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ORIGINAL RESEARCH

Neurodynamic Techniques Versus "Sham" Therapy in the Treatment of Carpal Tunnel Syndrome: A Randomized Placebo-Controlled Trial

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Abstract

Objective: To evaluate the efficacy of neurodynamic techniques used as the sole therapeutic component compared with sham therapy in the treatment of mild and moderate carpal tunnel syndromes (CTS).

Design: Single-blinded, randomized placebo-controlled trial.

Setting: Several medical clinics.

Participants: Volunteer sample of patients (N=250) diagnosed with CTS (n = 150).

Interventions: Neurodynamic techniques were used in the neurodynamic techniques group, and sham therapy was used in the sham therapy group. In the neurodynamic techniques group, neurodynamic sequences were used, and sliding and tension techniques were also used. In the sham therapy group, no neurodynamic sequences were used, and therapeutic procedures were performed in an intermediate position. Therapy was conducted twice weekly for a total of 20 therapy sessions.

Main Outcome Measures: Symptom severity (symptom severity scale) and functional status (functional status scale) of the Boston Carpal Tunnel Questionnaire.

Results: A baseline assessment revealed no intergroup differences in all examined parameters ($P>.05$). After therapy, there was statistically significant intragroup improvement in nerve conduction study (sensory and motor conduction velocity and motor latency) only for the neurodynamic techniques group ($P<.01$). After therapy, intragroup statistically significant changes also occurred for the neurodynamic techniques group in pain assessment, 2-point discrimination sense, symptom severity scale, and functional status scale (in all cases $P<.01$). There were no group differences in assessment of grip and pinch strength ($P>.05$).

Conclusions: The use of neurodynamic techniques has a better therapeutic effect than sham therapy in the treatment of mild and moderate forms of CTS.

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Carpal tunnel syndrome (CTS) is the most frequently diagnosed peripheral neuropathy characterized by the occurrence of multiple sensory and motor disorders.[1,2] In the case of peripheral neuropathies, the terms nerve compression syndrome or entrapment syndrome are often used.[3,4] Compression of the nerve, which occurs through surrounding tissues, can lead to its entrapment, which may result in limited nerve mobility. In physiological conditions, the nerve slides toward the surrounding tissues both longitudinally and transversally,[5,6] which allows for its adaptation to changes in the length of the nerve bed throughout limb movements. Such an adaptation mechanism ensures proper limb mobility range and protects the nerve from excessive tension and stretching.[7]

Numerous studies of CTS indicate that there is nerve slide impairment in the carpal tunnel because of compression.[8-10] Hough et al[8,9] demonstrated that the longitudinal slide of the nerve in patients with CTS was significantly worse in comparison with a control group. The reduction of the longitudinal slide in

