

The Lingual Plain-Wire System with Micro-Implant Anchorage

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Despite their esthetic advantages,¹ lingual orthodontic appliances have not gained widespread popularity since their introduction in the 1970s.²⁻¹⁰ The short interbracket distances require especially precise bracket positioning and wire bending, but the variable lingual morphology and limited access make this much more difficult to achieve than with labial appliances.

We have been designing methods to help overcome these technical problems since the early 1980s. With the Individual Indirect Bonding Technique, the setup cast can be used for exact positioning of lingual brackets.¹¹ The indirect Mushroom Bracket Positioner (MBP) allows the height, angulation, and inclination of the brackets to be established more quickly and precisely on the setup cast.¹²

The new lingual Plain Wire Mushroom Bracket Positioner* (PW-MBP) makes it possible to use preadjusted lingual appliances with preformed archwires. This article shows the

*Dentos, Inc., 258 BunJi, Dong-In Dong, Jung-Gu, Taegu 700-422, Korea; www.dentos.co.kr. U.S. Patent No. 6,575,740 B2.

application of the lingual plain-wire appliance in conjunction with a new micro-implant for skeletal anchorage.¹³

Bracket Placement Procedure

The PW-MBP consists of a setup cast holder, a stand, blades for the lingual brackets, and a blade holder (Fig. 1). The six sizes of lingual blades match six diameters of preformed lingual archwires, from .010" to .016" × .022".

To prepare the setup cast, the proper size blade is inserted into the blade holder. The lingual brackets are then attached to the blade with elastomeric ligatures or elastic thread, so they can be moved as necessary (Fig. 2). The blade holder is constricted or expanded to fit the setup cast, and the correct position is marked on its scale (Fig. 3).

The lingual brackets are bonded to the setup cast using a conventional light-cured resin. After individual transfer trays are made, the brackets are bonded in the mouth.

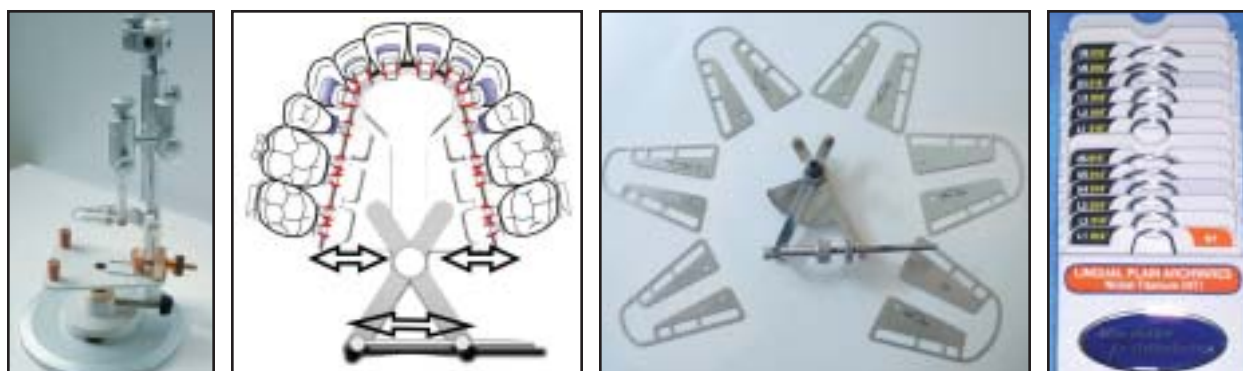
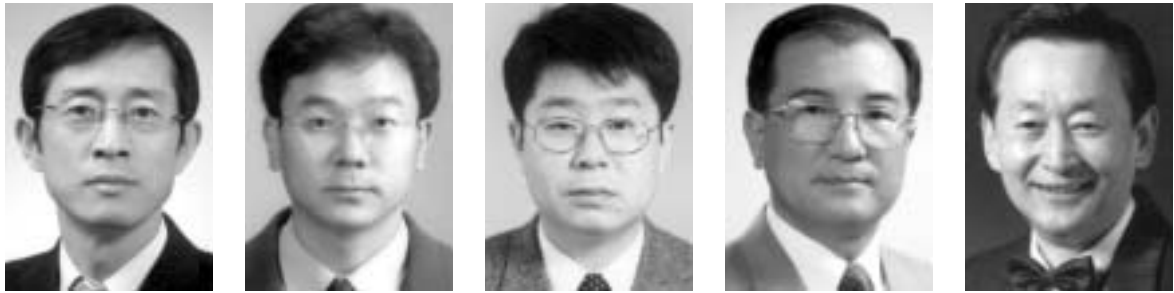


