

Angle Class II, Division 2, malocclusion with deep overbite

Paulo Renato Carvalho Ribeiro*

Abstract

This case report describes the orthodontic treatment of an adult patient, who presented a Angle Class II, Division 2, malocclusion, with overbite, severe curve of Spee, right maxillary lateral incisor proclined and gingival recessions. The patient was treated with extraction of the first premolars and maximum anchorage control. This case was presented to the Brazilian Board of Orthodontics and Dentofacial Orthopedics (BBO) representing the category 6, deep overbite malocclusion, as part of the requirements for obtaining the title of Diplomate by BBO.

Keywords: Angle Class II malocclusion. Corrective Orthodontics. Deep overbite.

HISTORY AND ETIOLOGY

The patient presented for initial examination at the age of 24 years and 7 months in good general health and no history of serious illness or injury. Her main complaint was related to the fact that the incisors were malpositioned with significantly altered axial inclination. The patient reported having undergone endodontic treatment in the upper left central incisor and had extensive resin restorations in the anterior teeth. No orthodontic treatment had hitherto been performed.

DIAGNOSIS

The patient presented with an Angle Class II, Division 2 malocclusion, a 100% overbite, sharp retroclination of teeth 11, 21 and 22, and labioversion of tooth 12. The upper dental arch contained extensive restorations in the central incisors, some recession, especially in the first molars,

and crowding. The lower arch exhibited adequate alignment, but with a pronounced Curve of Spee (Figs 1 and 2).

An analysis of the periapical radiographs disclosed an endodontic treatment in tooth 21 and reassured the author that the patient did not present with any condition that might compromise the orthodontic treatment (Fig 3). The side profile X-ray and cephalometric tracing showed: Incisor uprighting ($I-NA = 0^\circ$); Class II skeletal pattern, ANB angle = 5° , ($SNA = 80^\circ$ and $SNB = 75^\circ$) and normal mandibular growth in the vertical orientation ($SN-GoGn = 32^\circ$, $FMA = 23^\circ$ and $Y-axis = 60^\circ$). This information can be viewed in Figure 4 and Table 1.

A facial evaluation showed a straight side profile ($UL = 1\text{ mm}$ and $LL = 0\text{ mm}$), with passive lip seal, absence of significant asymmetries and proportional facial thirds.

* Specialist in Orthodontics and Facial Orthopedics, Rio de Janeiro State University (UERJ). Professor at the Course of Specialization in Orthodontics and Facial Orthopedics, Brazilian Dental Association (ABO) Juiz de Fora (MG). Graduate from the Brazilian Board of Orthodontics and Facial Orthopedics.



FIGURE 1 - Initial facial and intraoral photographs.

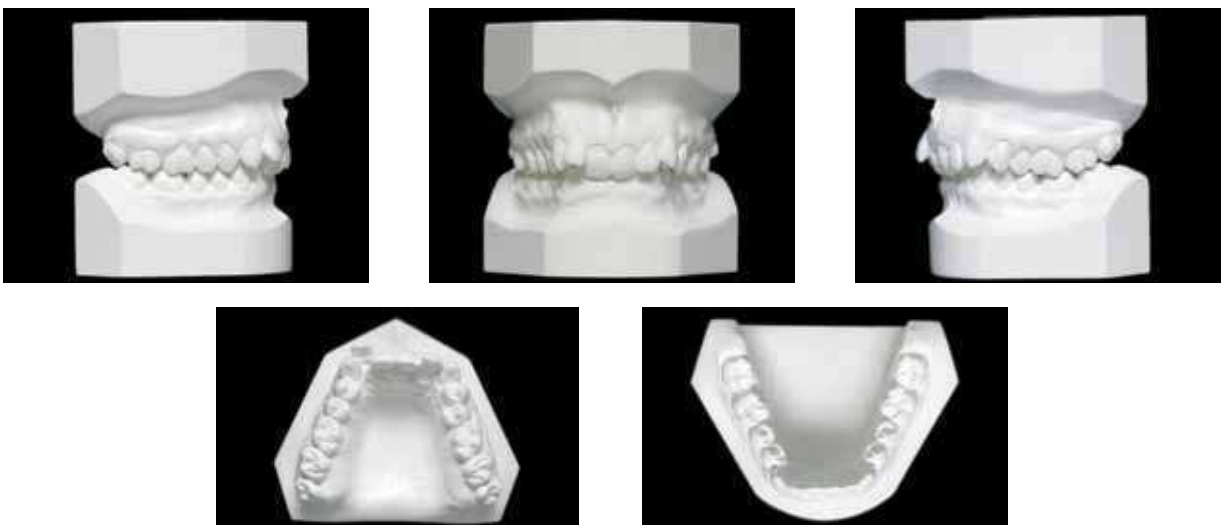


FIGURE 2 - Initial casts.

