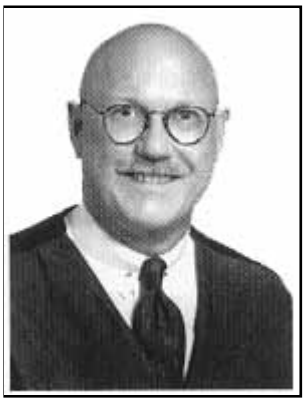
In italiano, per favore
En español, por favor

Original Article
Published on 05/04/98

Bonded Retainers:

step-by-step theory and practice

Part 1



Richard N Carter DMD, MS
Portland Oregon USA

"*Trust in God, but tie your camel*"

Arab proverb

Note: The author has no financial interest in the products described in this article.

The philosophy of bonded retention

Angle recommended fixed retention of certain badly displaced teeth, using unsightly band and bar retainers - all that technology allowed in 1917. It was thought that intermittent retention as provided by a removable retainer was insufficient to hold treated problems such as rotated lateral incisors seen in class II division 2 malocclusions.

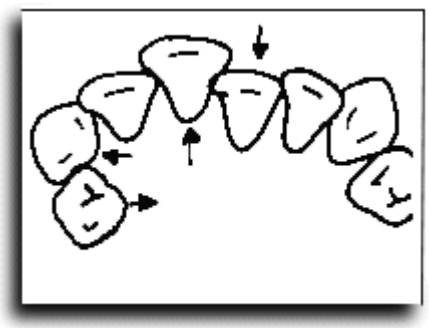
In 1975, when composites had become reliable enough to hold wires without bands firmly for two years, we began routinely bonding lower lingual wire retainers from canine to canine, with composite adhesive on the lingual of canines only. These replaced our banded retainers. With advances in both wire and adhesive technology, indications for and uses of bonded retainers have increased; we have some in service which are now 20 years old.

Figure 1. A bonded lower lingual canine-to-canine retainer does more than just hold the lower anterior teeth. Notice the role of overbite and overjet in maintaining form and function. Pressure of the lower lip resting normally against the upper incisal edges creates a force holding uppers against lowers against a smooth lingual arch.

When occlusion and crown length permit, virtually any pair or set of teeth within a single arch can be bonded from the lingual or palatal. Such cosmetic and functional retention has removed much of the imprecision and most cooperation requirements from routine orthodontic retention. It allows us to offer extended retention plans to most of our patients following a normal two year retention period[2]. Such retainers give excellent service for ten or more years without replacement. They require little patient cooperation. They provide constant and relatively fixed retention.

Lower bonded lingual retainers

Figure 1 shows a lateral view of a bonded lower retainer. Lip pressure of the lower lip against the incisal edges of the upper incisors holds the upper teeth against the lowers, which are held against the smooth bonded retainer wire. The lingual wire is part of a fixed system which holds the canines, the intercanine width, and the anterior arch form - both lower and upper - in the exact position of the arch at the time of bracket removal. It does not hold the incisor teeth vertically, depending instead on excellent anterior coupling to hold relationships through normal function. Usually, lower bonded retainers are from canine-to-canine and only bonded to the canine teeth with filled posterior composite resin (P50®, 3M). This is important.



Teeth must be relatively free to move independently with function. If adjacent teeth are held tightly together -e.g., directly bonding two centrals together - there will often be a fracture of the common bond due to independent flexion of the periodontal ligaments. Also, bonded 3 to 3 retainers should not be used where anterior coupling is not ideal, because the lack of physiologic forces shown in Figure 1 will render such retainers inadequate. They should not be used if the teeth are not straight! Prior to

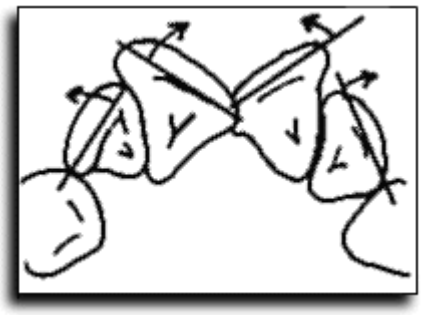


Figure 2. Rotations are distinguished from crowding, because the free gingival fibers have a memory of the rotation and are not reorganized during orthodontic tooth movement. We have fiberotomies performed during active treatment after teeth are derotated to a 110 % (overcorrected) position, then hold these teeth with flexible bonded retainers for two or more years.
A belt and suspenders ?

