

Perspectives about TMD: The Role of Neuromuscular Orthodontic Treatment Case Study

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It has long been known that if we want to preserve a friend it is necessary to avoid a discussion about religion and politics. The same principle applies to the dental community regarding dental occlusion and mandibular position, especially if they relate to the etiology of craniomandibular and temporomandibular disorders (TMD).

The literature presents two extremely diverse paradigms regarding the etiology, diagnosis and treatment of TMD. Majority of clinicians believe that dental occlusion and mandibular position play a primary etiologic role in the development of this pathology. Others dismiss this concept as strongly and attribute TMD to emotional tension and chronic pain, which they feel are responsible for the development of the signs and symptoms that characterize this type of syndrome.¹

Another controversial point that has been strongly debated among clinicians who seek answers to the mysteries of the treatment of TMD patient is how neuromuscular orthodontic treatment influences the resolution of this syndrome.

INTRODUCTION:

According the American Academy of Orofacial Pain (TMD Guidelines, 1993) Temporomandibular Disorders (TMD) is a collective term that comprises a number of clinical problems that involve the masticatory musculature, the temporomandibular joint (TMJ) and the associated structures, or both. TMDs are considered to be a sub classification of musculoskeletal disorders.² The second position is represented by the Research Diagnostic Criteria for Temporomandibular Disorders.³⁻⁴

The patient who suffers from TMD and craniomandibular disorders, also known as a Cranio Mandibular Dysfunction Patient (CMD), often presents with a chronic condition that involves alteration of the structure and/or function of the neuromuscular system, the temporomandibular joints, the occluding teeth and the global postural system. Although the etiology and pathogenesis of this syndrome are still poorly understood, all the literature based on scientific evidence, supports the concept that the etiology is multifactorial and

its pathogenesis can be influenced and precipitated from other co-morbidities that are being expressed in the same time and space.

To understand the etiology and management of this type of patient we must understand that not all patients can develop a TMD, there must be present certain conditions that, when they are present in certain relationship to each other, cause the precipitation of pain and dysfunction.

The first condition is the predisposition that can be genetic or intrinsic as well as acquired or extrinsic.

The first condition can involve any of the following: the muscles and their neuromuscular mechanisms, the ligaments and tendons, the skeletal structures and TMJ as well as psychological factors and characteristics of patient personality.

The second condition involves the special susceptibility brought about by traumatic injuries or systemic pathological alterations to the TMJ and related structures. Here we have to consider: "The role of inadequate dental procedures acting through the years over the occlusion."

The second condition is a Tissular Pathological Alteration, (an event) and the third condition a certain degree of stress, (distress). Both two last conditions must be present to break the patient homeostasis, predisposing the onset of symptoms that characterize the syndrome.

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

When we talk about the tissular pathological alteration remember that the existing occlusion in the patient will determine the: condylar position in the TMJ fossae, dictates muscle function: to posture the mandible at rest position and to move the mandible from rest position to habitual occlusion.

No matter how malpositioned the occlusion is in our patient, the neuromuscular system will struggle to create a habitual central occlusion with bilateral tooth contacts that allows the patient to carry on physiologic functions as necessary as the deglutition or masticatory function. The greater the malocclusion, the greater the

muscle accommodation that is necessary to bring the teeth into maximum intercuspation. The importance of the relationship between posture and occlusion must be recognized. Remember that any change at any level of the postural chain can develop ascending compensatory changes in the masticatory muscles. The converse is also true that any change in occlusion can create descending compensatory muscle changes at lower levels of the body.⁵⁻⁶

The objective and responsibility of the clinician who treats any patient with orthodontics is to treat not only the alignment of the teeth, but also the muscles and temporomandibular joints, together with a balanced cervical and upper quadrant relationship that improves the patient's final postural alignment.⁷

Thanks to the technological advances, based on the work of Dr. Bernard Jankelson, today we rely on the bio-instrumentation that allows us to get a higher level of understanding of the physiology and pathophysiology of the cascade of events presented in the TMD patient.

Aided by these computerized measurement devices, it is now possible to determine:

- The physiologic relationship of the mandible to the cranium, establishing the optimal physiologic mandibular position for each patient through the use of ultra- low frequency (TENS)
- The state of muscles at rest and function pre and post treatment, using the surface electromyography (EMG)
- The jaw movements in the frontal and sagittal plane and locates the mandibular physiologic position in the space through the use of computerized mandibular scanning (CMS)
- The nature of the sounds in the TMJ, using the electrosonography (ESG)

This permits the clinician to evaluate the orthodontic treatment plan with more security, converting an unhealthy habitual occlusion into a physiologic balanced occlusion that improves the prognosis of the TMD patient into the future.⁸⁻⁹

Case Study:**PHASE II NEUROMUSCULAR
ORTHODONTIC RESOLUTION
INITIAL DIAGNOSIS:**

A thorough evaluation was completed which included:

1. Medical & Dental History and Clinical Examination

History:

A fifteen year old female who began with severe limitation of her mouth opening. She had a history of chin trauma six years previously.

