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Case Report

Treatment with TMA Wire in Class III MEAW/GEAW Philosophy

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Abstract

Skeletal class III malocclusions is one of the biggest challenges in Orthodontics. After the diagnosis most patients refuse to do orthognathic surgery. With the new techniques, MEAW/GEAW, the problem can be solved with orthodontics compensation. This case report presents a dentoalveolar compensation in the orthodontic treatment of a 29-year-old male patient with class III malocclusion, concave profile, mandibular and maxillary prognathism, and a vertical deficiency in the posterior region. Treatment planning involved a TMA archwire, otherwise a gunmetal archwire, based on a multiloop edgewise archwire (MEAW / GEAW) associated with intermaxillary elastics with counterclockwise rotation of the occlusal plane in the posterior region of the maxilla aiming at obtaining an increased posterior vertical dimension. After 18 months of treatment, the skeletal class III relationship was camouflaged. At the end of the orthodontic treatment, it was possible to observe an improvement of the occlusal plane and a functional occlusion. The results remained stable at a a year follow-up. The MEAW/ GEAW, associated with the use of elastics, seems to be an effective treatment option for class III camouflage with reduced posterior vertical dimension with no need for additional anchoring devices but require adequate bending of wires and patient compliance.

Keywords: *MEAW/GEAW, Archwire, Class III patients*

1. Introduction

The diagnosis in class III patients can be difficult to the orthodontics, as also the treatment. The principal factor for the correct treatment is the skeletal, which includes the mandibular prognathism, the maxillary atresia, the anterior crossbite and the reduced skull base angle.

Other factor that can be a significant Challenged is the vertical grow, which often produce a open bite occlusion.

The objective in treating class III malocclusion is controlling the occlusal plane and obtaining an appropriate posterior vertical dimension, thus improving the balance between the mandibular ramus height and the posterior maxillary vertical dimension [9, 12].

Therefore, the multiloop edgewise arch wire (MEAW) technique developed by Kim provides an effective approach for treatment of skeletal class III malocclusion with high angle, providing the change of occlusal plane, leaving parallel of Frankfurt plane [1].

The distal movements of the posterior lower teeth occur through the boot loops and second-order bends (tip-back), along with class III intermaxillary elastics, promoting counterclockwise rotation of the occlusal planes. This improves both the sagittal bone and teeth relationship, allowing a good intercuspal relationship in a short period of time.

In this case, the counterclockwise rotation of the occlusal plane was promoted through orthodontic mechanics and no surgical intervention and without any type of skeletal anchorage. Verticalization and extrusion of the upper and lower molars as well as vestibular retro inclination of the upper and lower incisors were part of the compensatory treatment of this adult skeletal class III malocclusion with the MEAW/GEAW technique with TMA wire.

Also, can be seeing the modification of the occlusal plane.

2. Case Presentation

2.1 Diagnosis and Etiology

A 29-year-old, male came to the office with a mandibular prognathism and complain about the esthetic of the teeth. He presented a good general state of health and no history of systemic disease. The extraoral frontal examination revealed a dolichofacial aspect. The smile showed adequate gingival exposure. In the lateral view, a total and concave lower third profile was observed. The mento is adequate. Intraorally, he had a class III molar and canine relationship, with a negative overjet of -0,13mm and overbite of – 0,67mm. In the lower arch, the incisors showed a severe buccal inclination as the superior incisors also have a severe inclination. Symptoms of temporomandibular joint dysfunction were detected during jaw function and palpation with crack noise but no pain were referred.

The panoramic X-ray (Figure 5) not showing significant modification. The cephalometric analysis revealed a mandible (Facial depth 94°), and maxillary protrusion (Facial axis 96°) that means both, mandibula and maxilla was prognathic. Facial growth was hypodivergent (vert=brachyfacial) and the occlusal plane showed clockwise rotation indicating Cephalometric radiography also showed an increased upper and lower incisors pro-incline (Lower incisor inclination = 30° and upper incisor inclination superior de 36°) (Figure 2, Table 1).

Fig 1. *Photos pre-treatment*

2.2 Treatment Objectives.

The overall goals of the treatment plan were to achieve a good relation in occlusion moving de mandibula rotate to achieve class I relation. The specific objectives were promoting a counterclockwise rotation of the occlusal plane to incorporate the correct vertical dimension of the maxilla, moving upper incisor and lower incisor to a better position, establish a correct overbite and overjet, establish a class I molar and canine relationship, promote the tipping of upper and lower molars.

