

The Lingual Bracket Jig

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Many patients, especially adults, would prefer lingual brackets over labial appliances for esthetic reasons. Nevertheless, orthodontists have been hesitant to use lingual orthodontics because of factors including:

- Difficulty of direct viewing and access, particularly of retroclined anterior teeth.
- Variation in morphology of the lingual surfaces, especially on the maxillary anterior teeth.
- Wide range of labiolingual thickness of the teeth—from 4.6mm for lateral incisors to 9.2mm for canines—necessitating numerous in-out bends.¹
- Critical relationship between the vertical height of lingual brackets and the labial surface torque, due to the distance of the lingual brackets from the labial surfaces.²
- Much smaller interbracket distances in the anterior region, making compensatory bends difficult.²

For these reasons, precise placement of brackets is even more important in lingual orthodontics than in labial treatment. At present, lingual bonding is done indirectly, using the TARG system,^{*3} the Slot Machine,^{**1} or the CLASS system.^{***4} These procedures can be highly accurate, but they suffer from several drawbacks:

- They are time-consuming and require specialized technical skills, sometimes including the use of an outside laboratory to prepare the indirect bonding trays. If an outside laboratory is used, the clinician can only verify the correct bracket

positions after the brackets have been bonded in the mouth.

- Many measurements and other steps are needed before the brackets can be bonded to the cast and the final transfer tray prepared, increasing the possibility of errors.
- Changing a bracket position requires an additional laboratory procedure and expense.

This article describes a new Lingual Bracket Jig† (LBJ, Fig. 1) that offers both a relatively simple, yet accurate, chairside direct-bonding technique and an in-office laboratory system to prepare a tray for indirect bonding.

Lingual Bracket Jig Concept

The basic idea behind the LBJ is that lingual tooth anatomy and intertooth relationships are amenable to a lingual preadjusted edgewise approach. This principle was confirmed by making topographical contour maps of the lingual anatomy from several finished orthodontic cases.

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Fig. 1 Lingual Bracket Jig kit includes jigs for six maxillary anterior teeth and accessory for maxillary posterior teeth.

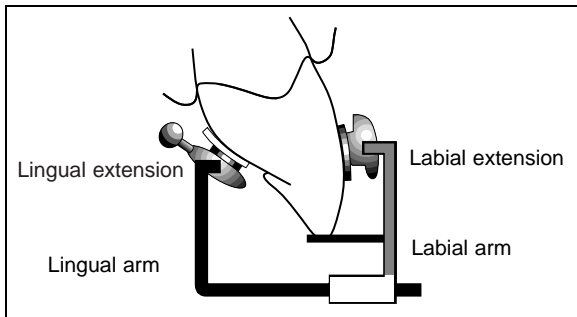


Fig. 2 LBJ transfers labial bracket prescriptions to lingual brackets.

It became apparent that, with the exception of cases with short clinical crowns, lingual morphology permits the establishment of a straight-wire lingual plane in both arches, and that this plane is parallel to the occlusal plane in most cases.⁵

The plane selected for the LBJ was the Andrews labial archwire plane⁶ (LA). The jig simply transfers the Andrews Straight-Wire Appliance* labial bracket prescription to the lingual surface (Fig. 2). Thus, the bracket slots line up around the arch, parallel to one another and to the occlusal plane, while the prescription provides tip, torque, rotation, and in-out.⁷

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Use of the Lingual Bracket Jig

The LBJ consists of:

- A set of six jigs, one for each of the six maxillary anterior teeth, which present the most morphological variation of the lingual surfaces.
- An accessory universal LBJ for the maxillary posterior teeth (no torque or angulation prescribed).
- A special millimetric ruler, accurate to .1mm.

Each jig has a labial arm and a lingual arm. The tip of the labial arm incorporates a prescription, similar to that of a preadjusted labial bracket. The lingual arm, which holds the lingual bracket, slides into the labial arm. The lingual bracket is mounted on the lingual arm extension, which parallels the labial slot and extension in all three dimensions. Thus, when the lingual bracket is mounted on the LBJ, the lingual bracket slot is parallel to the labial slot. When the labial arm is positioned correctly, according to the LA point, the lingual bracket is automatically placed in its correct position (Fig. 3).

