

## REVIEW ARTICLE

**Bonded retainers in Orthodontics: A review**

Nikhilnand Hegde, Giridhar Reddy.Y, Vinay.P, Ashish Handa

**Abstract**

The bonded orthodontic retainers made from flexible spiral wire and composite, are now routinely left in place for many years, even decades, as they guarantee excellent long-term stability at least while they are in situ. This paper reviews the rationale for the use of retention following orthodontic treatment, and to describe the types of bonded retainers currently in use for this purpose.

**Keywords:** Bonded Retainers; Lingual Retainers; Bonded Orthodontic Retainers

Retention is usually necessary following orthodontic treatment to overcome the elastic recoil of the periodontal supporting fibers and to allow remodeling of the alveolar bone. The degree of change is variable and largely unpredictable. Bonded lingual retainers have been shown to be an effective means of retaining aligned anterior teeth in the post-treatment position in the long term. (1, 2) This paper reviews the rationale for the use of retention following orthodontic treatment, and to describe the types of bonded retainers currently in use for this purpose.

A new era in dentistry was heralded by Buonocore with the introduction of acid-etch technique.(3-5) In 1965, Newman was the first one to report direct bonding of orthodontic attachments to tooth surfaces(6); and it was Kneirim who first reported its use to construct bonded fixed retainers.(7) Plain round orthodontic wires were used initially,(1) but Zachrisson in 1977 published the potential benefits of using multistranded wires for constructing the bonded retainers.(8) Later, Årtun and Zachrisson came up with an effective clinical technique, in which the wire was bonded only on canine teeth.(9) In 1983, Zachrisson proposed the advantages of bonding the multistranded wire on all the teeth in the labial segment.(10) The proponents of multistranded wire claim its two major advantages: a) increased mechanical retention for composite with no need of retentive loops (10), b) allowance of physiologic movement of teeth in spite of bonding several adjacent teeth due to its flexibility. (11)

Various designs of bonded fixed retainers had been developed; including several wire types with different diameters, various composites, the introduction of mesh pads, intracoronal and extracoronal wire ligation with composites, the use of resin fiberglass strips variants like banded mandibular adjustable retainer, bonded maxillary custom lingual retainer, labial retainers, v loop retainer and gold made ortho-flextech.

Two basic designs of lingual bonded retainers are currently in use. a) Rigid mandibular canine-to-canine retainers which were attached to the canines only. They were effective in maintaining inter-canine width but less so in preventing individual tooth rotations. b) Flexible spiral wire retainers are bonded to each tooth in the segment, their flexibility allowing for physiological movement of the teeth. This design is more effective at preventing rotation of the bonded teeth.(1) The use of fixed lingual bonded retainers for the permanent maintenance of the achieved orthodontic result is increasing as it carries the following advantages, a) differential retention,(1, 12) b) effective and reliable,(13) c) esthetically favorable,(14) d) good patient compliance,(14) e) long term and permanent retention(11) and f) aids in patients with reduced periodontal support.(15)

Materials used for the construction of bonded fixed retainers are, a) Wires: The plain blue elgiloy wire with loops at terminal ends which was used during the early periods were replaced by stainless steel wires for the last two decades. The usual trend of using hard drawn round stainless steel wires with diameter ranging from 0.025 to 0.032 inch was shifted towards the use of 0.015 to 0.032 inch diameter multistrand wire.(1) A 0.016"x.022" stainless steel rectangular wire retainers bonded on all six anterior teeth with 0.022" side in contact with the tooth surface was recommended to achieve a perfect control on alignment of mandibular incisors. In an attempt to reduce the bulk of the retainer and enhance esthetics, resin fiberglass strips also came into the scene; but carrying a disadvantage of making a rigid splint, hence limiting the physiologic tooth movement and causing more failure rates.(7)

b) Composite resins: A conventional restorative composite based on BIS-GMA, has been the pioneer material for bonding the retainers. In order to improve its handling properties, some authors also advised diluting it. Numerous bonding materials like an unfilled acrylic resin; an UV

light-activated conventional composite and a micro filled composite with 52.6% filler content had been tried. Hybrid composites had been used. Several studies support the use of some orthodontic bonding resins to provide satisfactory shear bond strength and wire pullout values. When considering the light curing units, plasma arc and fast halogen lights have been found to be quicker alternatives than conventional halogen lights.(16)

