Noncompliance Treatment of Class II Patients Using a Modified Twin Block

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Skeletal Class II malocclusion is one of the most frequently encountered orthodontic problems, occurring in about one-third of the population.[1] The Clark Twin Block* is commonly used for the correction of Class II skeletal and occlusal disharmonies in growing patients.[2-4] The traditional two-phase treatment involves an orthopedic Phase I with this removable functional device, followed by finishing of the occlusion with fixed appliances.

The amount of additional growth that can be obtained with functional appliances has long been a controversial topic.[5,6] D'Antò and colleagues attributed a small amount of maxillary growth restraint to the Twin Block, along with a significant advancement of the mandible in relation to the cranial base.[7] Other functional appliances (Harvold, bionator, and Schwarz) produced a minor increase in the same angle.

KRAVITZ KEYS

- The Twin Bonded Block (TBB) involves four composite bite blocks bonded to the deciduous teeth.
- The two upper bite blocks extend over the deciduous first and second molars. The two lower bite blocks extend over the canines and first molars.
- The height of each bite block is about 3-4mm, with a 60° inclined plane.
- The TBB works similarly to the functional resin turbos commonly applied in the permanent dentition.[8]

The Twin Block's dependence on patient compliance has often been cited as a disadvantage.[9] In addition, a significant proclination of the lower incisors—resulting from protrusion by the appliance's lingual components as the mandible tries to rebound to its normal resting posture—has been consistently reported in Twin Block studies.[10-12] Any pretreatment lower-incisor inclination should therefore be taken into account in treatment planning.

The classic Twin Block design has been modified by several authors over the years.[13-16] This article describes a new version called the Twin Bonded Block (TBB), in which the bite blocks are bonded to the deciduous teeth. The typical drawbacks of the Twin Block are thus eliminated, since there is no reaction force on the lower incisors and patient compliance is unnecessary.

Fabrication

An impression is taken using the traditional

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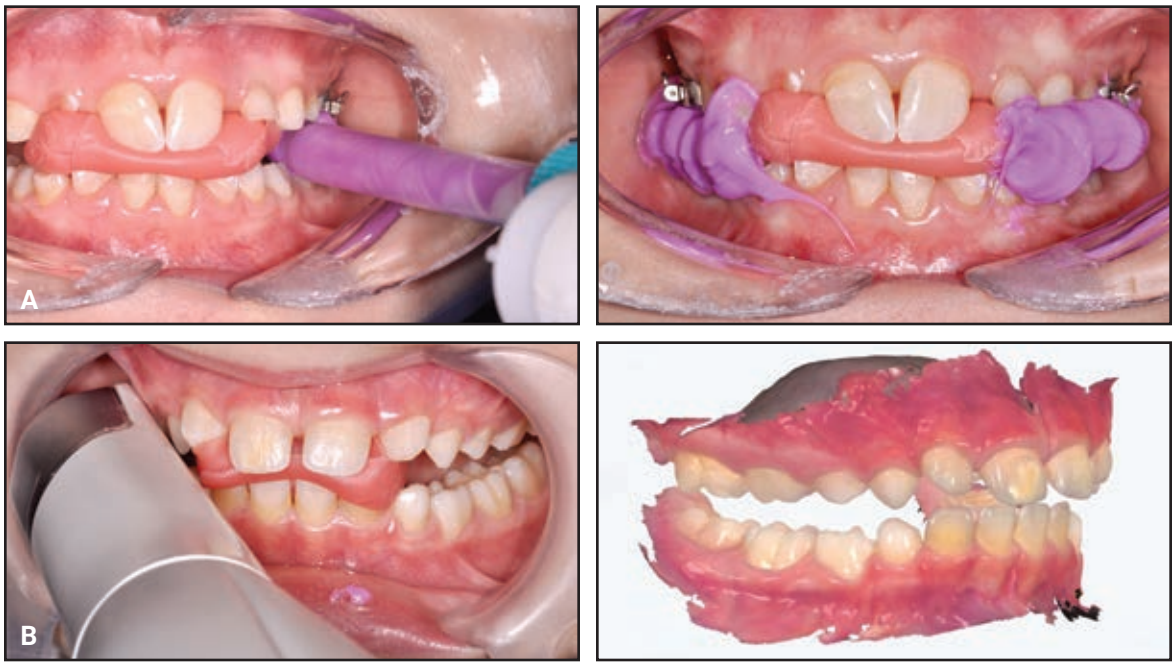


Fig. 1 Impressions taken using anterior wax jig. A. Traditional impression. B. Digital scanning.

method or with a digital scanner. In either case, an anterior wax jig can be used to guide the patient's lower jaw more easily (Fig. 1). For a traditional impression, the anterior jig should be covered by a silicone bite registration; with a digital impression, the jig is used as a key for scanning the bite. After anterior contact is obtained, the amount of advancement and posterior disclusion and, most important, the symmetry of the mandibular advancement can be verified from the positions of the molars and the anterior midlines.

The height of the bite blocks, as determined by the wax registration, should be about 3-4mm, rather than the 5mm recommended by Clark. This reduces the inclined-plane angle from 70° to about 60°, avoiding problems during mandibular excursions and improving patient comfort.

The TBB is fabricated by the laboratory technician from four small composite-resin bite blocks (Fig. 2). Each of the two upper blocks has an extension running from the distal ridge of the second deciduous molar to the mesial ridge of the first deciduous molar. It is important to leave about 1mm of free distal space on the ridge to avoid flash during cementation. In the lower arch, the blocks are extended from the deciduous canines

*Trademark of Protec Dental Laboratories Ltd., Vancouver, BC; www.protecdental.com.

