



Class III malocclusion with unilateral posterior crossbite and facial asymmetry*

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Abstract

This article reports on the orthodontic treatment performed on a 36-year-old female patient with skeletal and dental Class III pattern, presenting with a left unilateral posterior crossbite and mandibular asymmetry, and a relatively significant difference between maximum intercuspation (MIC) and centric relation (CR). The treatment was performed with maxillary dental expansion, mandibular dental contraction and anterior crossbite correction, eliminating the difference between MIC and CR. Results were based on careful diagnosis and planning of orthodontic compensation without surgical intervention in the maxilla, at the request of the patient. This case was presented to the Brazilian Board of Orthodontics and Facial Orthopedics (BBO) as representative of Category 5, i.e., malocclusion with a transverse problem, presenting with a crossbite in at least one of the quadrants, as part of the requirements for obtaining the BBO Certificate.

Keywords: Angle Class III. Crossbite. Facial asymmetry. Adult patient. Corrective Orthodontics.

HISTORY AND ETIOLOGY

The patient sought orthodontic treatment at 36 years of age, in good general health and without significant medical history. Her chief complaint concerned anterior and posterior crossbites and chronic pain in the left temporomandibular joint. She showed good oral hygiene, overall healthy-looking gingiva and some poorly fitting amalgam restorations.² She had no history of orthodontic intervention. When orthognathic surgery was suggested the patient expressed her unwillingness to undergo surgery to correct the malocclusion.

DIAGNOSIS

As regards dental pattern (Figs 1 and 2), she presented with an Angle Class III, subdivision left malocclusion, no mandibular dentoalveolar discrepancy, 3 mm overbite, 2 mm overjet, crowding in the upper anterior region, U-shaped maxillary arch, contracted on the right side, lower arch slightly expanded on the right side, posterior crossbite on the left⁵, less than 3 mm lower midline shift to the left and inclined lower occlusal plane.

Facial analysis revealed a concave profile with upper lip retrusion and mandibular deviation to the left side (Fig 1).

* Case report, Category 5 - approved by the Brazilian Board of Orthodontics and Facial Orthopedics (BBO).

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FIGURE 1 - Initial facial and intraoral photographs.

Regarding functional occlusion, at MIC she presented with a 5 mm mandibular deviation to the left side (Fig 5) and a 2 mm difference between MIC and CR. At CR, contact existed only between tooth 23 (left upper canine) and tooth 33 (left lower canine) with reduced mandibular deviation.

On clinical examination, bilateral clicks were observed in the TMJ with mandibular deviations on opening and closing movements and no crepitation or mandibular deflection at maximum opening. Palpation examination showed more intense pain in the left than in the right TMJ, regardless

of whether the mouth was open or closed.^{3,6} A maximum opening of 52 mm was recorded.

The analysis of panoramic and periapical radiographs (Fig 3) showed that the patient did not present with any condition that might compromise her orthodontic treatment.

She had a Class III skeletal pattern, ANB equal to -2.5° ($SNA=80^\circ$ and $SNB=82.5^\circ$), -8° convexity angle and retrusion of the maxilla. This information is depicted in Figure 4 and Table 1. Frontal analysis showed mandibular asymmetry and a 5mm deviation to the left (Fig 5).