The problem of play between the lingual extension and the lingual bracket slot is eliminated by the special spring mechanism of the lingual extension, which holds the lingual bracket securely, but still allows a quick release of the bracket after bonding. The spring fits either .018" or .022" brackets, although delicate manipulation is required to change its caliber (Fig. 4).



Fig. 3 A. Labial arm of LBJ positioned on labial surface of tooth, duplicating location of labial bracket relative to LA point. B. Lingual bracket automatically placed in correct position.

Three-Dimensional Control

In-out positions of the lingual brackets are set by measuring the labiolingual width of the widest tooth with the special millimeter ruler, fixing the in-out stopper, and sliding the jigs of all the anterior teeth to the same distance (Fig. 5).

The height of lingual bracket placement is controlled with an occlusal stopper (Fig. 6). At its zero position, the stopper allows 1mm between the incisal edges of the anterior teeth and the biteplanes of the anterior brackets, which provides an overbite of 1mm at the end of treatment (Fig. 7).⁸ For bonding to long, thin teeth with low cingulae, the occlusal stopper is adjusted by slid-



Fig. 4 Delicate spring mechanism on lingual extension holds lingual bracket securely, but allows quick release after bonding.



Fig. 5 In-out control of bracket positioning by measuring labiolingual width of widest tooth with special millimeter ruler and fixing in-out stopper. Jigs of all anterior teeth are then slid same distance.

ing it along the groove on the labial arm.

Placing full-size archwires in the lingual bracket slots and allowing them to work out completely could lead to clinically unacceptable results.⁹ Even with perfect bracket placement, full-size straight wires cannot deliver teeth to the straightwire torque prescription, because of force diminution and the play between the archwire and bracket slot. In addition, much more torque is required in extraction cases treated with the lingual technique than with labial brackets, since



Fig. 6 Zero position of occlusal stopper allows 1mm between incisal edges of anterior teeth and biteplanes of anterior brackets, providing 1mm overbite at end of treatment.

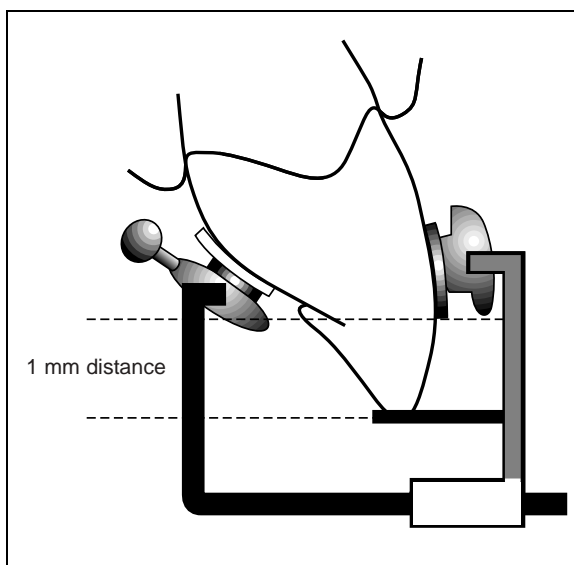


Fig. 7 Adjustable occlusal stopper.

the retraction force is applied lingual to the center of resistance of the anterior teeth, creating a tendency for these teeth to be retroclined during space closure.¹⁰

Therefore, extra torque is built into the LBJ (Table 1), based on the Bios* prescription.¹¹ This allows earlier torque control with lighter wires, ensuring adequate torque control throughout treatment and placing less dependence on full-size edgewise archwires. When more torque is needed, it is built into the system; when less torque is needed, the archwire is downsized to take advantage of bracket tolerance.¹¹

Case 1

This adult bimaxillary protrusion patient presented with flaring of the anterior teeth in both arches due to periodontal problems and pos-

TABLE 1
LBJ PRESCRIPTION

Maxillary Teeth	Torque	Angulation	Height
Central incisors	+18°	+5°	5.0mm
Lateral incisors	+10°	+9°	5.0mm
Canines	+3°	+10°	5.5mm
Posterior teeth	0°	0°	5.0mm

terior bite collapse (Fig. 8A). Lingual brackets were bonded indirectly with the LBJ, and space closure was carried out with an .0175" × .0175" TMA* archwire in .018" Ormco lingual brackets (Fig. 8C). The bracket positions were fully