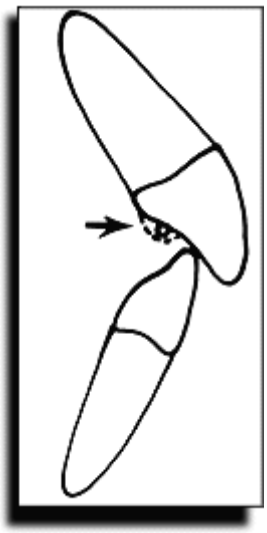
scheduling bracket removal and taking the retainer impression, all contact points should be flattened and "reproximated" to resist displacement[3,4] and all spaces closed. The retainer wire is constructed to ideal alignment.

Upper (palatal) bonded wire retainers

Because the lower incisors normally occlude in the lingual fossae of the upper, space to bond retainers is limited, especially in children with short crown heights. Indications for bonded upper linguals are:

- Rotated teeth
- Diastemas

Rotations are different from simple crowding. (Figure 2.) They should be held firmly for two years after active treatment[4,5, 6,7]. In addition, we have free gingival fiberotomies, as described by Edwards[8], performed by an oral surgeon or periodontist at least six months before brackets are removed to help prevent the pull of the free gingival fibers from creating rotational relapse. We hold the rotations and still allow the periodontal ligaments to function when holding adjacent teeth by using flexible spiral wires (FSW® Masel) as the retainer.



Various authors have described methods of bonding retainers [9,10, 11,12] and we have borrowed freely from them and incorporated refinements FSW retainers are bonded to each tooth they rest on, after sealing the entire lingual surface with light cured 3M Scotchbond® resin.
Care is taken to keep the composite smooth, minimal, and out of occlusion. In effect, we are enlarging the cinguli of the maxillary incisors in most cases (Figure 3).

Figure 3. A bonded upper retainer wire is located in the gingival third of the tooth to avoid occlusion. The composite is smoothed to effectively enlarge the cingulum slightly, feathering the edge so plaque retention is minimized.

Figure 4. A. Impressions are made with appliances in place, so the retainer may be bonded at the day of bracket removal.

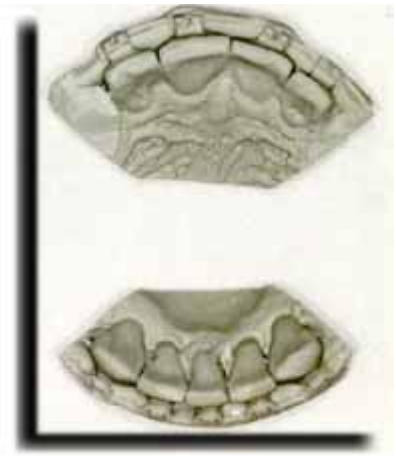


Figure 4. B. Models are trimmed up to the last tooth to be bonded to facilitate wire bending.

Lower bonded retainer preparation and fabrication

An impression of the linguals of teeth to be retained is taken at the appointment preceding bracket removal. Beading wax is rolled to the thickness of thin spaghetti and a rope pushed under the gingival wings of the anterior brackets to prevent alginate tearing when the impression is removed.
Usually, one scoop of alginate placed in the anterior only in a medium tray will give excellent coverage of the six anteriors.

A model is poured and trimmed to the first teeth to be bonded, so that access is easy for wire bending (Figure 4). Pre-formed .030 stainless steel wire segments (Figure 5) are made by assistants during slack time by bending around a turret.
Lingual wire main segments should not be bent with pliers, which will give asymmetric and marked wires. Remember, the arch form is supposed to be even and ideal - if there is a slight irregularity it should not be held permanently by bending the arch to contact it. We send these to a supplier for gold plating (*WonderWire, Wyomissing PA USA).*

Because canines are thicker than incisors, the wire ends have a slight bend to allow the loop to rest in the middle of the canine while the perfectly smooth anterior segment touches the lingual surface of all incisors. Notice that the wire must rest at the incisal/middle third junction of the crowns, at the contact points (Figure 6).
Mistakenly placing the wire in the middle or lower third of the teeth will allow incisors to slip and crowd. The ends of the wire may be bent at right angles or loops for added

Figure 5. Preformed .030 stainless steel wire segments are bent by assistants -into ideal arch form- and stored.
Avoid bending the incisor segment with pliers to avoid nicks or dents or asymmetries. By bending around turrets, symmetry is maintained.

retention. (Figure 6). Note that the loops must tip toward the gingival to follow the contour of the canines.
The portions to be bonded are roughened with a heatless stone to increase adhesion. In contrast to Zachrisson, we have not found it necessary to sandblast, but have always roughened the ends.

Click here for Part 2

HOME VJO 2.2

HOME VJO

Virtual Journal of Orthodontics