

## The Use of Electronic Devices in the Diagnosis and Treatment of Temporomandibular Disorders

*Editor's note: Normally "It's My Opinion" is strictly limited to a concise and succinct one page of this Journal. This month, because of the roles and reputations of the contributors and the profundity of their combined opinions, the space rule has been relaxed. The Journal invites readers to continue to express personal opinions on any topic in this forum.*

Clinicians are often in the position of having to decide whether to use a new form of therapy or instrument that is heavily promoted or advertised. Although it may appear that this new development is the outgrowth of years of research and clinical testing, this is not always the case.

As an example of the problems that this situation can create for the dentist and his patients, one only has to remember the era of implant treatment that preceded the scientific development and clinical validation of osseointegrated dental fixtures. Presently, several electronic devices are being promoted for use in the treatment of Temporomandibular Disorders (TMD). We offer the following comments in the hope of placing the use of these devices in perspective.

The International College of Cranio-mandibular Orthopedics (ICCMO) recently proposed that:

*"The only truly objective means of such diagnosis, treatment and validation, for conditions involving muscular skeletal dysfunction of the head and neck is electronic diagnosis of the musculature and craniomandibular relationship. The use of the instrumentation and technology presently available consisting of electromyography, TENS (for relaxation of muscles), and mandibular tracking provide a purely objective compilation of data not heretofore attainable and should not only be encouraged, but insisted upon as current state-of-the-art in the diagnosis and treatment of patients with head and neck pain".<sup>1</sup>*

Statements such as this give the impression that the techniques advocated have been shown, in controlled clinical trials, to be unequivocally superior to the physical examination, analysis of symptoms and conventional approaches to treatment. To our knowledge, this is not so. Furthermore, they imply, erroneously, that clinicians who do not avail themselves of this technology do not treat their patients in an acceptable manner. In fact, this argument has been used in a malpractice suit in the United States.

On the other hand, there are many dental scientists and clinicians, including ourselves, who believe that although electronic instruments offer new perspectives of the behaviour of the musculoskeletal system and are valuable aids to basic and clinical research, at the moment there is no good evidence that these instruments are useful in the diagnosis and treatment of TMD.

In addition, we are concerned about some of the tenets used to support the clinical use of the instruments. Many of these are unproven, doubtful or have already been shown to be incorrect. As a result, advocates of these clinical approaches come to some odd conclusions when data from healthy people do not fit their conceptions. In one remarkable paper, it was concluded that approximately 81 per cent of symptomless adults taking part in the study were really dysfunctional;<sup>2</sup> in another, the author writes of the "almost universal existence of various degrees of muscle accommodation and sustained tension".<sup>3</sup> Statements such as these are fatuous: they show a complete lack of objectivity, and seriously impair the credibility of the author and of those who cite their work to justify the value of similar diagnostic tests. When such criteria are used, many patients will be wrongly told that they are ill. If, as has been shown, kinesiographic<sup>4</sup> and

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electromyographic findings<sup>5</sup> cannot reliably distinguish between symptomatic and asymptomatic groups, it is difficult to see how they can be useful in diagnosis. It is certainly premature to claim that the diagnostic value of one of these instruments is equivalent to the electrocardiogram.<sup>6</sup>

Finally, the treatment dictated by these tenets (eg. the correction of presumed craniomandibular "malalignment") appears to be inappropriate because it is based on unproven or incorrect assumptions. Treatment with these instruments calls for electrical stimulation in order to completely relax the jaw muscles, because the jaw closing muscles are postulated to be completely relaxed in the "true" rest position. This "neuromuscular rest position" is supposed to coincide with the clinical rest position in asymptomatic subjects. If the two are not coincident, the clinician may take radical steps to change the face height of his patient. However, contrary to the hypothesis, the two positions are several millimeters apart in healthy people. Furthermore, the literature suggests that there is normally activity in the jaw closing muscles at the clinical rest position.<sup>2,7,8</sup>

Following relaxation, the clinician is supposed to increase the intensity of electrical stimulation until the teeth tap together in what is termed the "neuromuscularly relaxed occlusal position". It is postulated that this position should coincide with centric occlusion, but again the two positions are different in normal subjects,<sup>9</sup> and therefore there is no valid reason to try to make them match. In addition, there is no basis to the claim that the "neuromuscular occlusal" position is a physiologic position.<sup>10,11</sup> We suggest that the diagnostic criteria and treatment decisions used in conjunction with these instruments were developed from hypotheses that appear to be incorrect, and that the initial testing of the efficacy of the instruments seems to have been inadequate. Once it was found that data from asymptomatic subjects did not correspond to what was hypothetically labeled as "normal", further testing became imperative, but this does not appear to have been done. Thus, **in our opinion**, these instruments do not yet have a proven value in the diagnosis and treatment of TMD, and their use for purposes other than research could lead to misdiagnosis and overtreatment of patients.

## References

1. International College of Cranio-Mandibular Orthopedics Resolution: Third Party Reimbursement, adopted at Las Vegas, Oct. 8-9, 1987.
2. Cooper, B.C., Rabuzzi, D.D., Myofacial pain dysfunction syndrome: a clinical study of asymptomatic subjects. *Laryngoscope* 1984, 94:68-75.
3. Jankelson, B. Three-dimensional orthodontic diagnosis and treatment. *J Clin Ortho*, 1984, 18:627-683.
4. Feine, J.S., Hutchins, M.O., Lund, J.P. An evaluation of the criteria used to diagnose mandibular dysfunction with the mandibular kinesiograph. *J Prosth Dent*, 1988, 60:374-380.
5. Lund, J.P., Widmer, C.G. An evaluation of the use of surface electromyography in the diagnosis, documentation, and treatment of dental patients. *J Craniomandib Disord Facial Oral Pain*, 1989, 3:x-x.
6. International College of Cranio-Mandibular Orthopedics Position Paper, adopted by Board of Regents, March, 1988.
7. Rugh, J.D., Drago, C.J. Vertical dimension: A study of clinical rest position and jaw muscle activity. *J Prosth Dent*, 1981, 45:670-675.
8. Wessberg, G.A., Epker, B.N., Elliott, A.C. Comparison of mandibular rest positions induced by phonetics, transcutaneous electrical stimulation, and masticatory electromyography. *J Prosth Dent*, 1983, 49:100-105.
9. Remien, J.C., Ash, M.M. "Myo-monitor centric": an evaluation. *J Prosth Dent*, 1974, 31:137-145.
10. Bessette, R.W., Quinlivan, J.T. Electromyographic evaluation of the Myo-monitor. *J Prosth Dent*, 1973, 30:19-24.
11. Dao, T.T.T., Feine, J.S., Lund, J.P. Can electrical stimulation be used to establish a physiologic occlusal position? *J Prosth Dent*, 1988, 60:509-514.

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