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Correction of Class II Malocclusion with Carrière Distalizer Appliance: (A case report)

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Abstract

This article described the use of Carrière Distalizer Appliance as a method for Class II correction. A 23 year old female patient had a convex profile, a Class II malocclusion due to retrusive mandible, increased 6 mm overjet, and 3 mm overbite, normal growth pattern, normal mandibular plane, permanent dentition, moderate crowding in upper and lower dental arches and Class II molar and canine relationship bilaterally.

Treatment was started with the extraction of upper wisdoms. Bonding of Carrière Distalizer Appliance for distalization of the upper molars, lower molar bands were cemented on lower first band for attachment of class II elastics and lower Essix appliance for mandibular anchorage. The cephalometric superimposition of pre- and post-distalization used to evaluate the treatment effects of Carrière Distalizer Appliance.

This report demonstrated that the Carrière Distalizer Appliance was effective in treatment of Class II adult patient and within 9 months Class I molar and canine relationship was achieved.

Keywords: Class II malocclusion, Carrière Distalizer Appliance, Distalization

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Introduction

Class II malocclusions is one of the most common deformities, represented 37% of school children in Europe and 33% of all orthodontic patients in the USA. Moreover, Class II division 1 is more common than division 2.¹ Class II malocclusion had revealed to be caused by maxillary excess or mandibular deficiency or combination of both. However, mandibular retrognathism was considered a dominant one.²

The treatment of Class II malocclusion in growing patients included growth modification appliances to correct the underlying skeletal disharmony. Otherwise, the treatment modalities in adults with no growth potential is varying between orthodontic camouflage and surgical correction in more severe skeletal cases. Orthodontic camouflage could be achieved by either extraction or non-extraction protocol. Careful diagnosis for each individual case was mandatory and several variables should be considered during treatment planning such as soft tissue profile, the severity of the tooth size-arch length discrepancy. Molar distalization have been valuable tool in the management of Class II adult cases. Numerous designs of non-compliance intraoral appliances have been introduced and employed for class II correction.³ Carrière® Distalizer™ Appliance⁴ was introduced by Luis Carrière as an intermaxillary corrector with simple, non-invasive and esthetic design allowed its early use in the treatment before bonding the brackets especially in esthetic-conscious patient.

Diagnosis and etiology:

A 23-year-old female patient had Class II malocclusion, and increased overjet. She had good general health and had no history of major systemic disease or history of a bad habit. Her chief complaint was increased overjet and crowded teeth.

Pretreatment routine orthodontic records were taken. Extra-oral photographs showed that the patient had a convex soft tissue profile with a normal nasolabial angle. From the frontal view, the face was symmetric, and the lips were incompetent. smile lip line showed 100% of upper central incisors with excessive gingival display; upper dental midline was coincident with the facial midline. The smile appeared asymmetric, non-consonant, and with narrow buccal corridors.

Intraoral photographs and dental cast examinations demonstrated a Class II molar and canine relationship bilaterally. (Fig. 1) A 6-mm overjet and 3-mm overbite were observed. Upper & lower dental midlines were coincident; 3.5 mm of anterior crowding in the maxillary arch and 4.0 mm of anterior crowding in the mandibular arch were observed. A 2-mm discrepancy in the Bolton tooth-size ratio due to mandibular anterior tooth excess was measured.

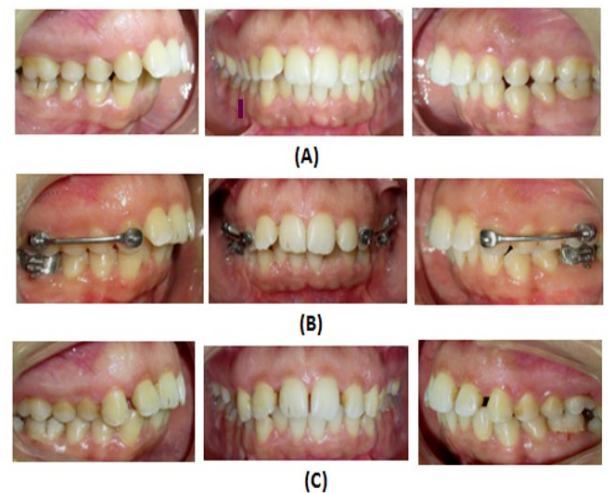


Figure (1): intraoral photographs; (A) pre-distalization, (B) four months of distalization, (C) post-distalization.