Fig. 1 Lingual Plain Wire Mushroom Bracket Positioner (PW-MBP) with six sizes of blades to match preformed archwires.



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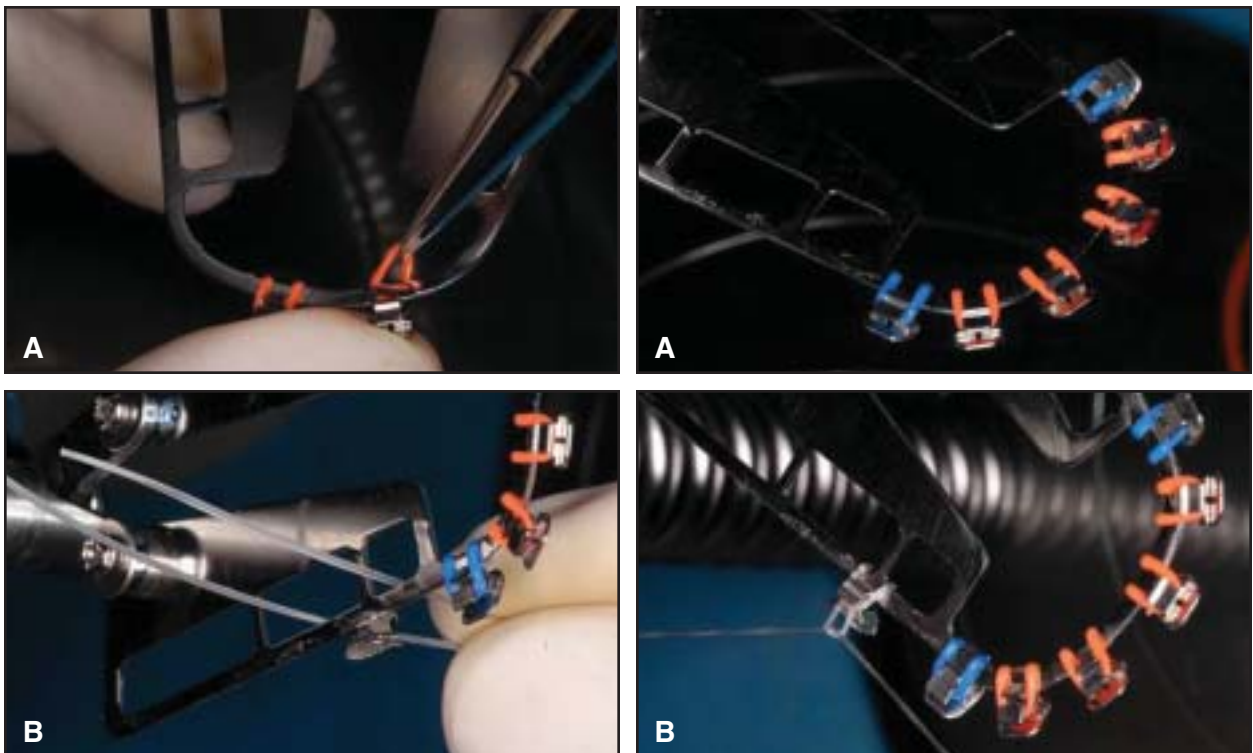


Fig. 2 A. Lingual brackets attached to blades with elastomeric ligatures. **B.** Additional brackets attached with elastic thread.



