ELECTRONEUROMYOGRAPHIC PREDICTORS OF RECOVERY DURING RTMS-BASED REHABILITATION OF FACIAL NERVE NEUROPATHY

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Abstract

Objective: To determine the value of electroneuromyographic parameters in monitoring recovery during rTMS-based rehabilitation. Methods: Distal latency, compound muscle action potential amplitude, motor unit potential duration, amplitude and phase number were compared across treatment groups. Results: The 10 Hz rTMS group showed the greatest reduction in distal latency and the largest increase in M-response amplitude. Conclusion: ENMG parameters provide objective biomarkers for treatment response and prognosis in facial nerve neuropathy.

Keywords: *electroneuromyography; M-response; distal latency; motor unit potential; facial nerve palsy; rTMS*

Introduction

Electrophysiological testing is central to the objective assessment of facial nerve injury. Clinical scales show visible function, but ENMG reveals the state of impulse conduction, axonal loss and reinnervation. Systematic reviews and expert analyses have emphasized that electrophysiology improves prognostic assessment in Bell's palsy, although interpretation must be standardized [5,6]. In facial nerve neuropathy, prolonged distal latency may reflect demyelination, edema or impaired conduction. Reduced M-response amplitude indicates axonal loss and decreased functioning motor units. Changes in motor unit potential duration and phase number may indicate reinnervation. This article focuses on ENMG outcomes from the dissertation and evaluates their usefulness in comparing 1 Hz rTMS, 10 Hz rTMS and conventional therapy.

Materials and Methods

A total of 103 patients were included in the final analysis. ENMG parameters were recorded before and after treatment. The assessed parameters were distal latency, M-response amplitude, motor unit potential duration, motor unit potential amplitude and number of phases. The treatment groups were conventional therapy plus 1 Hz rTMS (n=35), conventional therapy plus 10 Hz rTMS (n=37) and conventional therapy

alone (n=31). All groups received clinical monitoring using standard facial grading scales, allowing ENMG changes to be interpreted together with functional outcomes.

Results

At baseline, distal latency in the overall cohort was 4.61 ± 0.63 ms and M-response amplitude was 0.78 ± 0.36 mV, indicating impaired conduction with reduced motor response. After therapy, distal latency decreased from 4.59 ± 0.74 to 3.99 ± 0.33 ms in the 10 Hz group, from 4.58 ± 0.61 to 4.17 ± 0.37 ms in the 1 Hz group and from 4.67 ± 0.53 to 4.43 ± 0.41 ms in controls. M-response amplitude increased from 0.86 ± 0.40 to 1.32 ± 0.22 mV in the 10 Hz group, representing approximately 53% improvement. In the 1 Hz group, amplitude increased from 0.86 ± 0.42 to 1.22 ± 0.30 mV, while the control group increased from 0.79 ± 0.27 to 0.95 ± 0.21 mV. Motor unit potential amplitude also improved in all groups, with rTMS groups showing stronger dynamics than controls.

Discussion

The ENMG results confirm the clinical superiority of rTMS-assisted rehabilitation. The most meaningful pattern was the combination of shorter latency and higher M-response amplitude in the 10 Hz group. This indicates improvement in conduction and activation of a larger pool of functional motor units.

Phase number and motor unit duration should not be interpreted mechanically as simply “good” or “bad.” In a recovering nerve, polyphasic motor unit potentials can reflect reinnervation. Therefore, ENMG must be read in context: improved amplitude and latency, combined with clinical score improvement, forms a more reliable recovery signature than any single parameter.

Conclusion

ENMG markers are useful objective predictors of recovery in facial nerve neuropathy. The 10 Hz rTMS protocol produced the strongest ENMG dynamics, especially in distal latency and M-response amplitude, supporting its role as a neurophysiologically justified rehabilitation method.

References

1. Tiemstra J.D., Khatkhate N. Bell’s Palsy: Diagnosis and Management. American Family Physician. 2023;107(4):364–372.

2. Gardner S., Garber L., Grossi J. Bell’s Palsy: Description, Diagnosis, and Current Management. Cureus. 2025;17(1):e77656.

3. Kleinveld H.A., Stalpers X.L., Ket J.C.F., van der Veen E.L., Dikkers F.G. The value of electrophysiological tests in Bell’s palsy: a systematic review. Brain Sciences. 2023;13(4):624.

4. Guntinas-Lichius O., Volk G.F., Olsen K.D. et al. Facial nerve electrodiagnostics for patients with facial nerve palsy. Laryngoscope Investigative Otolaryngology. 2020;5(3):521–530.

5. Khan A.J., Szczepura A., Palmer S. et al. Physical therapy for facial nerve paralysis (Bell's palsy): an updated and extended systematic review. Clinical Rehabilitation. 2022;36(11):1424–1449.