

Review Article

Neuromuscular Dentistry and How it Decodes the Physiology of Occlusion

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To achieve the Perfect Balanced Occlusion should be the ultimate aim after any dental/medical procedure. It could be centric or eccentric, as long as the supporting structures (muscles and joints) are not compromised. So, it's time we stressed upon the Myocentric Occlusion (MCO).

MCO is the occlusal relationship between the mandible and the maxilla that minimizes the need for muscle accommodation and posturing and allows normal decompression of neural and vascular intracapsular tissue and associated connective tissue at rest. It provides the optimal condylar position that we strive to achieve in a gnathic system that may have become pathologic due to previous condylar positional discrepancies leading to neuromuscular disorders like TMD (Temporomandibular Disorders), OSA (Obstructive Sleep Apnoea) or CCMD (Cranio Cervical Mandibular Disorder).

This can be explained only with the help of knowledge in the science of Neuromuscular Dentistry (NMD).

Why?

Because only NMD preaches the physiology of muscles and the importance of precision by measuring with the help of the latest technological equipment. The science of NMD is well

chronicled in hundreds of scientific articles and textbooks including past ICCMO (International College of Cranio Mandibular Orthopedics) anthologies.

The masticatory muscles, which position and connect the mandible to the skull, should be the focal point of correct occlusion. Occlusion is maintained by the activities of these masticatory muscles which are controlled by neural integration of the feedback from peripheral proprioceptors and the reflex mechanism from the CNS. This is science.

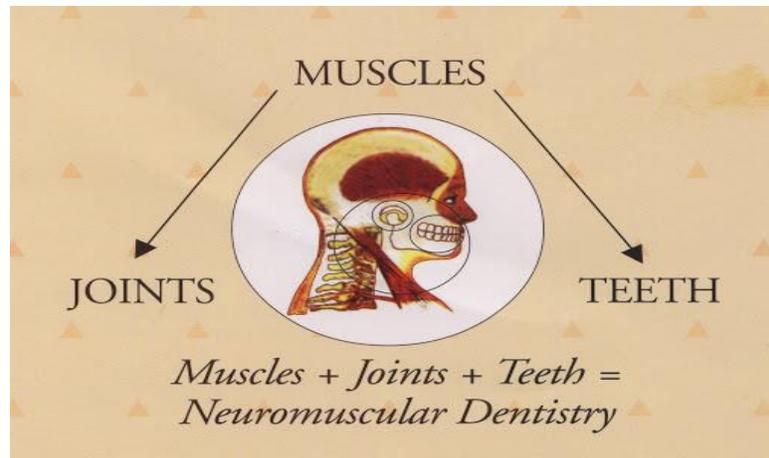


Figure - 1

In simple words, bite registration decides the fate of the patient. If taken correctly, he/she is going to be the happiest patient. The smallest occlusal discrepancy would transform the perfectly normal stomatognathic triad (Fig1) complex into a neuromuscular disorder, hence leading the patient to suffer from headaches, neckaches, migraines, sleep apnoea, etc. These patients then visit the ENT specialist, the neurosurgeon, the orthopedics, etc., for treatment of these aches, but to no avail. Almost 80% of patients end up with TMD as a result of that discrepancy and suffer the agony and would need to depend on medicines all their life.

Dental Occlusion is the Focal Point of our Posture

Since dental occlusion forms the first skeletal joint in our body, it plays a very important role in posture. If the occlusion is skewed, there will be a compensatory change in the cervical posture followed by the spine, the hips and the feet! (Fig2)

