A New Indirect Bonding Technique for Lingual Retainers

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The first bonded fixed retainers were made with plain round or rectangular orthodontic wires.[1-5] Zachrisson showed, however, that the irregular surfaces of multistranded stainless steel wires offered better mechanical retention without the need for retentive loops, and that the flexibility of these wires allowed physiologic movement of the teeth.[6-9]

To keep the retainer wire in the proper position for direct bonding, it must be held with a finger,[6] dental floss,[7,10,11] orthodontic elastics,[12-14] ligature wires, wires tack-welded to the retainer wire,[6,15] or inlay pattern resin.[16] Any shift in wire position can lead to bond failure and affect the stability of the treatment results.

To avoid this problem, clinicians have introduced various indirect bonding methods, using vacuum-formed thermoplastic sheets or silicone-based impression material as indirect transfer trays.[17-21] Because these trays are opaque or translucent, however, they require a self-curing adhesive, with more chairtime needed for polymerization and the risk of excess adhesive leakage into the gingival embrasures.

This article describes a new indirect bonding method for lingual retainers that uses a light-cured adhesive and a xenon plasma arc light.

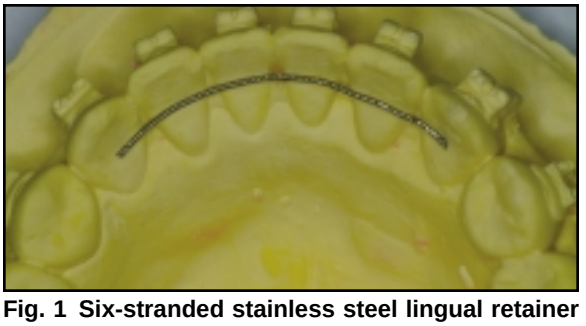

Fig. 1 Six-stranded stainless steel lingual retainer wire adapted to cast and attached with wax between central incisors.

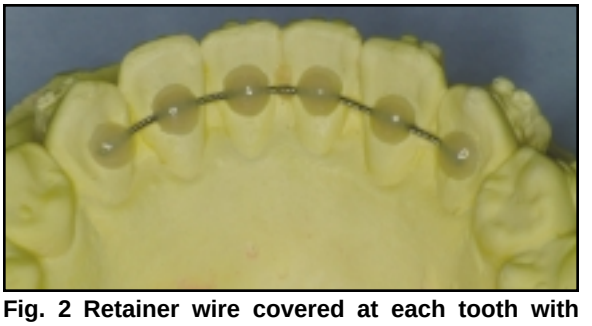

Fig. 2 Retainer wire covered at each tooth with light-cured adhesive.

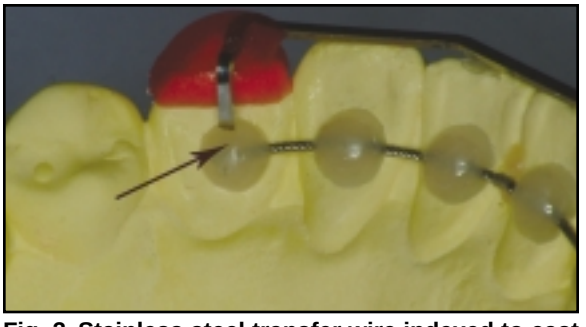

Fig. 3 Stainless steel transfer wire indexed to cast at canine tips (arrow indicates gap between transfer wire and retainer).

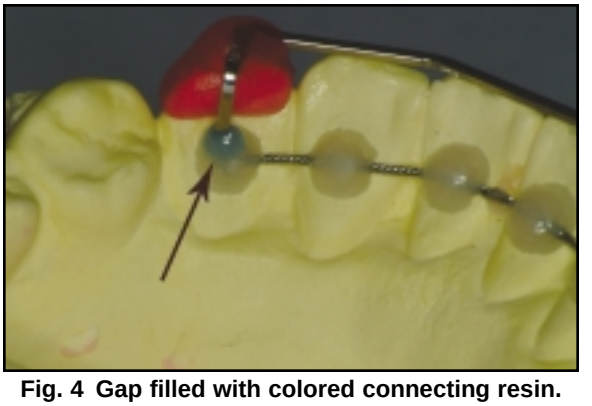

Fig. 4 Gap filled with colored connecting resin.

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Laboratory and Clinical Procedures

1. A few days prior to debonding, take an accurate impression, and adapt an .0195" six-stranded stainless steel retainer wire* to the cast. After applying a separating medium to the cast, attach the contoured retainer wire with wax at the contact point of the central incisors (Fig. 1). Cover the wire at each tooth with Transbond LR,** a light-cured adhesive especially designed for lingual retainers; a 1mm thickness of adhesive is recommended[22] (Fig. 2). Light-cure each bond for six seconds with a xenon plasma arc curing unit.***

2. To fabricate the transfer tray, adapt an .021" × .028" stainless steel transfer wire to the incisal edges of the cast. Stabilize the wire with sticky wax, and apply DuraLay† tooth-index resin at the canine tips or lateral incisor edges (Fig. 3). Connect the gap between the transfer tray and retainer with Bisfil-Core‡ connecting resin; a colored resin is preferred so that it can be easily identified for removal after bonding (Fig. 4). Light-cure the Bisfil-Core.

