

Protocols in the Craniomandibular Dysfunction Patient: Two Cases Study from a Neuromuscular Perspective Approach

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INTRODUCTION:

At the present the patient we named as a craniomandibular dysfunction patient (CMDP) is a very complex patient that can be the result of one or multiples concomitant entities that requires from the professional a deep knowledge of neuromuscular function and dysfunction and of psychosomatic and postural influences and a proper training in the management of dental occlusion in order to treat this complexity syndrome of the craniomandibular complex successfully.¹

The term CMDP (craniomandibular dysfunction patient), includes the Temporomandibular Disorders (TMD) that is a group of musculoskeletal disorders, affecting alterations in the structure and/or function of the temporomandibular joints, masticatory muscles, dentition and supporting structures, although its significance is more extensive and considers the influence of another systems distant from the head and neck, that are finally recognize as etiologic factors suggested as contributing to the development of TMD.

Under the umbrella of CMDP we include not only the functional disturbances of the masticatory system, if not the masticatory muscles disorders, the TMJ disk displacements, and the craniocervical-mandibular disorders, also known as craniomandibular disorders (CMD)

TMD is a term adopted by the American Dental Association in 1983, and is used by most researchers to facilitate coordination of research and communication.²⁻³ According the literature reviews, the prevalence of TMD varies between 12 and 60%, affecting more women from 25 to 45 years old.

Although the etiology and pathogenesis of TMD is not totally clearly, it is possible to identify the presence of an event, local (trauma, injury, or deep pain) or systemic (stress) that alter the “homeostasis” (physiologic tolerance) of the patient, that represents the limit of individual adaptability to a certain degree of functional interferences, and it should induce the development of the pathogenic sequence of masticatory system disorders.

Actual researches are insufficient to predict reliably which patient will or will not develop TMD, but the scientific community agrees that its etiology is a combination of multifactorial factors, that includes psychological, occlusal, parafunctional, traumatic, hormonal, systemic, postural and neuromuscular alterations.⁴⁻¹⁰

Nobody can today refuse the major role that dental occlusion plays as a factor of predisposition, precipitation and perpetuation in the etiology of this affection.

As stated by Dr. Ira L. Shapira, "*Occlusion is important in neuromuscular dentistry as a resetting mechanism of the trigeminal nervous system's control of the stomatognathic muscles*", this means that when there are noxious contacts received by the periodontal ligaments or the muscular proprioceptors there must be an accommodation of the muscles and the TMJ position to reach the final occlusion.

This accommodation is the major cause of hyperactivity in the neuromuscular system and compressive force acting over the TMJ, that are always present in the CMDP.¹¹

In order to treat this type of diseased state effectively we must first arrive at a diagnosis which has to be determined by careful scrutiny of those signs and symptoms presented by the patient.

Our initial diagnosis will be based on the history and clinical examination followed by the radiographic examination and the physiologic measurement of the functional status of the masticatory system with the use of precision objective measurement instruments: Surface Electromyography (EMG), Computerized Mandibular Scans (CMS) and Electrosonography (ESG). This three technologies along with the use of the neuromuscular stimulator (TENS device) to obtain the genetic length of the masticatory muscles as a prerequisite to establish the physiologic therapeutic occlusal position, is essential to aboard the diagnosis and management of the CMDP.¹²⁻¹³

Another point to consider is:

What type of patient is the CMD Patient?

Is common that this type of patients with facial or head pain first consult his family physician, and

a patient with ear head or neck symptoms consults an otolaryngologist, neurologist or orthopedist. But Pain is often the symptom that takes the patient to the consult, and finally perhaps to our office.

At this point and talking about PAIN we have to consider if:

- **THE PAIN IN OUR PATIENT IS ONLY A SYMPTOM OF A DISEASE (TMD) OR IS JUST AN ILLNESS ITSELF (CHRONIC PAIN)**
- **WHAT COMORBILITIES ARE BEING EXPRESSED TOGETHER WITH THE TMD?**

We are talking about differential diagnosis, because some of the symptoms commonly reported in the CMDP, may be caused by other illnesses or diseases that are being expressed at the same space and time of with the TMD.