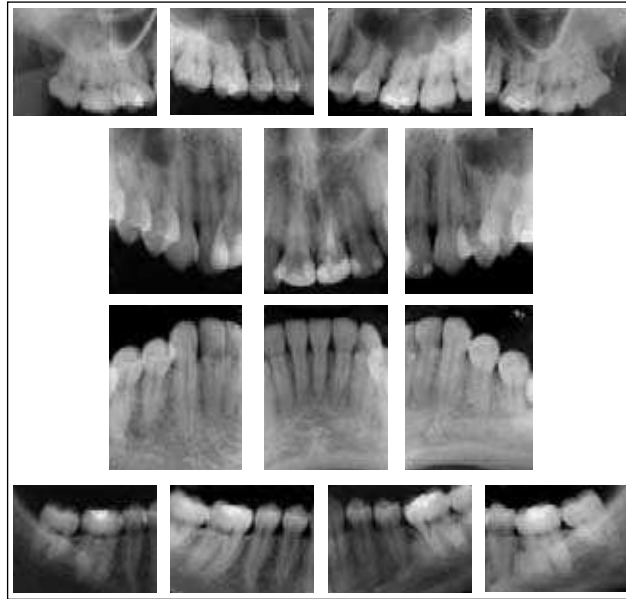


FIGURE 3 - Initial periapical radiographs.

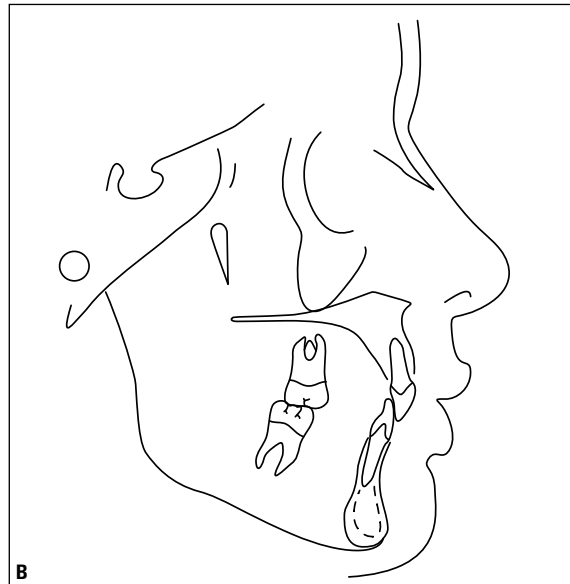


FIGURE 4 - Initial cephalometric radiograph of side profile (A) and cephalometric tracing (B).

TREATMENT GOALS

Considering that this is an adult patient with a harmonious facial profile, the author attempted to maintain the vertical, transverse and antero-posterior position of the bone bases. As regards

maxillary dentition the intent was to maintain the Class II molar relation with total control over anchorage, overbite correction and upper incisor inclination.^{4,5,6} The specific goal for the mandibular dentition was to level the Curve of Spee

while maintaining the intercanine and intermolar widths. Thus, it was anticipated that upon treatment completion correct guides would be achieved for the canines with adequate overbite and overjet, promoting a significant improvement in smile esthetics.