Fig. 2 Twin Bonded Block (TBB) consisting of four bonded composite bite blocks.

Fig. 3 Simple reactivation of TBB by adding composite resin.

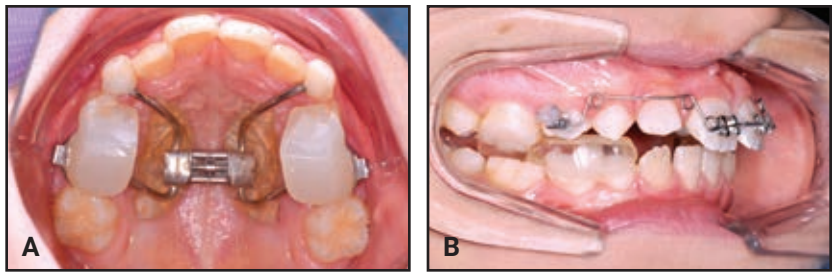


Fig. 4 A. TBB with rapid palatal expander (RPE). B. TBB with upper retrusion archwire.

to the middle of the first deciduous molars' occlusal surfaces.

The bonding procedure is simple. Once the upper and lower arches have been isolated, the teeth to be bonded are etched. The gel's application time should be extended by as much as 120 seconds because of the presence of aprismatic enamel on the deciduous teeth. After rinsing and drying, the bonding agent is applied to the treated surfaces. The composite blocks can be microsandblasted before the bonding agent is applied. A highly filled flow or dual (auto and photo) cement is used as the luting material; either a transparent or colored composite resin can be selected to simplify the procedure and reduce the risk of debonding.

In a low-angle patient, the TBB's posterior disclusion enables spontaneous extrusion of the upper molars. On the other hand, in a high-angle case, the vertical dimension can be controlled by adding bite blocks on the first molars. During treatment, the activation can be reduced by milling the composite, or the appliance can be sagittally reactivated, either uni- or bilaterally, by adding more composite (Fig. 3).

These bite blocks can be used in combination with various other devices (Fig. 4). For example,

an upper utility arch can be utilized for control and retraction of the upper incisors,[17] or the TBB can be combined with a rapid palatal expander (RPE) to begin correction of a Class II malocclusion during the expander's passive retention phase.

Case 1

A 7-year-old male in the mixed dentition presented with a full Class II molar relationship, an 8mm overjet, and a Class II profile associated with an excessive vertical dimension (Fig. 5, Table 1).

A TBB was designed and bonded in conjunction with composite bite blocks on the upper first permanent molars to control the vertical dimension (Fig. 6). Both the TBB and the molar blocks were progressively reduced until exfoliation of the deciduous teeth (Fig. 7).

After three years, with the transition of the buccal segments nearly complete, there was a significant improvement in the molar relationship and the overjet (Fig. 8). Cephalometric analysis

