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Orthodontic therapy with a Wilson bimetric maxillary distalazing arch

Araceli García Peña[1], Daniel Cerrillo Lara[2], David Barajas Ramírez[3], Flor Vianney Ceceña González[4]

[1](Orthodontic Specialty/ Universidad Autónoma de Baja California, México)
[2](Orthodontic Specialty / Universidad Autónoma de Baja California, México)
[3](Orthodontic Specialty/ Universidad Autónoma de Baja California, México)
[4](Orthodontic Specialty / Universidad Autónoma de Baja California, México)

Abstract:
Background*: Several methods and appliances have been developed over time to produce molar distalization, there are some factors to considerate to make the best choice to treat the patient with class II malocclusion like the growth pattern, dental crowding, age, among others.*
Case Report*: A9-year-old male patient presented a skeletal class II malocclusion, a neutral growth pattern,as well as retroclined upper incisors and proclined lower incisors presentinga bilateral molar class II relationship, an indeterminate canine class relationship, an increased overjet with a 5mm value and mixed dentition. As the patient is still growing up a dentoalveolar compensation is chosen using a 3D Maxillary Bimetric Distalizing Arch (3D-MBDA).*
Discussion: *The approach for this clinical case was more conservative avoiding the maxillary first bicuspids extraction and producing maxillary first molar distalization with this appliance and wearing intermaxillary 5/16" diameter Class II elastics with 3.5 oz. 24 hours per day until obtain the objective.*
Results*: Obtained a class I molar and canine relationships in both sides, the overjet was reduced from 5mm to 2mm and better facial harmony were achieved.*
Conclusion: *TheWilson bimetric maxillary distalazing arch performed in this case report proved to be an efficient way to produce molar distalization and correct dental class II malocclusion.*
Key Word*: Orthodontics, Class II malocclusion, Molar distalization, 3-D Maxillary Bimetric Distalizing Arch.*

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I. Introduction

There are many options to correct Class II malocclusions, one of them is the distalization of the maxillary first molars providing a good alternative to gain space with an orthodontic treatment without extractions of the maxillary first bicuspids. Some of the intraoral devices that would make this possible are the pendulum,the distal jet, the 3D Maxillary Bimetric Distalizing Arch (3D-MBDA), the jones jig, the forsus, the Herbst, themicroimplant-based distalization and others. All of them requires less cooperation of the patient than an extraoral appliances such as headgear that also can be used to fix the class II malocclusion but is not aesthetic for the patients which causes them to not cooperate with the treatment.[1-7]

In 1978 the Modular Orthodontic System became known for William L. Wilson and Robert C. Wilson to help to correct class II malocclusions and proposed an appliance to help with it; the 3D Maxillary Bimetric Distalizing Arch (3D-MBDA)helps the clinician trough the loading of intermaxillary Class II elastics and a 3D lingual arch as anchorage to achieve a rapid molar distalization with less negative effects.[2, 6, 8, 9]

According to Rana and Becher (2000), in order to the treatment objectives met with the MBDA device, it is very important that the patient that will receive this type of therapy in their study must have minimal crowding, a normodivergent growth pattern, class II malocclusion, upright upper incisors and still be adolescent. [6]

The average time of treatment that has been advertised to bodily distalization of maxillary first molars by Wilson´s was 6 to 10 weeks wearing Class II elastics reducing the load to maintain the mandibular anchorage and reinforcing it with the 3d lingual arch.[10]

The purpose of this case report was to describe the technique used to perform molar distalization in a class II malocclusion using a Wilson bimetric maxillary distalazing arch and orthodontic fixed appliances.

II. Material and Methods: Case Report

The following patient is a 9-years-oldmalewithout any medical issues or allergic data, who attended to the Orthodontics program clinic stating as a reason for consultation: "I want a better bite."

