Guest Editorial

Biometric dentistry and temporomandibular disorders

Medical and dental technological innovation continues to provide avenues of research for faster and safer diagnosis and treatment for patients. In this era of digital dentistry, the technological advances have led to better treatment outcomes, more comfortable patients, and a healthier dental community.

Problems involving the temporomandibular joint (TMJ) have been termed temporomandibular disorders (TMDs). Patients with many different disorders are included under the umbrella designation of TMD. It is important to emphasize that TMD is not one disease with one treatment.[1]

A lack of a more definitive diagnostic scheme, especially in published research, has led to confusion in terms of therapeutic approach to TM disorders. Patients, who have TMD, may or may not have damage to joint structures. Clarification of this issue – healthy joint or damaged joint – will be a major step forward in clarifying the clinical management of TMJ problems.

Biometric dentistry (BMD) is the computerized analysis of the teeth, jaw joint, and related muscles using a set of tools known as the BioPAK. This includes the T-scan III for the teeth, BioEMG III (surface electromyography [SEMG]), Jaw tracker (JT), and BioJVA (Joint Vibratory Analysis) for accurate diagnosis and treatment of TMDs.[2]

T-scan is dentistry's only clinically recognized and research-validated digital occlusion analysis system. T-scan system provides dynamic occlusal measurement – revealing the amount and timing of force on individual teeth and occlusal stability of the overall bite.

The objective of BMD is to reduce a patient's occlusal adaptive requirements. We can use BMD to evaluate these requirements and improve functionality within the stomatognathic system (teeth, muscles, and joints). In reality, the occlusion and the musculature are inseparable.

The approaches of gnathology, centric relation dentistry, and neuromuscular dentistry are often seen as recipes offering one standard solution for whatever is wrong with the TMD patient. However, with a biometric approach, the practitioner employs a comprehensive approach to individualized diagnosis and treatment. This concept has evolved from the acknowledged interdependence between the triad of the teeth, TMJ, and the neuromusculature.

BMD begins with the patient's chief complaint, a comprehensive health history, and a thorough clinical examination and is followed by sophisticated but inexpensive objective testing. It is customary to evaluate the TMJ status first, since treatment options may be somewhat limited. This can be done quickly, easily, and accurately with joint vibration analysis (JVA).

A JVA finding of significant pathology indicates that sophisticated imaging like magnetic resonance imaging can be justified. The first step is to determine whether the pathology is primarily intra- or extracapsular. When this has been accomplished, a decision, whether or not to treat joint pathology, is needed before proceeding with other areas of treatment.[3]

BMD recognizes that a well-functioning masticatory system requires many factors to be within the individual patient's adaptive range.

A simple, noninvasive way to evaluate muscle function is through SEMG. Evaluation of SEMG activity can be very helpful in detecting maxillo-mandibular mal-relationship, functional imbalances, and/or chewing interferences.[4]

Jaw movement can be recorded simultaneously with a JT. Distortions in the movements compared to normal controls, together with abnormal muscle function, can identify a wide range of mal-adaptations.

Recent research studies have concluded that objective measurements can enhance both diagnosis and treatment. This is accomplished biometrically by measuring the patients' joint, muscle, and occlusal functions. As the clinician learns the normal patterns of muscle and jaw function, the dysfunctional patterns become easily differentiated. Consequently, it is no longer necessary to guess whether occlusal interferences, joint dysfunctions, or muscle incoordination are present.

In conclusion, the use of simple tools such as SEMG, JVA, and JTs can provide practitioners with a clear insight into a patient's stomatognathic system. It is this insight that will

help in the necessary diagnosis that can aid in the treatment and management of a patient's muscle, joint, and occlusal dysfunctions, without having to take a guess and hope for a good result.

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