Chief Complaint: "I have problems opening my mouth."

At present she suffers from:

Left and right TMJ pain that increases with mouth opening.

Jaw locking as a consequence of disc displacement without reduction in both TMJ's.

Frequent headaches and cervical pain.

Ear pain and tinnitus.

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

Bilateral Class III molar occlusal relationship is present with lingual inclination of molars and bicuspids.

Functional side shift was observed as a consequence of eccentric interferences and a narrowing in the maxilla. This is the cause of a displacement of the mandible with asymmetry as well as mandibular torque.

2. Diagnostic Records: Study models, intra and extra oral photographs
3. Complete K-7 Neuromuscular Work-Up

TREATMENT PLAN:

- PHASE I: Mandibular neuromuscular orthosis worn 12 months for cranio-mandibular stabilization prior to orthodontic treatment.
- PHASE II: Neuromuscular orthodontic treatment to obtain a precise physiologic neuromuscular occlusion free of interferences during exit and entry into a terminal maximum teeth contact.



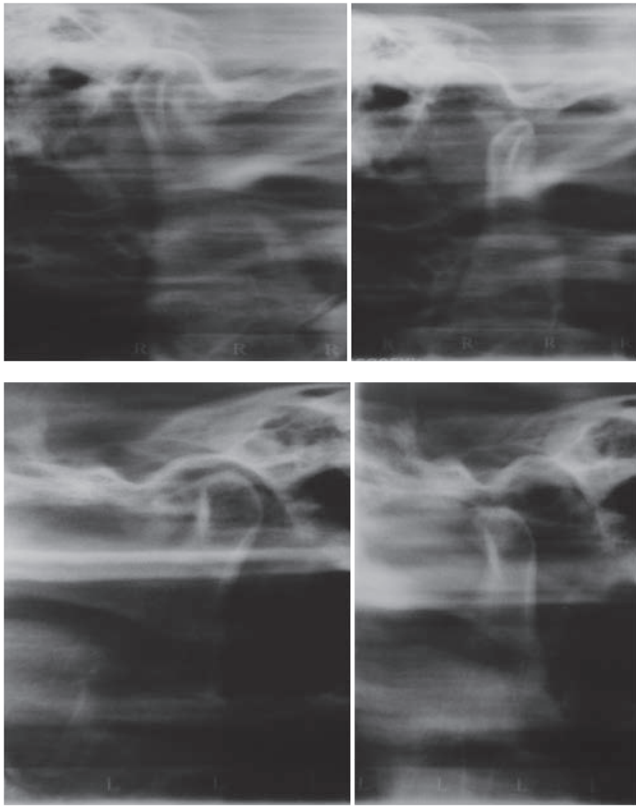
Picture 1-2



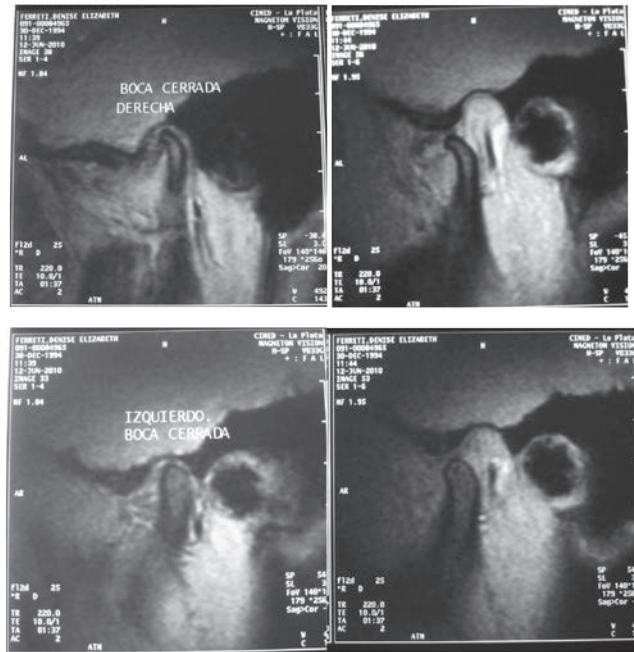
Picture 3-7: Intraoral views



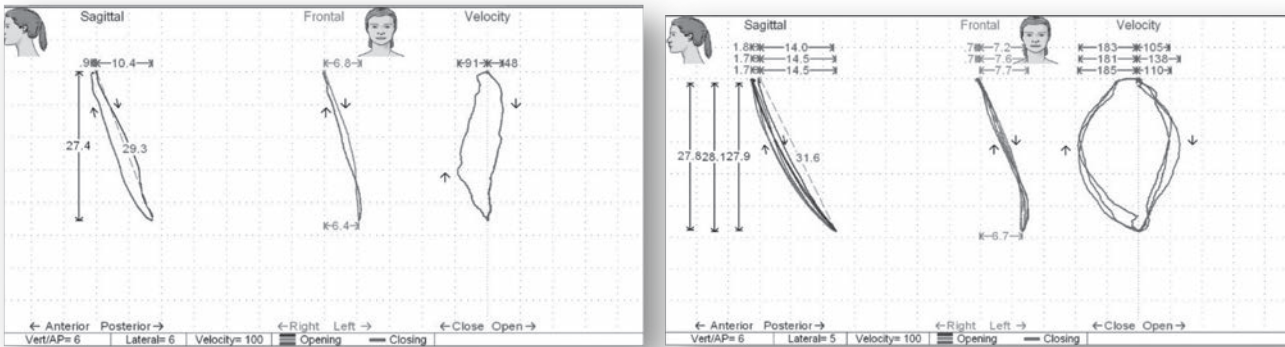
Picture 8: Panoramic Xray



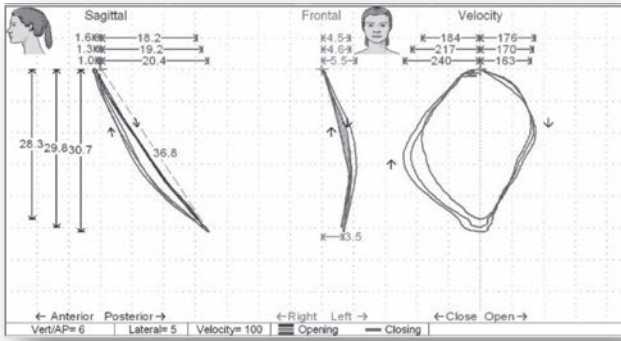
Picture 9: Tomograms



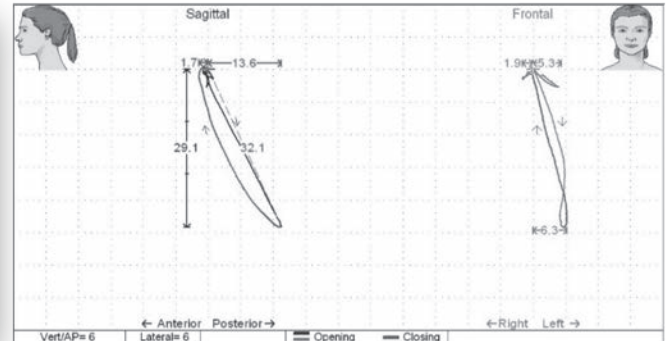
Picture 10: MRI. Right and left TMJ in habitual occlusion and maximum opening. A non-reducing disc displacement with deformation of the disc that gradually accentuates.



