THE EFFECTS OF TENS THERAPY ON TMJ PAIN AND MASTICATORY MUSCLE ACTIVITY IN PARTIALLY EDENTULOUS PATIENTS

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Importance of the Research. In recent decades, the stomatognathic system has become better recognized as an integrated, interdependent functional system made up of teeth, masticatory muscles, and temporomandibular joints (TMJs). Contemporary neuromuscular dentistry is evolving from single treatment procedures to more coordinated diagnostic and treatment procedures. More than 90% of the population displays some degree of malocclusion, and about 65% of headaches have TMJ or masticatory muscle dysfunction as the cause, making the clinical application unavoidable.

The literature emphasizes the bidirectional relationship between occlusal disharmony and temporomandibular disorders (TMD), with etiologic considerations such as premature occlusal contacts, asymmetric force distribution, and deviant tooth wear. Partial edentulism considerably increases these risks by disturbing occlusal equilibrium and muscle coordination. Even those who are fully dentate are not exempt—research shows that malocclusion alone, independent of tooth loss, can lead to muscular tension and joint pain.

In this regard, Transcutaneous Electrical Nerve Stimulation (TENS) is an interesting adjunct modality. TENS provides non-invasive relaxation of the muscles, enabling more physiologic determination of mandibular position before prosthetic therapy.

Objective of the Study. The objective of this research is to create and verify a standardized clinical protocol for the incorporation of TENS therapy into the prosthetic and diagnostic process for partially edentulous patients. In particular, the research assesses the effectiveness of TENS in reducing TMJ pain, enhancing the symmetry of the masticatory muscles, and optimization of mandibular positioning.

Materials and methods.

This randomized clinical trial involved two parallel groups of partially edentulous patients, as per the Kennedy classification system:

- Study Group (TENS group): received neuromuscular deprogramming with TENS prior to prosthetic treatment.
- Control Group: received standard prosthodontic treatment without TENS therapy.

All patients went through a full diagnostic process: oral hygiene evaluation, radiographic and clinical assessment of TMJ and related structures, electromyographic (EMG) recordings of temporalis and masseter muscles, utilization of a non-repositioning diagnostic splint, pain assessment with Visual Analog Scale

(VAS), jaw tracking analysis for mandibular kinematics evaluation, statistical analysis of paired and unpaired t-tests at a significance level of $p < 0.05$. The patients were seen at 1, 3, and 6 months to assess both immediate and medium-term results.

Results and discussing. The TENS group had a statistically significant decrease in TMJ pain scores ($p < 0.01$) with the mean VAS scores decreased by 46% at one month after treatment and remained so for six months. EMG analysis demonstrated better muscle symmetry and decreased hyperactivity of the masseter and temporalis muscles. The mandibular movement patterns also improved, which helped in the better prosthesis adaptation.

Especially significant, the fact that this study had a control group adds clinical validity to our results. Additionally, long-term follow-up demonstrates maintenance of therapeutic benefits. Nevertheless, additional studies with more patients and with investigation of the TENS dosage parameters are indicated to further establish the protocol.

Conclusion. TENS therapy represents a worthy adjunct to prosthodontic treatment of partially edentulous patients who have TMJ disorders. Through its actions of enhancing neuromuscular equilibrium and alleviating joint pain, it leads to more efficient, patient-oriented care. The introduction of TENS into daily clinical practice may potentially reformulate existing occlusal analysis and prosthetic treatment paradigms.

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