A New, Encapsulated Glass Ionomer for Band Cementation

VITTORIO CACCIAFESTA, DDS, MSC
MARIA FRANCESCA SFONDRINI, MD, DDS
GIUSEPPE SFONDRINI, MD, DDS

Enamel demineralization is more commonly associated with cemented bands than with bonded brackets.[1-3] The properties of conventional orthodontic cements, including high solubility in oral fluids and low bond strength, may contribute to demineralization beneath bands.[1]

Glass ionomer cements, developed by Wilson and Kent in 1972,[4] can inhibit demineralization and thus reduce the risk of caries by releasing fluoride into adjacent enamel over long periods of time.[8] In addition, they are able to absorb fluoride from fluoride toothpastes, thus acting as rechargeable, slow-release fluoride reservoirs.[9] Glass ionomers bond chemically to both enamel and dentin,[5] as well as to non-precious metals and plastics.[6] Although they do not require acid etching of the enamel, their bond strength can be enhanced by conditioning the tooth surfaces with a weak acid, such as polyacrylic acid, to remove contaminants and debris.[7]

A new, experimental glass ionomer cement has been introduced in capsule form to shorten mixing time and eliminate wasted adhesive. GC Fuji Band Capsule* (Fig. 1) is the encapsulated version of GC Fuji Band,* a glass ionomer formulated for cementing orthodontic bands and devices retained with stainless steel crowns or cast splints, such as Herbst** or expansion appliances. Each capsule contains the correct amount of powder and liquid for cementing one band (Table 1).

TABLE 1
PROPERTIES OF
GC FUJI BAND CAPSULE

Powder/liquid ratio	.30g/.15g
Mixing time	10 sec
Working time from start of mix	1 min, 20 sec
Net setting time from end of mix	2 min, 20 sec

Fig. 1 GC Fuji Band Capsule.

*GC America, Inc., 3737 W. 127th St., Alsip, IL 60803.

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Dr. Cacciafesta and Dr. M.F. Sfondrini are Assistant Clinical Professors and Dr. G. Sfondrini is Professor and Head, Department of Orthodontics, IRCCS University Hospital San Matteo, University of Pavia, Italy. Dr. Cacciafesta's address is Piazza Dante 3, 27100 Pavia, Italy; e-mail: vcacciafesta@hotmail.com.

Dr. Cacciafesta

Dr. M.F. Sfondrini

Dr. G. Sfondrini

Technique

1. After adapting the bands or metal crowns to be cemented, remove any contaminants from the internal surfaces. For improved retention, roughen the internal surfaces by sandblasting.

Fig. 2 Capsule mixed in amalgamator.

Fig. 3 GC Capsule Applier used to extrude adhesive over internal band surfaces.

2. Clean the tooth surfaces to be cemented with pumice and water. Rinse thoroughly. Blot away excess water with a cotton pellet or sponge, but do not dessicate the enamel surfaces, which should appear moist or glistening.
3. The capsule should be activated just prior to mixing. First, shake the capsule or tap its side on a hard surface to loosen the powder. Next, to activate the capsule, push in the plunger until it is flush with the main body. Immediately place the capsule in a capsule mixer or amalgamator (Fig. 2), and mix for 10 seconds at high speed (about 4,000rpm).
4. Remove the capsule from the mixer immediately, and load it into the GC Capsule Applier. The working time at room temperature is one minute and 20 seconds, from the start of mixing,

Fig. 4 Band seating and cementation.

Fig. 5 A. Mandibular right segment of cast-splint Herbst. B. Adhesive extruded over internal surfaces of cast splint.

but higher temperatures will shorten the working time.

5. For band cementation, extrude the adhesive to cover the internal surfaces of the band (Fig. 3). Seat the band, and when satisfied with its position, remove excess cement right away (Fig. 4).

For cementation of stainless steel crowns or cast splints, fill the adapted crown or the cast splint with cement (Fig. 5), and seat it. Add some extra adhesive on the occlusal surfaces of the teeth to produce a flat surface (Fig. 6). If a faster set is desired, irradiate the adhesive with a halogen curing light for 20 seconds, or cure it with a plasma-arc light for two seconds per tooth[10] (Fig. 7). After polymerization, remove excess cement, especially on the gingival, and finish the occlusal surfaces with a bur (Fig. 8).

Discussion

The greatest drawback of conventional band cements is that they are produced in the form of a powder and liquid that have to be mixed together manually. This results in wasted material, prolonged chairtime, and difficulty in producing a cement with the same physical properties every time. The new, encapsulated glass ionomer shown here eliminates waste, reduces

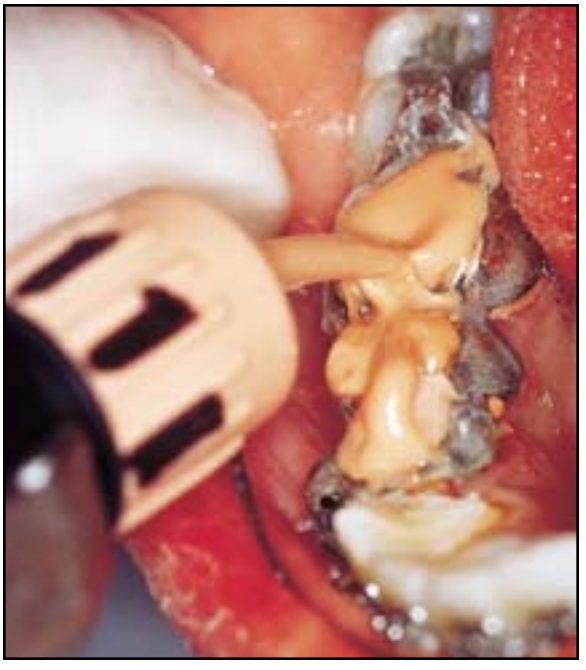

Fig. 6 Material added to flatten occlusal tooth surfaces.

Fig. 7 Light-curing for two seconds per tooth with plasma-arc light.

Fig. 8 Herbst appliance in place after removal of excess cement and finishing of occlusal surfaces.

chairtime, and provides reproducible physical properties, even with different operators, due to the controlled, consistent mixing procedure. The viscosity is always ideal for band cementation, and the quantity of cement in each capsule is correct for one band. Once the cement has been mixed, the capsule applier is a handy and precise means of dispensing the material onto the internal surfaces of the band, compared to the spatula commonly used with other cements.

Besides the favorable characteristics of conventional glass ionomers, such as fluoride release and the ability to bond to wet enamel, another advantage of this new product is its pink color. Most other cements become yellow-white over time, making it difficult to distinguish the cement from the tooth and thus increasing the risk of enamel damage during debonding. (A blue version of GC Fuji Band is also being tested; one color or the other is due to be released on the market in the fall of 2001.)

The only disadvantage of the encapsulated cement we have noted is that the setting time is quite short at room temperature. We suggest storing the capsules in a refrigerator to prolong the working time. If a faster set is desired, the cement can be light-cured with either a conventional visible light or a high-intensity curing unit, which can significantly reduce chairtime.

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