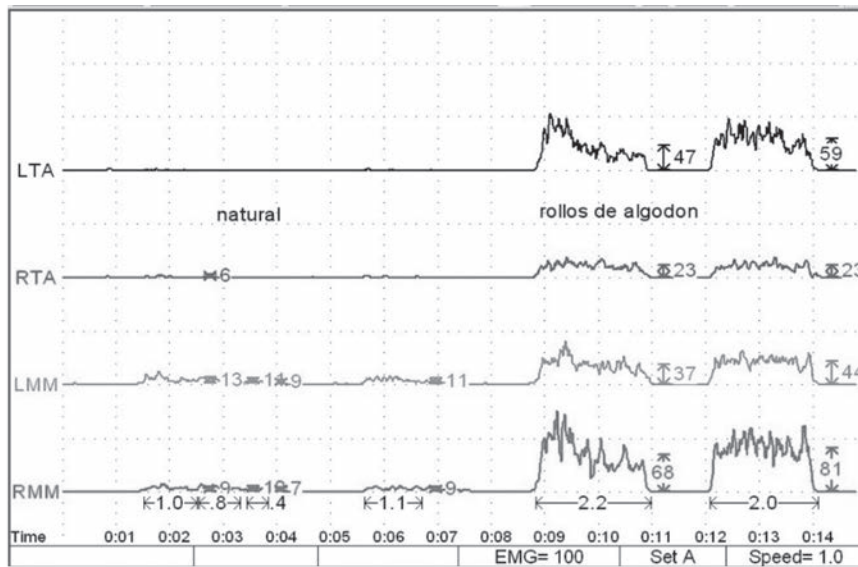
Picture 11: Scan 1&2 Pre treatment



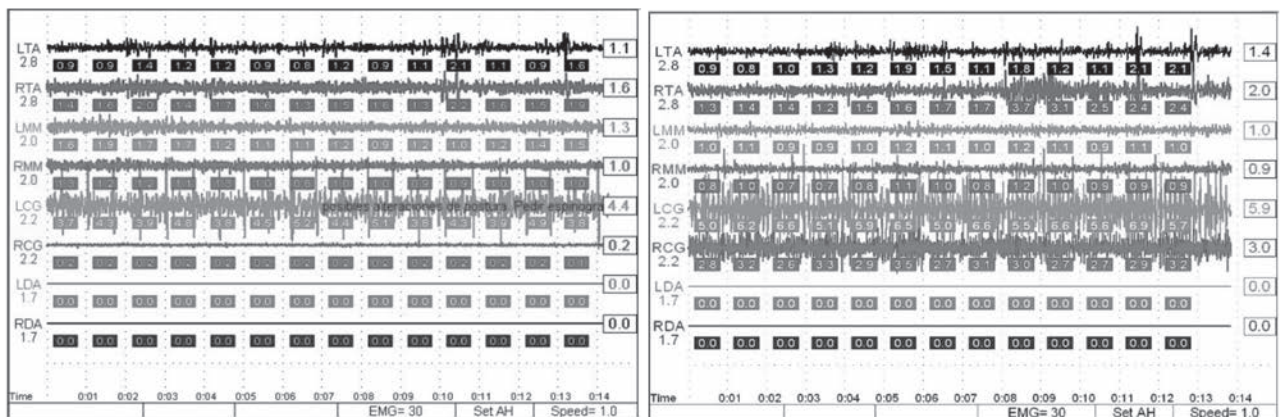
Picture 12: Scan 7. Cinematic post TENS therapy.



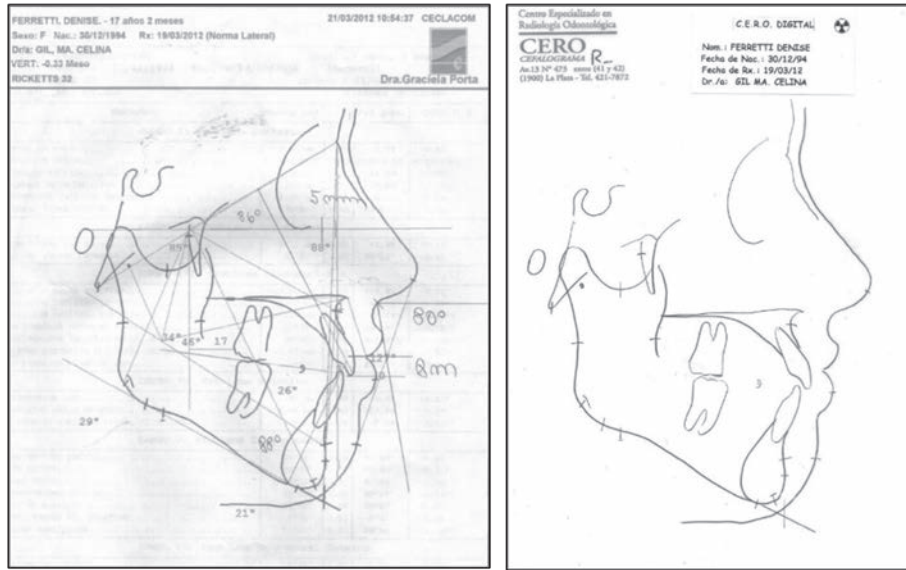
Picture 13: Scan 13. Limitation on both right and left lateral excursions.