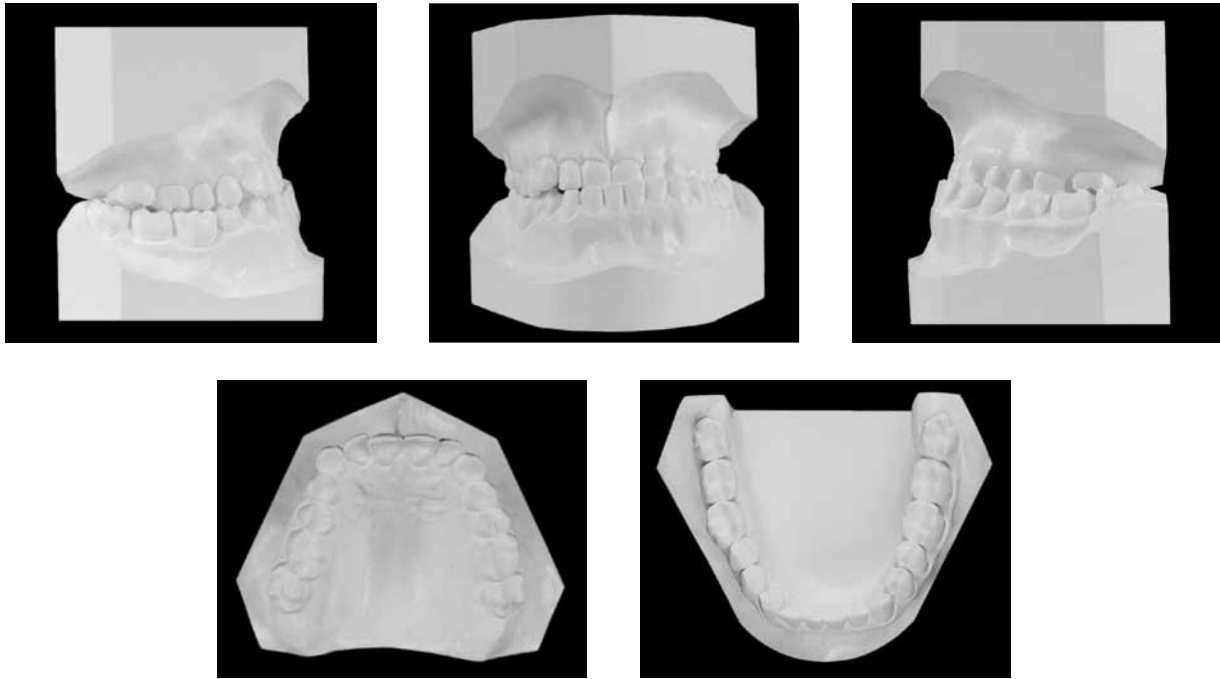


FIGURE 2 - Initial plaster models.

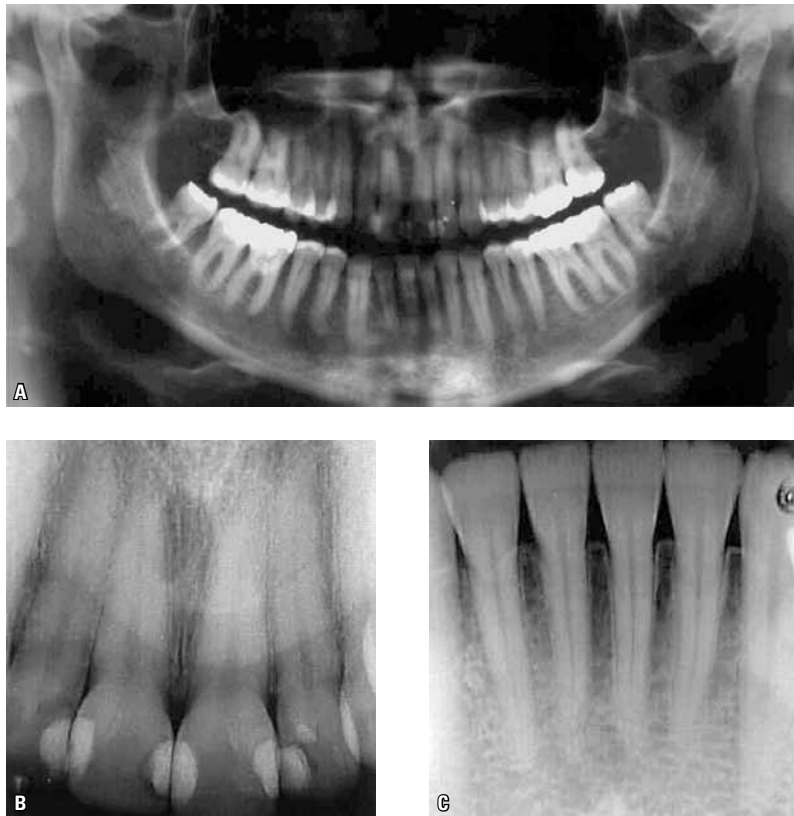


FIGURE 3 - Initial radiographs: **A)** Panoramic and **B, C)** incisor periapical.