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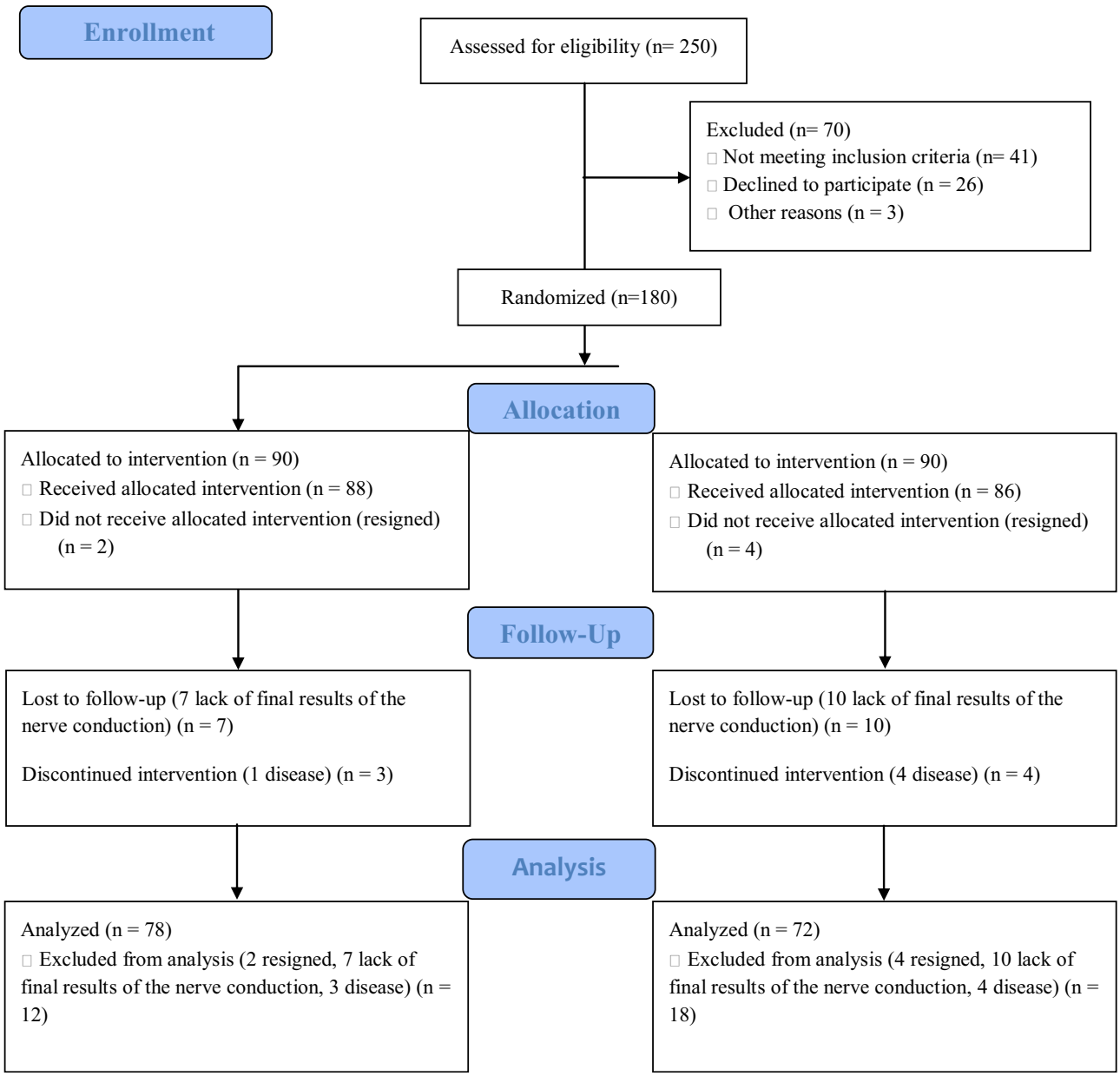

Fig 1 Flow diagram of phases through clinical trial.

patients with CTS was also confirmed by magnetic resonance and ultrasound imaging.[10,11] Valls-Solé et al[12] evaluated nerve slide indirectly using electrophysiological examination, and they concluded that the longitudinal slide was impaired. Erel et al[13] evaluated the transversal nerve slide in patients with CTS and demonstrated that it was limited. Subsequent studies also confirmed these observations.[6,14]

In physiological conditions, the peripheral nerve has adaptive mechanisms; therefore, it is resistant to the forces which occur during nearly all physical activities.[7] If the adaptive mechanisms are exhausted, the anatomy and physiology of the nerve become impaired. It has been demonstrated in ultrasound study in patients with CTS.[15] Chronic nerve compression may lead to local circulatory disorders, epineural and endoneuraloedema then for a considerable period fibrosis and reducing the mobility of nerve fibers.[16,17] These disorders result in several symptoms characteristic of CTS (eg, pain,[18] sensory impairment,[19,20] motor impairment[21,22]).

CTS therapy is based on both conservative and surgical management.[23] Surgical therapy is best documented scientifically,

List of abbreviations:

2PD	**2-point discrimination sense**
BCTQ	**Boston Carpal Tunnel Questionnaire**
CTS	**carpal tunnel syndrome**
FSS	**functional status scale**
NCS	**nerve conduction study**
SSS	**symptom severity scale**