

Retention

Post-Treatment Fixed Lingual Retainers

by Arlen J. Hurt C.D.T.

Abstract

The widespread use of bonded lingual retainers has been increasing, as clinicians and patients strive to retain post-orthodontic treatment results and avoid relapse. This article discusses various types of fixed retainers such as metal mesh pad retainers, custom composite pad retainers, dual retention techniques, and the use of a unique indirect tray system that enhances bonding of the appliance in the mouth. Bonding techniques are reviewed, along with the use of newer digital scanning technology, 3D technology, and the ability to construct multiple retainers from one model.

Numerous articles have explored the effectiveness and dependability of bonded retainers following orthodontic treatment,¹ and there are several videos on YouTube™ demonstrating different methods for fabricating these retainers. Bonded lingual retainers are not only a great way to preserve a patient's smile by preventing orthodontic relapse, but also are extremely valuable in stabilizing periodontally involved teeth.



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Both dentists and laboratory technicians understand that there is no dental appliance or fabrication that is indestructible, and that patients who do not comply with post-op instructions put any device to the ultimate test.

Several studies and articles have addressed the longevity and success of bonded lingual retainers.¹ It is estimated that approximately 20 to 25% of upper retainers will have some debonding issues within five years, and that 12 to 16% of lower retainers will experience similar difficulties.²

Most of these failures are attributable to extraoral or intraoral trauma.³ Even though these types of failures are not able to be controlled by either clinicians or laboratories, keeping track of failures, and recognizing and identifying if the patient has experienced any such trauma, is crucial in evaluating the success of retainer use in your practice.

Increased Usage

Laboratories report a steady increase in the use of bonded lingual retainers over the past 25 years, and attribute this increase to two factors:

First, each year, more and more orthodontic patients undergo retreatment because they did not responsibly wear their retainers after their initial orthodontic treatment; once they are retreated, patients will almost always insist upon fixed retention.

Second, with ready internet access, today's patients are more knowledgeable and aware of differing treatment options. These well-informed patients will often want to avoid anterior orthodontic relapse by requesting bonded retention after researching online or asking family or friends.

Types of Indirect Retainers

Laboratories generally manufacture two basic types of retainers: metal mesh pad retainers, and custom composite pad retainers.³ Both of these designs have unique features and are in wide usage. Materials and manufacturing processes have evolved over the last quarter century, and the specific designs



Figure 1:



Figure 2:



Figure 3:



Figure 4:

for each retainer are flexible and variable depending on the particular clinician's instructions.

The most popular upper fixed lingual retainers generally utilize a .016 x .022 stainless steel wire contoured to the centrals and laterals. In some situations, dentists will wish to include the upper cuspids as well, depending upon the available clearance with the lower teeth. **Fig.1.**

The most popular lower fixed lingual retainer design utilizes a solid stainless steel .016 x .022 wire contoured and bonded to the lingual surfaces of all the anterior teeth; sometimes, the dentists will wish to include the lower pre-molars as well. **Fig.2.**

The wires can come in different sizes and the wire shapes can vary from braided to rectangular. In addition, the wire can also be scalloped below the papilla to help avoid plaque build-up in hygienically challenged patients.

In the 1980s, the most frequently utilized retainers were the fixed metal mesh pad type,⁴ featuring small metal mesh pads on each tooth connected by a solid wire. **Fig.3.** These retainers were very successful and stable in the mouth, but were extremely technique sensitive, and difficult to fabricate in the laboratory. The retainers were difficult to fabricate because soldering procedures often resulted in solder flowing into the mesh pad area.

Ten years ago, with the advent of laser welders, these difficulties were eliminated. Today, labs can now laser weld these retainers with great precision and even add auxiliary hooks to them, if desired. These hooks are extremely useful in helping to discourage tongue thrust and in preventing an anterior open-bite from relapsing.

Currently, the most commonly fabricated fixed lingual retainer produced by Specialty Appliances is the custom composite pad retainer type.⁵ **Fig.4** and **Fig.5.** In the lab, a retention wire is adapted to the teeth on the model, and a custom composite pad placed on the designated teeth. This pad is then cured and formed directly onto the dental cast, resulting in a pad that is custom fit to that tooth's lingual surface.

This process allows the clinician to bond the retainer chairside and use the lab's unique, indirect tray system and flowable composite, greatly reducing the amount of excess adhesive and resin flash that has to be removed. These custom pads are durable, and the size of the pads can be adjusted as per the dentist's preference.