Pain in these patients, frequently presents multiple localizations and is part of the same problematic situation of the dysfunction, muscular in origin by the loose of their full resting length (genetic length) and the presence of muscle fatigue related to the muscle hyperactivity presented in this type of dysfunction.

An early appropriated treatment of these symptoms may prevent the development from the pathological state of PAIN that is the CHRONIC PAIN.

An understanding of the events which take place within the muscle tissue altering the normal physiological processes, enable the clinician to prevent and more effectively treat patients in acute and or chronic state of pain.^{14,15,16}

CONSIDERATIONS ABOUT CMDP

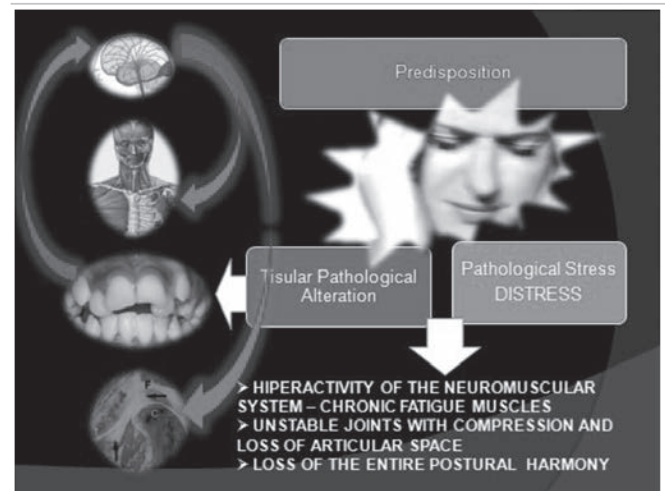
To understand the etiology and management of the CMD patient we must understand that not all the patients can develop this type of dysfunction, there must be present **certain conditions** that, when they are present in **certain relation** to each other, cause the precipitation of PAIN and DYSFUNCTION.

They are:

- **The patient must be predisposed to CMD:** The predisposition is a condition of special susceptibility. This susceptibility can

be a **Genetic or Intrinsic predisposition** that is inherent in the individual through the cellular specificity. It would involve the muscles and their neuromuscular mechanisms, the ligaments and tendons, the skeletal structures and TMJ and the psychological factors and characteristics of patient personality.

The other condition is the **Acquired or Extrinsic predisposition** that is the special susceptibility brought about by traumatic injuries or systemic pathological alterations to the TMJ and related structures.



Picture 1

At this point we must consider:

“The role of inadequate Dental procedures acting through the years over the occlusion.”

They must be considered as an **Acquired Predisposition.**

1. The tissues-neuromuscular system, the habitual occlusion and TMJ must be in some degree of pathological alteration.
2. The pathological stress DISTRESS must be present.

This triad is potentially present in all the individuals but to see any clinical manifestation of the TMD syndrome, all the three components must become involved and the syndrome precipitates.

If we consider the existing occlusion in the patient with TMD as a possible tissue pathological alteration and if this habitual occlusion determines the condylar position in the TMJ fossa, and dictates the muscle function to posture the mandible from rest position to habitual occlusion; we can understand that no matter how malpositioned the occlusion would be in the CMD patient, the neuromuscular system will struggle to create a habitual centric occlusion with bilateral tooth contacts that allows the patient to carry on with the physiologic functions as necessary as the typically swallowing that occurs approximately 2000 times a day. This clearly explain the major role that dental occlusion plays in the etiology of the CMDP as a primary cause, precipitant or perpetuating factor.

CASE STUDY I

INITIAL DIAGNOSIS:

1. Medical & Dental History and Clinical Examination

- History: 52 year old female who began with: severe persistent headache & otalgia, dizziness & tinnitus six years ago.

- Chief Complaint: “I want to recover my life”

At present she suffers from:

- ❖ TMJ and facial pain
- ❖ Cervicalgia and back pain
- ❖ Headaches and ear pain
- ❖ Dizziness and Tinnitus

She presented with bruxism, altered posture and general joint laxity.