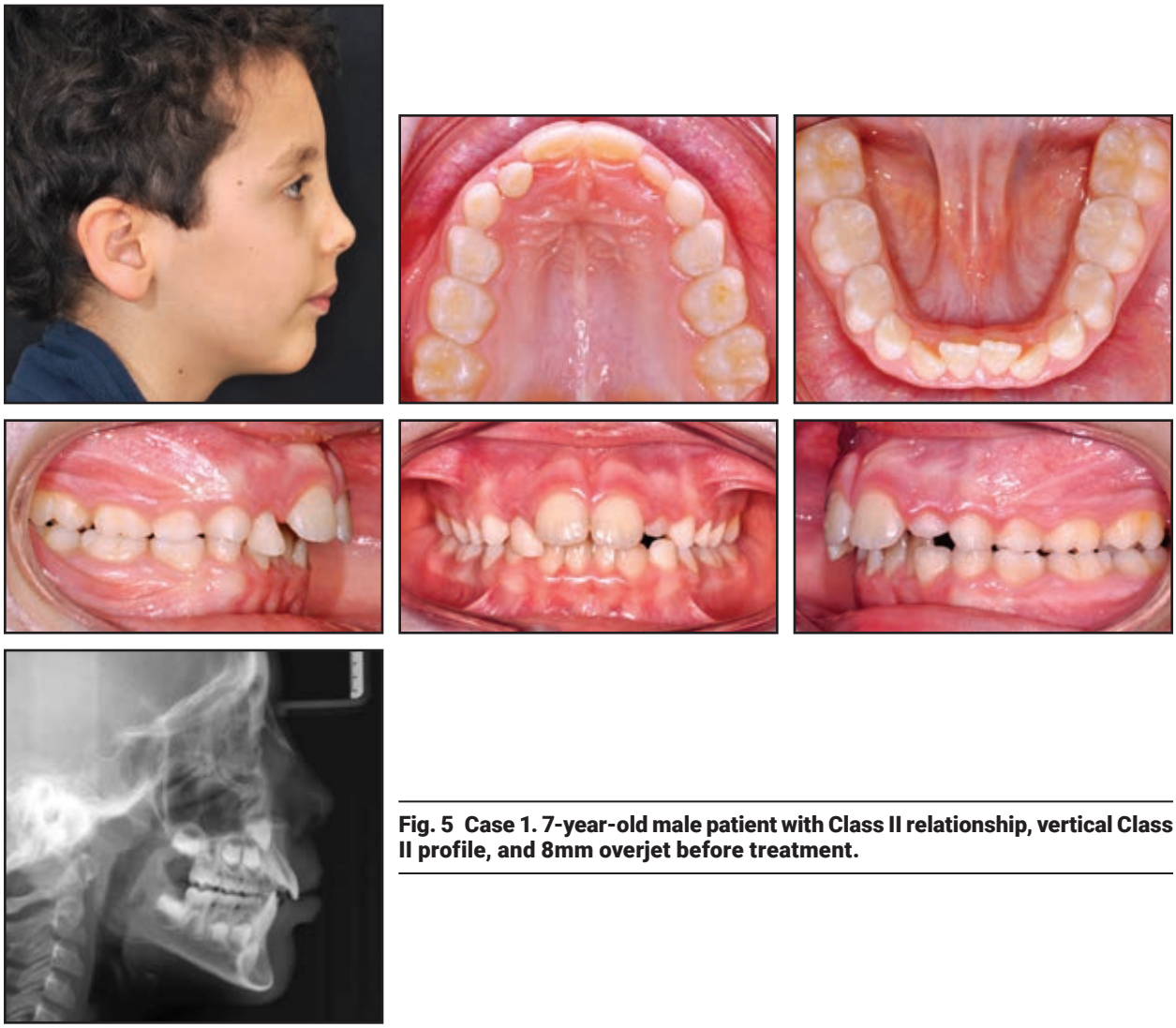


Fig. 5 Case 1. 7-year-old male patient with Class II relationship, vertical Class II profile, and 8mm overjet before treatment.

TABLE 1
CASE 1: CEPHALOMETRIC ANALYSIS

	Mean	Pretreatment	Post-Treatment
Maxillary position (SNA)	82.0° ± 3.5°	79.8°	80.0°
Mandibular position (SN-Pg)	80° ± 3.5°	74.4°	86.0°
Sagittal jaw relationship (AN-Pg)	2.0° ± 2.5°	5.4°	4.0°
Maxillary inclination (SN/ANS-PNS)	8.0° ± 3.0°	3.2°	4.2°
Mandibular inclination (SN/Go-Gn)	33.0° ± 2.5°	38.1°	35.7°
Vertical jaw relationship (ANS-PNS/Go-Gn)	25.0° ± 6.0°	34.9°	31.5°
Maxillary incisor inclination (1-ANS-PNS)	110.0° ± 6.0°	100.2°	98.9°
Mandibular incisor inclination (1-Go-Gn)	94.0° ± 7.0°	87.0°	93.3°
Mandibular incisor compensation (1-A-Pg)	2.0mm ± 2.0mm	−0.6mm	−1.5mm
Overjet	3.5mm ± 2.5mm	8.0mm	5.0mm
Overbite	2.0mm ± 2.5mm	2.0mm	4.0mm
Interincisal angle (1/1)	132.0° ± 6.0°	135.8°	136.0°

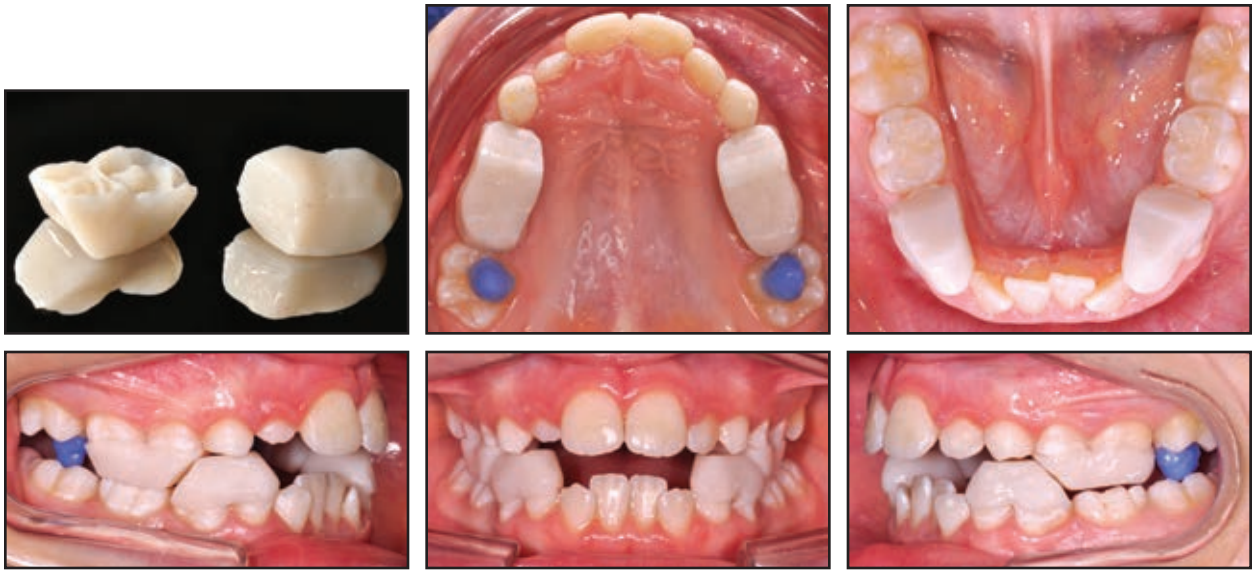
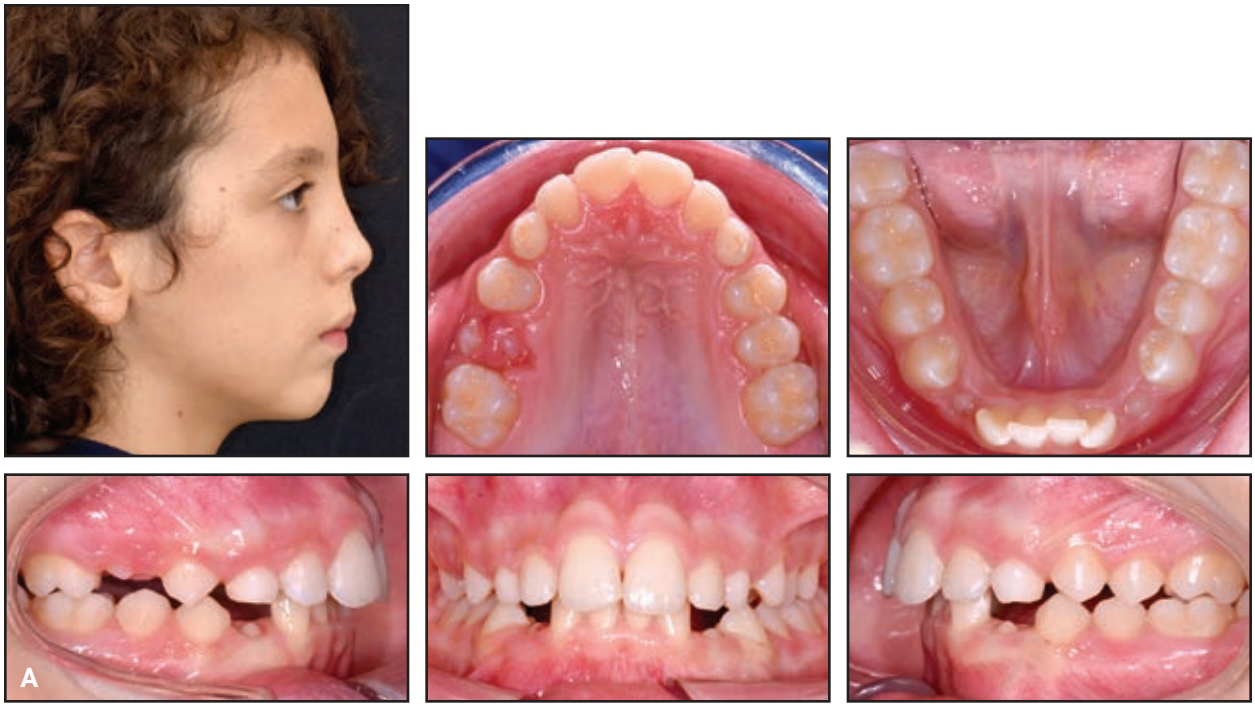


