO VISUAL ANALOGUE SCALE

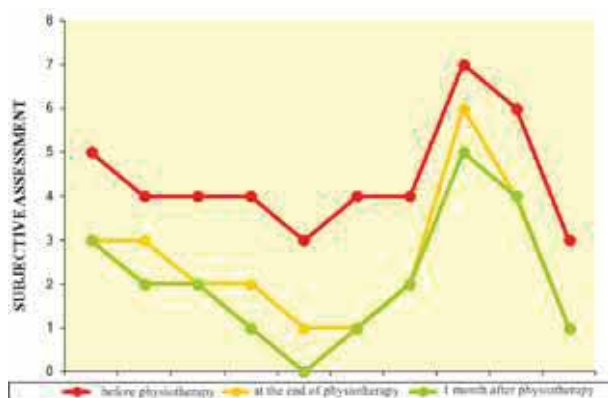


Fig. 1. Estimation of the patients for their subjective complaints before, at the end of physiotherapy and 1 month after the end of the physiotherapy course

Regarding the recovery of the function of the affected arm, the results of the second part of BCTQ showed statistically significant improvement at the end of the physiotherapy ($p < 0.001$), with a tendency for permanent retention of the obtained results within one month after the end of the treatment ($p < 0.001$) (Fig. 2).

THE EFFECTIVENESS OF A COMPLEX OF PHYSICAL FACTORS ON SYMPTOMS AND FUNCTION OF PATIENTS WITH CTS ACCORDING TO BOSTON CARPAL TUNNEL QUESTIONNAIRE

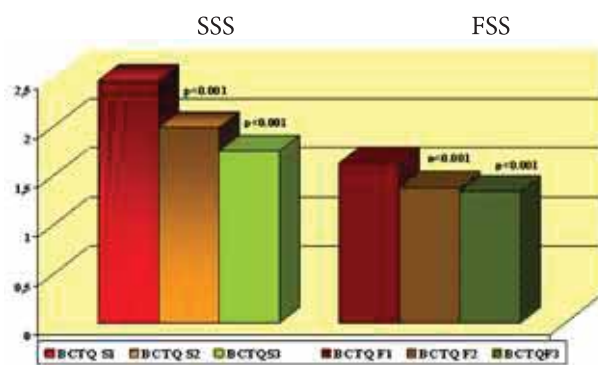


Fig. 2. Presentation of the results from BCTQ in two parts: 1st for „clinical symptoms“ - SSS (Symptom Severity Scale) and 2nd for „function“ - FSS (Functional Status Scale) (5, 7). The evaluation is before (S1, F1), after the last physiotherapy (S2, F2) and 1 month after the end of the physiotherapy course (S3, F3)

The proven fibrinolytic, antiedemic and anti-inflammatory effects of ultrasound therapy act synergistically with the analgesic and anti-inflammatory action of the galvanic current. Galantamine iontophoresis improves nerve conduction and this effect is further potentiated by the applied kinesiotherapy program. This confirms the studies done by Duymaz (6) where the combination of several physiotherapeutical procedures with a different but a synergistic mechanism of action has shown good results in the conservative treatment of CTS. This neurorehabilitation program creates conditions for optimal results according to the clinical form and stage of the disease, while with minimum investments, it seeks for maximum results to improve the quality of life of patients with CTS (14) and increases the opportunities not only for a more complete func-

tional recovery of the affected limb, but also for a restoration of the patient's previous lifestyle.

CONCLUSIONS

1. Combined physiotherapy treatment including preliminary application of ultrasound in the area of the carpal tunnel followed by Galantamine iontophoresis and a complex of kinesiotherapy favorably influence the subjective complaints of patients with CTS and the function of the affected arm.
2. The effect of physiotherapy persists within one month after the end of the treatment with a tendency of additional reversal of subjective complaints.
3. Results from VAS and BCTQ reveal that patients feel better according their subjective complaints, clinical symptoms and impaired functions of the involved upper limb, so they can manage better with the activities of daily living thus improving their quality of life. This two instruments are accessible, easy realizable and reliable for estimation of the effectiveness of any kind of conservative treatment of CTS.
4. Combined physiotherapy treatment is a good choice for treatment of CTS with moderate stage of damage, because of the lasting retention of the achieved results with respect to the reversal of symptoms and the preservation of the functional ability of the affected arm which along with it's low prime cost and shortening the period of absence from work is linked to the reduction of economic losses.

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