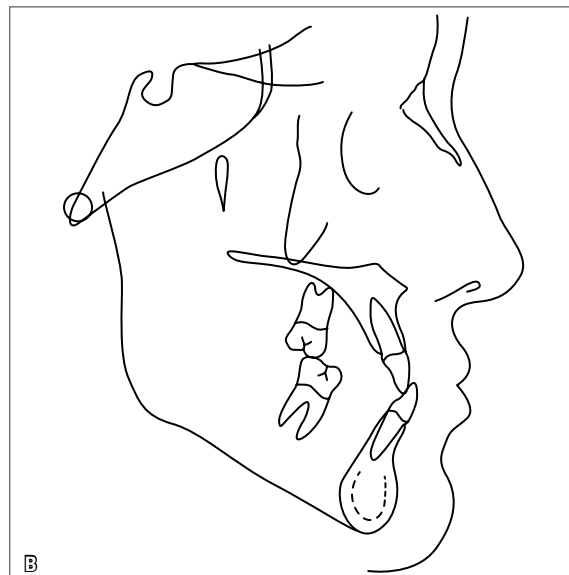


FIGURE 4 - Initial lateral cephalogram (A) and cephalometric tracing (B).

TREATMENT GOALS

The initial goal was to control chronic pain in the left TMJ by referring the patient to a specialist in temporomandibular disorders (TMD).^{2,3,6} After this issue had been successfully addressed, orthodontic treatment was administered with the consent of the specialist. At the patient's request, combined surgical-orthodontic treatment was ruled out.

Thus, to correct the anterior crossbite, the difference between MIC and CR⁶ had to be addressed through axial protrusion of the maxillary incisors and retroclination of the mandibular incisors, thereby achieving normal occlusion and slightly improving the profile.¹

The transverse problem was resolved by correcting the left posterior crossbite, which required expanding the upper dental arch^{4,7} and contracting the lower. Moreover, the purpose of eliminating the difference between MIC and CR was to correct the lower midline and reduce mandibular deviation.

TREATMENT PLAN

The first step would be to refer the patient to a TMD specialist^{2,3,6} and then have her third molars (38 and 48) extracted, since these teeth were extruded (Figs 1 and 3A).

After TMD treatment a Hyrax-type palatal expansion appliance would be installed (for six months) with bands on all maxillary molars and premolars (eight bands) to expand the upper arch and increase intermolar width.^{4,7} After expander removal, a palatal bar fabricated from 0.032-in stainless steel would be inserted, with bands on the first molars and palatal extension as far as the first premolars. In the lower arch, a 0.032-in stainless steel lingual arch would be placed, with bands on the lower first molars.

In the following step, fixed 0.022 X 0.028-in orthodontic appliances would be set up and stainless steel 0.014 X 0.020-in archwires inserted for alignment and leveling. Next, stainless steel 0.019 X 0.025-in archwires would be used to increase upper incisor axial inclination,