The extraoral clinical analysis showed an ectomorph patient with apparent facial asymmetry, brachyfacial biotype, facial midline coincides with dental midline and a convex profile.The nasolabial angle is in normal values but the mentolabial groove is deepand a deficient lip closure(Figure 1).

Figure 1. Facial photographs.

Intraoral photographs and study models showed a square-shaped upper and lower arches, the patient has a mixed dentition, thin periodontal biotype,mismatched dental midlines,moderate upper and lower dental crowding, bilateral molar class II relationship, an indeterminate canine class relationship,1.6mm of overbite and increased overjet with 5mm value (Figure 2).

Figure2. Intraoral photographs.

According to the cephalometric analysis, the patient presented a skeletal class II relationship,a neutral growth pattern,as well as retroclined upper incisors and proclined lower incisors(Table 1, Figure 3).

The panoramic view revealed 12 permanent teeth intraorally in process of apical closure. We can also observethe presence of 16 permanent teeth ineruption process, the upper and lower germs of the third molars in development. The height of both mandibularramus are symmetrical but with asymmetrical condyle anatomy, in addition to an uniform bone density with a crown root ratio 1:2, with no other apparent pathologies (Figure 4).

Patient	Norm	Initial
SNA	82° ± 2°	78.3°
SNB	80° ± 2°	72.6°
ANB	2° ± 2°	5.7°
SND	76° ± 2°	70°
Segment SL	51mm ± 2	38mm
Segment SL	22mm ± 2	16mm
Ang Go-GN/SN	32° ± 2°	36.7°
Plane Ocl/SN	14° ± 2°	20.6°
Ang 1s/NA	22° ± 2°	22.4°
Distance 1s/NA	4mm ± 2	0.4mm
1s/ ENA-ENP	70° ± 2°	69°
Ang 1s/SN	103° ± 2°	100.7°
Ang 1i/NB	25° ± 2°	24.8°
Distance 1i/NB	4mm ± 2	2.7mm
1i/ Go-Gn	90° ± 2°	95.5°
Interincisal angle	131° ± 2°	127°
Overbite	2.5mm	1.6mm
Overjet	2.5mm	5mm

Table 1. Lateral cephalometric analysis summary.

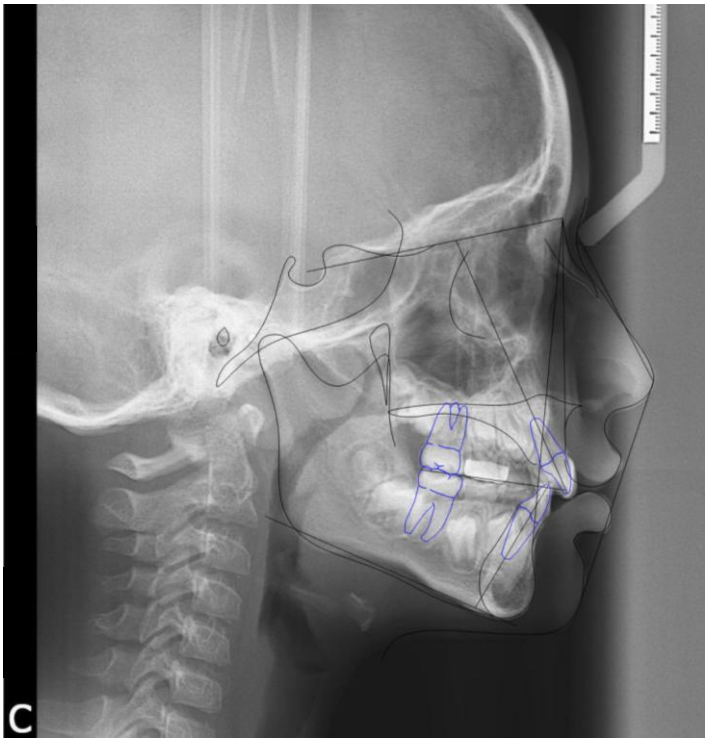

Figure3. Initial lateral cephalometric.