Fig. 6 Case 1. TBB bonded in conjunction with composite bite blocks on upper first permanent molars to control vertical dimension.

Fig. 7 Case 1. TBB and molar blocks progressively reduced until exfoliation of deciduous teeth.



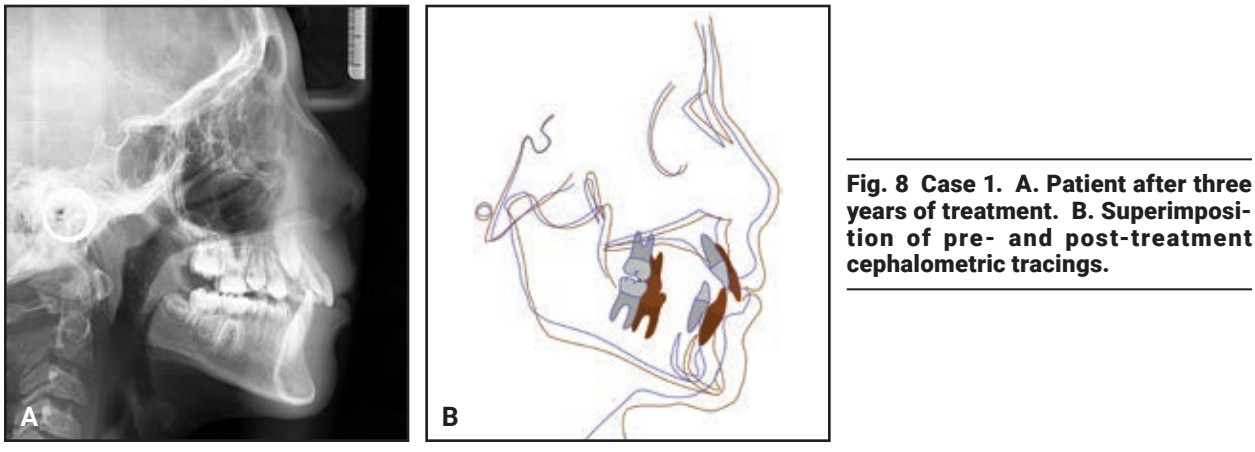


Fig. 8 Case 1. A. Patient after three years of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.

confirmed a correction of the skeletal Class II and a significant change in the growth pattern involving counterclockwise rotation (Table 1). Once this early treatment was finished, the patient was ready for Phase II.

Case 2

An 8-year-old male in the mixed dentition was referred by his pediatrician (Fig. 9, Table 2). He displayed a left unilateral crossbite with a centric occlusion-centric relation discrepancy, a full Class II molar relationship, and a low-angle profile.

An RPE was placed for 12 months of maxillary expansion (Fig. 10). One month before the end of activation, a TBB was bonded (Fig. 11); thus, the Class II correction was achieved during the expander's passive retention period.

