

# CASE REPORT

## Adult Class II Treatment Using a New Lingual Bracket and Skeletal Anchorage

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The first lingual appliances required several archwire bends to compensate for the lingual morphology of the teeth.<sup>1</sup> Not only did this complicate the clinical procedure, but it led to archwire breakage in the bend areas and created impediments to sliding mechanics, potentially interfering with canine retraction. A sliding jig could not be used, and it was difficult to adjust angulations for the correction of root positions.

The lingual straightwire concept, introduced by Takemoto and Scuzzo<sup>2</sup> and applied by other authors,<sup>3,4</sup> eliminates the need to

place bends in the archwires, thus making lingual treatment simpler, more practical, and faster and promoting better biomechanical control with greater patient comfort. Our desire to develop a lingual straightwire system that could be clinically effective as well as less expensive led to the design and production of the Prieto Straight Wire bracket (PSWb\*).

### Bracket Design

In lingual orthodontics, to achieve an ideal occlusion as described by Andrews,<sup>5</sup> four im-

portant principles must be taken into account.

#### 1. More Cervical Bonding

The more cervically the brackets can be bonded, the

\*PSWb brackets are available through Dental Press International, Maringá, Brazil; www.dentalcompras.com.br. Contact Dr. Lucas Prieto for additional information at prietoeprieto@terra.com.br.



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Fig. 1 Cutting clinical crowns off plaster casts demonstrates that buccolingual distances are less variable near gingival margin.

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**TABLE 1  
PSWb BRACKET SPECIFICATIONS**

	Profile	Angulation	Torque	Distal Offset
Upper incisors	1.9mm	0°	60°	0°
Lower incisors	1.9mm	0°	50°	0°
Upper canines	2.4mm	9°	55°	8°
Lower canines	2.1mm	9°	40°	4°
Upper first premolars	1.8mm	0°	0°	0°
Lower first premolars	1.8mm	0°	0°	0°
Upper second premolars	2.3mm	0°	0°	0°
Lower second premolars	2.3mm	0°	0°	0°
Upper first molars	1.8mm	0°	0°	10°
Lower first molars	1.8mm	0°	0°	0°
Upper second molars	1.8mm	0°	15°	10°
Lower second molars	1.8mm	0°	0°	0°



**Fig. 2** Anterior Prieto Straight Wire brackets (PSWb) have slots on gingival ends, with tie wings positioned higher and thus farther from soft tissue than in other systems.

greater the ability to use a straight archwire, as was shown by Takemoto and Scuzzo in a study of casts with ideal occlusions<sup>2</sup> (Fig. 1). When brackets are positioned too close to the gingival margin, however, inflammation is more likely to occur. To avoid this problem, the PSWb anterior bracket slot is placed at the gingival end of the bracket, but the gingival tie wings are higher and thus farther from the soft tissue than in other systems (Fig. 2). This configuration is similar to the one proposed by Andrews.<sup>5</sup>

### 2. Higher Anterior Bracket Profile

When a straight wire with an archform between square and oval is placed against the lingual surfaces, the wire will be closer to the posterior teeth than to the anterior teeth (Fig. 3). One way to



Fig. 3 Straight lingual archwire rests farther from anterior teeth than from posterior teeth.

compensate for that discrepancy is to raise the profile of the anterior lingual brackets. If the archform is square, the profile can be the same for all four incisor brackets (Fig. 4A); if the arch is more oval, the central incisor bracket profile should be reduced in comparison to that of the lateral incisor bracket. In this case, the lateral incisor bracket should have a slight distal offset (Fig. 4B).

### 3. Distal Canine Bracket Offset

The distance from a straight lingual wire to the canine surface is greater on the distal side than on the mesial (Fig. 5). Therefore, the canine bracket should have a thicker base on the distal—in other words, a distal offset. With the third-generation PSWb, the offset was moved to the slot, thus keeping the bracket bases uniform and thin.