- History of Present illness

- ❖ 6 year history of the dysfunction
- ❖ Treatment prior to our consultation:
 - Use of different types of oral splints and soft nightguards, which didn't help
 - Treatment of posture : Some help
 - Drugs medication for chronic pain were prescribed for years but the symptoms continued



Picture 2

□ Clinical Examination

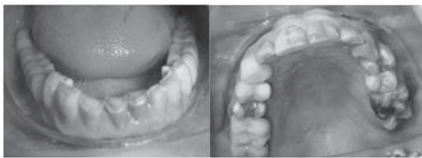
Pain on palpation of both TMJ and temporalis area, with palpable condylar heads on closure that is indicative of over closure and posterior displacement of the condyles into the Glenoid fossae.

Pain on palpation of both internal and external pterygoids and masseters, and bilateral severe pain on palpation of temporalis tendon attachments.



Pictures 3-5

As dental signs we can observe severely worn incisal edges in the anterior teeth and severe attrition throughout both arches in natural occlusion.



Pictures 6-7

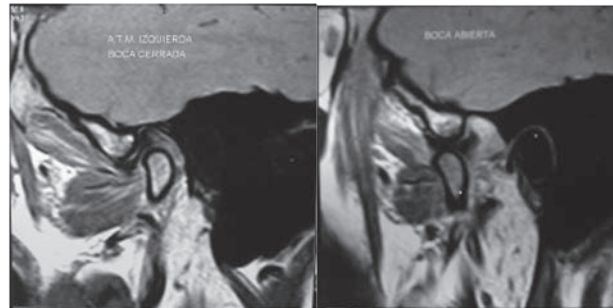
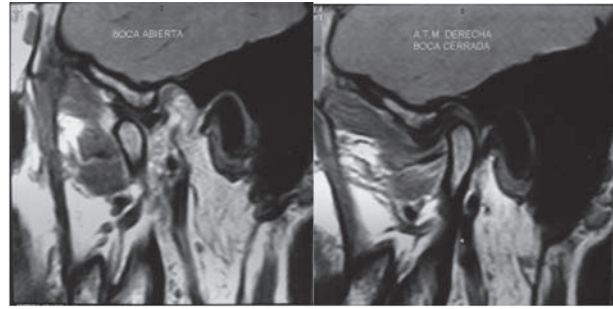
2. Radiographic Evaluation and MRI



Picture 8-RX

In the Panoramic X-Ray we can observe the posterior displacement on both condyles in habitual occlusion with severe compression of the

retrodiscal tissues, especially in the right TMJ, as consequence of a right mandible torque.



**Pictures 9-10 (top) MRI
Pictures 11-12 (bottom) MRI**

The MRI shows that the right condyle has a hyper-excursion and is surpassing the apex of the temporal eminence.

The disc seems to be posteriorly positioned between the temporal eminence and condylar head, actually the central thin part of the disc now opposes the superoposterior aspect of the condyle, this is really a physiological disc position that accompanies maximum condyle translation in hypermobile joints.

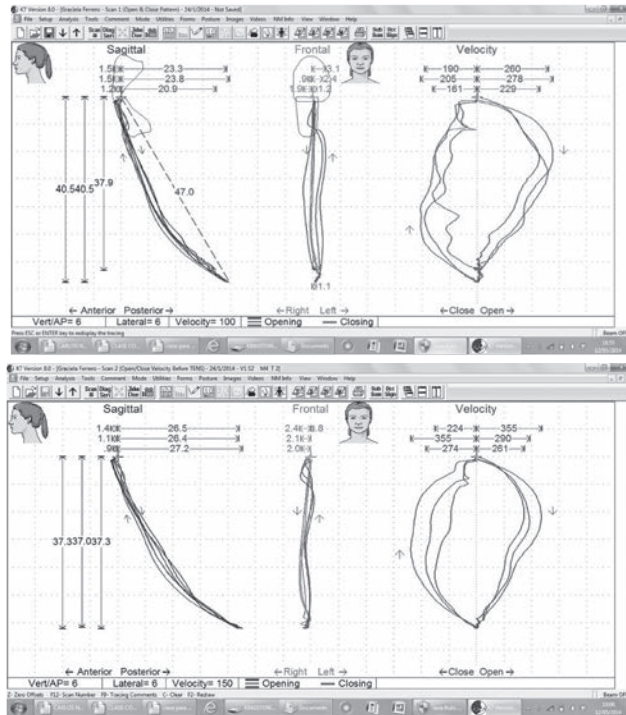
The postural problem, the imbalance in the Atlas-Occipital connection, creates and maintains an unstable