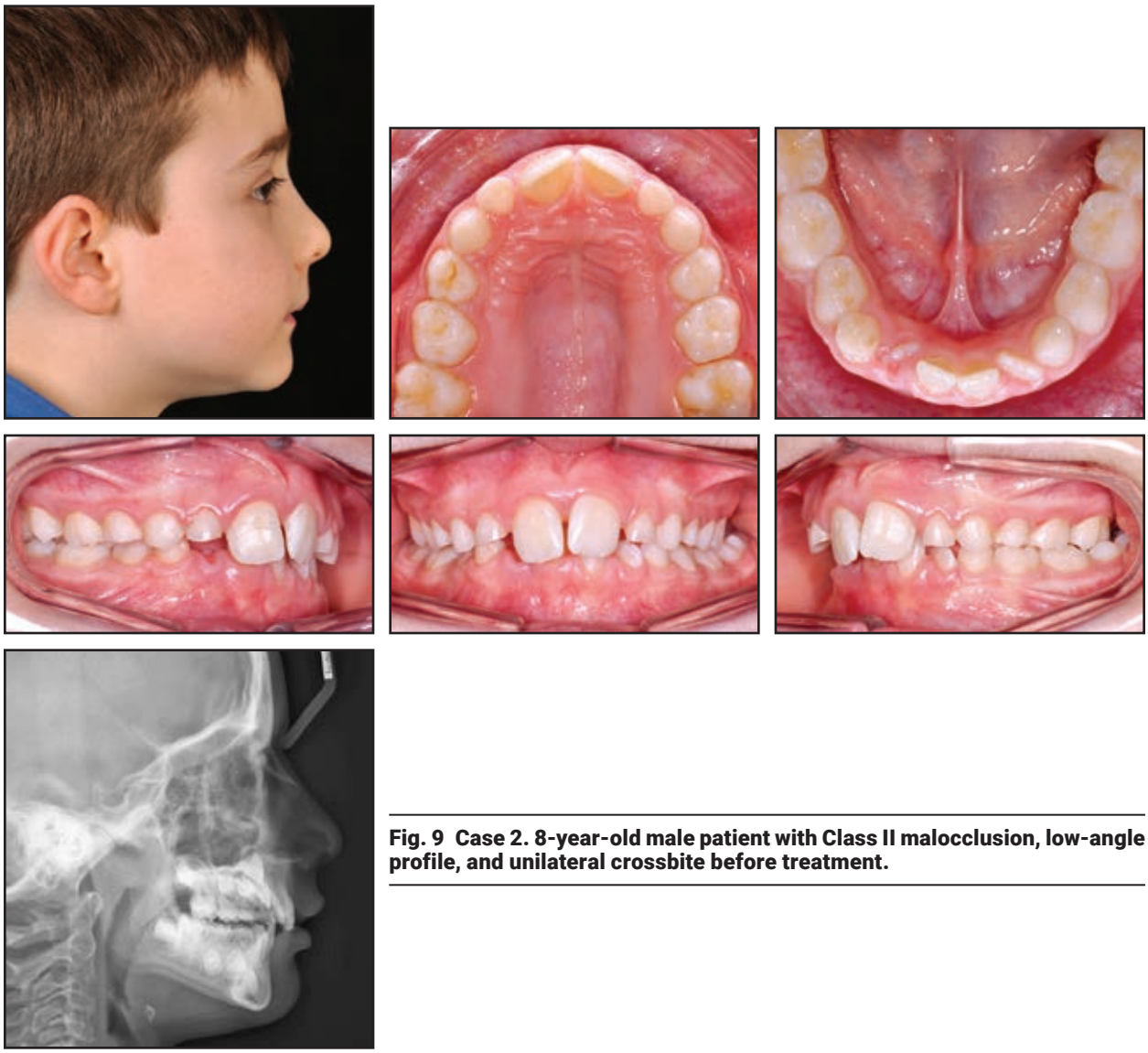


Fig. 9 Case 2. 8-year-old male patient with Class II malocclusion, low-angle profile, and unilateral crossbite before treatment.

TABLE 2
CASE 2: CEPHALOMETRIC ANALYSIS

	Mean	Pretreatment	Post-Treatment
Maxillary position (SNA)	82.0° ± 3.5°	78.0°	81.1°
Mandibular position (SN-Pg)	80.0° ± 3.5°	71.5°	77.4°
Sagittal jaw relationship (AN-Pg)	2.0° ± 2.5°	6.5°	3.7°
Maxillary inclination (SN/ANS-PNS)	8.0° ± 3.0°	10.3°	8.4°
Mandibular inclination (SN/Go-Gn)	33.0° ± 2.5°	36.3°	30.0°
Vertical jaw relationship (ANS-PNS/Go-Gn)	25.0° ± 6.0°	26.0°	21.6°
Maxillary incisor inclination (1-ANS-PNS)	110.0° ± 6.0°	95.5°	104.7°
Mandibular incisor inclination (1-Go-Gn)	94.0° ± 7.0°	94.6°	94.2°
Mandibular incisor compensation (1-A-Pg)	2.0mm ± 2.0mm	–1.7mm	–1.0mm
Overjet	3.5mm ± 2.5mm	6.5mm	5.0mm
Overbite	2.0mm ± 2.5mm	3.0mm	5.0mm
Interincisal angle (1/1)	132.0° ± 6.0°	143.9°	139.5°

Fig. 10 Case 2. After 12 months of RPE.

Fig. 11 TBB bonded one month before end of RPE activation.