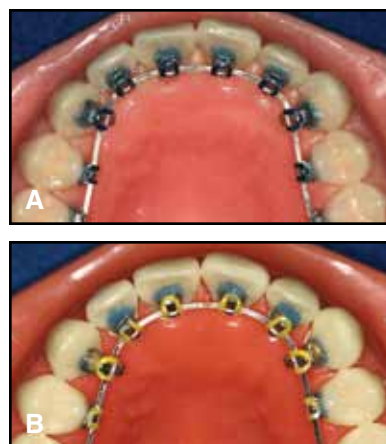


Fig. 4 A. Four incisor brackets have similar profiles in case with square archform. B. With oval archform, central incisor brackets have slightly lower profile than lateral incisor brackets, which have slight distal offset.

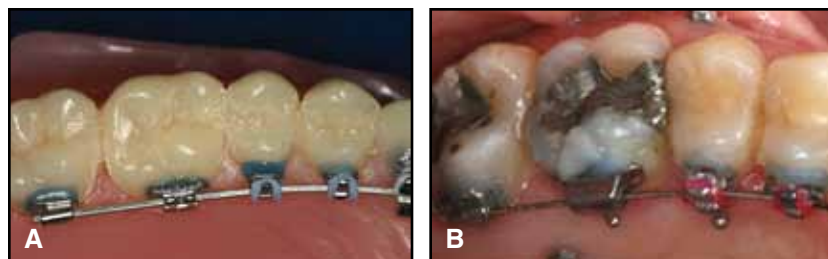
### 4. Higher Second Premolar Bracket Profile

In an ideal occlusion, a line drawn tangent to the second premolar's lingual surface will pass through 1-1.5mm of the first molar on the lingual side. Although the buccolingually narrower second premolar is usually bonded with a thicker resin base (Fig. 6A), the third-generation PSWb second premolar bracket itself has a higher profile (Fig. 6B).

The PSWb system thus incorporates all the necessary compensations for the lingual surfaces (Table 1), allowing simple indirect bonding without complicated setup requirements or auxiliary devices. The straight wires are precontoured and individualized for each patient according to the Prieto Diagram<sup>6</sup> included with the brackets; one of eight archform options is chosen



Fig. 5 Straight archwire lies farther from distal edge of canine than from mesial edge. PSWb canine bracket incorporates distal offset in bracket slot rather than in base.



**Fig. 6** A. Previous version of PSWb second premolar bracket had thicker resin pad. B. Third-generation PSWb second premolar bracket has higher profile.

by positioning the diagram over the brackets on the working cast.

### Diagnosis and Treatment Plan

A 29-year-old female presented with a Class II occlusion that was more accentuated on the left side (Fig. 7, Table 2). The upper incisors were significantly protruded, but the teeth were well aligned. The upper midline was deviated slightly to the right.

Despite a significant overjet and a small mandible, the patient showed satisfactory lip closure and a harmonious face.

After the patient refused any orthognathic surgical treatment, we devised a plan for upper-arch distalization with palatal miniscrew anchorage and Class II mechanics using intermaxillary elastics. Both arches would be bonded indirectly with PSWb brackets.<sup>7-9</sup>

### Treatment Progress

The maxillary arch was initially bonded from second premolar to second molar on each side, and a modified transpalatal bar extending anteriorly was placed in the first-molar tubes (Fig. 8). A self-drilling miniscrew was inserted in the midpalatal suture and connected with elastomeric chain to the transpalatal bar to begin distalization with 150g of force, using .016" × .022" segmental

