Light-hardened luting cement for orthodontic bands and appliances

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Use of Vitremer Core Buildup/Restorative Cement (3M Dental Products Division) as a luting cement for orthodontic bands and space maintainers was described in 1994.[1] For use as a luting agent, the restorative cement is mixed with a slightly lower powder liquid ratio so the blend is more fluid than one used for a dental restoration. A chief advantage of using Vitremer Restorative Cement for luting stainless steel orthodontic bands is that the material has a light-curing component which hardens substantially in 40 seconds. When a visible light beam is applied from the occlusal aspect, the light irradiates through the translucent tooth structure and initiates the photopolymerization reaction. Following initial light curing, the chemical resin "dark cure" reaction and acid-base polyalkenoate (glass-ionomer) setting reaction continue to completion within the band. Other band cements take at least several minutes for initial hardening and the teeth must be carefully isolated during that time. Another important advantage is that once hardened, the light-hardened resin-modified glass-ionomer cement systems are virtually insoluble in the mouth and have good physical strengths. Bands luted with such cement do not detach. The fluoride content of these cements in close proximity to enamel surfaces also is a beneficial feature. The only disadvantage to using the light-hardened cement is that the material adheres so well to axial surfaces of both primary and permanent teeth, that when the band or appliance is removed, bur cutting, along with ultrasonic scaling, is often required for complete removal of the glass-ionomer material.

3M Unitek Dental Products now markets a blue-colored light-hardened band cement (Unitek Multi-Cure Glass Ionomer Orthodontic Band Cement) based on the Vitremer Restorative Cement formulation. Three years' experiences with the blue cement have been identical to those with Vitremer Restorative Cement.

This technique description details orthodontic band cementation using 3M Unitek Multi-Cure Glass Ionomer Orthodontic Band Cement. In addition, cementation of a translucent mandibular acrylic inclined bite plane for anterior crossbite correction in a preschooler, using a low powder/liquid ratio blend of Vitremer Restorative Cement is described.

Technique Case 1

A traditional band and soldered wire loop space maintainer[2] was made for a 5-year-old boy. The appliance was designed to be attached to the mandibular right primary second molar and span the site of the missing primary first molar (Fig 1). The space maintainer was cemented into place as follows:

Fig 1. Band and soldered wire loop space maintainer indicated for five-year-old.

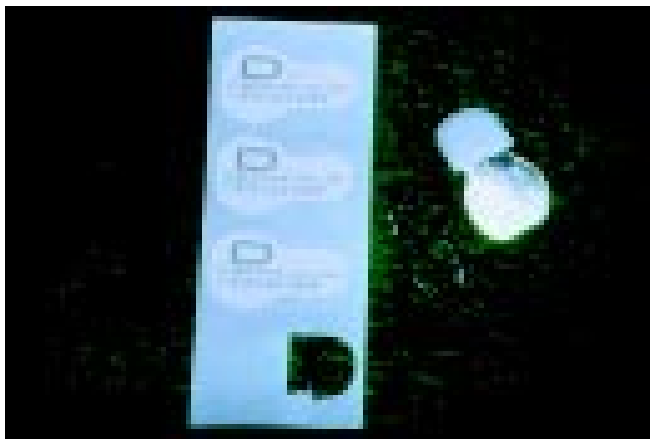

Fig 2. BAND-CAP peeled off strip.

1. The second molar was thoroughly cleaned using a rubber cup and prophylaxis paste. (Experience has shown that it makes no difference if the cleaning pumice paste contains fluoride, or not).
2. A BAND-CAP (Dentaurum Inc.) adhesive cementing strip is peeled from the sheet, leaving the underlying paper adhering to the finger tab section (Fig 2).

Fig 3. BAND-CAP applied to occlusal aspect of band.

Fig 4. Space maintainer ready for cementation.

Fig 5. Space maintainer/cement assembly seated on second molar.

Fig 6. Band and loop space maintainer cementation completed.

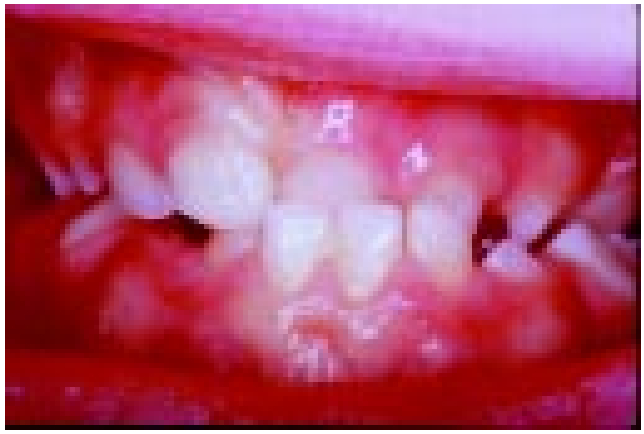

Fig 7. 28-month-old girl with left incisor crossbite.

Fig 8. Mandibular acrylic inclined bite plane filled with fluid blend of Vitremer Restorative Cement.

3. The occlusal aspect of the appliance is compressed upon the adhesive metal surface of the BAND-CAP (Fig 3).
4. After blending the cement, the mixing spatula is used to spread the cement upon the internal band surfaces. The adhesive BAND-CAP prevents occlusal escape of the cement, during this step and band setting.
5. Care is taken to assure that all internal band surfaces are covered with cement and no air bubbles are entrapped (Fig 4).
6. The assembly is compressed into position with finger pressure (Fig 5).
7. The BAND-CAP is removed and seating completed with a serrated amalgam condenser or band seater.
8. The visible light beam is applied from the occlusal direction for 40 seconds.
9. Using an ultrasonic scaler and hand instruments, excess cement is removed and the cementation procedure is complete (Fig 6).

Fig 9. In nine weeks, crossbite corrected and appliance ready for removal.

Case 2

A 28-month-old girl had crossbite of the left primary central incisor and lateral incisor and primary first molars (Fig 7). Incisor crossbite correction was completed as follows:

1. A mandibular inclined bite ramp, for incisor crossbite correction, was fabricated on a dental stone model.[3, 4] Translucent methylmethacrylate orthodontic resin was used so that a visible light beam could penetrate.
2. Vitremer Restorative Cement was mixed with a slightly more fluid consistency than that used for a dental restoration. Using an orange Accudose Syringe Tip (Centrix Inc.), the cement was injected into the appliance (Fig 8).
3. The appliance was seated upon the mandibular incisors and excess cement wiped away using cotton swabs.
4. The visible light beam was applied for 40 seconds from the labial aspect. No light exposure from the lingual direction was needed. Besides the labial light source that initiated cement hardening, complete cement setting was assured from the ensuing chemical resin cure and glass-ionomer acid base reactions.
5. The appliance remained in place for 9 weeks and the incisor crossbite had been resolved (Fig 9).

Author's Observations

The remarkable success of light-hardened resin-modified glass-ionomer band cement in its first five years of use parallels the success of its chemically hardened counterpart, used for crown cementation[5, 6]. Since 1992, the author has yet to recement a stainless steel crown, orthodontic appliance, orthodontic band, or space maintainer using either the light initiated or chemically activated resin-modified glass ionomer systems. These cements, which combine favorable characteristics of the glass ionomers, with enhanced physical properties of the resin component, are making clinical dental procedures for children easier and quicker. In addition, reliability of these cements in the mouth is sure and sustained. Dental clinicians treating children are looking forward to clinical research reports about all the resin-modified glass ionomer cements that confirm scientifically what is being observed empirically.

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