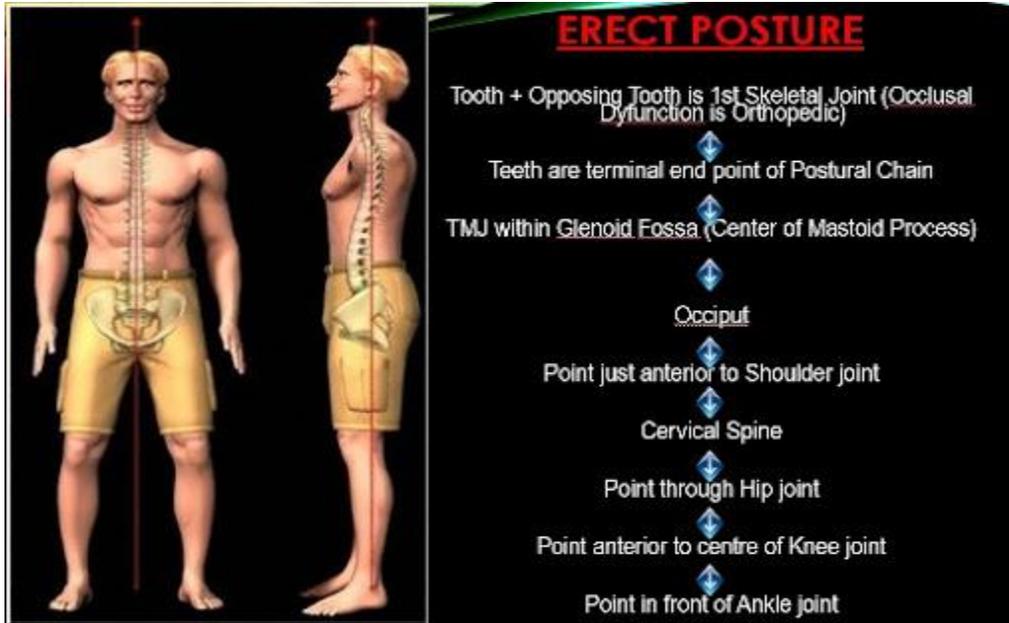


Figure -2

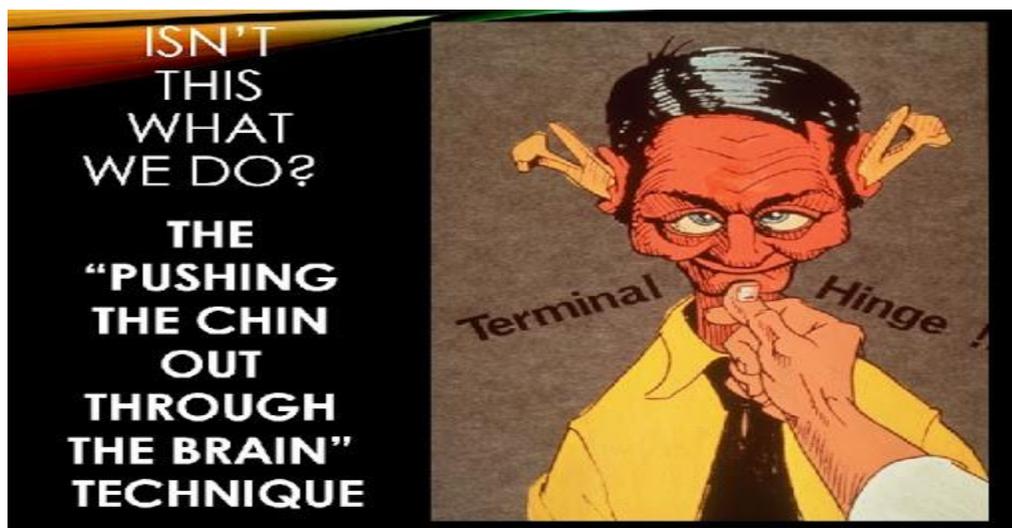


Figure -3

Centric occlusion (CO) and centric relation (CR) are terms that have always ended up pushing the mandible upward and backward. But for a TMD patient, isn't it that very same CO that has led to the problem? What all we do to try and coerce that patient into CO.... Dawson's technique, the forced swallow technique, the hand in mouth technique, pushing the condyle out through the brain technique ...! Have you ever given it a thought that while forcing the patient to bite into

that CO, you may be actually pushing the mandible, and hence the condyles, backward and upward into the retrodiscal pad of the glenoid fossa? That CO may only be his habitual occlusion, which his body may have self-repaired to compensate for that small occlusal discrepancy, which we always tend to overlook. The muscles of mastication that act upon the mandible have been trained by our CNS to keep the condyles and the mandible in that erroneous position to avoid that high point! AND THAT'S HOW WE CREATE TMD! (Fig3)

What is Neuromuscular Dentistry?

Neuromuscular Dentistry is the science of dentistry that embodies adopted accepted scientific principles of pathophysiology, anatomy, form and function. NMD objectively evaluates the complex relationship between teeth, temporomandibular joints (TMJ) and the masticatory muscles to achieve an occlusion that is based on the optimal relationship between the mandible and the skull – Neuromuscular Occlusion (MCO). This is achieved by relaxing the muscles controlling the jaw position to establish a true physiological rest position upon which treatment considerations are based. Once relaxed, do we need to add to the teeth to attain optimum jaw position or do we need to reduce tooth structure to relax the hypertonic muscles? How do we decide?

As per The Right Bite™ protocol, NMD can be divided into 4 categories:

- Addition NMD
- Reduction NMD
- Dental Sleep Medicine
- Posturology

The Right Bitetm Protocol

Conceptualized by Dr. Raj, this protocol helps us to decide when to add and when to reduce. Several protocols were imbibed to understand science. The Golden Proportion (Phi), Hank Shimbashi's Golden Vertical, LVI's GV, Myotronics - ICCMO's TENS protocol, Tekscan –

BioResearch's DTR (Disclusion Time Reduction) protocol, etc., were respectfully utilized to segregate patients to treat with the addition or reduction NMD.

Achieving the Golden Vertical (GV) with the patented TENS unit (J5/QuadraTENS) should be the ultimate aim of any dentist post-treatment. If the GV is more than the current Vertical Dimension (VD), we need to follow Addition NMD. If the GV is less than the VD, then Reduction NMD needs to be done on the patient.