**TABLE 2**  
**CEPHALOMETRIC ANALYSIS**

	Norm	Pretreatment	Post-Treatment	Difference
SNA	82.0°	88.0°	85.0°	3.0°
SNB	80.0°	84.0°	83.0°	1.0°
ANB	2.0°	4.0°	2.0°	2.0°
Convexity Angle	0.0°	10.0°	8.0°	2.0°
Y-Axis	59.0°	55.0°	57.0°	-2.0°
Facial Angle	87.0°	92.0°	92.0°	0.0°
SN-GoGn	32.0°	28.0°	30.0°	-2.0°
FMA	25.0°	20.0°	21.0°	-1.0°
IMPA	90.0°	101.0°	99.0°	2.0°
U1-NA	22.0°	34.0°	19.0°	15.0°
U1-NA	4.0mm	8.0mm	4.0mm	4.0mm
L1-NB	25.0°	33.0°	30.0°	3.0°
L1-NB	4.0mm	8.0mm	6.0mm	2.0mm
Interincisal Angle	130.0°	104.0°	129.0°	-25.0°
U1-APo	1.0mm	3.5mm	2.5mm	1.0mm
Upper lip-S Line	0.0mm	1.0mm	0.0mm	1.0mm
Lower lip-S Line	0.0mm	-1.0mm	0.5mm	1.5mm