Fig. 3 A. Blade holder with scale. **B.** Blade holder on maxillary setup cast (Ormco brackets). **C.** Blade holder on mandibular setup cast (Fujita brackets).

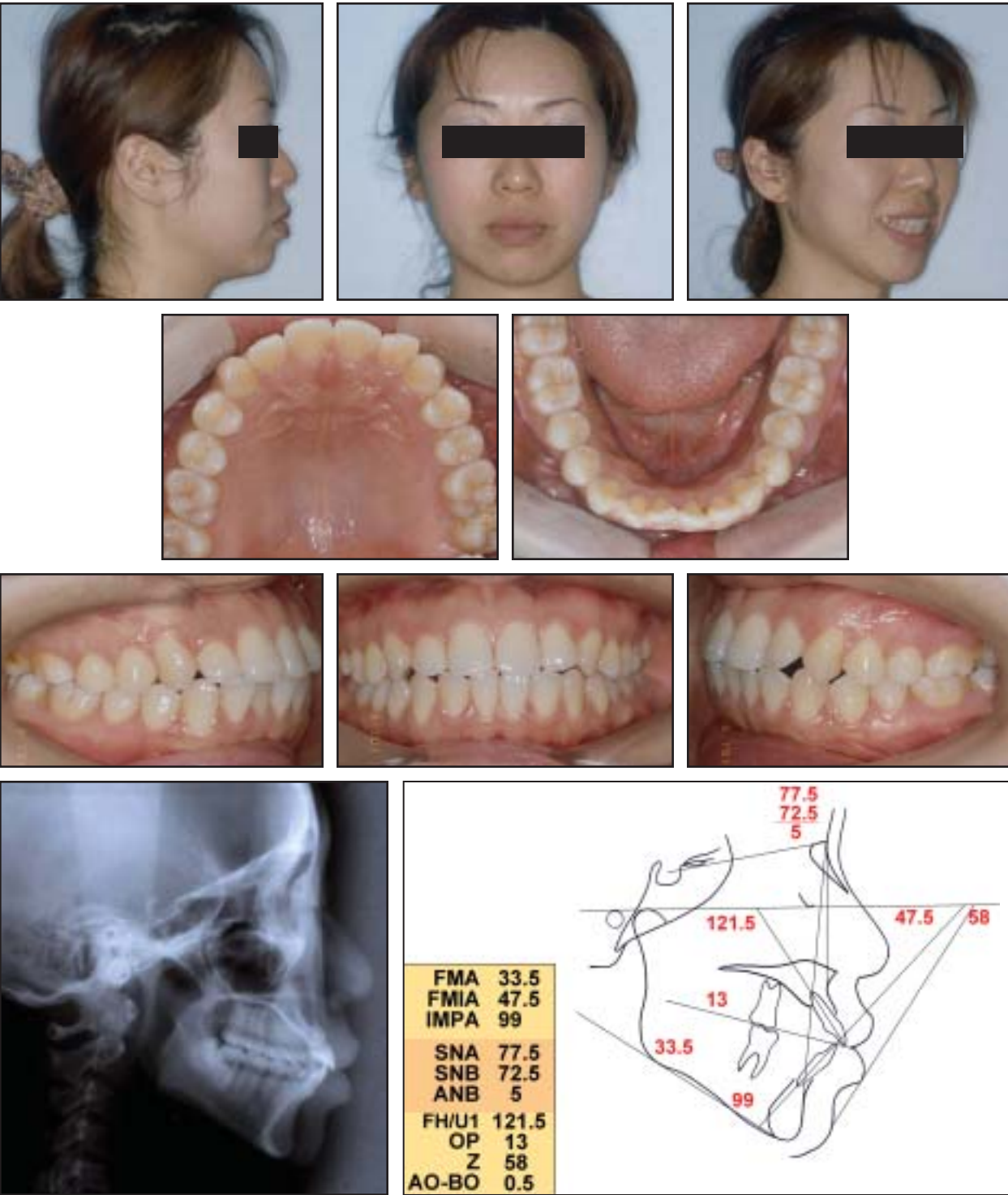


Fig. 4 30-year-old female patient with protrusive lips and irregular anterior teeth before treatment.