Picture 13

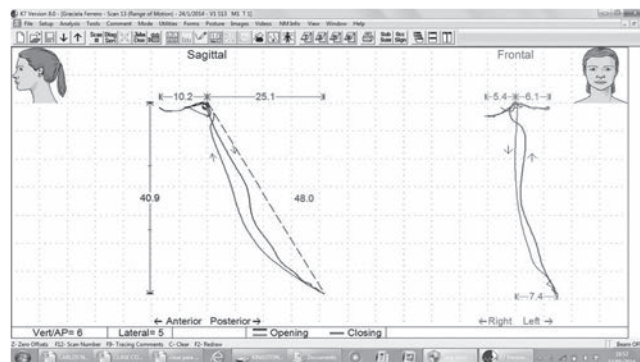
occlusion, and it is an important contributing and perpetuating factor in this pathology.

3. Full Neuromuscular Work-Up



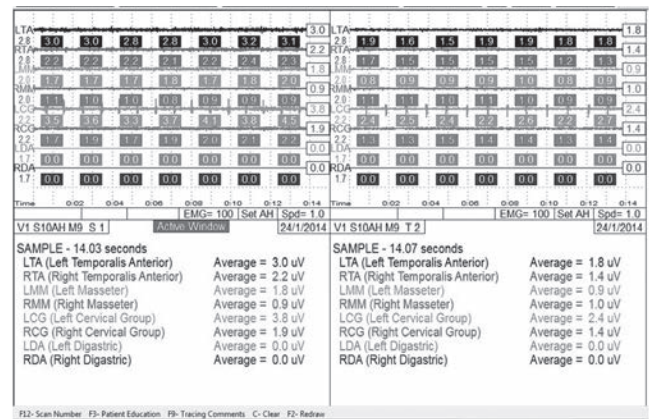
Pictures 14-15 (Scans 1-2)

Scan 1 & 2: Comparison of velocity pre & post TENS therapy. Improved function after TENS therapy.



Picture 16 (Scan 13)

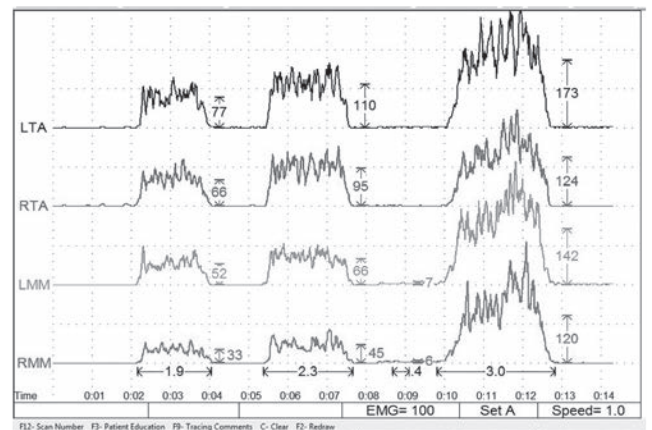
Scan 13: Range of lateral motion pre TENS therapy. Restricted excursive movements to the right and to the left.



Picture 17 (Scans 9-10)

Scan 9 & 10: Comparison of EMG muscles at rest pre and post TENS therapy.

Elevated resting activity in left temporalis anterior and left trapezius pre TENS.