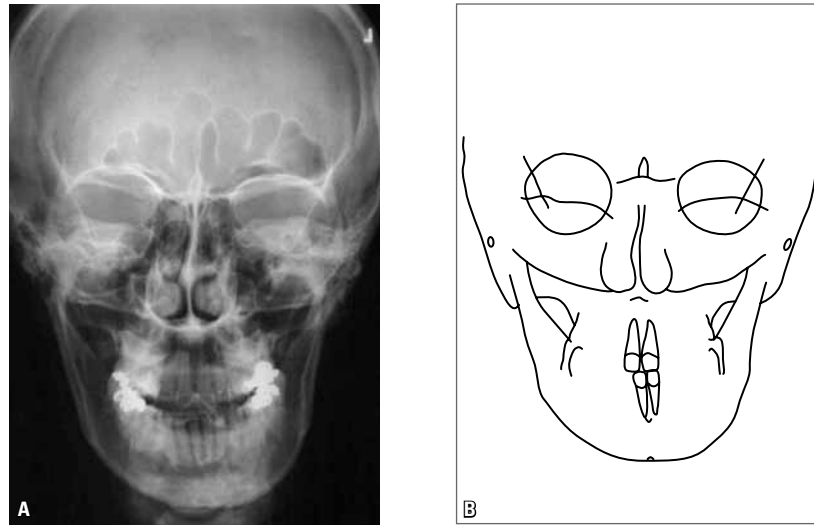


FIGURE 5 - Initial posteroanterior cephalometric radiograph (A) and cephalometric tracing (B).

induce retroclination of lower incisors and finish the case. In the phase of anterior crossbite correction it would be necessary to use Class III intermaxillary elastic mechanics.

During the finishing stage, the patient would be referred to a speech therapist for evaluation of her oral functions.

After the active treatment phase, an upper wraparound-type retention plate would be used, and on the lower arch a stainless steel 0.028-in lingual canine-to-canine arch (retainer).

TREATMENT PROGRESS

Treatment of the chronic pain in the left TMJ lasted four months under the TMD specialist's supervision. In addition, the patient was periodically evaluated throughout the orthodontic treatment. Extraction of the third molars was performed after this period.

For maxillary expansion, a Hyrax-type expander was installed with bands on all molars and premolars, and 1/4 turn activation once a day for 28 days. The patient wore the appliance for six months.

After expander removal, a 0.032-in stainless steel palatal bar was installed, welded to bands

on the first molars and palatal extension as far as the first premolars. The appliance was removed in the early finishing stage and the bands replaced with bonded brackets.

On the lower arch, a 0.032-in stainless steel lingual arch was placed with bands on the lower first molars. The lingual arch was also removed in the early finishing stage and the bands replaced with bonded brackets.

Upper fixed appliance set-up was performed after removal of the palatal expansion appliance at the same time that the palatal bar was installed. The lower fixed appliance was set up three months after lingual arch installation. All second molars were also included in the treatment, with orthodontic bands. Next, a sequence of 0.014-in to 0.020-in diameter stainless steel alignment and leveling archwires was used. Stainless steel 0.019 X 0.025-in archwires were used to increase the axial inclination of upper incisors and retroclination of lower incisors. At this stage, Class III elastic mechanics was introduced. After crossbite correction, occlusal adjustments were performed by compensatory grinding in some consultations until the end of treatment to improve dental intercuspatation quality. Stainless steel 0.019 X 0.025-in

archwires were also used when finishing the case in both the upper and lower dental arches.

After ensuring that all the intended goals had been achieved the fixed orthodontic appliance was removed from both arches and the retention phase begun. In the upper arch a wrap-around-type removable device was installed and worn 24/7 in the first year, and then only at nighttime for at least another year. The patient was monitored through regular consultations. A stainless steel lingual canine-to-canine retainer was placed on the lower arch to be used indefinitely. The patient underwent speech therapy for eight months.

TREATMENT RESULTS

In reviewing the patient's final records, it became clear that the major goals set at the beginning of treatment were attained (Figs 6, 7 and 9). The skeletal Class III (Fig 9 and Table 1) remained unchanged because the patient refused to undergo orthognathic surgery for correction of the maxillomandibular relationship and mandibular deviation (Fig 6).

In the upper arch, proper alignment was achieved as well as some improvement in the shape of the arch, and a deliberate 10° increase in incisor axial inclination (Fig 9 and Table 1), which corrected the anterior crossbite.¹ Expansion



FIGURE 6 - Final facial and intraoral photographs.