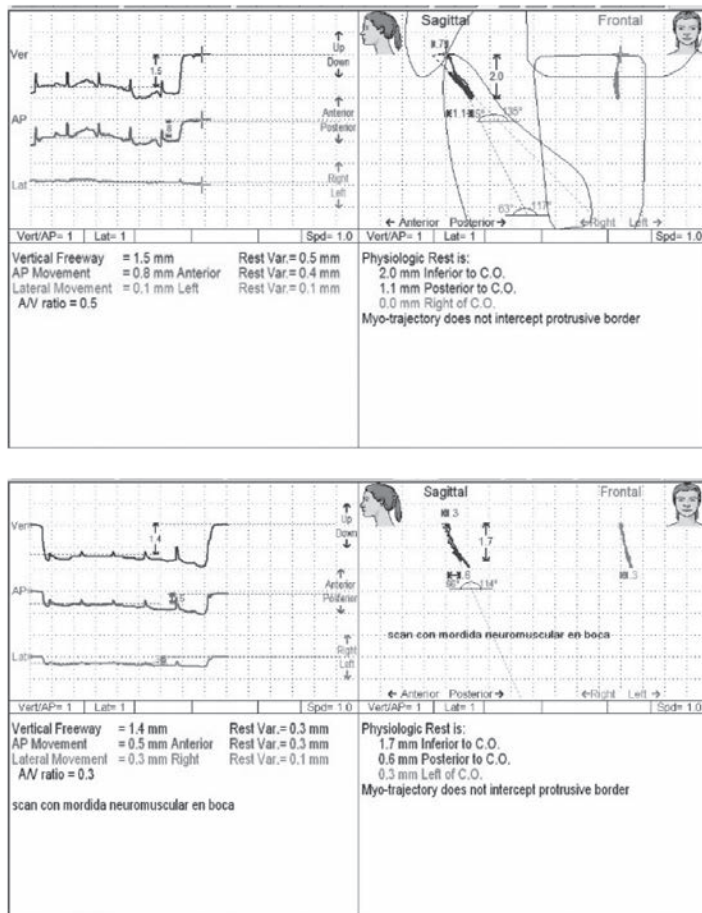
Picture 14: Scan 11. Pre treatment



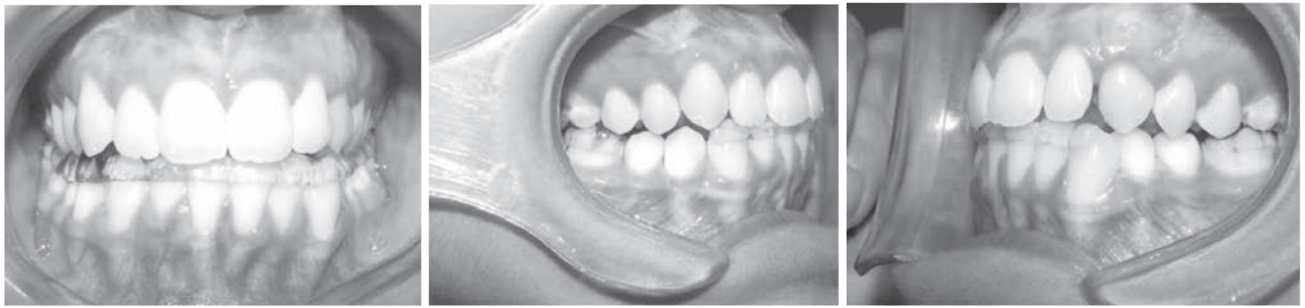
Picture 15: Scans 9-10. Pre treatment



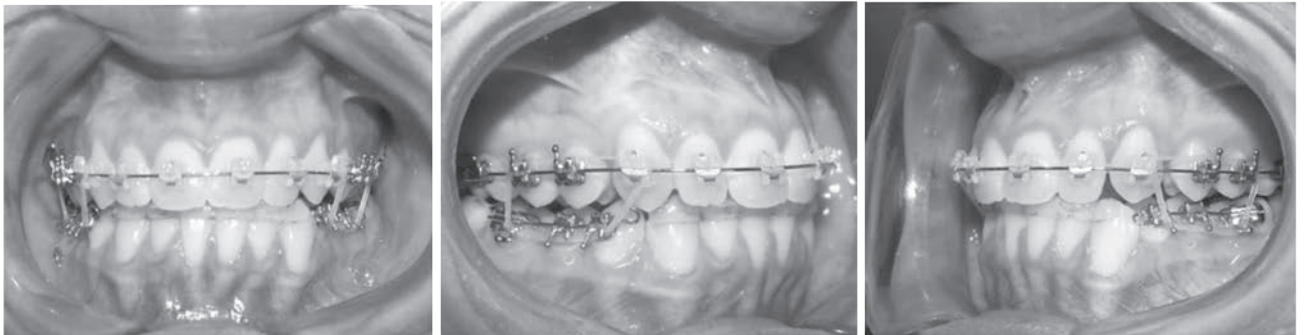
Picture 16: Lateral cephalograms



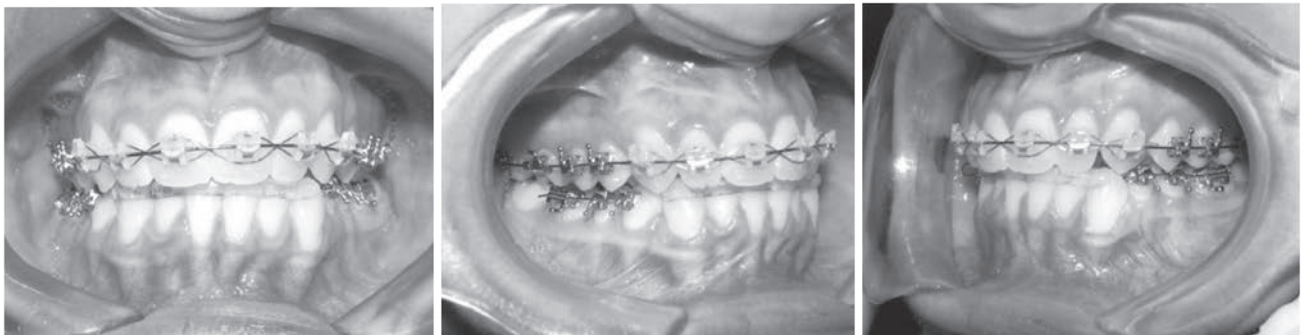
Picture 17: Scan 5 with and without orthosis