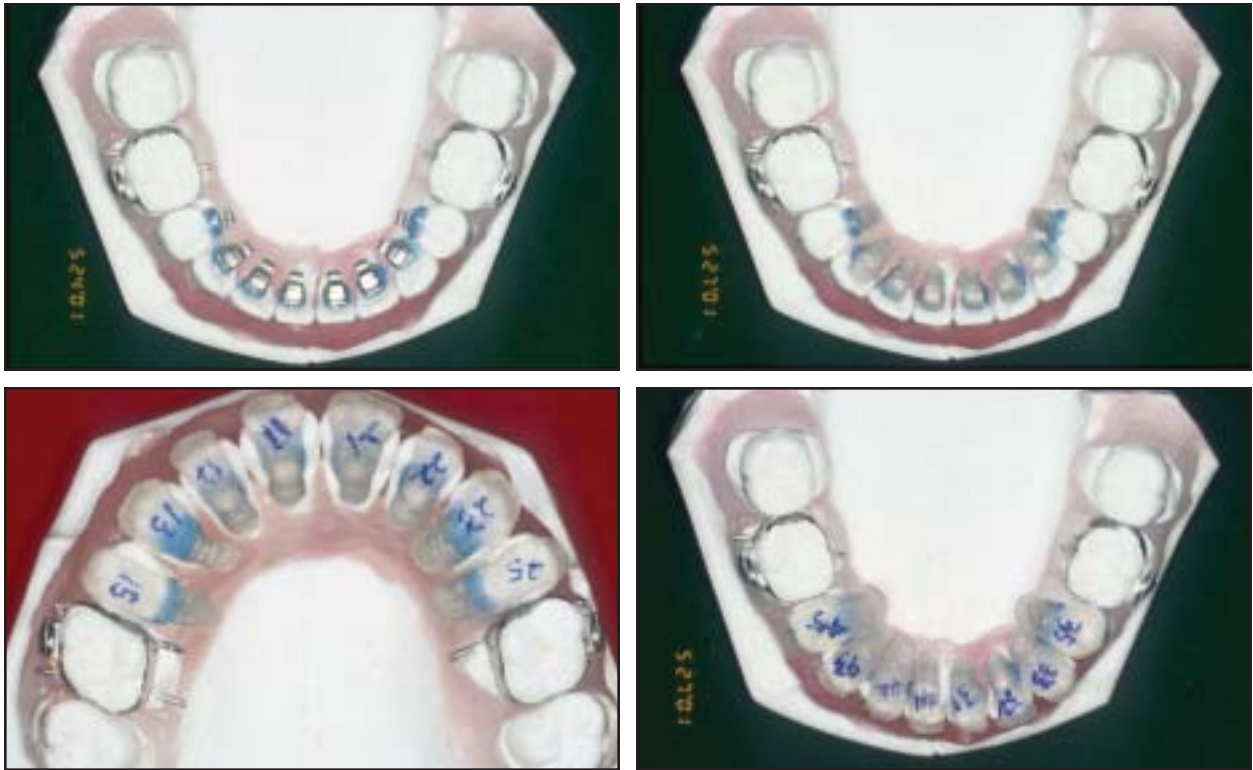


Fig. 5 Fabrication of Individual Indirect Bonding trays after setup with PW-MBP.

Case Report

A 30-year-old female presented with the chief complaint of protrusive lips (Fig. 4). She had a Class I occlusion and skeletal pattern, with an edge-to-edge overbite, minor arch-length discrepancies (1mm) in both arches, and a nearly flat curve of Spee. Cephalometric analysis indicated an ANB angle of 5° , an FMA of 33.5° , an FH-U1 angle of 121.5° , an occlusal plane angle of 13° , and a Z-angle of 58° .