Laboratories generally charge \$50 for the custom composite pad retainers and \$75 for the traditional metal mesh pad retainers.

Bonding the Retainer

One of the important decisions in choosing a particular laboratory to fabricate the fixed lingual retainers, would be their ability to provide special, two-tray transfer systems, also known as indirect tray systems.⁶ This is a two-part tray system that allows the dentist to handle the retainer with stability, yet has



Figure 5:



Figure 6A:



Figure 6B:



Figure 6C: Clinical photo by Dr. Tim Shaughnessy.

the flexibility to allow easy removal of the tray once the retainer has been bonded in place. This greatly reduces the amount of chair time and also allows the doctor to bond the appliance with a flowable composite. **Figs. 6A, 6B, 6C.**

The lab fabricates a flexible inner tray made from a pressure-formed vinyl material that covers the brackets, and an outer hard acrylic material that is processed over the inner tray. This outer tray acts as a carrying and seating tray. The system helps the dentist position and seat the appliance, while maintaining a clear field of vision.

The retainers can be bonded with either a self-curing or a light cure material. Generally, clinicians will use the light-cured method on the custom-composite retainers and the self-cure method on the metal mesh pad type.

Enhanced stability

An additional technique for enhancing orthodontic stability and avoiding relapse is to utilize not only these fixed, bonded retainers, but also a vacuum-formed invisible retainer. **Fig. 7.** The advantages of this dual retention system are that:

- Patients occasionally forget to wear the removable retainer at night, but the fixed retainer will still protect them;
- Patients achieve not only anterior fixed retention, but also posterior retention;
- Patients have additional security if one of the appliances breaks or is lost.



Figure 7:

This technique, using dual retention, is especially accepted and appreciated by patients who have been in orthodontic treatment more than once, and understand how important it is to avoid relapse.

New technologies

We are living in an age of advanced digital technology, and some labs, such as Specialty Appliances, are uniquely equipped to incorporate these advances. They can utilize the dentist's digital intraoral scans to manufacture the retainers, or digitize the dentist's models or impressions with tabletop scanners. This allows them to digitally remove any brackets or retention buttons, block out any undercuts, and manufacture the retainers on the digital models. Labs equipped with an Objet

260V 3D printer, accurate to within 80 microns, can receive a scan of the patient's mouth from an e-mail, print the models, and manufacturer the appliances directly on the printed models. **Fig.8.**

3-D printing technology allows multiple retainers to be constructed from one model. With this technology, the scanned final impression can be stored, and the dentist can have multiple retainers made at one time, or order them from the lab on an as-needed basis.

Step-by-step bonding procedure

The following step-by-step process for bonding fixed lingual retainers is recommended by Specialty Appliances:

Step 1: Make sure the retainer fits properly. This is done by inserting the tray with the retainer into the patient's mouth and checking closely with a mirror to be sure the composite pads fit flush with the lingual surfaces of the cuspids. Once the fit is verified, the pads should be cleaned with acetone to remove any debris from the trial fit.

Step 2: Clean the lingual surfaces of the teeth with plain prophylax paste.

Step 3: Apply etchant to the lingual surfaces of the teeth using a small syringe. Allow 30 seconds for etchant to take effect.

Step 4: Thoroughly rinse the etchant from the teeth and dry with compressed air until the typical chalky white appearance is obtained.

Step 5: Apply a plastic conditioner on the composite pad and allow 90 seconds.*

Step 6: Paint a thin film of light-cure primer on the back of the composite pads and on the lingual surfaces of the teeth.*

Step 7: Apply a flowable composite with a small metal syringe tip, so the minimum amount of paste is used.



Figure 8:

Note: Most clinicians feel that a small amount of light-cure material should be used in case of any discrepancies in the impression taking, model pour-up, or laboratory fabrication.

Step 8: Seat the retainer in the mouth and apply firm pressure to the hard outer tray.

Note: This step is easy to perform because the incisal edges of the transfer tray will orient exactly to the teeth.

Step 9: Activate the light-cure material using a hand-held curing light. Thirty seconds helps ensure a good initial bond.

Step 10: Remove the transfer trays from the mouth, and light cure each pad again for 10 seconds. The final result should have an even seal around the periphery of the composite pads.

A small burr may be used to trim any excess flash. Some clinicians also elect to add a small amount of flowable composite over the edges of the pads, after the indirect procedure, to give a completely smooth finish to the pads. ■

*Steps 5 and 6 can be combined into one step using Assure® bonding resin because it acts as a conditioner and primer.

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