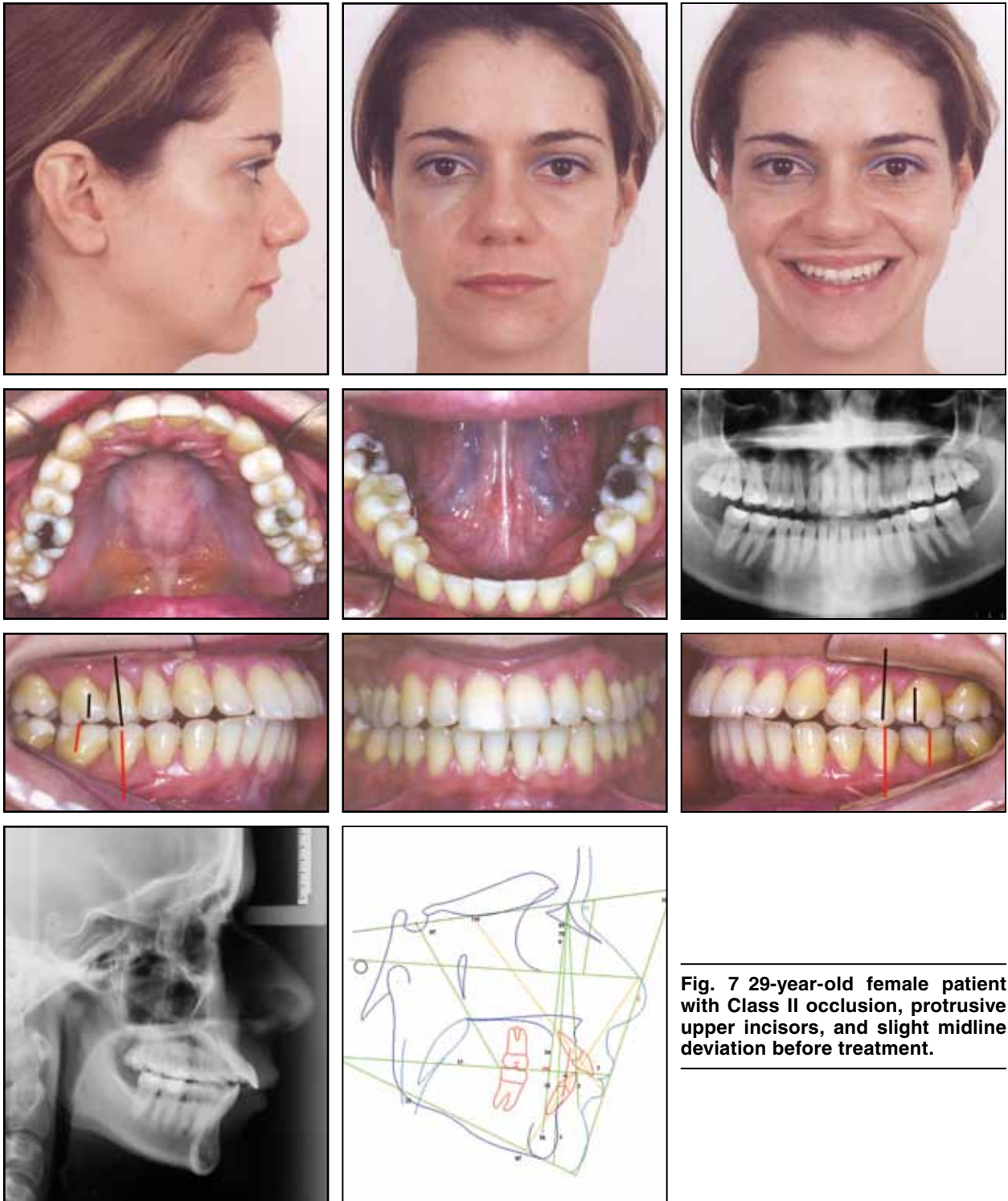


Fig. 7 29-year-old female patient with Class II occlusion, protrusive upper incisors, and slight midline deviation before treatment.

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wires to consolidate the buccal segments. The entire lower arch was bonded, with a thermal .016" wire placed for initial alignment.

After 10 months of treatment, the remainder of the upper arch was bonded, and an .016" thermal wire was placed. An additional miniscrew was inserted in the palate between the left first and second molars; elastic chain between this screw

and a hook on the left side of the transpalatal bar was used to increase the distalizing forces on the left side (Fig. 9).

Another 14 months later, distalization was complete and the transpalatal bar was removed. Spaces in the upper left canine region were closed using elastic chain attached directly to the lateral palatal miniscrew (Fig. 10). Finishing wires were .017" ×

.025" stainless steel in the upper arch and .017" × .025" TMA\*\* in the lower.

Total treatment time was 30 months (Fig. 11, Table 2). A modified bionator was prescribed as a retention device to maintain the Class II correction (Fig. 12).

\*\*Registered trademark of Ormco Corporation, Orange, CA; www.ormco.com.

**Fig. 8** Upper arch bonded with PSWb lingual brackets from second premolar to second molar on each side, with modified transpalatal bar and midpalatal miniscrew used as anchorage for distalization; entire lower arch bonded with PSWb lingual brackets for initial alignment.



**Fig. 9** After 10 months of distalization, second miniscrew (arrow) placed palatally between left first and second molars as anchorage for additional distalizing force in left buccal segment.



**Fig. 10** Transpalatal bar removed after 24 months of treatment, with elastic thread attached directly between canine bracket and lateral miniscrew for space closure on left side.