Figure4. Initial panoramic x-ray.

Case Report Location: The clinical case report was made in the orthodontic specialty program at the Autonomous University of Baja California (Universidad Autónoma de Baja California), Campus Tijuana , México.

Treatment Plan

Phase I

Alignment and leveling using 2x4 upper fixed appliances(Roth Slot 0.022"). Mandibular anchorage was obtained with a standard lingual arch. A Wilson'sarch type was fabricatedand placed in the clinic.

Phase II

Upper and lower fixed appliances (Roth Slot 0.022"). Alignment and leveling. Upper and lower conformation with sequence of arches. Intermaxillary elastics with Class II Mechanics. Harmonization of arches. Root torque. Retention with upper and lower removable appliances.

Treatment Objectives

Relieve the crowding, establish Class I molar and canine relationships,correct the midline shift,create ideal overbite and overjet,dental stabilityandto keep a proper and aesthetic soft-tissue profilewith facial harmony.

Case evolution

We initiated the first phase with the placement of fixed appliances from the upper right lateral incisor to the upper left lateral incisor (Roth Slot 0.022") with fixed bands on upper first molars, after that,we proceeded with the alignment and leveling which were carried out with Niti 0.014" archwire, after that we used the following arch wire sequence: Niti 0.016," 0.018", 0.016"x0.016", 0.016"x0.022", Stainless Steel 0.016"x0.022".Each archwire was cinched. Mandibular anchorage was obtained with a standard lingual arch.

Once we had a 0.016"x0.022" SS archwire on the upper arch, we proceeded to place a Wilson´s biometric distalizing arch type that was fabricated in the clinic, initially it was placedpassively and we indicated the use of intermaxillary5/16 diameter Class II elastics with 3.5 oz. 24 hours per day, which were to be changed once each day. The next appointment, we activated the Omega loop on both sides of the arch, so it would accommodate a 5mm length stainless-steel open coil spring (0.040" diameter) and compressed by 2mm against the buccal first molar tubes on both sides. At the next appointment, we verify the patient´s cooperation with the use of intermaxillary Class II elastics and we reactivated the omega loop,so it compressed the open coil spring about 1 to 2mm against the buccal molar tube on both sides(Figure 5). The same procedure was done until the objective was achieved.

The goal of molar distalization was achieved in 6 months approximately. After we obtained the desired results, the biometric arch remained passive for the next 3 months using only the intermaxillary 5/16 diameter Class II elastics with 3.5 oz. 24 hours per day. Lateral cephalograms and panoramic x-raystaken before and after treatment to evaluate the treatment effects.

We initiated the orthodontic phase with full bondedupper braces (Roth Slot 0.022") using a Niti 0.014" archwire to initiate the alignment and leveling phase. The patient unfortunately missed his appointments for the next full year. After the patient came back, we bonded the lower fixed appliances. The alignment and leveling phase were initiated using Niti 0.014" arch wire, and we changed the upper archwire to a Niti 0.016". The following arches we change in a progressive sequence matter.

We placed a lower reversecurve on a 0.016"x0.022" SS archwireand a removable anterior bite plane in combination with the use of5/16" diameter class II elastics with 3.5 oz. of force. After 3 appointments the lower reverse curve arch was flattened, and the anterior bite plane was removed nevertheless we continued using Class II elastics for a few months,following the next sequence: 5/16" diameter with 3.5 oz, 5/16" diameter with 6 oz, 1/4" diameter with 3.5 oz. and finally a 1/4" diameter with 6 oz. were used. The canines were distalized until they reached a class I relationship, after that objective was obtained, we used tiebacks to do the anterior retraction. The panoramic x-ray was analyzed to verify root parallelism,some braces were repositioned. After releveling we placed a 0.017"x0.025"stainless steel archwires in the upper and lower arches. Elastic chains were placed from first molar to first molar in both arches to achieve remaining space closure. After obtained our final objectives the orthodontic fixed appliances were removed, and the retention was obtained with upper and lower removable appliances.