Functional examination revealed normal temporomandibular joint with no clicking noises during opening or closing of her jaws and no shift on closure.

Pre-treatment panoramic and lateral cephalometric radiographs were taken. The

panoramic radiograph showed no caries, and all third molars were erupted.

The cephalometric analysis (Table 1) demonstrated a Class II skeletal relationship (ANB, 5°.6) with normal position of the maxilla and retrusive position of the mandible in relation to the anterior cranial base. The patient had a normal growth pattern (Frankfort horizontal plane to mandibular plane, 28.2°). The angle between the maxillary incisors and the palatal plane was 116.2° and the angle between the maxillary incisors and the Nasion-A point was 27.7°, while their position related to Nasion-A point was 8-mm. The mandibular incisor to mandibular plane angle was 101° and the angle between the lower incisors and the Nasion-B point was 35.2°, while their position related to Nasion-B point was 7.5-mm. Upper lip was -0.9 mm to Esthetic line and lower lip was 1.1 mm to Esthetic line.

Based on the findings, the patient was diagnosed as skeletal Class II with retrusive mandible, normal growth pattern, proclined and protruded upper and lower incisors. Upper lip and lower lips were protruded.

Treatment Progress

Patient was referred to extract both upper third molars prior to distalization in order to avoid tipping of first and second molars during distalization.

Following extraction of third molars, the length of the appliance was measured from midpoint of the labial surface of canine to buccal groove of first molar on the working cast of the patient using a disposable dentometer provided with the appliance.

A 25 mm Carrière Distalizer was bonded in the maxilla from the canine to the first molar bilaterally. In the mandible; first molar was banded for the attachment of Class II elastics. An Essix appliance made of 1-mm thickness was used as anchorage on the mandibular dentition. The Essix retainer was modified posteriorly with small cut for the hook of the molar band. Bilateral Class II elastics were prescribed

for full-time wear, except while eating. Elastic wear protocol was according to the manufacture's: heavy 1/4-inch with force of 6 oz elastics used during the first month followed by heavy 3/16-inch with force of 6.5 oz elastics from the second month until Class II molar and canine relationships was corrected. Usually the appearance of interincisal diastema between the upper incisors was a sign for the progress of distalization. (Fig. 1)

Table (1): Cephalometric Measurements

Measurement	Pre-distalization	Post-distalization
SNA (°)	82.1	82
SNB (°)	76.5	76.2
ANB (°)	5.6	5.8
A-Na perp (mm)	1.1	0.7
Pog-Na perp (mm)	-7.1	-8.7
Wits appraisal (mm)	4.5	3
SN/MP (°)	37	38.2
FH/MP (°)	28.2	29.3
PP/SN (°)	4.5	4.6
PP/MP (°)	32.5	33.7
OP/SN (°)	13.9	15.7
PFH/AFH ratio (%)	61.5	60.3
LAFH/AFH ratio (%)	59.5	59.4
UI/PP (°)	116.3	113.6
UI/NA (°)	27.7	26.9
UI/NA (mm)	8.8	6.6
LI/MP (°)	101	104.2
LI/NB(°)	35.2	39.1
LI/NB (mm)	8.1	9.8
Nasolabial angle	119	120.2
Ls- E line	-0.9	-1.2
Li- E line	+1.1	+2.3

ANB, A point, Nasion, B point; FH, Frankfort horizontal; LI, lower central incisor; OP, occlusal plane; SN, sella nasion plane; MP, mandibular plane; PP, palatal plane; SNA, sella nasion point A; SNB, sella nasion point B; UI, upper central incisor; A-Na perp, Linear distance from point A to Nasion perpendicular plane; Pg-Na perp, Linear distance from Pogonion to Nasion perpendicular plane; LAFH, lower anterior facial height; PFH, posterior facial height; AFH, total anterior facial height; Li, labrale inferius; Ls, labrale superius; E line, line from pronasal (Pn) to soft tissue pogonion point (Pog").

