The Use of Glass Ionomer Sealants on Newly Erupting Permanent Molars

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"Clinical Showcase" is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. If you would like to contribute to this section, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Practitioners have been attempting to find conservative ways to treat pit-and-fissure defects for years. In 1955 Buonocore predicted the ability to prevent caries by sealing pits and fissures with a bonded resin material, and he and a coauthor published a paper on pit-and-fissure sealants in 1967.[1] Since then, there have been hundreds of reports documenting the efficacy of pit-and-fissure sealants.

Resin-based pit-and-fissure sealants work exceptionally well, and serve their function for many years when placed properly.[2] Their clinical limitation is in the difficulty of handling the resin sealant in a moist environment. Unless complete isolation of the tooth has been achieved, salivary contamination will result in failure of the resin sealant. Many studies have confirmed that resin-based sealants have greater retention than glass ionomer sealants, but these studies were all conducted under conditions of good isolation and moisture control. Glass ionomer can be used as an alternative to resin sealants, especially where resin sealants are contraindicated. Clinical situations in which glass ionomer may serve as a good sealant include treatment of children whose primary molars have deeply pitted or fissured surfaces, where isolation may be difficult; treatment of permanent first or second molars that have not fully emerged (**Fig. 1**); and situations where a "transitional" sealant may be considered before placement of a "permanent" resin sealant.[3]

Glass ionomer has many reported advantages. Of great importance in its use as a sealant material is its hydrophilic nature, which makes it compatible with the challenging environment of the mouth. It sets rapidly, which can also reduce sensitivity to moisture. Glass ionomers release fluoride, which allows remineralization of enamel and provides an antimicrobial effect. The fluoride ions are taken up by the enamel, which renders the tooth structure less susceptible to acid challenge through disruption of bacterial activity.[4] The ability of glass ionomer to release other ions, notably calcium and aluminum, has been studied, and there is evidence to show that these ions also promote remineralization of the tooth.[5]

Hicks and Flaitz compared the formation of caries-like lesions in occlusal enamel adjacent to light-cured resin-modified glass ionomer sealants and in conventional light-cured fluoride-releasing sealant. Although both substances protected the pit-and-fissure enamel from caries development, the extent of caries involvement in the adjacent unsealed occlusal incline was lower with the resin-modified glass ionomer than with the conventional resin sealant.[6] Donly and others reported that resin-modified glass ionomer in constant contact with an adjacent incipient carious lesion can

Figure 1: Glass ionomer can be used to treat emerging permanent molars.

Figure 2: Emerging permanent first molar before treatment.

Figure 3: GC Fuji Triage kit.

Figure 4: Prophylaxis is performed in the usual manner with pumice.

Figure 5: The cavity conditioner is dispensed in a well.

Figure 6: The cavity conditioner is applied for 10 seconds with a microbrush.

Figure 7: The capsule of glass ionomer is tapped on a hard surface 2 or 3 times.

act as a fluoride reservoir and has the same remineralization capacity as twice-daily brushing with a fluoridated toothpaste.[7] Others have suggested that fissures sealed with glass ionomer are more resistant to demineralization than control fissures, even after macroscopic loss of sealant.[8] Studies have shown that even though glass ionomer sealants applied under ideal conditions may have poorer retention rates than their resin-based counterparts (because of their chemical bonding to the tooth), small amounts of sealant remain in the fissures and release fluoride even after the sealants appear to have been lost.[9] This provides a valuable caries preventive effect and is clinically advantageous, particularly relative to clinical situations in which a resin sealant could not have been placed at all.

It has been stated that sealants should be placed on the occlusal surfaces of teeth during the most susceptible period (the first year after eruption), when the tooth is emerging and oral hygiene is difficult to maintain. After this period, the risk of caries is lower and the consequence of sealant loss less important.[10] Glass ionomers offer a mechanism for applying sealants to newly erupting teeth, where resin-based sealants may be contraindicated. GC Fuji Triage (GC America, Alsip, Ill.) is a chemical-set glass ionomer sealant and surface protection material that allows the dentist to seal a newly emerging permanent molar when isolation is difficult.

