Bonded Lingual Retainers

Bonded Lingual Retainers (BLRs) are an alternative to conventional removable retainers. Though there are several variations in design and materials, they all are bonded to the lingual surface of the anterior teeth and are not visible from the facial view. The majority of these appliances are made for the mandibular arch, though they can be made for the maxillary arch if there is enough clearance in the occlusion. Patients with deep bites are not good candidates for maxillary BLRs.

In recent years, these appliances have gained popularity for two important reasons. The first reason has to do with the increased patient demand for “invisible retention”. The marketing of the Invisalign system has raised public demand for retainers that are unobtrusive. Patients want a product that can be worn without being seen. The second reason is based on a need to maintain the stability of the mandibular anteriors during the retention phase of orthodontic treatment. For years many orthodontists have believed that expansion of the mandibular arch beyond the original width between the canines is very unstable. The latest studies seem to support this belief and recommend permanent retention to avoid relapse. The BLR is a good choice in these situations since the appliance is fixed in place and does not rely on the patient for compliance in wearing it.

The original design of BLRs consisted of a prefabricated appliance that came in various sizes and had a solid piece of .028 stainless steel wire attached to two metal pads with a mesh surface to be bonded to the canines. The technician would choose the size that best suited the case and then custom bend the appliance to fit the patient’s work model. When placing the appliance in the patient’s mouth, the orthodontist would have to guess at the position intended by the technician and they would have to hold that position until the initial set of the cement. Some tricks were developed to hold the appliance in place for cementation such as tying floss around the wire and pulling it tight between the anteriors in three locations. A variation of this prefab design was developed to address concerns over rotations of the incisors which were not properly controlled by the original design. Metal bonding pads were added to each of the anterior teeth for individual control. The idea was a good one in concept but in practical application it was flawed. Getting each pad positioned in an ideal bonding location on each anterior tooth was sometimes difficult due to the prefabricated nature of the appliance.

Some orthodontists began using a solid piece of wire custom bent to the lingual of the anterior teeth and bonded directly over the wire to the surface of each tooth. This worked well but could be difficult to cement into place. A variation of this method which has become popular uses custom pads made of a light-cured composite which are pre-formed in the laboratory over the wire onto each anterior tooth using a work model. The custom fit of the pads provides a superior bonding surface because more surface area of the pad comes into contact with the tooth. Over the years different wire types have been used for this design including a solid round wire, a rectangular wire, and a braided wire (smaller strands braided into one larger strand).

An innovation in the bonding of these appliances came in the form of what is known as a transfer tray. After bending the appliance the technician would fix it in place on the work model, and use
a silicone putty material to form a tray that fit over all six of the patient’s anterior teeth and the Bonded Lingual Retainer. When the putty set-up it formed a matrix that could be used by the orthodontist to duplicate the original fit of the appliance as intended by the technician. Cement was placed on the pads of the appliance while it rested in the transfer tray. The tray was then placed in the patient’s mouth and held there until the initial set of the cement. The orthodontist would then remove the tray leaving the appliance bonded in place.

As the bonding materials of choice began to trend more toward light cured materials, the putty was no longer a practical option as the light could not penetrate the tray to cure the cement. Labs began switching over to vacuum or pressure formed materials similar to those used to make athletic mouth guards only thinner. This material adapted well to the models and appliances and light could penetrate it. The down side was that they were too flexible which meant that the appliance could easily fall out of the tray and that the wrong amount of pressure during the bonding process could displace it or even activate the wire by bending it slightly. The solution came in the form of what is known as the two-tray system. This process uses a thin layer of the soft mouth guard material (EVA) with a hard outer layer of the material used to make invisible retainers (PVC) formed over top of it. The soft inner layer grips the appliance and fits over the teeth easily, while the hard outer layer provides a rigid shell for easy handling without displacing or activating the appliance.

From the fabrication process through the bonding process both the technician and the orthodontist must be very careful to keep the bonding surfaces of these appliances clean. By far the largest cause of failure in the integrity of these appliances comes from bond failures. One cause of these bond failures is contamination of the bonding surfaces. The technician must clean these surfaces with acetone upon completion of the appliance and the orthodontist must clean them again if a trial fit is performed on the patient prior to bonding. Another cause of bond failures is moisture. After etching the teeth to enhance bond strength, a “dry field” must be maintained in the area where the custom pads will be attached in order to decrease the likelihood of bond failures.