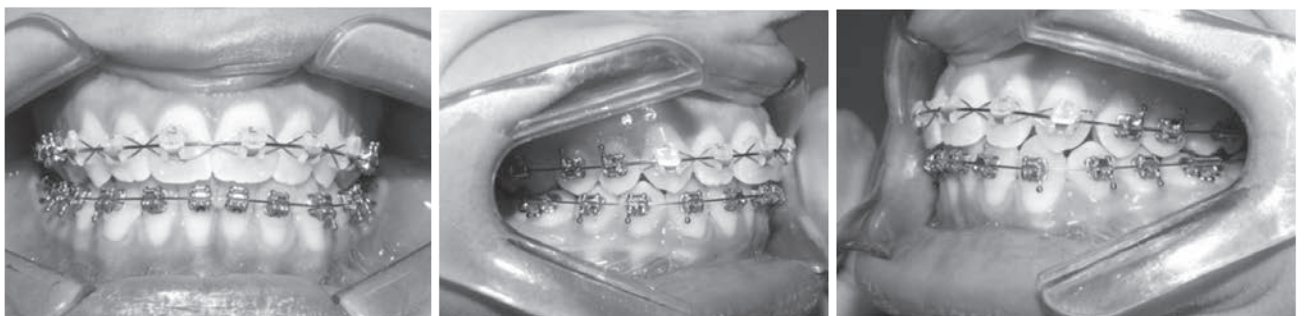
Picture 18: Mandibular orthosis worn 12 months for crano-mandibular stabilization prior to orthodontic treatment.



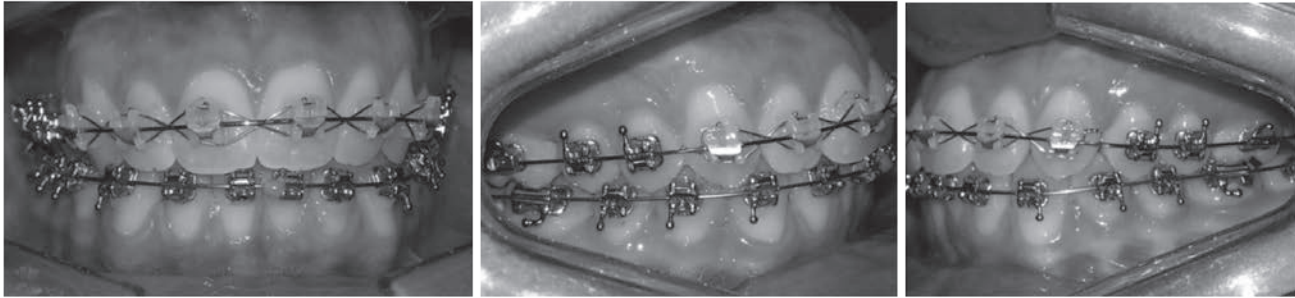
Picture 19: Upper Sentalloy arch 0.14 – 0.18 were used to level, align and rotate teeth as simultaneous arch development took place, while it was maintained the lower appliance in a tripod format (anterior region and second molars) to hold the mandible in the neuromuscular therapeutic position throughout treatment. 3/16 inch 60z parallelogram elastics were used for verticalization and upward development of the lower arch to the pre-determined appliance position.



Picture 20: Once the mandibular posterior teeth were in contact holding the mandible and the condyles in an stable functional position, the use of the orthosis was discontinued and we started to work with the inferior arch.



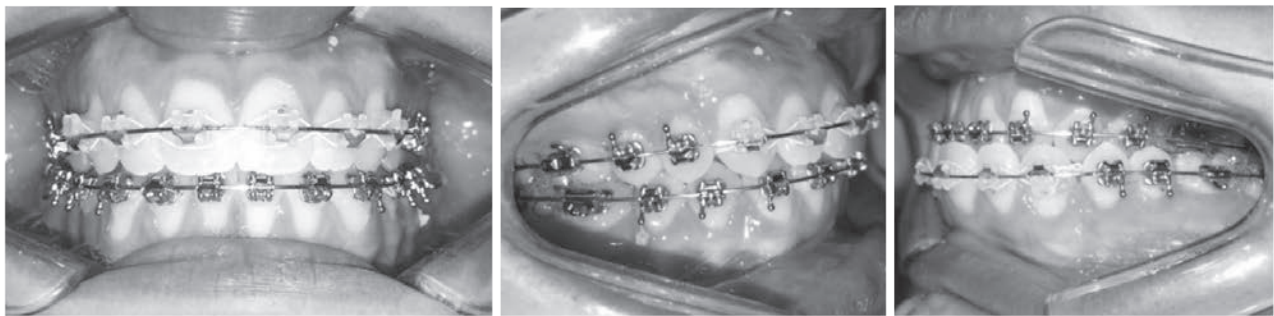
Picture 21: Full arch wire mechanisms were implemented to verticalize and develop the inferior arch.



Picture 22: Nitinol superior arch 0.16 x 0.22 / Wire inferior arch 0.18.



Picture 23: Wire superior and inferior arch 0.16 x 0.22.