TREATMENT PLAN

To achieve the proposed goals the patient was informed that the treatment plan involved the extraction of the first upper premolars. In the following step, an orthodontic appliance was fixed to the upper arch teeth (Standard Edgewise system, slot 0.022 x 0.028-in), a headgear and transpalatal arch were fitted and round stainless steel 0.014 to 0.020-in arch wires were used for alignment and leveling of the posterior segments. To enable the alignment of the upper anterior teeth, the canines were moved slightly distally using sectional arch wires (T loops). At the same time a Ricketts^{5,6} utility arch wire was made from round stainless steel and used to correct the overbite and projection of the upper incisors. Whenever possible, based on this projection of the upper incisors, the orthodontic appliance was bonded to the lower arch and a series of 0.014 to 0.020-in straight arch wires installed for leveling. For anchorage control the use of Class II mechanics was also planned, in case it proved necessary. After moving the upper canines distally the incisors were retracted using rectangular 0.019 x 0.025-in stainless steel arch wires, with vertical loops between the lateral incisors and canines. The cases were finished using upper and lower 0.019 x 0.025-in arch wires with individual bends, as needed. Upon completion of the active treatment, the author used, as planned, an upper removable wraparound retainer made of 0.036-in stainless steel wire, and on the lower arch, an intercanine retainer using 0.032-in wire. The patient was duly instructed, verbally and in writing, about the necessary cares in handling the retention appliances, as well as their oral hygiene.

TREATMENT PROGRESS

Attachments were welded to orthodontic bands, which were fitted to the first and second molars and a transpalatal arch was installed on teeth 16 and 26. Subsequently, the patient was instructed to have teeth 14 and 24 extracted, and finally Standard Edgewise metal brackets (slot 0.022 x 0.028-in)—with no built-in angulation or torque—were bonded. Then a Klohen type traction device was provided for the patient to wear during night time. Sectional arches were used to start the alignment and leveling on the right and left hand sides from second molar to canine with 0.015-in coaxial stainless steel wire and straight 0.014 to 0.018-in round arch wires. To promote incisor alignment canines were moved slightly distally. Simultaneously, a Ricketts utility arch was fashioned using round stainless steel 0.014-in arch wire initially applied only to achieve central incisor projection. As soon as possible the lateral incisors were included and alignment and leveling proceeded up to a 0.018-in arch wire. The canines continued to be retracted with a stainless steel 0.017 x 0.025-in sectional arch. However, anchorage control was compromised due to inadequate patient compliance in using the traction device, which required a change in mechanics. To intrude the anterior teeth 0.018-in stainless steel wire was used as a stabilizing arch, including all upper teeth except the canines—which were bypassed—, and Burstone T-loops made with 0.017 x 0.025-in TMA wire were used for canine retraction. Thanks to this change, anchorage control was achieved. On the lower arch, the same type of brackets bonded to the upper arch were utilized. Alignment and leveling were performed using 0.014 to 0.020-in stainless steel arch wires. For upper incisor retraction 0.018 x 0.025-in stainless steel arch wires were used, with loops. On the lower arch, an arch wire of the same thickness was formed, with well adjusted omegas loops, and the use of Class II intermaxillary elastics was prescribed to improve anchorage. Upon

completion of space closure, the upper arch was re-bonded for re-leveling with 0.014 to 0.020-in stainless steel wire. The treatment was completed using ideal stainless steel 0.019 x 0.025-in arch wire on the upper and lower arches and the use of Class II elastics. Third molar extraction was prescribed. After ensuring that all the intended goals had been achieved the orthodontic appliance was removed and the retention phase began. To this end, we used a removable upper wraparound retainer, made with stainless steel wire 0.036-in and a lower retainer with round wire 0.032-in bonded

to teeth 33 and 43. The patient was recommended to wear the upper retainer 24/7 for the first year and after that period, twelve hours a day for six months, and finally, just nights for another six months. The lower intercanine retainer was prescribed indefinitely.

TREATMENT RESULTS

In reviewing the patient's final records (Figs 5 to 9), it becomes clear that the goals were attained.^{1,7} In the maxilla, the bone base was kept at a vertical and transverse position, with a small



FIGURE 5 - Final facial and intraoral photographs.

