

METHODOLOGY OF CLINICAL RESEARCH IN TMD

Editorial -- Dental Abstract

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When a patient comes to a dentist for diagnosis and treatment of a temporomandibular disorder they are asking that doctor to do their best to duplicate the most successful result of past cases. Clinical diagnosis and treatment requires a methodology capable of defining and reproducing such conditions of past success. This methodology is called clinical ethology . Clinical judgement can be expressed by accurate measurement of the behavior observed and analyzed like any scientific data.

Clinical judgement is experience understood. Based on understanding the measurable physiologic parameters affected in treatment, a clinician may assemble data which demonstrates the similarities, disparities and variations of patients who constitute the spectrum of TMD and the results obtained by the different therapeutic modalities used. Thus can one scientifically evaluate the factors associated with success or failure and decide how to improve future performance¹.

Retrospective studies of patient records with appropriate data can provide solutions to problems previously thought to be irremediable because of lack of understanding of the relevance of the data. As such, any good clinician can benefit from any inanimate measuring device which improves his sensory acuity. Information obtained from electromyography, electrosonography and electrokinetic tracings, analyzed properly can aid in assessing what a specific disorder does to a patient and the effect of treatment on that condition at an accuracy level far beyond the powers of subjective observation.

As conductors of such clinical research, dentistry has been impeded by a series of negative subjective literature assaults opposing clinical use of objective measurement in TMD.,,,,,, Critical analysis of such articles has found them lacking scientific merit. They demand epidemiological methodology as a means of validating suitability of objective electronic measurement for clinical use. Epidemiology has been demonstrated to be illogical and inappropriate for the study of TMD. It is a paradigm in crisis.⁹

Epidemiology is the science of the occurrence of diseases in human populations. There is a specific conceptual and theoretical framework which underlies the conduct and interpretation of epidemiological research. There must be a clear concept of what constitutes the disease under consideration. One must have well-defined diagnostic criteria so as to not confuse or confound the study disease with other diseases. There must be two clearly defined states, "diseased" and "disease-free".

Epidemiologists concerned with the design and appraisal of therapy in treating TMD as stress disorders are impeded by the clinical complexity of TMD. The diverse patterns of symptomatology and etiology of TMD defy classification as a single disease for epidemiologic studies. Multiple legitimate diagnoses may co-exist simultaneously in the same patient. Establishment of valid healthy controls have never been accomplished, and repeated epidemiologic studies of TMD signs and symptoms have not been consistent or reproducible.

The search for unifying principles applicable to the treatment of TMD is condemned by its clinical complexity and non-specificity of diagnosis. The diverse symptomatology of TMD is based on the fact that TMD is not a single disease. And because TMD are stress-related disorders, the patterns of appearance and of evolution vary so greatly in different hosts with the same pathologic state, no single course of natural history typifies the expectations in all individual patients. The human beings treated by dental clinicians are a heterogeneous group. Epidemiology does not typify the way in which patients select doctors nor the way doctors make diagnoses or select treatment.¹⁰

Those opposing the clinical use of objective electronic measurement in TMD advocate a subjective gold standard. Greene⁵ and Mohl⁸ submit that the most logical diagnostic approach for patients suffering from craniofacial pain disorders and musculoskeletal problems is the interpretive one. Their gold standard to identify the presence or absence of TMD is evaluation of the patient's chief complaint, history, clinical examination and when indicated, radiographs. As an analogy to support this position, Horal's paper is cited in which 212 low back pain patients were carefully matched with 212 controls based on detailed histories, physicals and radiographic exams. The two groups were indistinguishable with regard to illness criteria with two exceptions: the control subjects did not consider themselves sick and did not seek treatment. If Horal's study is credible and relates analogously to TMD, the "Gold Standard" reduced to its lowest common denominator is "You've got it if you say you've got it, and you don't, if you say you don't." In an imperfect world, however, there are such phenomena as hypochondriasis, insurance fraud, psychosomatic illness, dishonesty, and attorneys who would be ecstatic to initiate lawsuits based on such irrefutable criteria.