Picture 18 (Scan 11)

Scan 11: EMG Muscle Activity

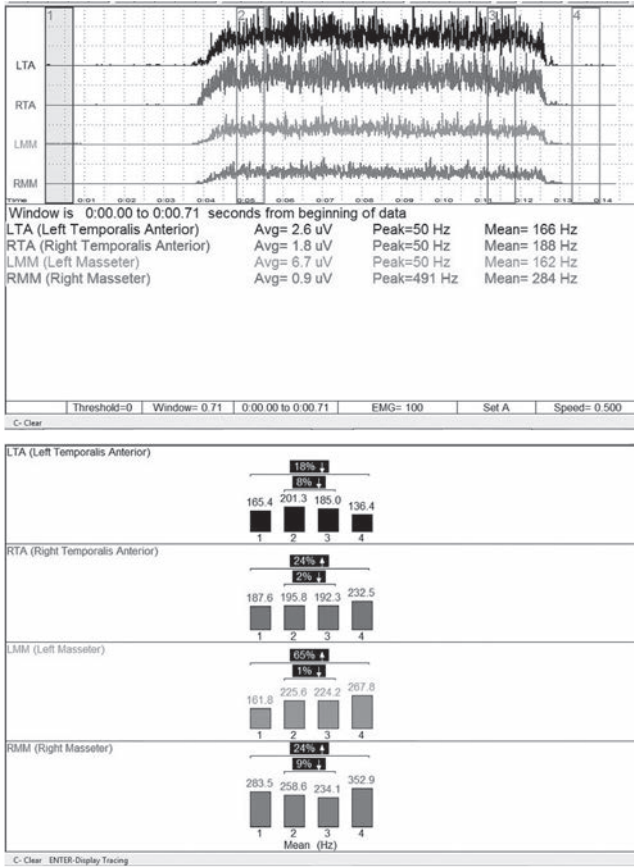
Function = Clench

Natural teeth pre TENS v. cotton roll

Cotton clench shows potential functional improvement with a change of occlusion: a treatment goal.

The EMG function test confirmed that her existing habitual occlusion, is not allowing the patient to achieve optimum recruitment of available motor units in the elevator muscles. This would suggest that the functional disturbance of the stomatognathic system has, in this case, an occlusal and postural origin, and confirmed the need to stabilize

the occlusion again via an orthopedic appliance during the first stage and neuromuscular prosthesis rehabilitation during the second stage.



Pictures 19-20 (Scan 18)

Scan 18: Confirmed the degree of fatigue of the masticatory muscles as consequence of an unsolved combined occlusal and postural dysfunction.

The objective of our treatment

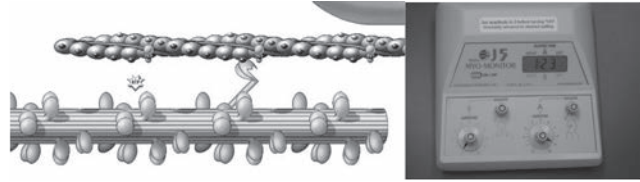
The goal of our therapy would be first to provide and then to maintain the health and stability in the stomatognathic system

- ❖ Teeth
- ❖ Neuromuscular System
- ❖ Temporomandibular Joints

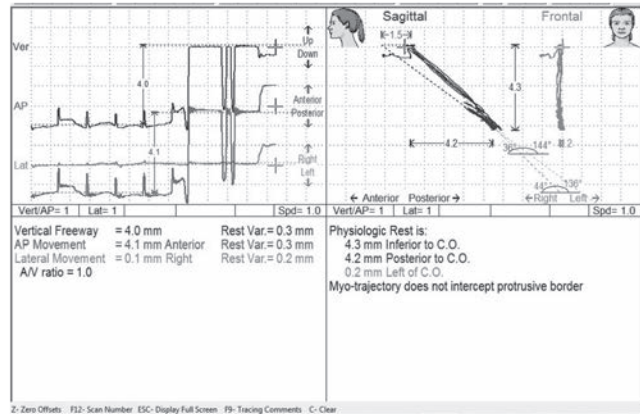
And from this system, working in an Inter-disciplinary Team, we want to improve the global postural system

So our first step would consist in obtaining the Physiologic Rest Position.

The use of the TENS (J-5 Myomonitor) allow us to recover the genetic length or physiologic length of the muscle fiber (maximum efficiency).