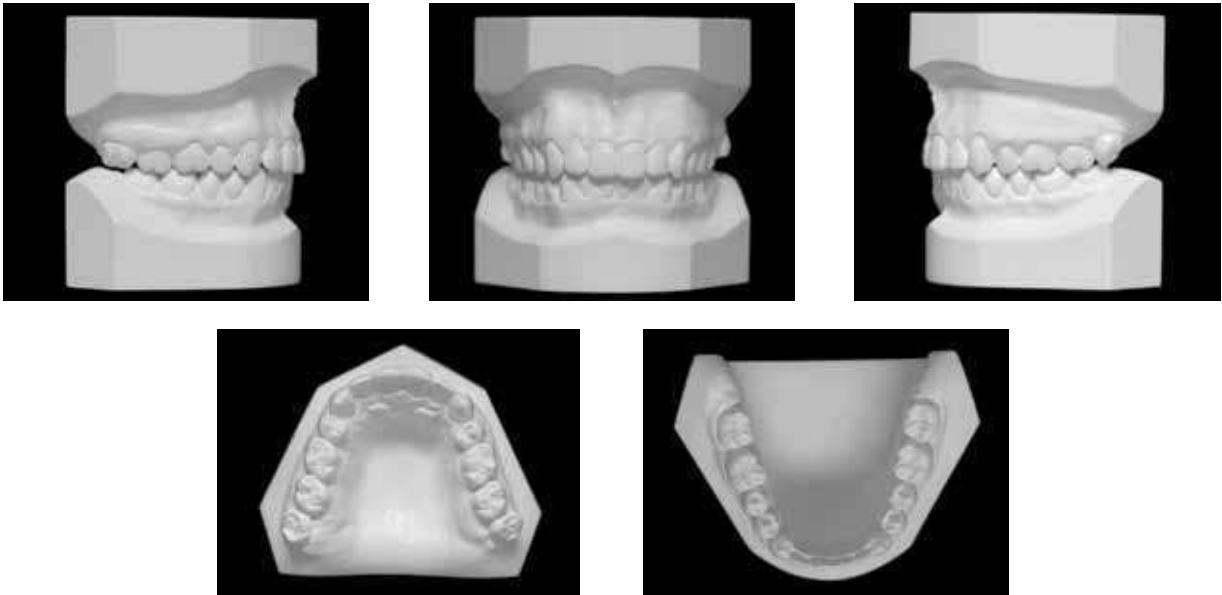


FIGURE 6 - Final casts.



FIGURE 7 - Final panoramic radiograph.

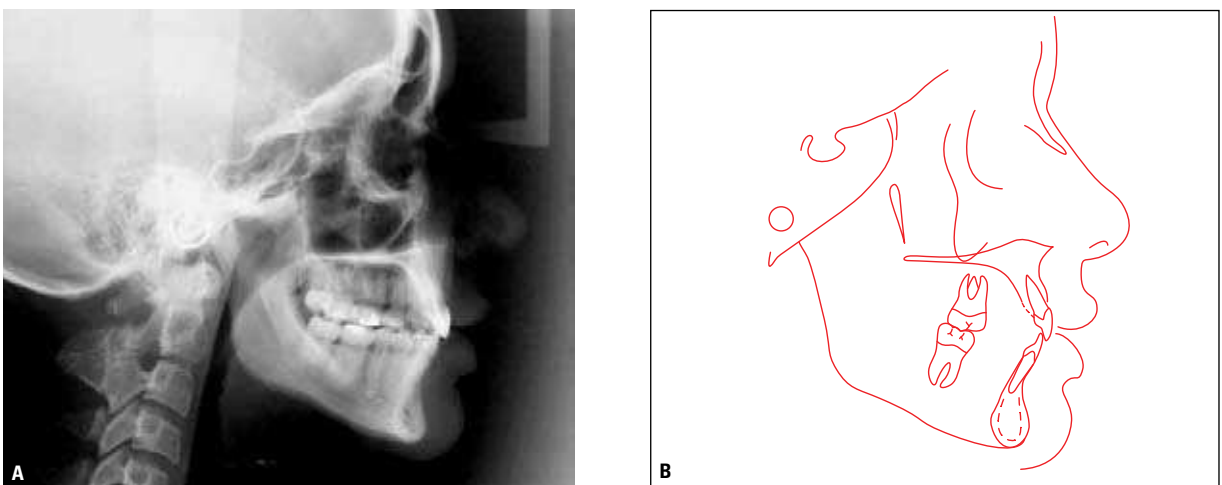


FIGURE 8 - Final cephalometric radiograph of side profile (A) and cephalometric tracing (B).