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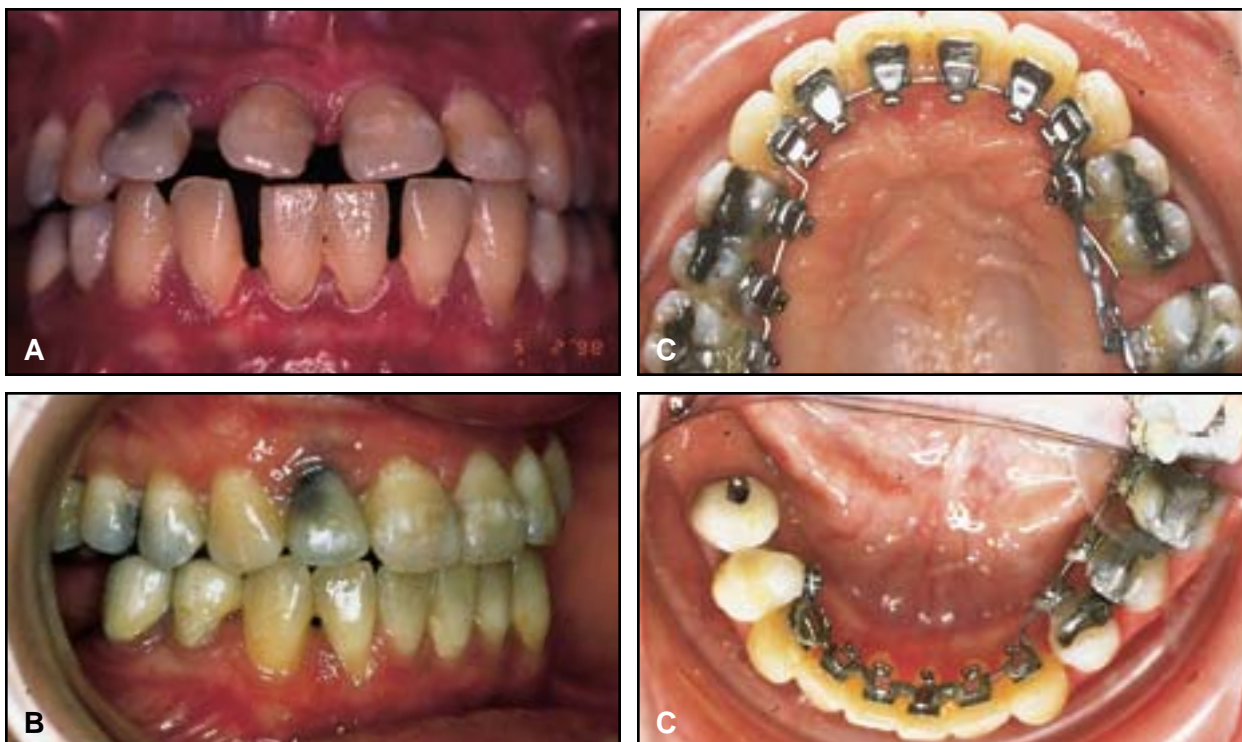


Fig. 8 Case 1. A. Adult bimaxillary protrusion patient before treatment. B. After six months of treatment. C. Lingual brackets bonded indirectly with LBJ; spaces closed with full-size TMA archwires in .018" brackets.

expressed in the tooth positions six months later (Fig. 8B).

Case 2

This patient presented with maxillary crowding and a blocked-out maxillary left cuspid (Fig. 9A). The maxillary left lateral incisor was in crossbite, with excessive lingual root torque. Ormco lingual brackets with .018" slots were bonded indirectly to the six maxillary anterior teeth using the LBJ, and brackets with .022" slots were bonded indirectly to the posterior teeth by "eyeballing" (Fig. 9B).

After initial alignment with an .016" preformed nickel titanium lingual archwire, and

interproximal reduction in the posterior region to resolve the crowding, a full-size .0175" × .0175" TMA archwire was engaged. After five months, the torque and vertical position of the left lateral incisor had improved, but the tooth looked shorter than it should have (Fig. 9C). One might suspect that the bracket had been bonded too close to the incisal edge. Nevertheless, after another five months of torque control with the same TMA archwire, without changing the bracket position, the tooth appeared to have the correct length and torque (Fig. 9D).