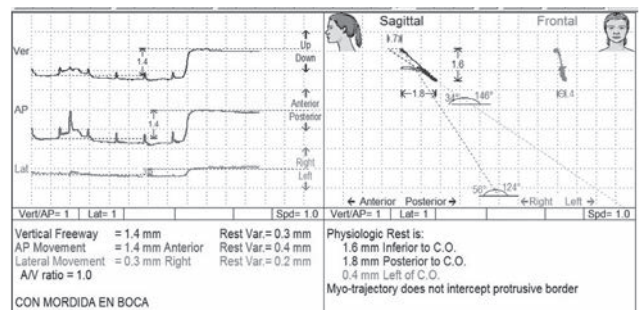
Pictures 21-22



Picture 23 (Scans 4-5)

Scan: 4-5
Sweep & Sagittal/Frontal
Post TENS True Rest Position

This scan shows that the habitual occlusion of the patient is not a real anterior hyper-occlusion but a posterior hypo-occlusion.



Pictures 24-25

Scan: 4-5
Myobite on NMO to be used for the first orthosis.



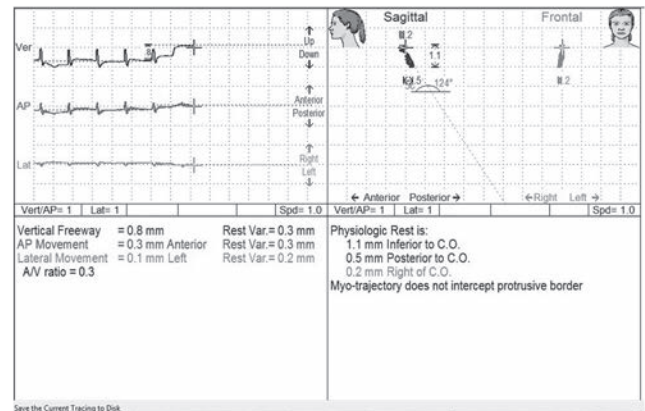


Pictures 26-28 (Intraoral Views)

Initial Treatment

Phase I

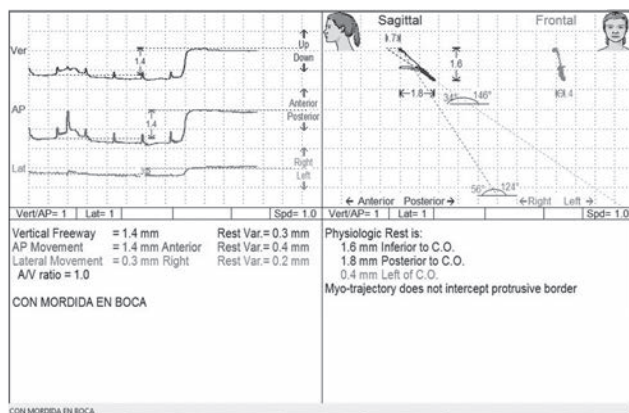
- ❖ During this initial phase of therapy we decided to use an acrylic neuromuscular orthosis to create a new “ideal” occlusal position that avoids the muscle accommodation to posture the mandible in the habitual occlusion
- ❖ This orthosis should be used during the night and no more than four hours a day, during this phase.
- ❖ With the use of the orthosis, at the same time we start to work with orthodontics in the maxillary arch to align and expand the superior arch allowing the advancement of the mandible to the final neuromuscular therapeutic position



Picture 30 (Scans 4-5, Final Position)

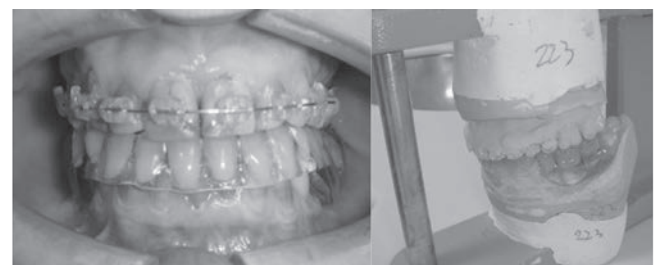
Scan 4-5: A new Myobite on the final NMO obtained after the orthodontic treatment on the superior arch.