Table 1. *Measurements pre and post treatment. Ricketts analysis*

Measurement	Norm	Pretreatment	Post-treatment
Overjet	2,5 ± 2,0mm	-0,13mm	2,24 mm
Overbite	2,5 ± 2,0mm	-0,67 mm	0,34mm
Lower incisor extrusion	1,25 ± 2,0mm	0,82 mm	-0,31mm
Interincisal angle	130° ± 6	112°	128°
Facial axis	90° ± 3	96°	96°
Facial depth	87° ± 3	94°	94°
Facial angle	87° ± 3	88°	88°
Mandibular plane	26° ± 4	21°	20°
Lower face height	47° ± 4	46°	47°
Mandibular arco	26° ± 4	35°	27°
Mandibular corpus length	66 ± 3 mm	84 mm	84 mm
Convexity of point A	2 ± 2 mm	2,1 mm	2,2mm
Oclusal plane to XI	3,75 ± 3 mm	-2,5 mm	-6,5mm
Oclusal plane inclination	19,3° ± 4	24°	28°
Lower incisor to A-Pog	1 ± 2mm	7,1 mm	6,6 mm
Lower incisor inclination to A-Pog	22° ± 4	30°	19°
Upper incisor inclination to A-Pog	28° ± 4	36°	31°
Upper molar to PTV	13 ± 3mm	27 mm	23 mm

2.3 Treatment Steps.

Treatment began with full-fixed appliance with Roth prescription with self-ligate brackets, was placed in both dental arches (0:022×0:028-inch slot, Aditek). The first wire was a 0,12" niti arch in both arches. Then changed for a 0,14" niti, both arches, 0,16" niti, both arches, then a 0,16x0,16" niti arches, and finally a 0,16x0,22" steal arch in both aches.

Treatment with GEAW arches was initiate with a flat activation of the TMA arch (0,16x0,22). After 30 days start the wire activation, bending the upper and lower molars tipping distally with the Kim and Sato guidelines, to eliminate dental interferences. Associating a short 3/16" silicone elastic intermaxillary in the first bend of the wire (canine and lateral incisor).

After 8 months it could be observed the counterclockwise rotation of the mandibula and the class I molar and canine were achieved.

At that time the bending with tip back at the molar section was removed, turning the wire in flat position to reconstruction of the Occlusal Plane. Remained two months to achieve the correct interocclusal position.

Therefore, the wires were changed to a steal 0,16x0,22" to stable the jaw in that position, obtaining a Physiological Occlusion, to achieve a good intercuspation and the elastic intermaxillary continuing use at this time.

60 days after it was removed the elastics.

Two aligners were made as retainers. The retainers were made by a 1 mm pet-g material. 24hs use was recommended.

