

Ultrasound-guided percutaneous neuromodulation in chronic lateral elbow pain

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Abstract

Background Lateral epicondylalgia (LE), also known as tennis elbow, refers to a painful condition around the lateral epicondyle of the humerus and the common extensor tendon, which worsens with dorsiflexion and/or wrist supination against resistance. The aim of this study was to evaluate the effect of ultrasound-guided percutaneous neuromodulation (PNM) applied to the radial nerve in relation to pain, functionality, electrophysiological excitation and the morphology of the nerve in patients with chronic lateral epicondylalgia.

Material and Methods A randomized clinical trial was performed. In total, 28 patients (15 women, 13 men) with chronic unilateral LE were randomly divided into two groups: a control group (CG = 12) who did not receive any treatment and an experimental group (PNM = 16) who received a weekly session during three weeks of ultrasound-guided PNM on the affected radial nerve. Concretely, the therapy consisted of the application of an asymmetric biphasic current on the symptomatic side, with a frequency of 10 Hz, a phase duration of 250 microseconds, and sufficient current intensity to observe a contraction in the forearm during 1.5 minutes. The variables analyzed were: pain, measured via the visual analog scale (VAS); functionality, measured using the Patient-Rated Tennis Elbow Evaluation (PRTEE); the morphology of the nerve with the calculation of the cross-sectional area (CSA) and the electrophysiological excitability with the intensity-time curve (accommodation coefficient) of the radial nerve studied

Results There were no differences between the two groups in the initial assessment regarding pain, functionality and nerve morphology (all comparisons obtained a $p > 0.05$). However, at the end of the study, the groups were significantly different. After treatment, there were significant differences in all variables: for the VAS ($p < 0.001$) with a large effect size ($d > 0.8$); for all values of the PRTEE ($p < 0.001$) the effect size was median ($d > 0.5$) and for the CSA ($p = 0.001$) the effect size was large ($d > 0.8$). Only the PNM group displayed significant increases in their values compared to the initial assessment, with a large effect size for all variables ($d > 0.8$). Regarding the accommodation coefficient, 75% of patients (12/16) displayed hypoexcitability of the nerve in the PNM group and 64% of patients (8/12) in the CG at the beginning of the study. After treatment, only the PNM group showed significant improvements in the pattern of excitability of the radial nerve, reaching normal nerve function in all subjects ($p < 0.001$).

Conclusion Ultrasound-guided PNM leads to a decrease in pain and CSA of the radial nerve; furthermore, it produces an increased functionality of the elbow and

Keywords

- ▶ percutaneous neuromodulation
- ▶ ultrasound
- ▶ radial nerve
- ▶ chronic epicondylalgia

normalization of the electrophysiological excitability of the affected radial nerve. Ultrasound-guided PNM appears to be an appropriate tool for the treatment of patients with chronic LE.