To align the maxillary arch changing the inclination of the incisors allow the mandible to advance with this new Myobite to the final therapeutic occlusal position.



Picture 29 (Scans 4-5)

SCAN 4-5: The first Myobite on NMO to be used for the first orthosis was 0.7mm posteriorly to the neuromuscular occlusal position.



Pictures 31-32

One year later the patient made a significant improvement in her aesthetics and was symptom-free.

She had:

- ❖ No TMJ and facial pain.
- ❖ No cervicgia and back pain.
- ❖ No headaches.
- ❖ No ear pain.

Note: The patient treatment required postural changes.

Phase II

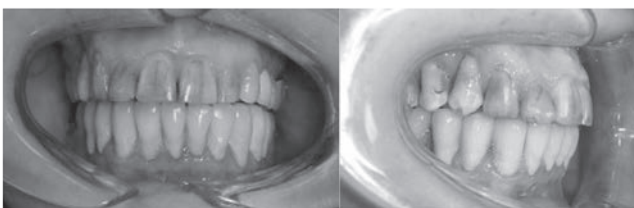
At this moment we have decided with the patient to do permanent changes in her occlusion recovering the vertical dimension, due to the reconstruction of the inferior arch.

- ❖ This new appliance should be used full time to guide the perpetuation of the new physiologic occlusion during the prosthetic rehabilitation.



Pictures 33-35 (Phase II)

The unhealthy occlusion was converted into a healthy neuromuscular balanced occlusion with prosthesis rehabilitation, during the second phase.

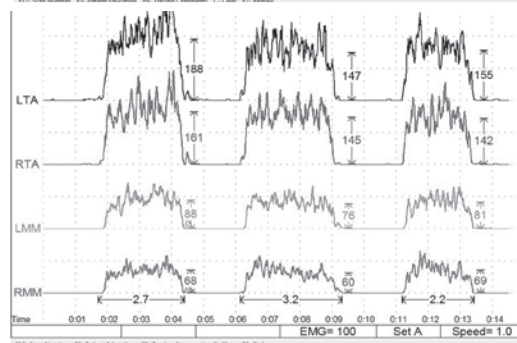
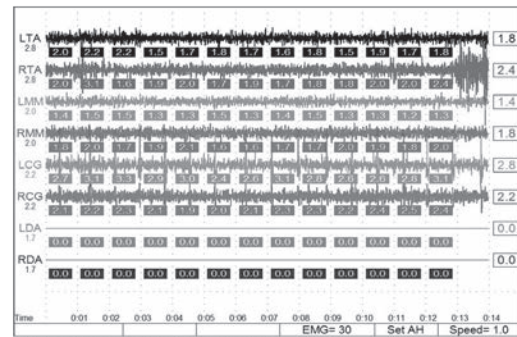
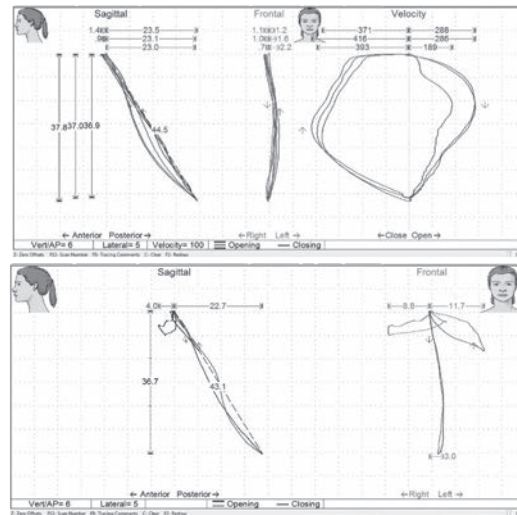


Pictures 36-39

Control post treatment:

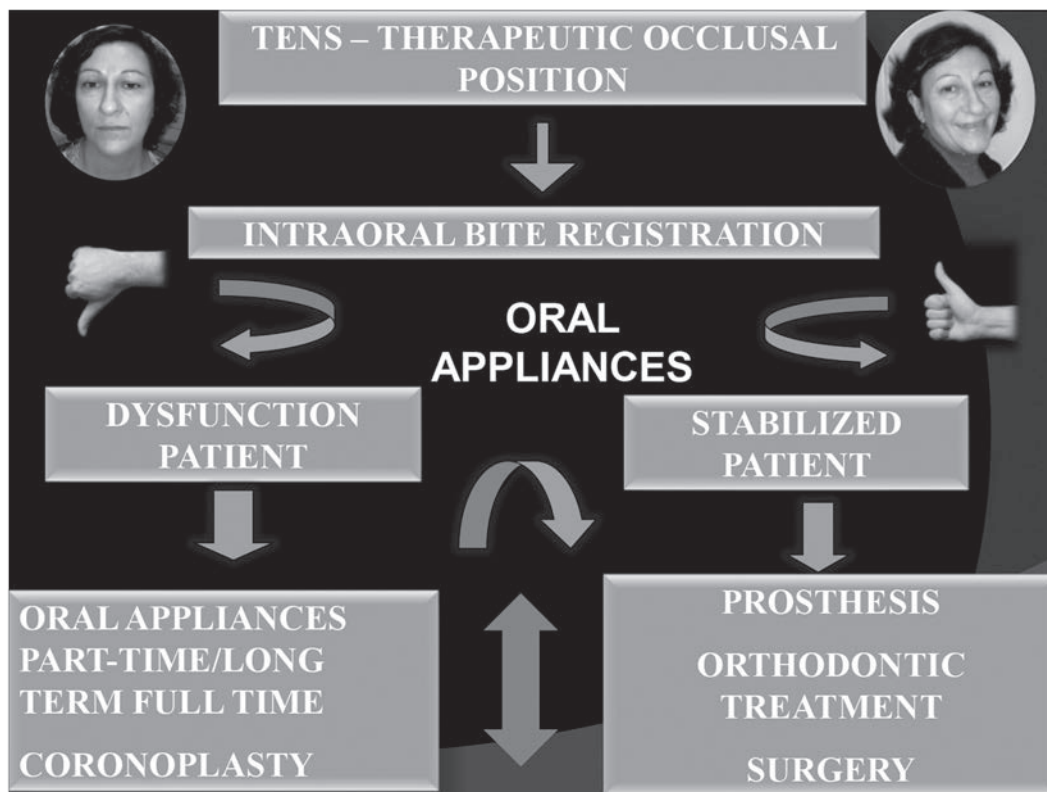


Pictures 40-41



Pictures 42-45

Scan 1&2&13&10&11: All the scans improved after treatment. Scan 11: we observe a symmetrical, effective muscle function port treatment.



Picture 46

DISCUSSION AND CONCLUSIONS:

The purpose of this presentation is to present a Protocol of Diagnosis & Treatment recommended to be used in the CMD patient that helps the professional to aboard this type of complex patients.

This protocol should follow the following steps:

1. Initial diagnosis of the cmdp should be based on medical & dental history, clinical examination, radiographic evaluation, and full neuromuscular work-up.
2. Full neuromuscular work-up lets us document pre & post dysfunction treatment, select the therapeutic occlusal position and objectively monitor our patient progress.
3. Establish the treatment plan for our patient: that may be possible only from an accurate and precise diagnosis.

All the days hundreds of thousands of suffering patients are looking for a treatment that gets the relief they deserve for their Pain State, but sometimes the professional lost in the Pain and

they cannot identify the real origin of the disease and finally the illness that sometimes is a chronic pain state.

The management of these types of patients often involve diagnosis and treatment by specialists from fields as diverse as otolaryngology and neurology, traumathology, kinesiology, psychology, internal medicine, experts in pain management and other disciplines that work together as members of the interdisciplinary team that have to be involved in the treatment of the CMDP.

For all these reasons to establish and follow a clear protocol is necessary to treat the CMDP.

Remember that occlusion is critical and can make our cases succeed or fail, so finding and maintaining the neuromuscular occlusion position, is critical in any treatment, especially in the TMD patients, and the only way to obtain and maintain this position is using the bioelectronic technology.

“If it has been measured, it is a fact, if not, it is an opinion.”

Dr Bernard Jankelson

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