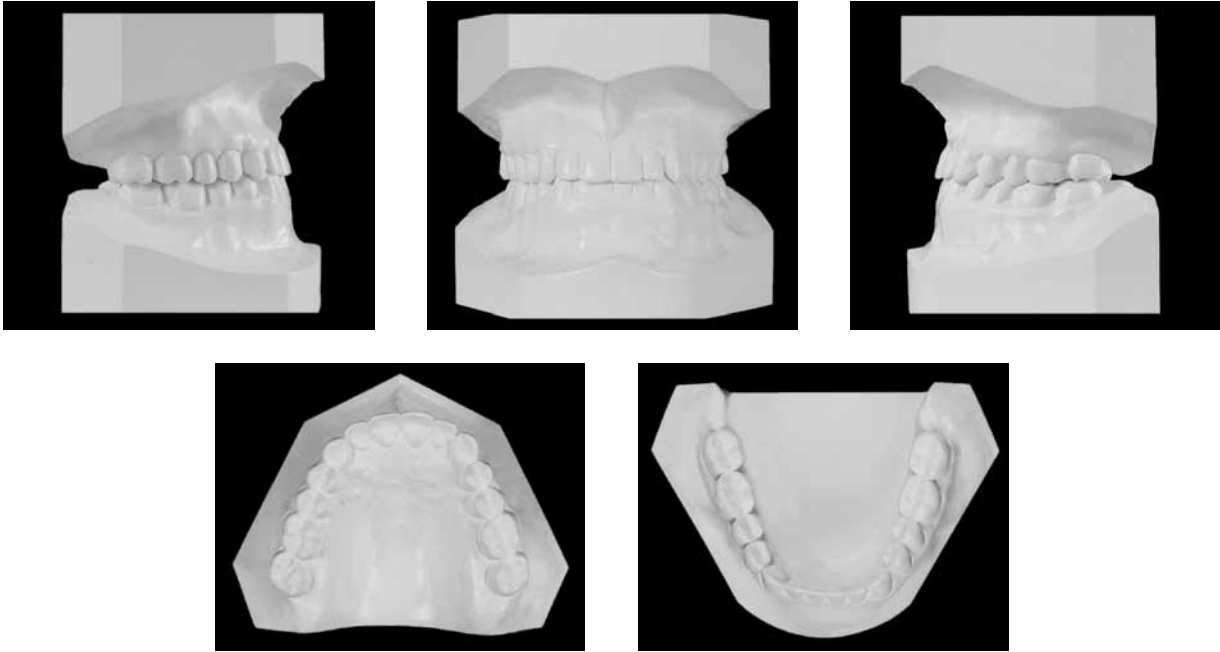


FIGURE 7 - Final plaster models.

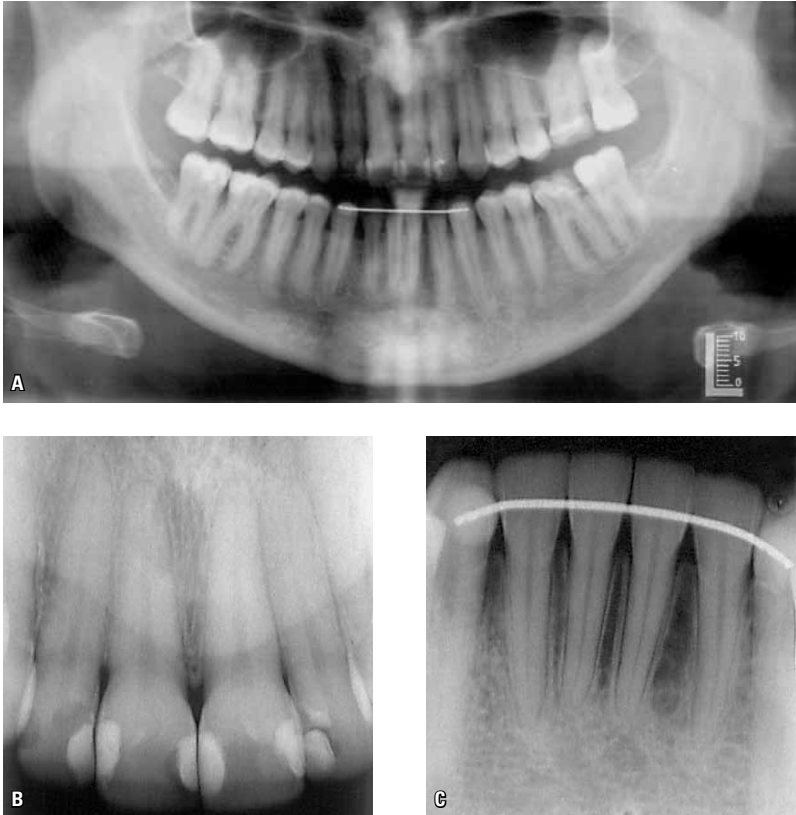


FIGURE 8 - Final radiographs: A) Panoramic and B, C) incisor periapical.

