Chapter 8
Transcutaneous Electrical Nerve Stimulation (TENS)/T-Scan Combined Occlusal Therapy for Musculoskeletal and Posturo-Occlusal Disorders

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ABSTRACT

Masticatory muscle hyperactivity has been considered a significant factor in promoting and perpetuating dysfunctional symptoms observed in temporomandibular disorder patients. Many therapeutic modalities have evolved within dental medicine that attempt to lessen or resolve the varying symptoms frequently reported by dysfunctional patients. One such method, known as ultra-low frequency (ULF) transcutaneous electrical neural stimulation (TENS), has been used to relax the masticatory musculature by applying an electrical stimulus to the efferent motor fibers of the fifth and seventh cranial nerves, such that TENS can result in pain analgesia and patient sedation, restore compromised muscle physiology and increase muscle resting length. TENS also aids in establishing a neuromuscular maxillomandibular relationship by inducing a muscularly contracted involuntary arc of closure. This chapter will discuss TENS as a treatment modality for temporomandibular disorders (TMD), explain how to employ TENS to obtain a neuromuscular maxillomandibular relationship, and illustrate in a clinical case report the use of TENS in combination with the T-Scan Computerized Occlusal Analysis System to measurably and physiologically balance, a removable overlay anatomical acetyl resin orthotic prosthesis. This chapter will also detail the interrelationships between TMD musculoskeletal problems and posturo-occlusal disorders, and how disclusion time reduction therapy (DTR) with occlusal rebalancing, performed with the T-Scan 9/BioEMG synchronization, can improve whole body alignment. The chapter concludes with discussions about the problems with direct anatomic relationships, and the three problems of occlusion.
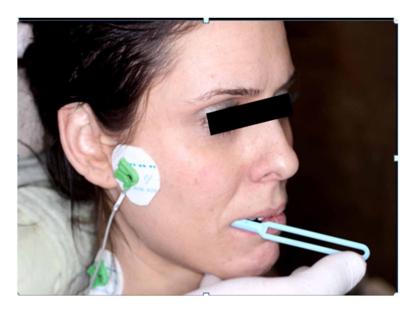
INTRODUCTION

Masticatory muscle hyperactivity has been considered a significant factor in promoting and perpetuating dysfunctional symptoms observed in Temporomandibular Disorder patients. Muscle hyperactivity leads to facial pain, clenching and grinding habits, temporal headaches, and mandibular fatigue. Suggested muscle relaxation treatments include muscle relaxant medications (Dionne, 1997), biofeedback (Dalen, Ellertsen, Espelid, & Gronningsaeter, 1986), stress reduction counseling (Schumann, Zwiener, & Nebrich, 1988), intraoral orthosis (Carr, Christensen, Donegan, & Ziebert, 1991), and therapeutic massage (Wright & Schiffman, 1995).

Ultra Low Frequency (ULF) Transcutaneous Electrical Neural Stimulation (TENS) has been shown in to cause direct stimulation of motor nerves (Gomez & Christensen, 1991). This stimulatory effect can be used to relax hyperactive masticatory musculature, by applying a once-per-second electrical stimulus to the efferent motor fibers of the Vth and VIIth cranial nerves (Kamyszek, Ketcham, Garcia, & Radke, 2001). After electrodes are properly placed on the patient's head (Figure 1), brief rhythmic twitch contractions are induced within the musculature, resulting in an increase in circulation and a reduction in posturing electrical activity (Kamyszek, Ketcham, Garcia, & Radke, 2001). Afferent nerve fibers are also stimulated during the pulsing, such that TENS has been used to provide analgesia for patients suffering from facial pain (Holt, Finney, & Wall, 1995), to control the pain response to cavity preparation (Horiuchi, Suda, Hanada, & Suzuki, 1978), and as a method of patient sedation (Shane & Kessler, 1967).

Figure 1. One set of three TENS electrodes are placed over the Left and Right Coronoid notches, with the third electrode placed on the center of the neck below the Nuccal Line. The second set of three TENS electrodes are placed over the Left and Right Scalene muscle groups, between the sternocleidomastoid and Levator Scapulae. A third electrode is centered on the neck beneath the one first placed below the Nuccal Line. Here, the patient is being pulsed into articulating paper to mark the occlusal contacts present on an orthotic.

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