Case 3

Another adult patient presented with a mild

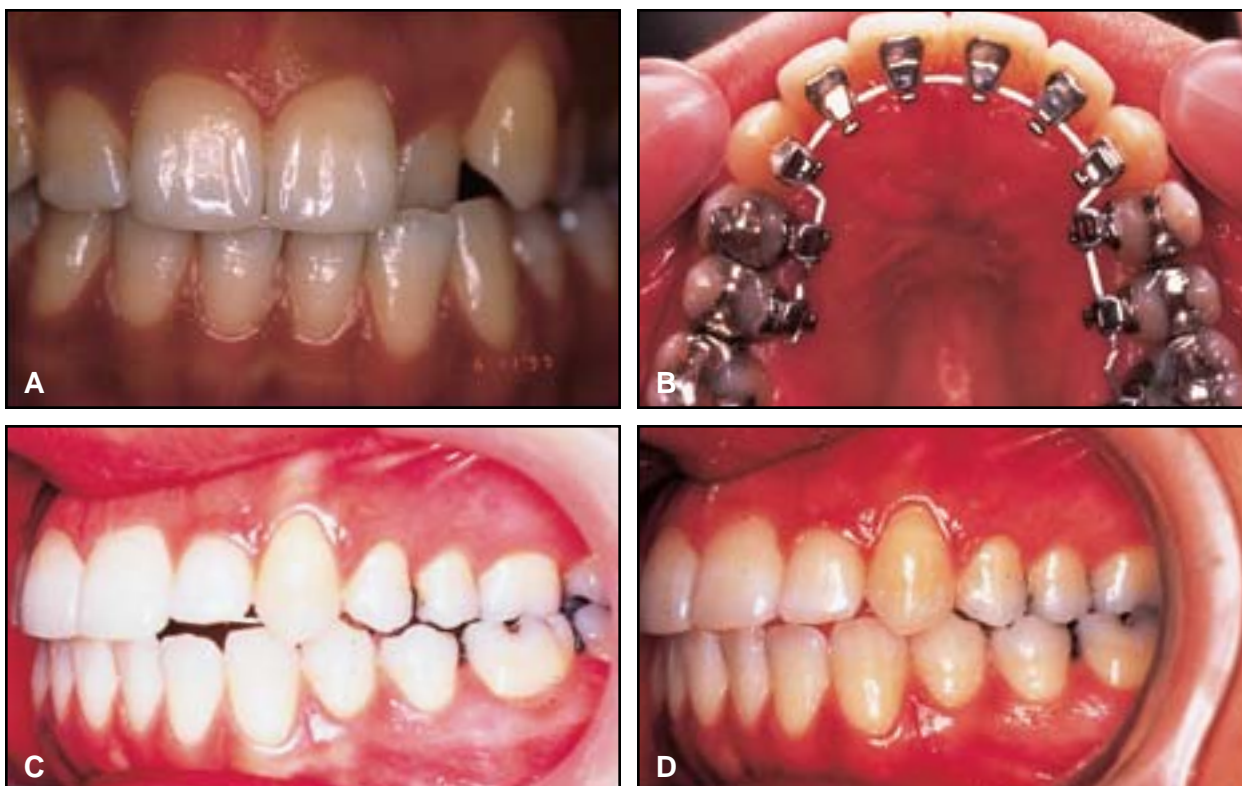


Fig. 9 Case 2. A. Patient with maxillary crowding and blocked-out maxillary left cuspid before treatment. B. .018" lingual brackets bonded indirectly to anterior teeth with LBJ; .022" brackets bonded indirectly to posterior teeth by "eyeballing". C. After five months of torque control with full-size TMA archwire, left lateral incisor shows improved torque and vertical position, but looks short. D. After five more months with same archwire and bracket position, incisor shows proper length and torque.