The treatment objectives were to reduce the lip protrusion and correct the slight irregularity of the anterior teeth with lingual orthodontic appliances, after the extraction of four first premolars.

The setup cast was constructed for overcorrection, and Fujita triple-slot lingual brackets were bonded to the cast using the PW-MBP as described above. Individual Flexible Core

Trays¹³ were made from flexible and hard layers of Fermit** light-cured resin (Fig. 5). The brackets were bonded one by one using the individual trays, and the upper and lower first molars were banded.

Initial .014" stainless steel archwires were inserted into the horizontal bracket slots for canine retraction (Fig. 6). To correct the minor anterior rotations, .012" nickel titanium archwires were placed in the occlusal slots from second molar to second molar. Next, .014" and .016" Elgiloy*** archwires were inserted into the horizontal slots for angulation control, followed by an .016" × .022" TMA† wire to control the

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***RMO, Inc., P.O. Box 17085, Denver, CO 80217.

†Registered trademark of Ormco/A Company, 1717 W. Collins Ave., Orange, CO 92867.



Fig. 6 Initial .014" stainless steel archwires in horizontal bracket slots.



Fig. 7 Two micro-implants placed in palate between upper first and second molars, with .016" × .022" TMA archwire in horizontal bracket slots for maxillary anterior torque control.



Fig. 8 En masse retraction of anterior teeth using .016" × .022" stainless steel maxillary archwire and .016" × .016" stainless steel mandibular archwire.



Fig. 9 Final detailing with .014" Elgiloy archwires in occlusal bracket slots.



Fig. 10 Removal of micro-implants.

torque of the six maxillary anterior teeth (Fig. 7).

Two micro-implants* (12mm long, 1.3mm in diameter) were placed in the palate between the maxillary first and second molar roots. For en masse anterior retraction, an .016" × .022" stainless steel maxillary archwire and an .016" × .016" stainless steel mandibular archwire were inserted into the horizontal slots of the lingual brackets (Fig. 8). In the maxillary arch, extension

hooks were soldered to the main archwire between the upper central and lateral incisors, and nickel titanium coil springs were attached from the extension hooks to the palatal micro-implants. In the mandibular arch, retraction was carried out with sliding mechanics, using Class I elastic thread.

After anterior retraction, .014" Elgiloy wires were inserted into the occlusal bracket slots for final detailing (Fig. 9). The micro-implants were removed without anesthesia during this phase of treatment (Fig. 10). Total treat-

*Dentos, Inc., 258 BunJi, Dong-In Dong, Jung-Gu, Taegu, Korea; www.dentos.co.kr.