3. To facilitate removal of the transfer tray and retainer, soak the cast in water for 20 minutes. Before bonding the retainer, sandblast the adhesive bases with 50-micron aluminum oxide to remove any residual separating medium and to improve bond strength through micromechanical etching.

4. After debonding the fixed appliances, pumice the lingual surfaces of the anterior teeth, etch with 37% phosphoric acid for 30-40 seconds, rinse, and dry. Paint the lingual surfaces with Transbond XT** primer, and apply an additional layer of Transbond LR to the adhesive bases on the retainer.

5. Firmly seat the transfer tray and retainer in the mouth, remove any excess bonding material with a scaler or explorer, and light-cure each base for two three-second cycles with the xenon plasma arc curing unit (Fig. 5). Use a utility plier to carefully twist the transfer wire near the connecting

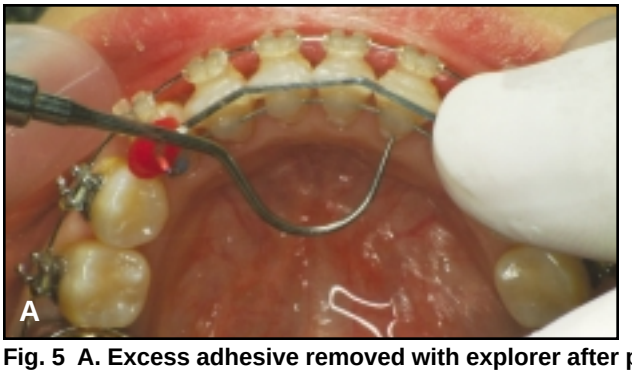
*G&H Wire Company, P.O. Box 248, Greenwood, IN 46142.

**Trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016.

***Flipo, Lokki S.A., 14 rue Frédéric Mistral, 38370 Les Roches de Condrieu, France; www.lokki.com.

†Reliance Dental Manufacturing Co., 5805 W. 117th Place, Worth, IL 60482.

‡Trademark of Bisco, Inc., 1100 W. Irving Park Road, Schaumburg, IL 60193.



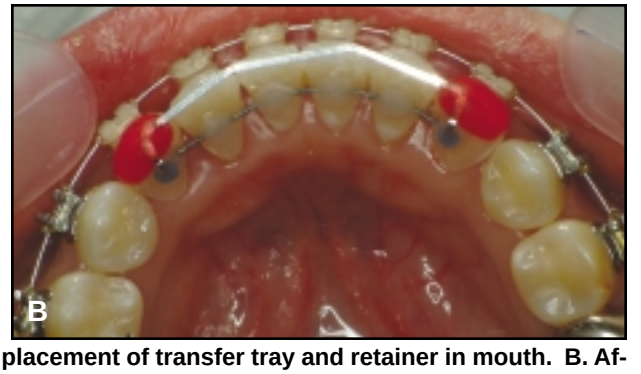


Fig. 5 A. Excess adhesive removed with explorer after placement of transfer tray and retainer in mouth. B. After curing with xenon plasma arc light.

Fig. 6 After removal of transfer tray.

Fig. 7 Finished lingual retainer after removal of remaining connecting resin.

resin, and remove the tray (Fig. 6). Finish the appliance by removing the rest of the connecting resin (Fig. 7).

Discussion

According to Årtun and Zachrisson, one of the main reasons for fixed retainer bond failure is distortion of the retainer wire during polymerization of the adhesive.[23] The wire-resin transfer tray shown here completely stabilizes the retainer so that a light-cured adhesive can be used, giving the operator as much time as needed before curing to remove excess composite that might cause gingival inflammation. A xenon plasma arc light has been found to be a time-saving alternative to conventional halogen lights for curing lingual retainer adhesives without compromising bond strength.[24]

Occlusal wear can reduce the thickness of the composite over the retainer wire and thus lead to breakage.[25] Because Transbond LR has been shown to have significantly greater surface hardness than other adhesives, it would have greater resistance to abrasion, minimizing the possibility of long-term retainer failure.[24]

This technique has been used for bonding 15 lower canine-to-canine and 10 lower premolar-to-premolar retainers in our clinic. No bond failures have occurred over three to six months of observation.

Conclusion

Although it requires more laboratory time, the indirect bonding method described in this article offers several advantages over other techniques:

- Better visibility and accessibility for accurate placement of the retainer.
- Ability to remove excess resin from around the retainer before curing without affecting bond strength.
- Improved stability of the transfer tray.
- Reduced chairtime with the use of a xenon plasma arc curing light.

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