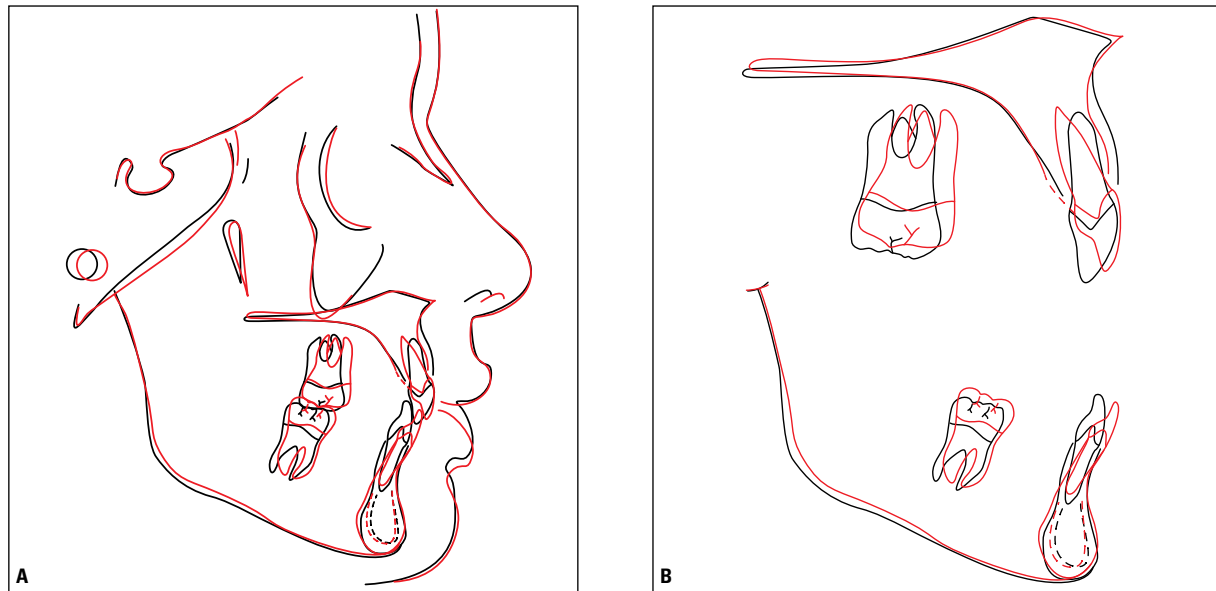


FIGURE 9 - Total (A) and partial (B) superimposition of initial (black) and final (red) cephalometric tracings.

anteroposterior change reflected in the slight movement of point A, due to the correction of incisor inclination. This resulted in a Class I skeletal pattern with the ANB angle changing from 5° to 4° . As can be seen in Table 1, the 1-NA angle underwent a major change from 0° to 16° and the linear positioning of the incisors (1-NA, mm) increased by 2 mm, increasing from 2 mm to 4 mm. This change was made to allow overbite correction, considering that the initial retroclination precluded intrusion owing to the proximity of the incisors' root apex to the cortical bone of the maxilla. The intercanine and intermolar widths were maintained (Table 2).

In the mandible, there was no change in the position of the bone base. There was an increase in incisor inclination, as can be seen in Table 1, reflected in alterations in the 1-NB measurements (from 14° to 26°) and the IMPA angle (from 87° to 98°). Thus, the interincisal angle underwent a significant change from 161° to 135° . Similarly to the maxilla, the intercanine and intermolar

widths remained unchanged (Table 2).

An analysis of the panoramic radiograph (Fig 7) revealed adequate root parallelism, except in the region between the upper lateral incisor and canine on the right hand side and between the lower canine and first premolar on the same side. There was also a slight apical blunting of the upper incisors, compatible with the significant movement performed in these teeth.

The dental occlusion showed an improved posterior intercuspation on both sides and the treatment was finished with a Class II relation on the molars, occlusion key on the canines, as well as adequate overbite and overjet. The gingival recessions, which had been noted initially, remained unchanged. The patient was requested to undergo an aesthetic rehabilitation treatment in the anterior region as well as to have her third molars extracted. Facial aesthetics did not change significantly while the facial profile was maintained. The smile, however, improved significantly due to the proper alignment and leveling of the anterior teeth.



FIGURE 10 - Facial and intraoral control photographs taken three years and four months after treatment completion.

