Lingual Retainer Application Using Indirect Bonding Technique: A Technical Note

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Abstract

Introduction: Fixed retainers are the most commonly used method of retention after orthodontic treatment. Accurate and passive adaptation of the fixed retainer wire to the anterior teeth, in addition to moisture control during the bonding procedure, are of utmost importance. Therefore, indirect bonding techniques of fixed retainers have been recently introduced to overcome the disadvantages of direct bonding methods, such as moisture contamination and changes in the wire position during intraoral bonding. Another benefit of indirect bonding methods is less dedicated chair time for bonding fixed retainers. A modified technique is used for the construction of the silicone tray in this technical note of indirect bonding of lingual retainers.

Keywords: Fixed retainer, Orthodontics, Relapse

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Introduction

Orthodontic relapse has been defined as a return to the pretreatment condition of the dentition. Even with a correct diagnosis and treatment plan followed by adequate posttreatment retention protocols, relapse still occurs in a high percentage of orthodontically treated cases with a tendency to return to the original malocclusion many years after (1, 2). There are multiple factors affecting the stability of orthodontic treatment, including the severity and type of malocclusion, treatment approach, patient cooperation, growth, adaptability and type of the hard and soft tissues, as well as duration and timing of the retention protocol (2).

Long-term retention of orthodontic treatment that requires minimal patient cooperation is generally the preferred method, as long as patients can maintain adequate oral hygiene. Fixed retention protocols, which include bonding of a stainless-steel wire on the lingual surfaces of the anterior teeth, have shown satisfactory results in maintaining and ensuring the stability of the aligned anterior dentition (3).

Although there are different bonding techniques for fixed retainers, direct bonding is the most common procedure, which includes bonding the composite pads directly in the patient's mouth, with or without previous bending, and adaptation of the retainer wire by a laboratory technician (3). Indirect bonding techniques have been introduced to overcome the disadvantages of direct bonding, which are more challenging due to the risk of contamination from saliva and changes in wire position during the bonding procedures that lead to failure (4). Indirect retainers are fabricated passively on the patient's casts and then transferred intraorally using a tray containing the retainer wire and composite pads. Although indirect bonding enables a more accurate placement of attachments and improved patient comfort with less chair time, it is a sensitive technique that requires more laboratory time and procedures, including an additional set of impressions (3, 5).

This technical note describes a practical and effective technique for indirect retainer fabrication and clinical bonding.

Materials and Method

Preparation of the indirect retainer and silicone tray:

C silicone putty (Speedex Putty, Coltène/ Whaledent, Altstatten, Switzerland) impressions were taken from the maxillary and mandibular arches, and plaster casts were constructed. The upper and lower retainer wires (0.016×0.022", Bond-A-Braid, Reliance, USA) were passively adapted on the plaster casts. Afterward, the lingual surfaces of the anterior teeth on the plaster casts were coated twice with a separating medium (allowing it to dry in between).

The adhesive was applied over the upper and lower retainers on plaster models, and each bonded tooth was light-cured for the required time (Figure 1). The composite pads used to attach the lingual retainer wire to the tooth surface of the plaster casts were modeled according to the lingual tooth surface anatomy, covering 4/5 of the surface and leaving about a millimeter of uncovered enamel. Special care was taken to ensure a smooth transition from the composite surface to the enamel, thereby preventing bacterial plaque accumulation. In this example, Transbond™ LR Light Cure Adhesive (3M™, Monrovia, California, USA) was employed, and each tooth was light cured (Lite Q LD-107, Monitex Industrial Co. Ltd., Taipei, Taiwan) for 10 sec.

An impression of the plaster casts with the bonded retainer was taken using C silicone putty and the one-stage impression technique (Figure 2). The silicone was cut distal to the last bonded tooth covering the lingual and incisal surfaces of the anterior teeth to allow easier intraoral placement of the silicone tray during the indirect bonding of the lingual retainer (Figure 3). The plaster casts and silicone trays were placed in water for 10 min,and then the silicone trays were slowly removed from the plaster casts. At this stage, the constructed retainer and composite pads should be in the silicone tray (Figure 4).

The composite pads were gently polished with a polishing brush by applying light pressure, and subsequently, acetone was applied on the resin surfaces to remove residual impurities from the resin base.