Treatment Results

After nine months of Carrière Appliance treatment, the post-distalization photographs were taken and dental cast examinations demonstrated a bilateral Class I molar and canine occlusion was achieved and the distalizer was removed. The patient was ready for Phase II with fixed appliance. The panoramic x-rays demonstrated the axial inclination of the maxillary canines, premolars, and first molars after their distal displacement. (Fig. 1)

Before (T1) and after treatment (T2) digital lateral cephalograms were digitally traced, analyzed and superimposed using Dolphin Imaging software Ver. 11.5 [Patterson Dental Supply, Inc., Chatsworth, CA]. The post-distalization cephalometric evaluation (Table 1) and regional cephalometric superimposition (Fig. 2) showed that the mandibular plane angle increased about (1°). The maxillary incisors showed slight retraction and retrusion. However, lower incisors showed more proclination and protrusion. Soft tissue measurements revealed slight increase of nasolabial angle associated with slight upper lip retraction while lower lip was protruded.

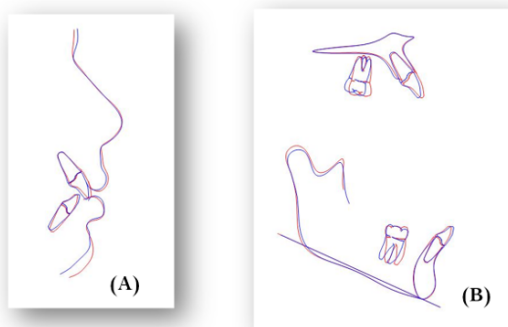


Figure (2): Cephalometric superimposition at pretreatment (red) and posttreatment (blue). (A) Profile superimposition. (B) Maxillary regional superimposition and Mandibular regional superimposition.

Discussion

One of the advantages of treating a Class II malocclusion in two phases was the ability to divide the treatment objectives. Sagittal correction could complete in Phase I, thus facilitated the correction of dental

discrepancies with fixed appliances during Phase II, thus reducing the total treatment time.

Since the patient in this report was adult in postpeak growth stage, there was no skeletal sagittal correction and the slight changes in SNA, SNB, ANB or A- NP were related to the incisors movements. This results were contradictory to other authors ^{5,6,7}. However, part of the difference between current study and other studies might be related to the age factor. The chin point (Pog- NP) showed backward movement related to the clockwise rotation of mandible which led to backward bony-chin repositioning. There was decrease in WITS which indicated good management of class II toward class I which related to the increased occlusal plane inclination (OP/SN). These findings were in consistent with previous studies. ^{5,6,7}

Vertically, the mandible showed downward, backward rotation. The mandibular plane angle (SN/MP) and (FH/MP) increased. This result was in line with other investigators. ^{5,6,7,8} The dentoalveolar changes showed that upper incisors retroclined and moved slightly backward by the effect of all posterior teeth distalization and driftodontics. Contradictory results were described in previous studies. ^{5,6,7,8}

Proclination of lower incisors was a well-known side effect of Class II elastic use ⁹ and functional therapy. ^{10,11} The lower incisors proclination and forward movement was evident in this case even with the use of the Essix appliance as anchorage device. This findings was again in agreement with literature ^{5,6,7,8}

However, when comparing Essix appliance with other anchorage methods that used with Carrière Motion appliance, it was found that Essix appliance was better than a lower lingual arch but worse than fixed appliance.

Regarding soft tissue measurements, the nasolabial angle was increased as a result of retrusion of upper lip and retroclination of upper anterior teeth. While the lower lip showed forward movement as a result of proclination and forward movement of lower incisors. These results was in accordance with previous study.¹³ Meanwhile, it was previously mentioned in the literature that changes in the positions of the incisors might have a direct impact on the supporting soft tissues.¹⁴

In this report class I canine and molar relationship was achieved within 9 months, which was in line with previous study reported that the treatment duration with Class II elastics was 8.5 months.⁹ However, this finding was contradictory to Carrière¹⁵ who proposed (4 - 6) months for Class II correction.

Although, Class II elastic usage was one of the most common methods of correcting Class II malocclusion, the major drawback with elastics was the intense need for patient compliance which was true in this case. This feature was reflected as a longer treatment duration when compared to treatment using other non-compliance distalizers that required less patient cooperation. Additionally, the number of debanding of the molar bands and missed follow-up appointments was another factors that prolonged the treatment time

Conclusion

This report demonstrated that Carrière Distalizer Appliance was effective in correction of dental Class II malocclusion in adult patients and patient compliance should be considered as an important factor influence the treatment duration.

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