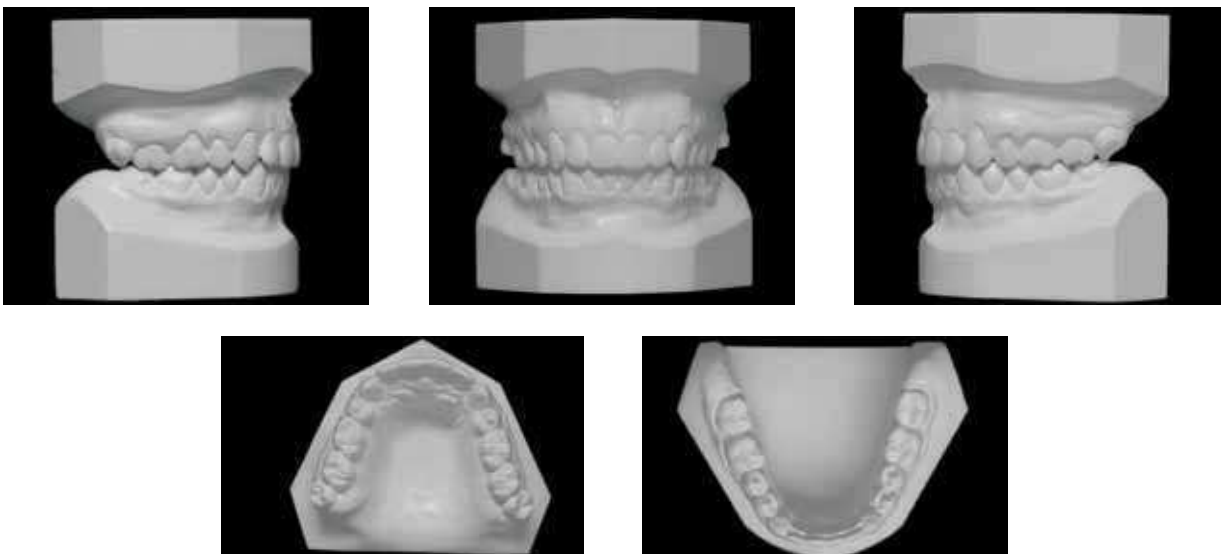


FIGURE 11 - Control casts - three years and four months after treatment completion.



FIGURE 12 - Panoramic (A) and periapical (B) control radiographs of incisors acquired three years and four months after treatment completion.