Clinical portion of the indirect retainer bonding:

The lingual surfaces of the anterior teeth were prepared for bonding by following normal tooth preparation procedures. A thin layer of the indirect bonding adhesive was applied on the etched lingual surfaces of the anterior teeth and the composite pads of the retainer. In this case, Sondhi™ Rapid-Set Indirect Adhesive (3M™ UNITEK, Monrovia, California, USA) was used for indirect bonding. A thin layer of Sondhi™ Rapid-Set Indirect Adhesive Resin A was applied on the etched and dried lingual surfaces of the anterior teeth. Sondhi™ Rapid-Set Indirect Adhesive Resin B was applied on the resin base surface of each tooth in the indirect silicone tray (Figures 5 and 6). No mixing of the indirect bonding resins was required as it was a contact set resin.

The silicone tray was placed on the anterior teeth and held for the required time according to the manufacturer's instructions. In this case, active and equal pressure was applied to hold the silicone tray in place for 30 sec. The silicone tray was then completely removed after being left to sit passively on the teeth after 2 min, and the gingival embrasures were checked for excess resin (Figures 7 and 8).

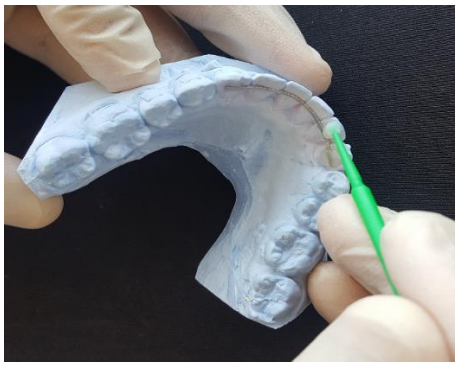

Figure 1. Application of the adhesive on the plaster model

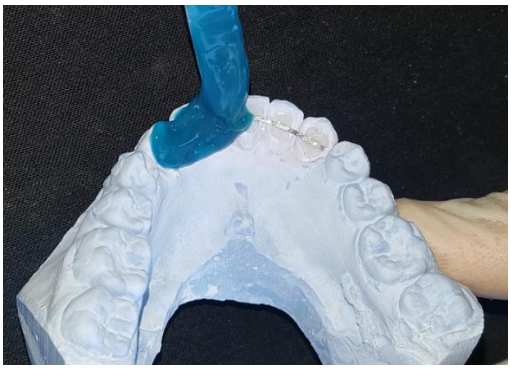

Figure 2. Impression of the plaster cast with the bonded retainer

Figure 3. Cutting of the silicone tray for intraoral placement

Figure 4. The constructed retainer and composite pads in the silicone tray

Figure 5. Application of the indirect adhesive on the etched lingual surfaces of the anterior teeth

Figure 6. Application of the indirect adhesive on the composite pads of the retainer

Figure 7. Placement and pressure application of the silicone tray on the anterior teeth

Figure 8. Removal of the silicone tray

Discussion

Retention after orthodontic treatment is a critical part of the treatment itself since changes are unpredictable due to maturational factors and relapse (6). Therefore, different removable and fixed retention protocols are used after treatment for an extended period (7).

Fixed retainers are the most commonly used method to maintain the esthetic and functional treatment results without any harmful effects on oral tissues and with minimal need for patient compliance (2, 8). However, bonding failures of fixed retainers are a significant problem, estimated at 6% and 25%, depending on the

technique and the observation period, (6). The most common site of retainer failure has been reported to be at the adhesive and enamel interface (7).

Careful preparation and passive adaptation of the fixed retainer wires to the anterior teeth, in addition to moisture control, are essential factors for the success rate of the retainer. Various indirect bonding techniques have been described in the literature to improve clinical procedures of bonding fixed retainers, with advantageous properties such as reduced clinical chair time, accurate placement of the retainer, patient comfort, and reduced risk of moisture contamination during polymerization (3, 4, 7, 9). Another positive aspect of the indirect bonding technique is the prevention of torque differences of the teeth included in the fixed retention since the secured position of the retainer wire inside the transfer tray ensures the passive position of the wire from fabrication to placement, allowing for absolute passivity of the wire during the bonding procedure (3).

This technical note describes a feasible and effective indirect bonding guide for fixed retainers, which doesn't require vacuum thermoforming machines to construct the transfer tray but instead makes use of silicone putty, which is readily available in dental practices.

Conflict of Interest:

There is no conflict of interest to declare.

Acknowledgments

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