Psychological studies of scientists have shown strong evidence of cognitive limitations which lead to frequent judgement error and a very limited ability to deal with complex information. Many scientific descriptions are inaccurate because they utilize reporting procedures that go beyond the scientist's cognitive capabilities. David Faust, in his classic epistemologic text, "The Limits of Scientific Reasoning" relates that the reliability of subjective scientific judgement is poorer than had been previously assumed. Cognitive limitations are almost certainly the most basic, most prevalent and most troublesome source of human judgment difficulties. The existence of scientists' cognitive limitations is not even

an issue, but rather the extent, manifestations and consequences of their judgment errors and how to substantially reduce them. There is little doubt that scientific genius exists but little evidence that most clinicians are geniuses.

Faust summarizes that "Investigations of the predictive efficiency of subjective impressionistic human judgment (such as that exercised by individual clinicians) versus that of even a crude non-optimized mechanical prediction function is about as clearly divided in favor of the latter as we can ever expect to get."¹³ Interjudge reliability among diagnosticians in organic specialties also show cognitive deficiencies and inferiority to objective data combination.

An interesting affirmation of this relative to TMD was reported in a study by Hathaway and Anderson. Four clinicians, trained in TMD diagnosis and treatment, developed diagnostic criteria for TMD. They were then given clinical data consisting of history, clinical findings and radiographs (the "Gold Standard") for each of forty patients, and asked to develop a primary and secondary diagnosis for each patient. Despite prescreening agreement by clinicians on diagnostic criteria, they were unable to reliably agree on diagnoses for patients on the basis of clinical data, and clinically significant agreement was not achieved even with joint problems.

Karl Popper, regarded as one of this century's greatest epistemologists states¹³, that, "There is no such thing as an unprejudiced observation." Popper has introduced as criteria for separating science from non-science the capacity of science to pose testable hypotheses. Knowledge advances when a sound hypothesis or theory which appears to be the best solution to a particular problem is tested rigorously and withstands repeated attempts to demonstrate that it is false. Falsification is thus a critical element in the advance of knowledge. Application of Popper's scientific views to the problem of clinical diagnosis demands that a diagnostic hypothesis be possible to refute.

Subjective observations are merely statements about an individual's beliefs. The patient's subjective complaint of pain is irrefutable, and so by Popperian standards are unscientific. Thus by any reasonable standards of science the "Gold Standard" (you've got it if you say you've got it, etc.) must be rejected resoundingly. Based on its use of subjective data it is unreliable and unscientific. Based on the patient's complaint of pain alone it is untestable. Based on weak and unsubstantiated diagnostic criteria for TMD it is vague. In clinical testing it did not work.

The argument that "recent epidemiological evidence does not support a direct link between TMD and malocclusion"⁶ is perhaps the most universally difficult anomaly for clinical dentists to accept. Epidemiology is not the study of cause and effect. It is the study of the distribution of diseases in human populations. Virtually on a daily basis, clinical dentists treating TMD using neuromuscular instrumentation are adjusting occlusions and repeatedly not only getting

symptomatic relief, but improvement of objectively measurable parameters. The dental literature is replete with retrospective studies which do demonstrate that correction of the occlusion (and "balancing muscles") relieves the symptoms of TM disorders of muscular origin., The causal factors are neither sufficient nor necessary. There is no scientific evidence against occlusion as a cause of TMD. Epidemiologic studies to disprove occlusion as sufficient cause of TMD would thus be a waste of time. To stop correcting occlusion on the basis of subjective literature searches is ludicrous. Epidemiological methodology is being incorrectly utilized relative to TMD and occlusion.

Regarding every patient all clinicians face three challenges: (1) reach the correct diagnosis; (2) select the mode of patient management that will do the most good and the least harm; and (3) keep up to date with useful advances in one's chosen health specialty. In scientific medicine great strides are being made in diagnosis treatment and establishing etiology by studying and understanding the paraclinical measurements presented by electronic instrumentation. Electronic data does not take the thinking out of diagnosis and treatment, but rather provides an accurate basis for thought.

Sigmund Freud has said "To learn to see what is right in front of one's nose; that is the task, and a heavy task it is." It has been said that clinical judgement is experience understood. If we have no measurement, we do not know what we did or did not do.

One of the defining characteristics of human thought is the ability to stand apart in skeptical relation to one's knowledge. Knowledge is what one is taught but wisdom is what you bring to it. We have been told that what we were taught in dental school was science and as such it was indisputable; until someone came along with a new notion that squelched the old. Epidemiology and subjectivity don't work for TMD. Ethology and objectivity do. It is time for dentistry to take TMD from the realm of syndromes and nosology and their attendant subjectivity, and accept the challenge of learning how non-invasive objective electronic measurement can help improve clinical skills.