HOW TO

SANDWICH GLASS IONOMER

Silmet Ltd.'s ProBase™cement serves as liner-base for resin modified glass ionomer cases.

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Information provided by Silmet Ltd.

Conventional glass ionomer cements were first introduced by Wilson and Kent in 1972.[1] They are a tooth-colored material based on the reaction between silicate glass powder and polyacrylic acid. The setting reaction of glass ionomer cements is facilitated by the early release of calcium ions. In conventional glass ionomer formulas, the slower release of the aluminum ions is responsible for increased cross-linking, which significantly improves the strength over a period of several days.

This improvement in physical properties is an important characteristic of these materials in their clinical use.[1] In the 1990s several faster setting, high-viscosity conventional glass ionomer cements became available for use as longer term restorative materials in higher stress bearing areas. These materials set faster and are of higher viscosity because of finer glass particles, Anhydrous polyacrylic acids of high molecular weight and a high powder-to-liquid mixing ratio. The setting reaction is the same as the acid-base reaction typical of conventional glass ionomer cements.

Resin-modified glass ionomers were first introduced in 1992. These combine an acid-base reaction of the traditional glass ionomer with a self-cure amineperoxide polymerization reaction. Resin-modified glass-ionomer cements, such as Silmet's ProBase,™ have the advantage of a long working time combined with a rapid set and higher early strength. They also are easily bonded to resins and have higher strength properties comparable to conventional glass-ionomer cements.[2]

Both conventional and resin-modified materials have excellent physical properties suited for a wide variety of dental applications.[3, 4] Glass ionomers have excellent fluoride release and are able to bond to both enamel and dentin during the setting process.

Glass ionomers are indicated for restorative indications, luting, sealants and as a base or liner. In 1977 McClean first recommended lining composite resins with glass ionomer cement.[1] In this technique, the glass ionomer would be placed to the dento-enamel junction and the composite


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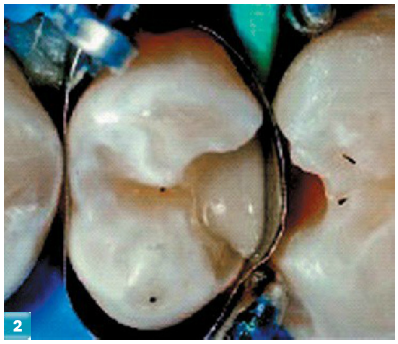
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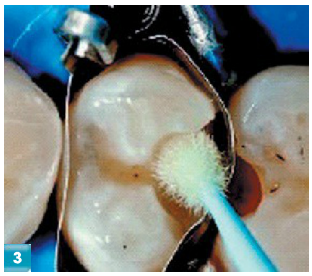
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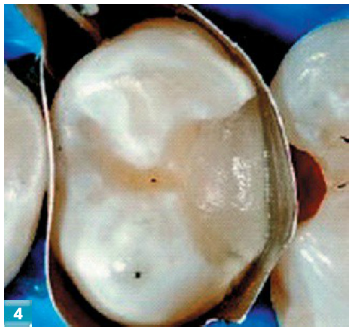
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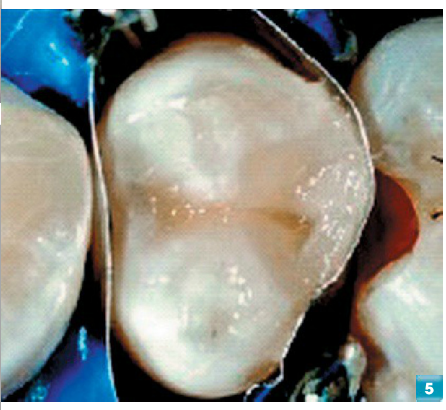
AT A GLANCE

1. Place a polyacrylic cavity conditioner on the enamel and dentin tooth structure.
2. Place a single increment of ProBase over the dentin.
3. Use ProEtch to etch the entire cavity that remains.
4. After applying ProLink bonding agent, place the first increment of ProFil composite resin.
5. Shape the final occlusal increment into the correct occlusal form using composite instruments.
6. The completed RMGI sandwich restoration.
7. The completed restoration displays the appropriate physical contours.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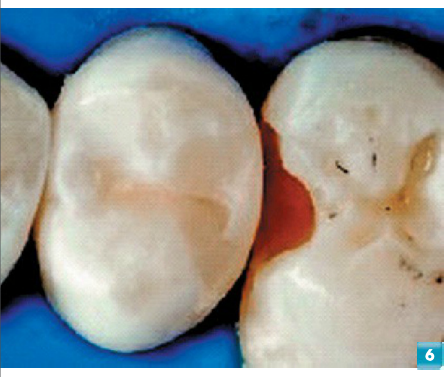
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resin placed over it with the glass ionomer acting as a dentin substitute. Subsequent to the placement of the liner, an adhesive material is used and the composite resin restorative is placed. This suggestion was a valuable technique as glass ionomers were able to bond to and seal dentin and could represent a practical way of reliably restoring posterior teeth with composite resin. It was shown that composite resin could be bonded to acid treated glass ionomer in 1985.[3]