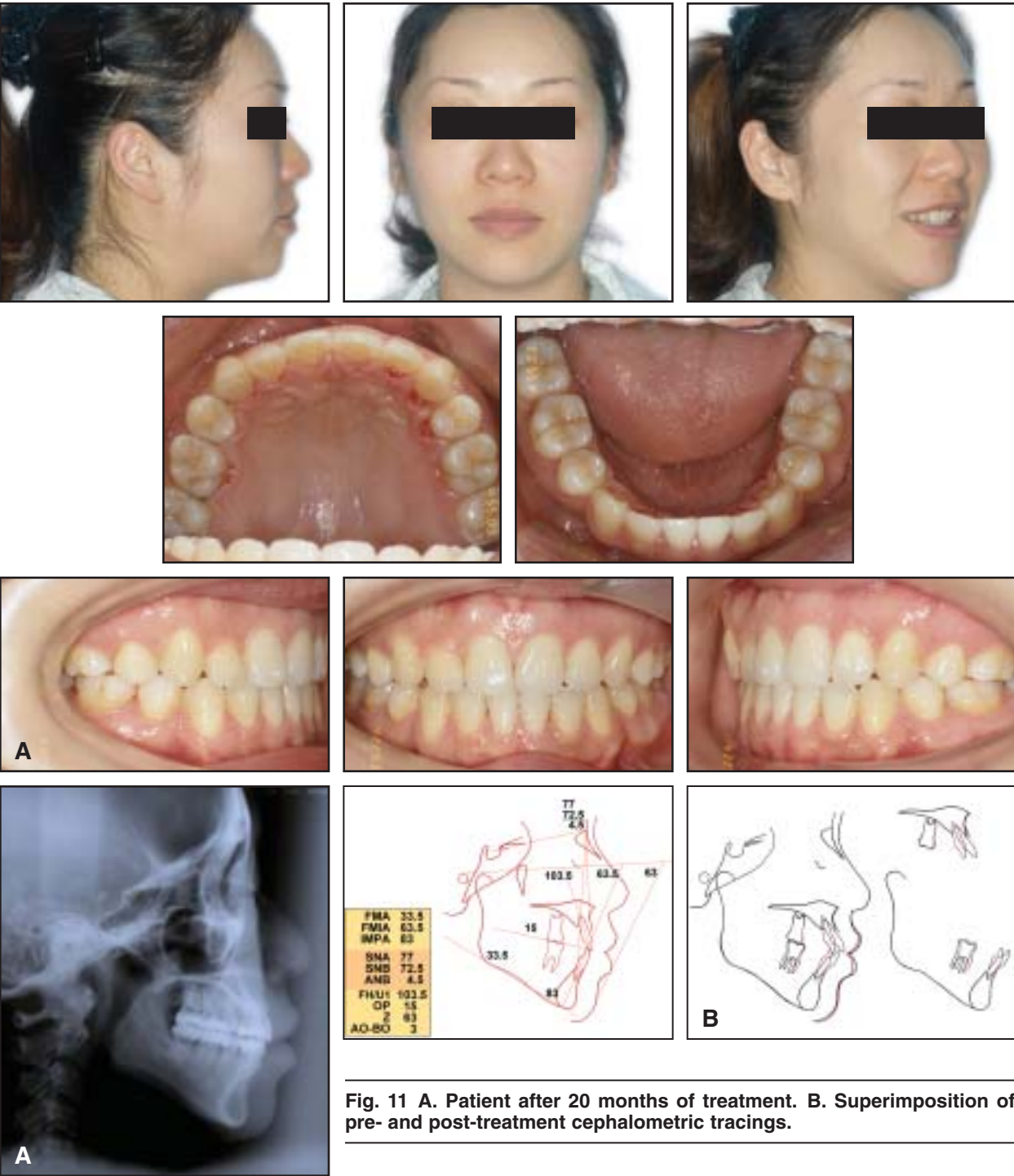


Fig. 11 A. Patient after 20 months of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.

ment time was 20 months (Fig. 11).

Post-treatment cephalometric analysis showed that the skeletal measurements and the molar positions were maintained. The Z-angle was increased from 58° to 63°, indicating an improvement in the profile. The FH-U1 angle decreased from 121.5° to 103.5°, and FMIA increased from 47.5° to 63.5°.

Discussion

To ensure the most accurate bracket positioning, we have used a setup cast for indirect bonding of both lingual and labial brackets since 1986. Because of the variable morphology and inclination of the lingual tooth surfaces, however, it is difficult to achieve identical bracket height, angulation, and torque at the same time on all teeth.

The Mushroom Bracket Positioner made it possible to level all the brackets on one flat plane simultaneously on the setup cast.¹² As the case presented here demonstrates, the PW-MBP system now allows us to treat patients with preformed lingual archwires. A new lingual bracket is currently being designed for this system to reduce the thickness of composite between the bracket bases and the teeth.

Lingual treatment preserves more anchorage than the labial technique, but cannot eliminate anchorage loss entirely. Compliance with

extraoral appliances is problematic, especially among adult patients. The new orthodontic micro-implants provide skeletal anchorage without requiring special cooperation or compromising esthetics.¹³

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