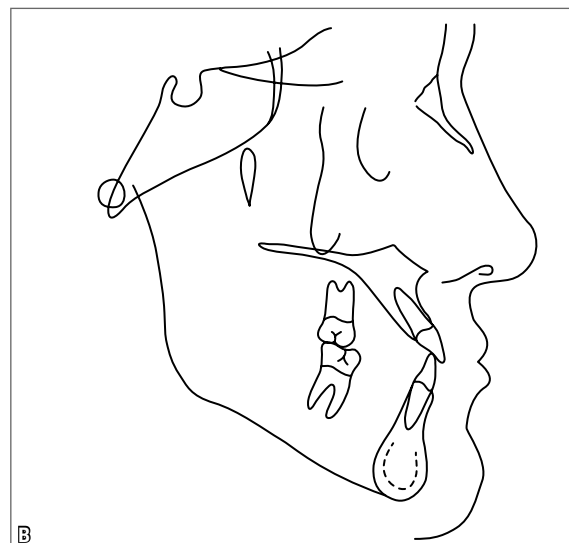


FIGURE 9 - Final lateral cephalogram (A) and cephalometric tracing (B).

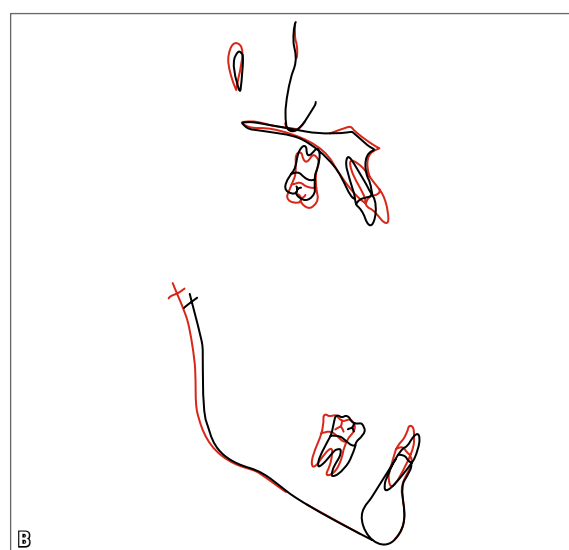
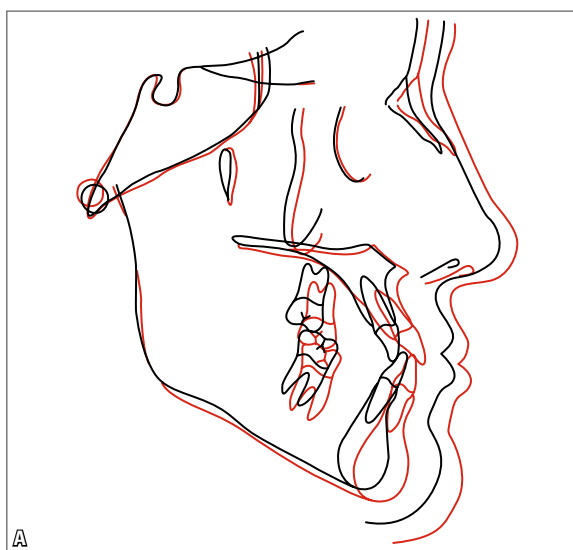


FIGURE 10 - Total and partial superimposition of initial (black) and final (red) cephalometric tracings.

occurred in the premolar and molar regions with a 5 mm increase in intermolar width (Table 2), contributing to posterior crossbite correction while eliminating a functional shift which had been detected and resulted from premature torque in the maxillary left canine^{4,7} (Figs 6 and 7).