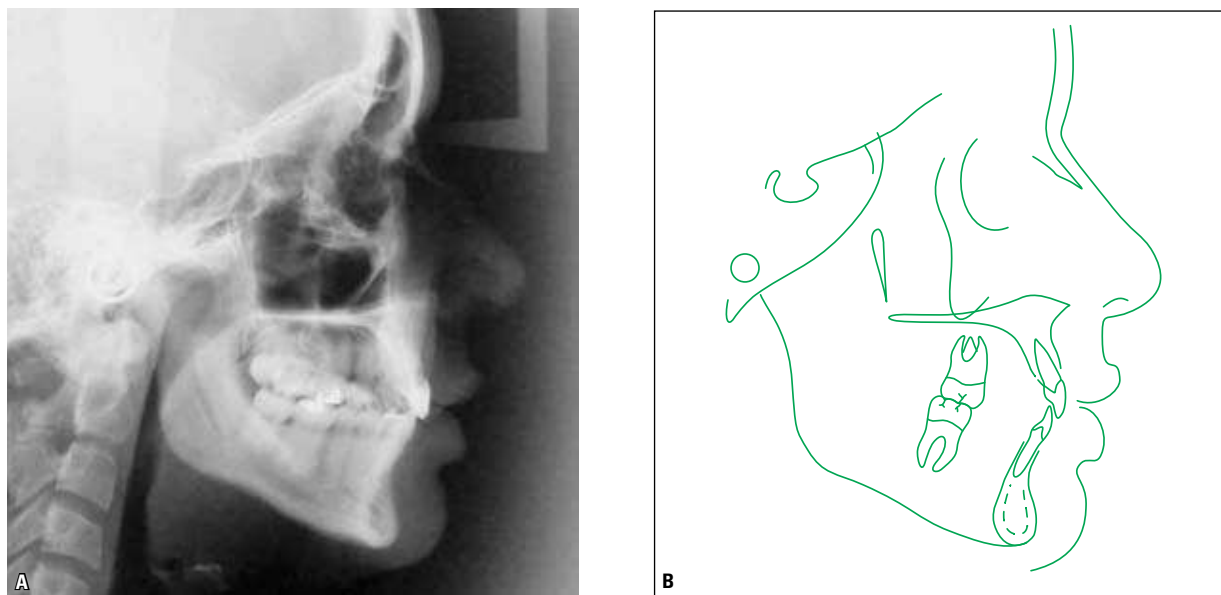


FIGURE 13 - Control cephalometric radiograph (A) and cephalometric tracing (B) - three years and four months after treatment completion.

Tests obtained three years and four months after the end of the corrective orthodontic treatment period (Figs 10 to 14) demonstrated that such positions remained stable. Upon treatment completion, the aesthetic rehabilitation had not

yet been fully performed and the third molar extractions had not been implemented. The cephalometric values had minor variations and the intercanine and intermolar widths were stable, as shown in Tables 1 and 2.

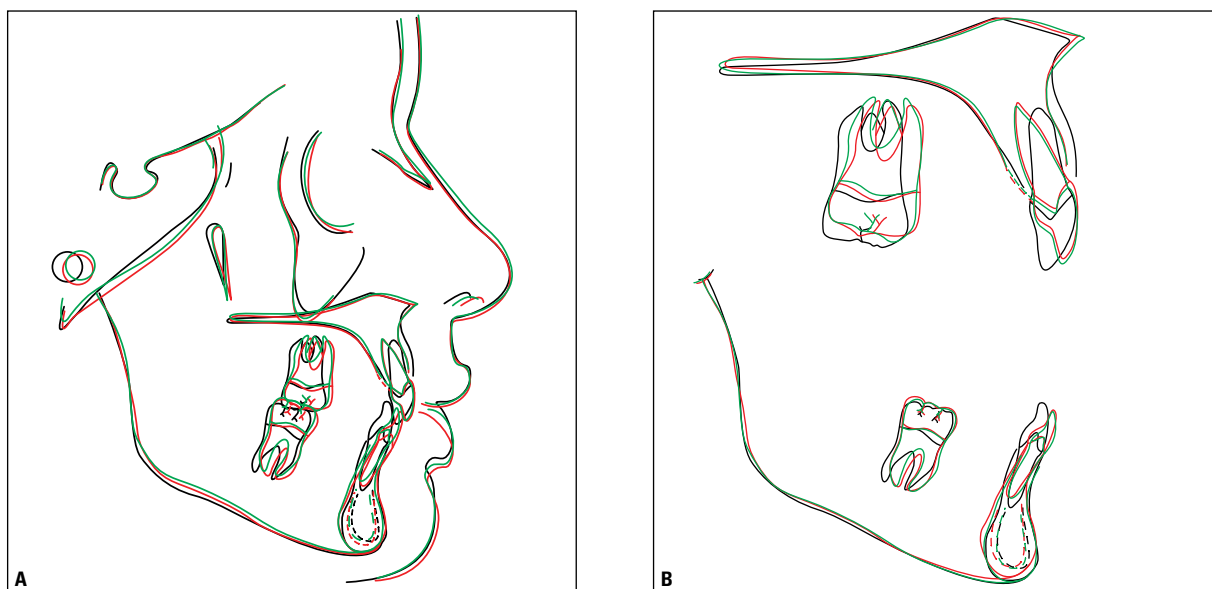


FIGURE 14 - Total (A) and partial (B) superimposition of initial (black), final (red) and control (green) cephalometric tracings - three years and four months after treatment completion.

TABLE 1 - Summary of cephalometric measurements.