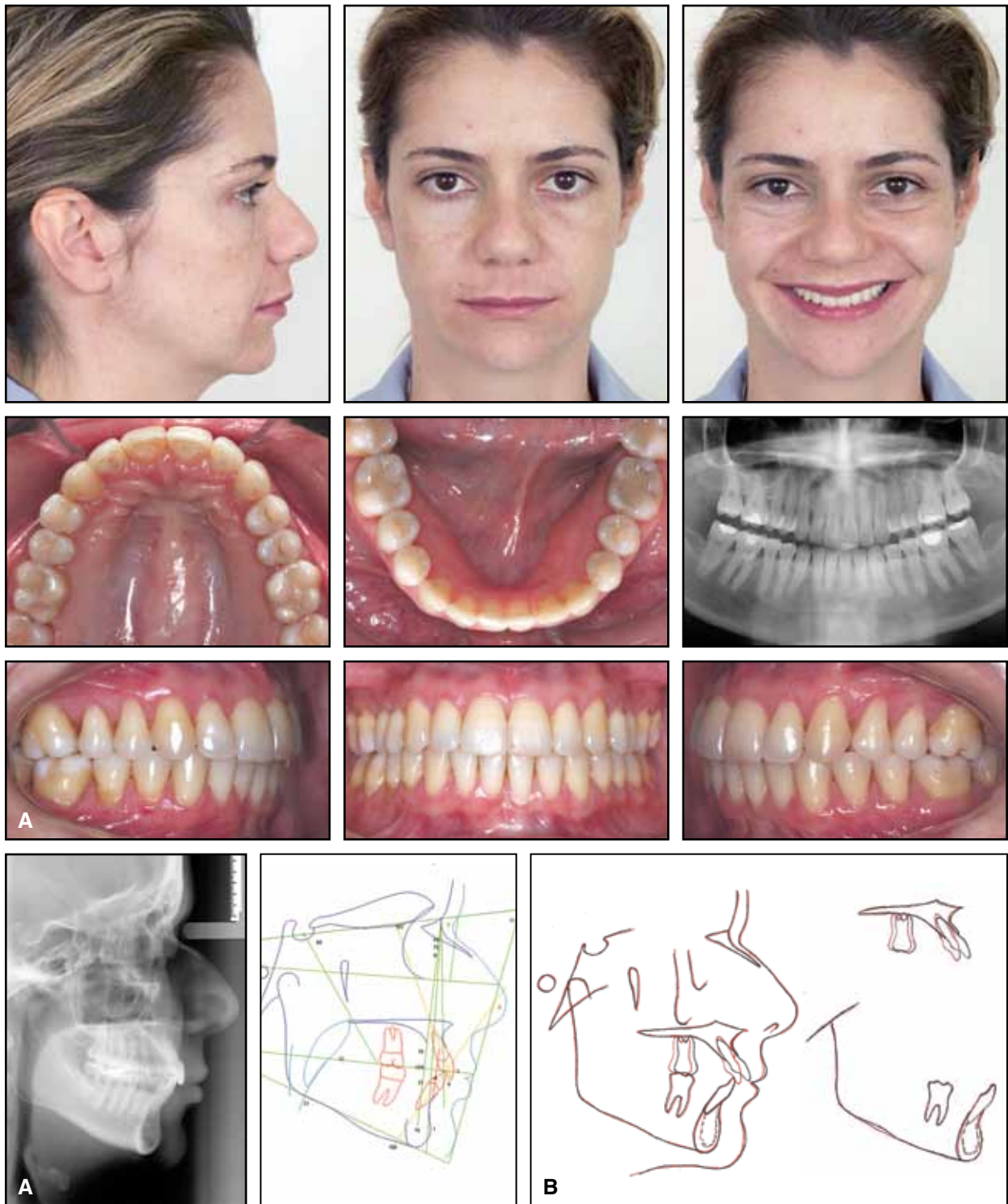


Fig. 11 A. Patient after 30 months of treatment. B. Superimposition of pretreatment and post-treatment cephalometric tracings.



**Fig. 12 Bionator used for retention.**

## Discussion

Lingual orthodontics has evolved significantly in recent years. Improvements in clinical techniques and materials have afforded better three-dimensional control, resulting in shorter treatment times with consequently lower biological impact while still providing the esthetic appearance desired by many patients.

The Incognito\*\*\* system uses customized, low-profile brackets along with preformed wire bends to compensate for the in/out, torque, and inclinations of the teeth. Alterations in all three planes of space are made with robotically placed wire bends, thus prioritizing the wire over the

bracket positioning. The new STb\*\* appliance does use straightwire mechanics,<sup>2</sup> which we believe to be the best strategy for lingual orthodontics, but its incisor and canine brackets have similar profiles with no compensatory angulations, and the posterior brackets have no in/out compensation.

The third-generation PSWb thus offers mechanical advantages over both alternative lingual appliances. Furthermore, the PSWb system simplifies bracket placement and permits fast, precise indirect bonding with reduced chairtime, at a lower cost to the patient.

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