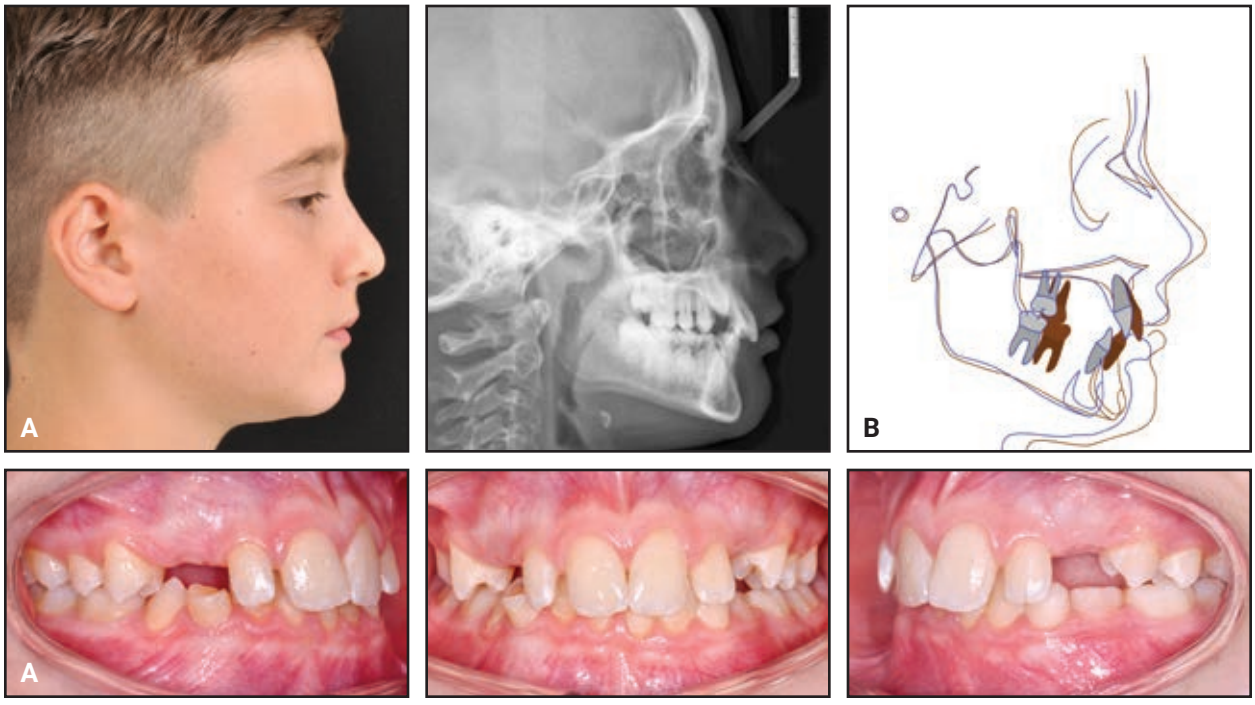


Fig. 12 Case 2. A. Patient two years after removal of TBBs. B. Superimposition of pre- and post-treatment cephalometric tracings.

After 27 months of treatment, we observed a complete correction of the molar relationship and an improvement in the skeletal discrepancy (Fig. 12, Table 2).

Case 3

A 7-year-old female in the mixed dentition presented with the chief complaint of excessive upper-incisor protrusion (Fig. 13). She had a full Class II molar relationship, an impinging deep bite, and a 10mm overjet. Cephalometric analysis (Table 3) confirmed a low-angle skeletal Class II relationship (ANB = 7.5°).

The extension of the upper bite blocks was reduced because of the patient's transposed upper left premolars, which required careful management of deciduous-molar exfoliation to facilitate spontaneous premolar eruption (Fig. 14). The TBB immediately opened the bite, eliminating the trauma to the upper palatal mucosa from the severe deep bite. With the addition of an .016" TMA** retrusion archwire with a closing loop, the overjet was reduced to a normal range in two months.

Active Phase I treatment lasted about 10 months (Fig. 15). The upper archwire was then removed, and the bite blocks were progressively reduced so they would exfoliate with the deciduous teeth.

Treatment with TBB resulted in a complete correction of the Class II molar relationship without the need for compliance and without side effects on the lower incisors. No retention was necessary after Phase I, since the progressive reduction of the TBB maintained the results.

The patient was observed every six months until she was in the permanent dentition. Spontaneous eruption of the upper left premolars was achieved through strategic extraction of the upper left deciduous molars. A second phase of treat-