	MEASUREMENTS	NORMAL	A	B	A-B DIFFERENCE	C
SKELETAL PATTERN	SNA (Steiner)	82°	80°	79°	1	79°
	SNB (Steiner)	80°	75°	75°	0	75°
	ANB (Steiner)	2°	5°	4°	1	4°
	Convexity Angle (Downs)	0°	7°	4°	3	6°
	Y-axis (Downs)	59°	60°	61°	1	61°
	Facial Angle (Downs)	87°	85°	84°	1	83°
	SN – GoGn (Steiner)	32°	32°	32°	0	33°
	FMA (Tweed)	25°	23°	25°	2	26°
	IMPA (Tweed)	90°	87°	98°	11	96°
	DENTAL PATTERN	\perp – NA (degrees) (Steiner)	22°	0°	16°	16
\perp – NA (mm) (Steiner)		4 mm	2 mm	4 mm	2	4 mm
$\bar{\perp}$ – NB (degrees) (Steiner)		25°	14°	26°	12	24°
$\bar{\perp}$ – NB (mm) (Steiner)		4 mm	3 mm	6 mm	3	6 mm
$\frac{1}{1}$ – interincisal angle (Downs)		130°	161°	135°	26	136°
PROFILE	$\bar{\perp}$ – APo (mm) (Ricketts)	1 mm	0 mm	3 mm	3	2 mm
	Upper Lip - S Line (Steiner)	0 mm	1 mm	0 mm	1	0 mm
	Lower Lip – S Line (Steiner)	0 mm	0 mm	0 mm	0	0 mm

TABLE 2 - Measurements of transverse distances on the dental arches (mm).

MEASUREMENTS		A	B	A - B Difference	C
Intercanine width	Upper	34.5 mm	34.5 mm	0	34.5 mm
	Lower	26 mm	26 mm	0	26 mm
Intermolar width	Upper	47 mm	47 mm	0	47 mm
	Lower	43 mm	43 mm	0	43 mm

FINAL CONSIDERATIONS

Angle Class II, Division 2 malocclusion is characterized by retroclination of central incisors usually associated with a pronounced overbite. To correct this anomaly in adult patients professionals often rely on the extraction of first premolars. This procedure, as in our case, requires adequate anchorage control to ensure an appropriate relation between the canines. The treatment described in this study shows that—even in the face of compliance issues regarding the patient's use of headgear—thanks to ongoing result assessment and a timely change in mechanics (in this case, the author resorted to the Burstone sectional arch mechanics) it is possible to keep anchorage under control by means of specific biomechanical principles²⁻⁷ and thus achieve the goals laid down at the start of treatment. The correction of severe overbite was performed by a set of well-planned tooth movements that initially included the projection of the upper incisors by means of an uncontrolled tipping movement so

as to allow the apex of these teeth to move away from the labial cortex. Only then was intrusion performed, as required, with the aid of a round Ricketts^{5,6} utility arch.

During upper incisor retraction as well as during the finishing phase it became necessary to use Class II⁸ elastic mechanics to facilitate anchorage control in view of some initial difficulties. With the increasing inclination of upper and lower incisors the interincisal angle's final value was very close to the ideal and by superimposing the initial, final and control cephalometric phases (Fig 14), as can also be seen in the occlusal records of the control phase (Figs 10 and 11), the stability of the mechanics used by the author is clearly demonstrated.

Submitted: October 2009
Revised and accepted: December 2009

REFERENCES

1. Andrews LF. The six keys to normal occlusion. Am J Orthod. 1972 Sep;62(3):296-309.
2. Burstone CR. Deep overbite correction by intrusion. Am J Orthod. 1977 Jul;72(1):1-22.
3. Burstone CJ, Koenig HA. Creative wire bending: the force system from step and V bends. Am J Orthod Dentofacial Orthop. 1988 Jan;93(1):59-67.
4. Nanda R. Biomechanics in clinical Orthodontics. 9th ed. Philadelphia: W. B. Saunders;1997.
5. Ricketts RM. Bioprogressive therapy as an answer to orthodontic needs. Part I. Am J Orthod. 1976 Sep;70(3):241-68.
6. Ricketts RM. Bioprogressive therapy as an answer to orthodontic needs. Part II. Am J Orthod. 1976 Oct;70(4):359-97.
7. Strang R. Tratado de Ortodontia. 3^{ra} ed. Buenos Aires: Bibliográfica Argentina;1957.
8. Tweed CH. Clinical Orthodontics. St. Louis: C. V. Mosby; 1966.

Contact address

Paulo Renato Carvalho Ribeiro
Rua Oswaldo Cruz, 75 – Santa Helena
CEP: 36.015-430 – Juiz de Fora / MG
E-mail: paulorenatojf@terra.com.br