In the lower arch, some improvement was achieved in tooth alignment and a 9° decrease,

also deliberate, in incisor axial inclination (Fig 9 and Table 1).¹ In the posterior region, a slight 2 mm contraction was noted at molar level (Table 2), which also contributed to posterior crossbite correction (Figs 6 and 7).

The relationship between the upper and lower arches was quite satisfactory, with normal molar occlusion well established on both sides,

TABLE 1 - Summary of cephalometric measurements.

MEASUREMENTS		Standard values	A	B	Difference A/B
Skeletal Pattern	SNA (Steiner)	82°	80°	81°	1
	SNB (Steiner)	80°	82.5°	84°	1.5
	ANB (Steiner)	2°	- 2.5°	- 3°	0.5
	Convexity Angle (Downs)	0°	- 8°	- 9°	1
	Y-Axis (Downs)	59°	61°	60°	1
	Facial Angle (Downs)	87°	87°	88°	1
	SN – GoGn (Steiner)	32°	29°	29°	0
	FMA (Tweed)	25°	28°	27°	1
Dental Pattern	IMPA (Tweed)	90°	91°	81°	10
	$\bar{1}$ – NA (degrees) (Steiner)	22°	29°	39°	10
	$\bar{1}$ – NA (mm) (Steiner)	4 mm	2 mm	5.5 mm	3.5
	$\bar{1}$ – NB (degrees) (Steiner)	25°	25°	16°	9°
	$\bar{1}$ – NB (mm) (Steiner)	4 mm	5 mm	3 mm	2
	$\frac{1}{\bar{1}}$ – Interincisal Angle (Downs)	130°	128°	128°	0
	$\bar{1}$ – APo (mm) (Ricketts)	1 mm	6.5 mm	5 mm	1.5
Profile	Upper Lip – S Line (Steiner)	0 mm	-2 mm	-2 mm	0
	Lower Lip – S Line (Steiner)	0 mm	0 mm	0 mm	0

TABLE 2 - Intermolar and intercanine widths (in mm).

MEASUREMENTS	A	B	Difference A/B
Intercanine Width: Upper / Lower (mm)	35 / 28	35 / 26	0 / 2
Intermolar Width: Upper / Lower (mm)	50 / 50	55 / 48	5 / 2

adequate intercuspation and crossbite correction in the anterior and left regions⁶ (Figs 6 and 7).

Facial profile remained concave with a slight improvement in the relationship between the upper and lower lips. In frontal view, a slight decrease occurred in mandibular deviation (Fig 6).

The analysis of panoramic and periapical radiographs (Fig 8), showed good root parallelism with no significant morphological changes. The lateral cephalometric radiograph (Fig 9, A), clearly shows that the anterior crossbite was corrected.

FINAL CONSIDERATIONS

It is noteworthy that most of the results were related to the difference between MIC and CR, diagnosed during the initial clinical examination. Manipulating the mandible at CR⁶ was decisive for correcting the Class III molar relationship. It also contributed to reducing mandibular deviation and diagnosing

the posterior crossbite, which was unilateral but functional.⁵ At CR, a transverse relationship was noted between the dental arches.

The initial and final X-rays (Figs 4A and 9A) were performed with different RX devices and changes were introduced in the X-ray acquisition procedures (note the difference in the SN line), thereby restricting the analysis of cephalometric tracing overlays (Fig 10). However, the differences in the axial inclination of upper and lower incisors in the partial superimposition of the maxilla and mandible are remarkable (Fig 10, B) as well as in

the relation between incisors in total superimposition (Fig 10, A).

Today, after 18 months of retention, the patient remains under periodic control and has not shown any occlusal instability. She has displayed outstanding compliance in wearing the upper removable appliance as well as throughout treatment. Nor did she complain of any pain in her left TMJ during the active and retention periods. After removal of the fixed appliances, the patient was referred for replacement of her amalgam restorations (Fig 1) with composite resin fillings (Fig 6).

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