This so-called "sandwich" of glass ionomer, dental adhesive and composite resin was proposed as an effective technique for both anterior and posterior resin based restorations creating the optimal combination of desirable properties in a restoration. Two variations of this type of restoration exist: the open and closed sandwich. In a closed sandwich, the dentin is covered with a resin modified glass ionomer (RMGI) lining cement. The liner is completely covered with the restorative material. In the open sandwich technique, RMGI is used to replace the dentin and also to fill the cervical part of the box, which results in a substantial part of the glass ionomer cement being exposed to the oral environment.

The growing evidence that glass ionomers have a key role in maximizing the success of composite resins, especially in posterior stress bearing situations, has led to a resurgence of the sandwich technique for improving the service life of composite restorations.[4] The sandwich technique is the restoration of choice when proximal gingival margins extend beyond the cementoenamel junction.

About the material

ProBase is a light cured, high fluoride releasing resin-modified glass ionomer cement designed for use as a liner-base material under any kind of restorative material and offers a suitable solution for pulp isolation and protection. It exhibits excellent mechanical and esthetic properties. Featuring strong adhesion to dentin and excellent mechanical properties, ProBase is the perfect liner/base solution to help protect dentin.

Case presentation

A female patient presented to our clinic for a 6-month hygiene appointment. While receiving her periodic oral examination, we noticed a resin sealant on tooth No. 34 (placed many years prior) was breaking down. There also was some staining and incipient decay present on the occlusal surfaces of tooth Nos. 33 and 35. After examination and consultation, a closed sandwich technique was chosen because of the depth of the lesion and its proximity to the pulp and to provide a sound impermeable seal to isolate the deep affected dentin.

STEP 01 After removal of the caries and preparation of the cavity, place a polyacrylic acid (cavity conditioner) on the dentin tooth structure where the RMGI is to be applied. After 10 seconds it is rinsed away and the tooth structure is lightly dried. **(Fig. 1)**.

STEP 02 A single increment of a ProBase RMGI (Silmet Ltd.) is placed over the dentin. The layer extends onto the interproximal cavosurface enamel and/or cementum margin where it's polymerized using a SecuraLight™ LED light cure device (Silmet Ltd.) **(Fig. 2)**.

STEP 03 The entire RMGI cavity is then etched with ProEtch™ 37% Phosphoric acid (Silmet Ltd.) in preparation for the composite resin restoration. This will improve micromechanical bond to composite resin. Apply a thin layer of ProLink™ Bonding. When the restoration retention area lies primarily within dentin, it's necessary to apply a second layer **(Fig. 3)**.

STEP 04 The first increment of ProFil™ composite resin (Silmet Ltd.) is applied **(Fig. 4)**.

STEP 05 The final occlusal increment is shaped into the correct occlusal form using composite instruments **(Fig. 5)**.

The completed RMGI premolar **(Fig. 6)** displays the appropriate physiological contours **(Fig. 7)**.

Conclusion

Today, restorative dentistry emphasizes minimally invasive approaches to care. This encompasses prevention, remineralization, and when needed, adhesive restorations. These approaches lessen the chance for subsequent adverse outcomes, including the advancement of tooth decay, pulpal involvement, and tooth fracture. As dentists, our goal is to have the knowledge of various dental products to select the best material for any given scenario.

After many decades of improvements in oral health, tooth decay is on the rise again. Much of the blame can be placed on today's high-sugar diet consisting of fast food, soda pop, sport juices, and energy drinks. Another factor that comes to mind is the fact baby boomers are living longer. A majority of these patients may be taking medications that are causing severe drying in the mouth that results in a high caries rate, or they are simply challenged in brushing and flossing properly because of dexterity issues.

Resin-modified glass ionomer restorations are ideally suited for use in the treatment of patients who are at high risk for caries. Whatever the situation, it is important for all dentists to select the right restorative dental material for the right case to ensure long-term restorative success. ●

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