The main disadvantages were hygiene problems, deteriorated effectiveness, discomfort, durability, reparability and physiological harm to soft and hard tissues could be some of the potential problems of using bonded retainer indefinitely. The most commonly observed failure used to be at the wire/composite interface, due to insufficient placement of adhesive and/or abrasion wear. Review of the literature found limited gingival and periodontal problems with occasional accumulation of plaque and calculus causing no apparent damage to the dental or periodontal tissues because the region is regularly bathed by saliva, which has a remineralizing, acid-buffering and antibacterial properties.(7)

Some authors advocated that patients with compromised periodontal support could tolerate a bonded retainer better than the removable retainers.(17) Unexpected movements of anterior teeth have also been reported due to active component of wire, operator induced elastic deflection of wire during bonding or mechanical deformation due to biting on flexible wire retainers and also on bonding thick stainless steel wires only on canines.(7, 8, 11)

In conclusion as long as the bonded fixed retainer is intact treatment result is maintained, orthodontists can be confident in recommending permanent retention to their patients. Retainers should be checked at least once a year, patients must be instructed to report immediately in case of a failure and retainers can be remade at perhaps 10-year intervals to counter the wire fatigue fractures.

**Authors Affiliations:** 1. Dr. Nikhilanand Hegde, MDS, Professor, Department of Orthodontics, Krishnadevaraya College of Dental Sciences, Bangalore 2. Dr. Giridhar Reddy, Y, MDS, Professor, Department of Orthodontics, NIMS Dental College, NIMS University, 3. Dr. Vinay. P, MDS, Professor, Jaipur, Rajasthan, 4. Dr. Ashish Handa, Post Graduate Student, Department of Orthodontics, Krishnadevaraya College of Dental Sciences, Bangalore, India.

#### References

1. Butler J, Dowling P. Orthodontic bonded retainers. *Journal of the Irish Dental Association.* 2005;51(1):29-32.

2. Kini V, Patil SM, Jagtap R. Bonded Reinforcing Materials for Esthetic Anterior Periodontal Tooth Stabilization: A Case Report. *International Journal of Dental Clinics.* 2011;3(1):90-1.
3. Buonocore MG. A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. *Journal of Dental Research.* 1955;34(6):849-53.
4. Gaikwad A. Reinforcing esthetic with fiber post. *International Journal of Dental Clinics.* 2011;3(2):89-90.
5. Saha MK, Saha SG. Restoration of anterior teeth with direct composite veneers in Amelogenesis Imperfecta. *International Journal of Dental Clinics.* 2011;3(2):99-100.
6. Knierim R. Invisible lower cuspid to cuspid retainer. *The Angle Orthodontist.* 1973;43(2):218-20.
7. Newman GV. Epoxy adhesives for orthodontic attachments: progress report. *American Journal of Orthodontics.* 1965;51(12):901-12.
8. Zachrisson BU. Clinical experience with direct-bonded orthodontic retainers. *American Journal of Orthodontics.* 1977;71(4):440-8.
9. Årtun J, Zachrisson B. Improving the handling properties of a composite resin for direct bonding. *American Journal of Orthodontics.* 1982;81(4):269-76.
10. Zachrisson B. The bonded lingual retainer and multiple spacing of anterior teeth. *Swed Dent J Suppl.* 1982;15:247-55.
11. Durbin DD. Relapse and the need for permanent fixed retention. *Journal of Clinical Orthodontics.* 2001;35(12):723-7.
12. Renkema AM, Sips ETH, Bronkhorst E, Kuijpers-Jagtman AM. A survey on orthodontic retention procedures in the Netherlands. *The European Journal of Orthodontics.* 2009;31(4):432-7.
13. Cerny R, Lloyd D. Dentists' opinions on orthodontic retention appliances. *Journal of Clinical Orthodontics.* 2008;42(7):415-9.
14. Wong P, Freer T. Patients' attitudes towards compliance with retainer wear. *Australian Orthodontic Journal.* 2005;21(1):45-53.
15. Moskowitz EM, Kaner C. Predictable retention for the periodontally compromised patient. *Journal of Clinical Orthodontics.* 2004;38(1):14-6.
16. Bearn DR. Bonded orthodontic retainers: a review. *American Journal of Orthodontics and Dentofacial Orthopedics.* 1995;108(2):207-13.
17. Reddy R, BR C, Chaukse A. Retention Appliances—A Review. *International Journal of Dental Clinics.* 2010;2(3):31-6.

#### Address for Correspondence

Dr. Nikhilanand Hegde, MDS,  
Professor, Department of Orthodontics,  
Krishnadevaraya College of Dental Sciences,  
Bangalore, India.  
Email: vinay10reddy@yahoo.co.in

Source of Support: Nil, Conflict of Interest: None Declared