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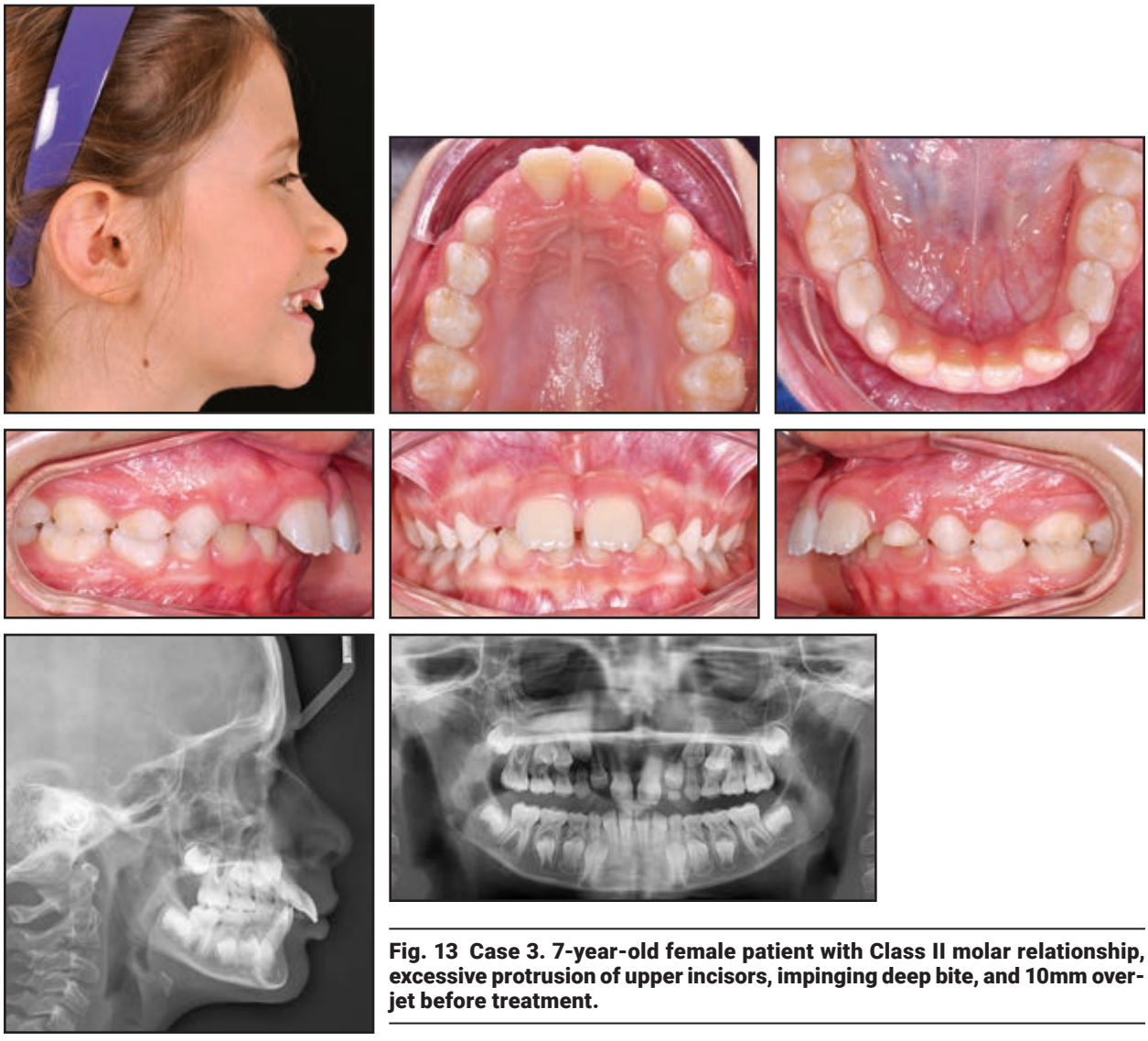

Fig. 13 Case 3. 7-year-old female patient with Class II molar relationship, excessive protrusion of upper incisors, impinging deep bite, and 10mm overjet before treatment.

ment with an MBT***-prescription multibracket appliance was then carried out to finish the occlusion, close the upper diastemas, and improve the deep-bite correction (Fig. 16).

After 15 months of Phase II treatment, the patient had Class I molar and canine relationships with coincident midlines and a normal overjet (Fig. 17). A slight deep-bite tendency remained, but it seemed well balanced with the patient's low-angle skeletal type. In fact, her counterclockwise growth pattern counteracted the extrusion of the upper first molars, resulting in a vertical dimension almost identical to the pretreatment condition. Cephalometric superimpositions indicated that the lower-incisor torque remained unchanged, despite the functional Class II treatment. The skeletal Class II malocclusion was corrected (ANB = 2.5°), and the patient's profile and smile were harmonized (Table 3). Upper 2-2 and lower 3-3 lingual wires were bonded for retention.

TABLE 3
CASE 3: CEPHALOMETRIC ANALYSIS

	Mean	Pretreatment	Post-Phase I	Post-Treatment
Maxillary position (SNA)	82.0° ± 3.5°	89.0°	87.5°	91.4°
Mandibular position (SN-Pg)	80.0° ± 3.5°	82.8°	82.0°	89.5°
Sagittal jaw relationship (AN-Pg)	2.0° ± 2.5°	62.0°	5.5°	1.9°
Maxillary inclination (SN/ANS-PNS)	8.0° ± 3.0°	8.9°	8.0°	6.5°
Mandibular inclination (SN/Go-Gn)	33.0° ± 2.5°	29.9°	29.0°	25.0°
Vertical jaw relationship (ANS-PNS/Go-Gn)	25.0° ± 6.0°	21.0°	21.0°	18.4°
Maxillary incisor inclination (1-ANS-PNS)	110.0° ± 6.0°	126.6°	113.0°	123.3°
Mandibular incisor inclination (1-Go-Gn)	94.0° ± 7.0°	100.9°	98.0°	99.6°
Mandibular incisor compensation (1-A-Pg)	2.0mm ± 2.0mm	−1.1mm	1.0mm	0.3mm
Overjet	3.5mm ± 2.5mm	10.0mm	4.0mm	3.0mm
Overbite	2.0mm ± 2.5mm	4.0mm	3.0mm	4.0mm
Interincisal angle (1/1)	132.0° ± 6.0°	111.5°	128.5°	118.7°

Conclusion

Although Phase I skeletal correction is a much-debated topic, Clark's Twin Block is reportedly one of the most effective functional appliances. The modified device presented in this article has further advantages: it is simple and inexpensive; it functions 24 hours per day, without requiring patient compliance; it is versatile enough to be employed in conjunction with other devices; it creates no proclination of the lower incisors, since it is not anchored to those teeth; and it can be used in both hypodivergent and hyperdivergent patients. Further studies are needed to evaluate the actual skeletal correction produced by this device.