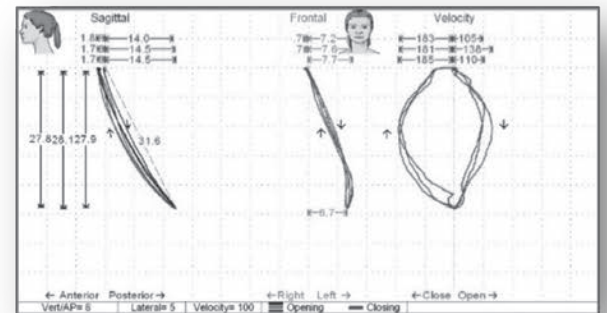
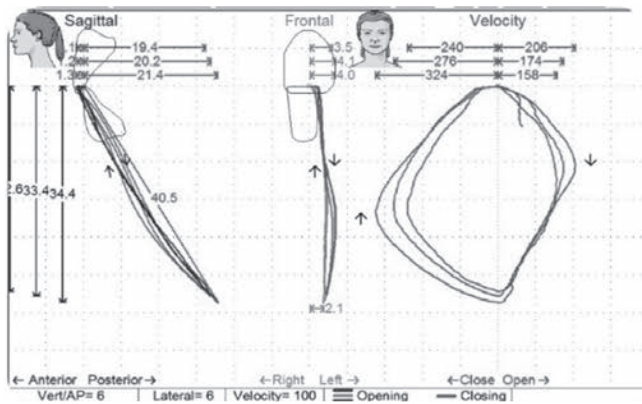
Picture 24: Wire superior and inferior arch 0.19 x 0.25 / Multi-braided 0.19 x 0.25.



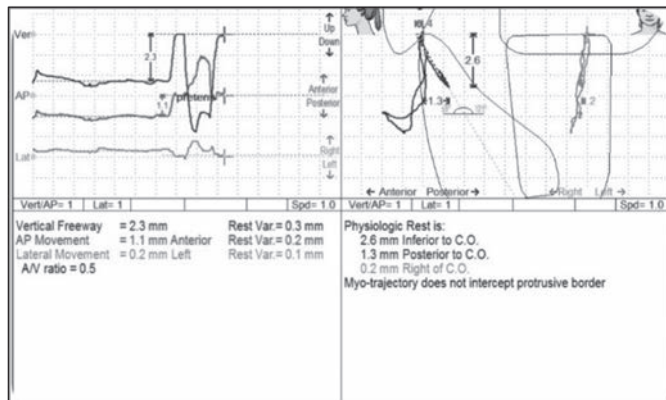
Picture 25: When we finished we obtained a stable occlusion with solid occlusal terminal contacts in the physiologic therapeutic position.



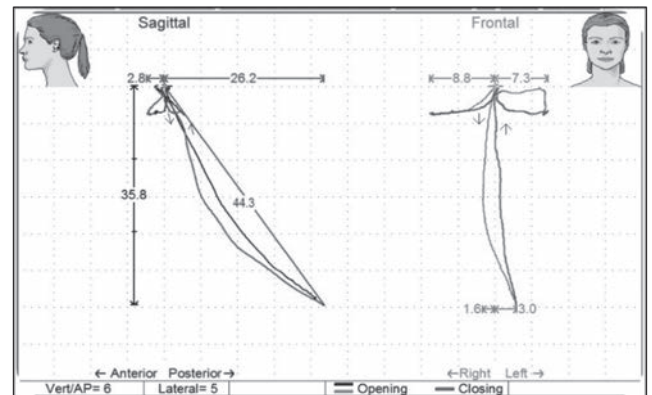
Picture 26: Finished bite. The patient was symptom free.



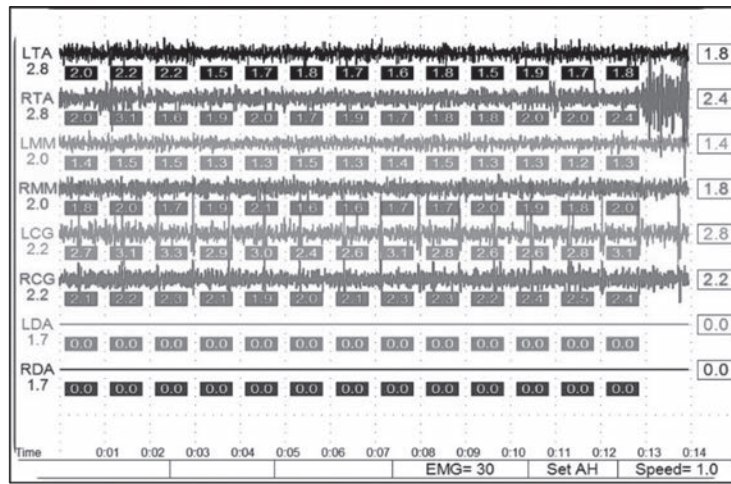
Picture 27: Comparative SCAN 1 & 2 post and pre treatment