In the treatment described here, GC Fuji Triage was used as a sealant on an emerging permanent first molar (**Fig. 2**).

Technique

The GC Fuji Triage kit contains glass ionomer capsules (in either white or pink), an applier, GC Fuji Cavity Conditioner and GC Fuji Coat LC

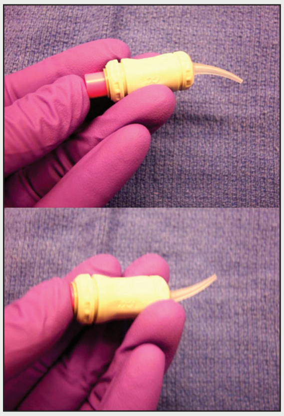

Figure 8: Unactivated capsule (top) and activated capsule (bottom).

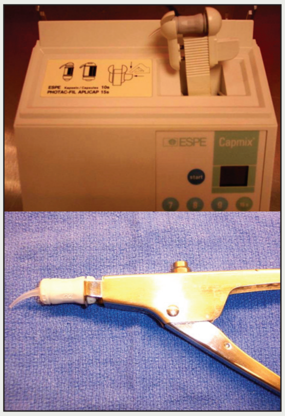

Figure 9: The capsule is loaded into the applier, triturated (top), reloaded into the applier (bottom), and clicked twice.

Figure 10: The glass ionomer is extruded onto the tooth with the applier.

Figure 11: The material can be light-cured.

Figure 12: The GC Fuji Coat LC is dispensed in a well.

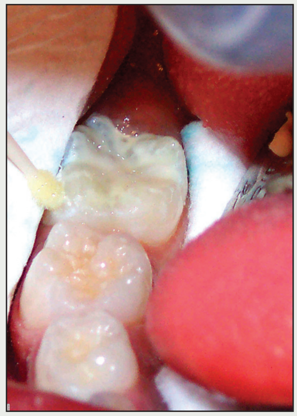

Figure 13: The coating material is applied with a microbrush and light cured.

coating agent (**Fig. 3**). Prophylaxis with pumice is performed in the usual manner, and the tooth is then rinsed thoroughly with water. During the procedure, attempts should be made to avoid aggravating the operculum (**Fig. 4**).

One drop of the cavity conditioner is dispensed into a well (**Fig. 5**). Cotton rolls and triangular buccal isolation shields are positioned to retract the tongue and cheek and to ensure moisture control, and the cavity conditioner is applied with a microbrush for 10 seconds (**Fig. 6**). The tooth is gently dried with an air syringe but no attempt is made to desiccate the tooth. The surface of the tooth should have a moist, glistening appearance.

The capsule of glass ionomer material is tapped on a hard surface 2 or 3 times to loosen the powder (**Fig. 7**). The capsule is then activated as follows (**Figs. 8** and **9**). First, the plunger is pushed in until it is flush with the main body. The capsule is placed immediately into the capsule applier, and the lever is clicked once. The capsule is then removed from the applier, placed into an amalgamator and triturated for 10 seconds at high speed (approximately 4,000 rpm). The capsule is then loaded back into the capsule applier, the lever is clicked twice to prime the capsule, and the glass ionomer is immediately extruded onto the tooth (**Fig. 10**).

The material is manipulated into all pits and fissures and under the operculum with a microbrush. At 23°C, the material has a working time of 1 minute and 40 seconds from the time of mixing; at higher temperatures the working time is shorter. The material is self-curing, but a light-curing device can be used for 20 to 40 seconds to hasten setting (**Fig. 11**).

When the material loses its glossy appearance, one drop of GC Fuji Coat LC is dispensed into a well (**Fig. 12**). The coating is applied with a

Figure 14: Appearance of completed restoration.

microbrush to the treated surface and adjacent areas, and light curing is applied (**Fig. 13**). The completed restoration is shown in **Fig. 14**.

Conclusions

The technique for applying GC Fuji Triage glass ionomer sealant and surface protection material has been described and illustrated. This material allows the dentist to seal a newly emerging permanent molar when isolation is difficult.

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