Figure 5. Intraoral treatment progress photographs

III. Results

The finalclinical results showed that we obtained a class I molar and canine relationships in both sides, the overjet was reduced from 5mm to 2mm. The shape of the arches is more uniform and coordinated between each other and the dental crowding was alleviated.The spee curve in the mandibular arch was flattened(Figures6 and 7). The maxillary incisors showed significant proinclination and mandibular plane angle decreased, an acceptable soft-tissue profile and facial harmony were maintained (Table 2, figure 8 and 9).

Figure 6. Intraoral final photographs.

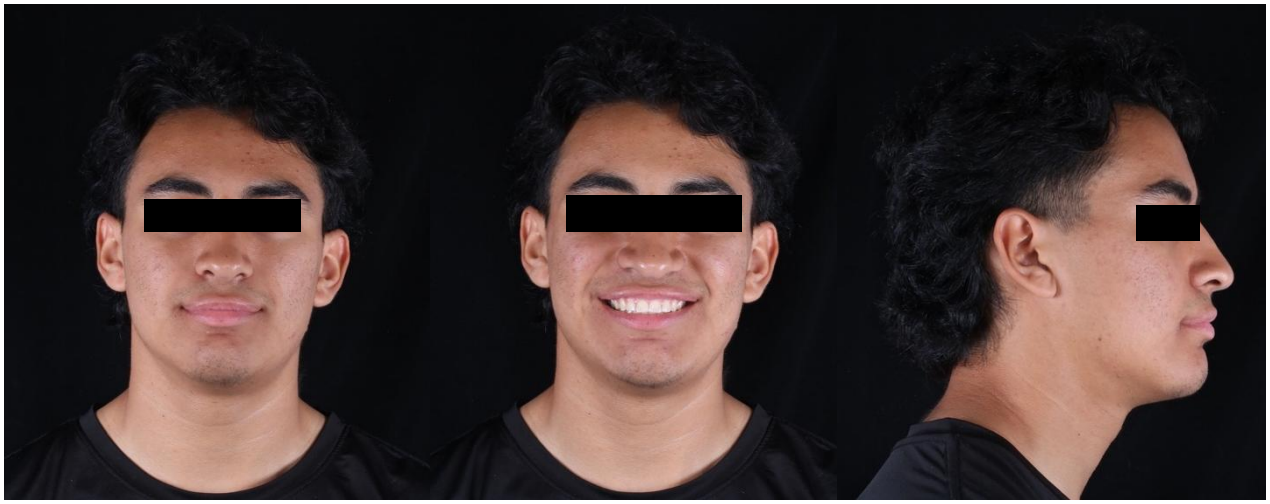

Figure 7. Final facial photographs.

Figure8. Final panoramic x-ray.

Patient	Norm	Initial	Final
SNA	82° ± 2°	78.3°	78.6°
SNB	80° ± 2°	72.6°	75.2°
ANB	2° ± 2°	5.7°	3.4°
SND	76° ± 2°	70°	72°
Segment SL	51mm ± 2	38mm	45mm
Segment SL	22mm ± 2	16mm	20mm
Ang Go-GN/SN	32° ± 2°	36.7°	33.7°
Plane Ocl/SN	14° ± 2°	20.6°	20.5°
Ang 1s/NA	22° ± 2°	22.4°	28.4°
Distance 1s/NA	4mm ± 2	0.4mm	4.5mm
1s/ ENA-ENP	70° ± 2°	69°	61°
Ang 1s/SN	103° ± 2°	100.7°	107°
Ang 1i/NB	25° ± 2°	24.8°	36.3°
Distance 1i/NB	4mm ± 2	2.7mm	6.9mm
1i/ Go-Gn	90° ± 2°	95.5°	107.4°
Interincisal angle	131° ± 2°	127°	111.9°
Overbite	2.5mm	1.6mm	1.7mm
Overjet	2.5mm	5mm	2mm