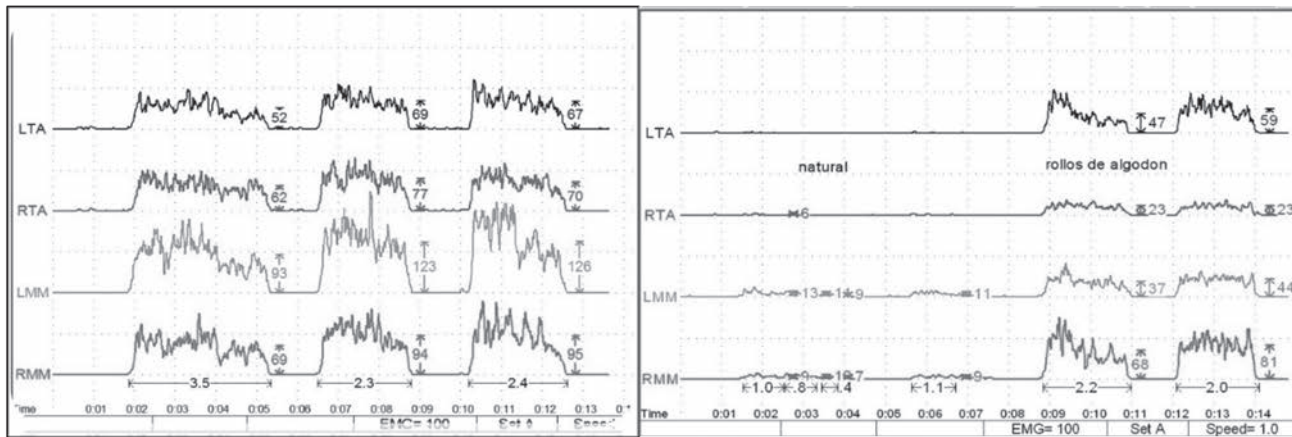
Picture 28: Scan 5 Final Bite



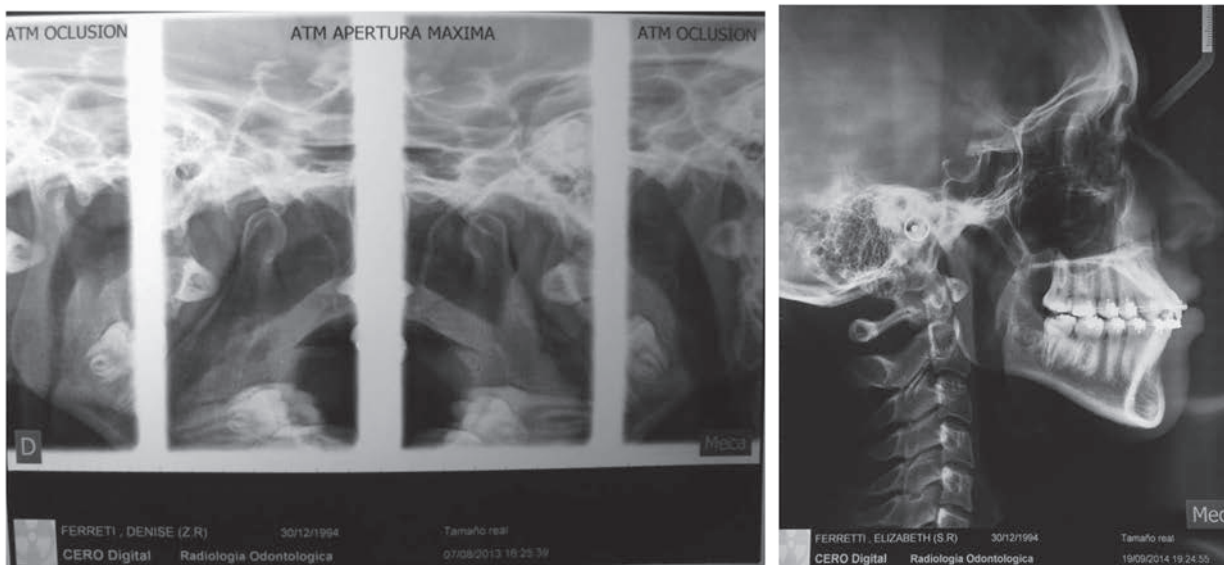
Picture 29: Scan 13 post treatment



Picture 30: Scan 9 post treatment



Picture 31: Scan 11 Comparative test post and pre treatment



Picture 32: Finishing Tomograms

CONCLUSIONS:

Based on my experience in the field of neuromuscular dentistry and orthodontic treatment, as illustrated in this paper, a significant number of patients suffering from craniomandibular dysfunction will receive a great benefit through the use of neuromuscular orthodontics or orthopedic treatment specifically during the long term treatment Phase II.

The key to resolving this problem during this phase is to maintain the orthotic in the tripod format throughout the treatment. The orthotic must only be removed when a stable neuromuscular occlusion has been established and the patient continues to be asymptomatic. It is necessary to check the final precise occlusion obtained throughout the orthodontic treatment by cinematics (Scan 4-5).

Orthodontic treatment can be a great help or a great problem in treating the complex TMD patient. The progress of the available technology can help the clinician to diagnose and treat their patients in any field of dentistry and especially for the orthodontic patient.

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