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Fig. 14 Case 3. TBB with reduced extension of upper bite blocks to control timing of deciduous-molar exfoliation in upper left quadrant.

Fig. 15 Case 3. After 10 months of Phase I treatment.

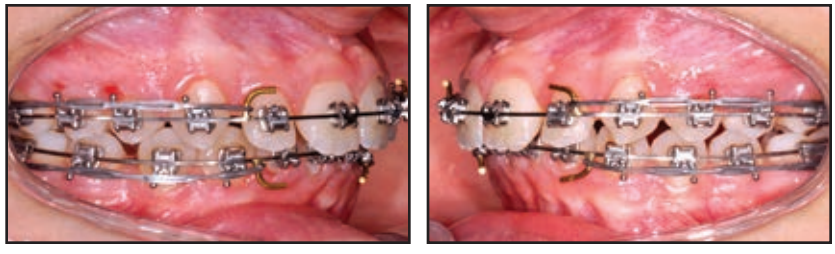

Fig. 16 Case 3. Phase II treatment using MBT*-prescription brackets and .019" × .025" stainless steel archwires with tiebacks.**

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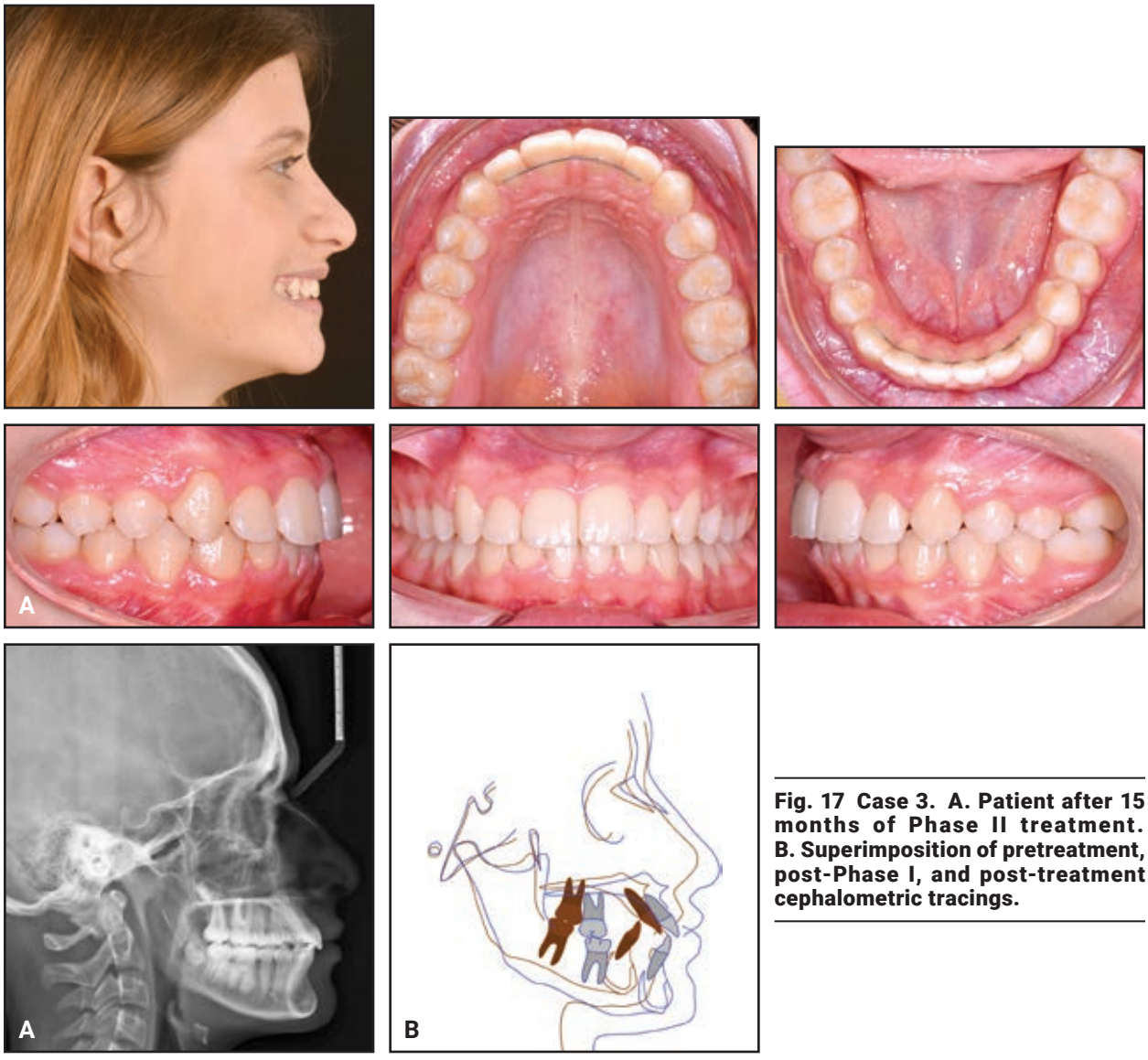

Fig. 17 Case 3. A. Patient after 15 months of Phase II treatment. B. Superimposition of pretreatment, post-Phase I, and post-treatment cephalometric tracings.

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