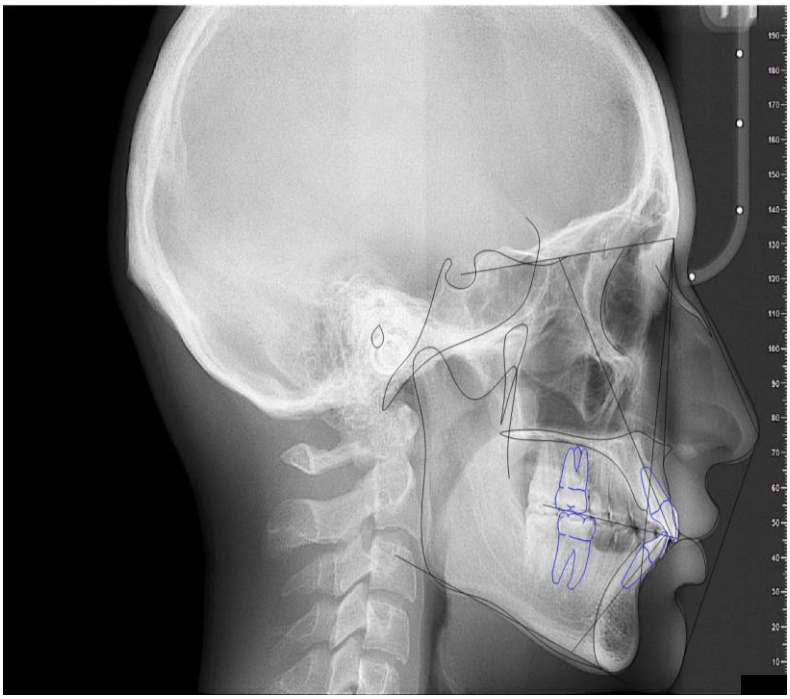

Table 2. Initial and finallateral cephalometric analysis summary.**Figure9.**Final lateralcephalometric.

IV. Discussion

The correction of the class II malocclusion could be done with the Wilson bimetric maxillary distalazing arch, this device can be bought prefabricated (Rocky Mountain Orthodontics, Denver, CO) or can be also manufacture at the dental clinic or dental laboratory if it is necessary, as we did with this case report with good results.[6, 9]

Antonarakis and Kiliaridis (2008)mentioned on their systematic review the importance of the eruption of the second maxillary molars and the presence of the third maxillary molar germs, as well as Karlsson and Bondemark (2006) concludes that if the second maxillary molars are not erupted when you move distally the maxillary first molars the results are going to be better and more efficient, as in the case of our patient where the second molars had not yet erupted and the distalization was a success.[11, 12]

The patient selection was accurate in this clinical case as Rana and Becher (2000) done on his retrospective study since our patient also had a skeletal class II relationship, a neutral growth pattern, a bilateral molar class II relationship, overjet increased and retroclined upper incisors. [6]

The patient in this case report were instructed to wear intermaxillary 5/16" diameter Class II elastics with 3.5 oz. 24 hours per day until obtain the objective, then this protocol does not match with the proposed by Wilson´s with load reduction from 6 oz. to 4 oz. and then to 2 oz. every 7 days, neither with the used by Rana and Becher (2000) because on their study was incorporated nickel titanium open coil and in this case we used stainless-steel open coil spring.[6]

V. Conclusion

The orthodontic therapy with a Wilson bimetric maxillary distalazing arch performed in this case proved to be an efficient way to produce molar distalization and correct dental class II malocclusion in patients with nonextraction therapy. It is a low-cost device that requires the cooperation of the patient who wears the class II elastics to achieve the objectives of the treatment plan and a greater stability of the results. It is important to know that in this case the appliance did not correct the skeletal discrepancies between the jaws.

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