Addition NMD involves applying the ULF TENS (J5 Myomintor), confirming the reduced EMGs (M-Scan), registering the new bite (K7/JT) and then providing a customized anatomic orthotic with the chair-side Erkodent 3D Occluform to maintain the new mandibular position for 8-10 months. Reduction NMD involves applying the ULF TENS (J5 Myomonitor), confirming the EMGs (M-Scan) and then using the DTR protocol (with The T-Scan) to reduce interferences at the Micro-occlusal level to achieve the most physiological occlusal relationship.

The bite registration for an oral sleep appliance to treat Obstructive Sleep Apnoea has to be done with the muscles in mind. A custom made sleep appliance cannot be at the same bite registration (70% of maximum protrusion!!!) for everyone. And what about the vertical! The Right Bite™ protocol helps us to decide the right bite so that the patients don't have any more muscle tightness in the morning after wearing the appliance in a forced advanced mandibular position.

The importance of cervical posturology is gaining momentum in the pathophysiology of facial pain and other neuromuscular disorders. With every change in mandibular position, there would be a compensatory change in the cervical vertebral position. Hence, the possibility of TMD/Facial pain-causing back pain (Descending TMD) or rotated cervical vertebrae causing TMD (Ascending TMD) should always be kept in mind during diagnosis.

The NMD Armamentarium

There are several TENS devices available in the market. Most of these medical units can be seen at the physiotherapist's office used to relax a particular muscle. Due to the importance of maintaining the synergy of both the TMJs during any movement, these medical devices will not be of much use. The ULF TENS units used for mandibular kinesiology are patented for the following features of its pulse delivery:

- 1) The pulses are antidromic (which means it hits the nerve and hence relaxes all muscles supplied by that nerve).
- 2) The pulses are ultra-low frequency (to aid in the proper antidromic feature)
- 3) The pulses are simultaneously bilateral (to allow for a synergistic twitch)
- 4) The pulses are at 1.5s apart (to maintain the perfect angle for the actin-myosin fibers to allow proper muscle firing)

Any other TENS would only compromise the quality of muscle recruitment, leading to low-quality treatment.

The EMGs are very important as we need to measure if the muscles are relaxed or not. We can never check for hypertonicity with palpation with our bare hands! EMGs are measured with the portable M-Scan or the fixed and highly precise and sensitive K7/BioEMG.

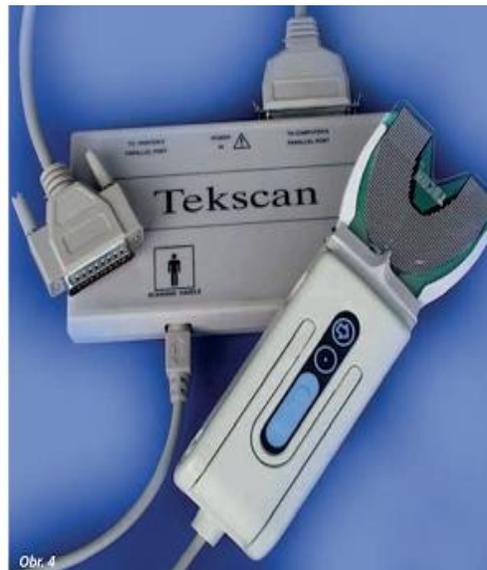
The 3D mandibular kinesiographic jaw trackers (K7/JT) enable us to confirm the precise occlusal point up to a fraction of a millimeter. A small change would lead the patient into a neuromuscular disorder.

The Erkodent 3D Occluform helps us create customized anatomic orthotics in a matter of minutes. The occluder is important as without it the bite registration in 3D (pitch, yaw and roll) will not be accommodated.

Finishing an occlusion is normally done with bite articulating papers, be it on the teeth or the orthotics. The generally used ones are 120 μ . Our dental proprioception is so sensitive that even a 10 μ hair strand can be felt. The usage of 4 μ , 8 μ , 20 μ , etc., Bausch articulating papers have to be stressed. But even they are not measured. T-Scan helps us quantify the force and then make the necessary changes.







Conclusion

There is a reason why we study anatomy (and that too the entire head and neck), physiology and biochemistry in our first year of dental school! But by the final year, we have all converted to ourselves to being “mechanics” of the teeth. We need to re-learn our subject. We deal with more than just the teeth. It’s not that NMD only helps us to treat neuromuscular disorders; it helps us prevent them from happening as well. NMD, if incorporated justly, to our general dental practice in every field that we know, can reduce the number of iatrogenic neuromuscular disorders.

NMD is not a special science that needs different thinking. It’s all general dentistry but MEASURED!

In summary, NMD is the science of occlusion encompassing not only the teeth but the objective evaluation of the status and function of the jaw muscles and joints – before, during and after treatment – to achieve the optimal result.

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