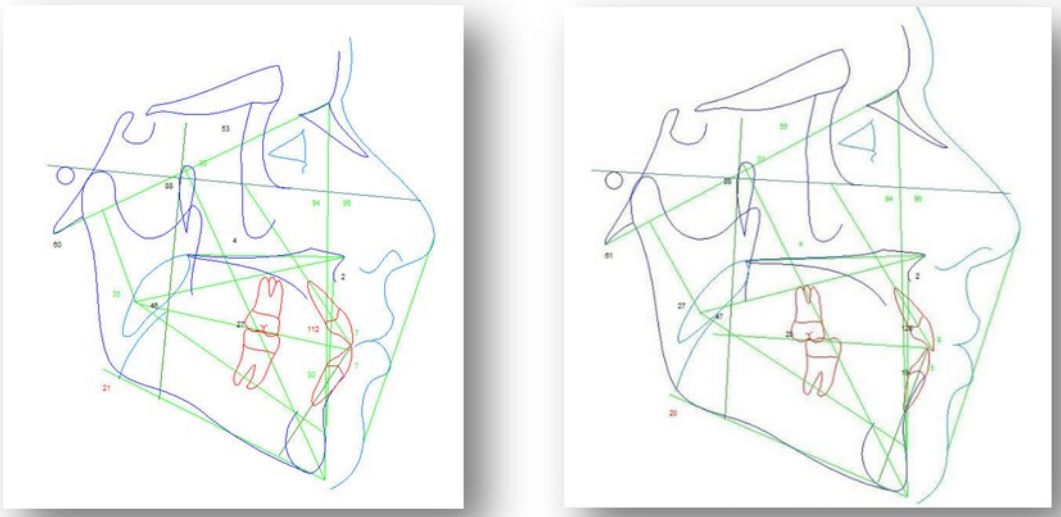

Fig 2. *Pre-treatment (left) and pos-treatment (right) cephalometric.*

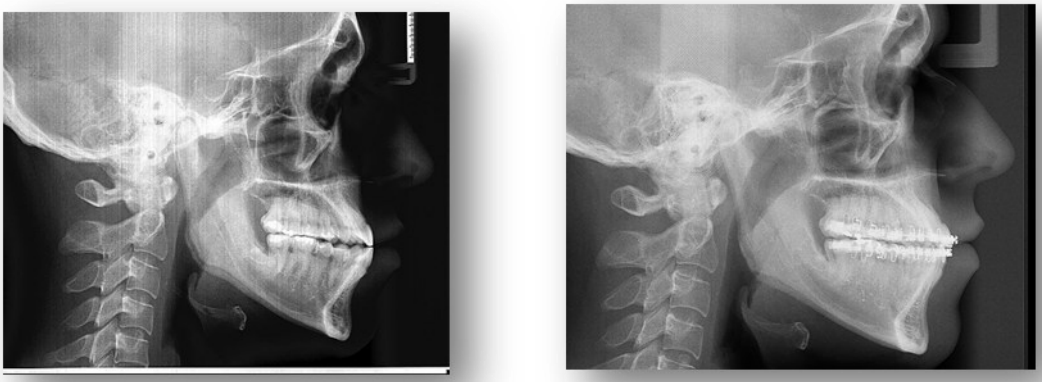

Fig 3. *Tele radiography pre-treatment (left) and pos-treatment (right).*

3. Results

The final registries showed that most treatment targets were accomplished. Intraorally, the anterior crossbite was corrected, a Class I Canine and a Class III molar functional relationship was achieved, with adequate overjet and overbite. The step between molar and premolars was not removed. The intercuspal among upper and lower pre-molars was not reached as expected. Panoramic X-ray showed a verticalization of the upper and lower molars and premolars, with acceptable parallelism and no signs of significant bone or root resorption. Final Cephalometric radiography revealed an improved of occlusal plane, modification at lower (19°) and upper incisors (31°), and the relation among then (126° inter incisor angle). The arco mandibular was modified (35° to 27°) shows the new position of the jaw. There were no modifications in the Facial axis and the Facial angle. It can be observed that the occlusal plane inclination was modified turning of 24° in to 28°.

Fig 4. *Photos pos treatment.*

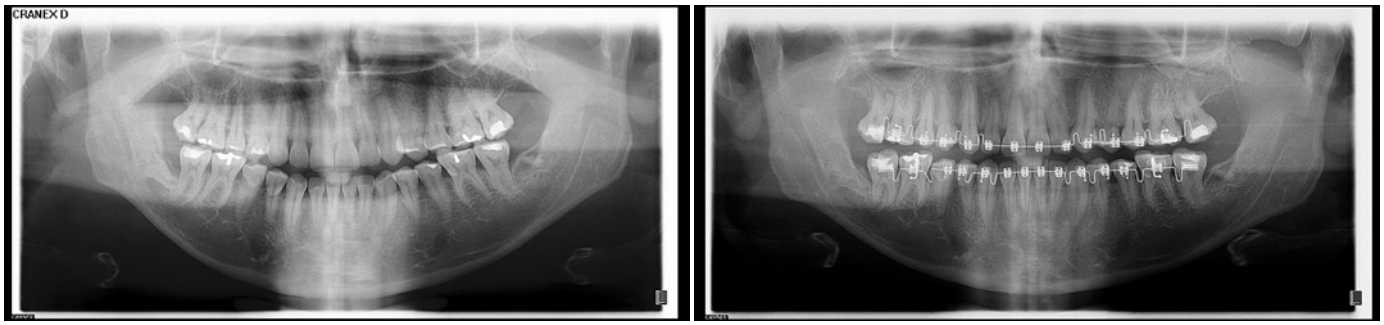

Fig 5. *Panoramic X-ray pre-treatment and pos-treatment.*

4. Conclusion

Despite the technique that use for the correction of class III malocclusion, the correct diagnosis is fundamental to apply the correct mechanics. In this case we use a TMA wire doing the same principles of GEAW.

All objectives that were proposed, a counterclockwise rotation of the occlusal plane, solve the anterior crossbite, overjet and overbite, the class I of molar and canine, get reached.

Another objective of this work was to demonstrate that the most important is not that material we use, but the diagnosis and the concept of the technique that will be applied.

The GEAW arch with the TMA wire was as effective as a gunmetal wire in that case. The activation was the same as a gunmetal wire.

Conflict of Interest

The author declare no conflict of interest.

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