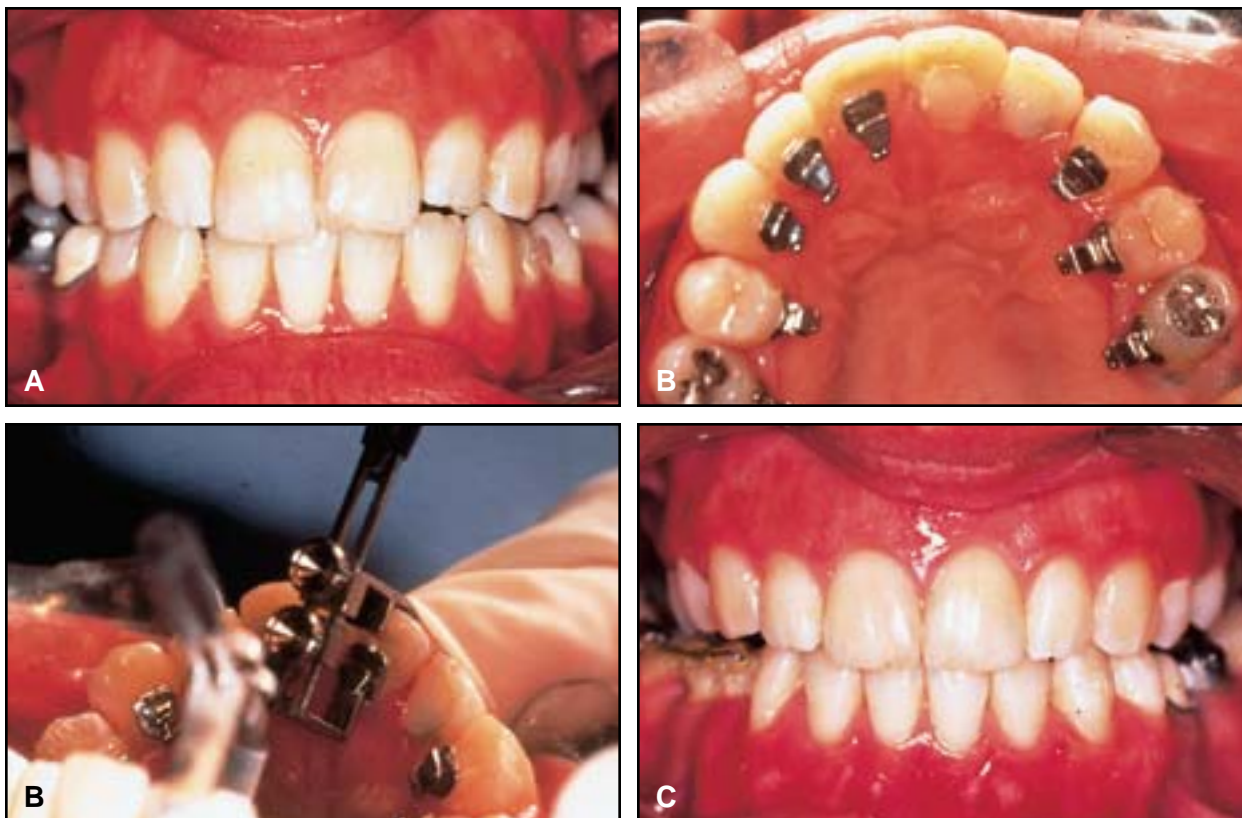


Fig. 10 Case 3. Adult patient with mild Class II malocclusion and moderate crowding. **A.** After seven months of treatment with full-size TMA archwire, maxillary left incisors appear malpositioned. **B.** Brackets repositioned directly with LBJ. **C.** One month later, incisor positions corrected.

Class II malocclusion and moderate crowding. The four first molars were extracted because of their dental condition. The treatment plan involved closure of the extraction spaces and resolution of the crowding and excessive overjet. Ormco lingual brackets with .018" slots were bonded indirectly to the six maxillary anterior teeth using the LBJ, and brackets with .022" slots were bonded indirectly to the posterior teeth by "eyeballing".

After seven months of working out the bracket prescriptions with a full-size .0175" × .0175" TMA archwire, the maxillary left incisors looked malpositioned (Fig. 10A). The two brackets were replaced directly with the LBJ (Fig. 10B), and the tooth positions were then corrected within a month (Fig. 10C).

Conclusion

Lingual bracket positioning with the LBJ is simple and quick, and requires no special training. The LBJ automatically incorporates the Straight-Wire labial prescription into the bonded lingual brackets in all dimensions. This allows the orthodontist to perform direct as well as indirect bonding as in-office procedures, while maintaining case-by-case control over bracket positioning.

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