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Feature

Reliable, Durable Class II Posterior Resin Composite Restorations

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More Features

Posterior resin composites have become a commonly placed type of restoration. They enjoy far greater success today than they have in the past due to advances in polymer and filler technology. There still remain some hurdles, which keep many clinicians from benefiting from their best performance. These include incidences of post-operative sensitivity and inability to create interproximal contacts on a consistent basis. This article will address both issues by offering techniques that will allow clinicians to eliminate post-operative sensitivity and to reliably create interproximal contacts in each and every class II resin composite restoration.

CLINICAL TECHNIQUE

Figure 1 shows tooth 36 with an old fractured amalgam restoration and in need of repair. Figure 2 shows the cavity preparation and the rubber dam in place. Matrices and wedges are placed in both the mesial and the distal (Fig. 3). The matrices are Composi-tight Sectional Matrices (Garrison Dental Solutions, Inc, Spring Lake, MI) and the wedges are Flexi-wedges (Common Sense Dental, Nunica, MI). The author finds that the orange wedges are the desired size in about 90 percent of the cases.

The author prefers not to use the rings that accompany the matrices, although the choice whether or not to use them must be made by each individual clinician. The resin adhesive is then applied (Fig. 4). The resin adhesive used is Simplicity (Sure/ Dental Innovations, Oakville, Ontario, Canada) (Fig. 5). Simplicity is a no-rinse adhesive system useful in all types of applications. Simplicity has

been shown to etch uncut enamel as well as phosphoric acid,1 to generate dentin bond strengths equal to a one-bottle rinse-etch system2 and to be stable in long-term water storage.3 The adhesive is light-activated for 10 seconds with an Ultralume 5 (Ultradent, South Jordan, UT). A flowable resin composite, in a layer of about 0.5-1 mm, is then applied to the pulpal floor of the preparation, up to and inclusive of the intersection of the cavity floor and the matrices (Fig. 5).

The use of flowable resin composites have been shown to improve adaptation of the restorative resin to the cavity and also to decrease the incidence of voids at the cavosurface interface.4-9 the flowable used in this case is Permaflo (Ultradent, South Jordan, UT). Permaflo is selected as it has a high degree of radiopacity and is reported by the manufacturer to have a modulus of nine, which is very high for a flowable resin composite. A high modulus will provide a layer that is highly resistant to tensile forces that are generated by the restorative resin that is placed on top of the flowable.

In essence, the flowable layer increases the tensile resistance of the adhesive, reinforcing the adhesive. Enhancing the tensile resistance of the adhesive will help insure that there is no post-operative sensitivity. In this case, the flowable is applied to and light activated separately in each of the boxes. Before light-activation of the flowable resin, a special tip is applied to the Ultralume 5. These Proxi-tips will help create interproximal contacts each and every time a class II resin is placed. The normal lens on the Ultralume 5 is removed and the proxi-tip is snapped on. The proxi-tips have a ball end, which can be gimbaled to a desired angle. Flowable is inserted into the distal proximal box in a thin layer, but one that includes the matrix wall. The ball is placed against the contact (as shown in Fig. 6), held for five seconds with a slight pressure and then the light is turned on for 10 seconds. Flowable is then inserted into the other proximal box and it is light activated for 10 seconds following the same procedure. The normal lens for the Ultralume 5 is then replaced onto the light and the flowable is light activated for 10 seconds. The flowable resin becomes part of the restoration and holds the contacts in place (Fig. 7).

It is imperative that the flowable be light activated for at least 20 seconds. The bottom of class IIs are some distance from the emitter of the light generating unit and the matrices tend to act as filters, reducing the amount of light reaching the bottom of the cavity. The author believes that the failure to provide an inadequate amount of energy to the resins at the bottom of the restorations is a major contributor to the failure of class II resin restorations as well as to post-operative sensitivity. The modulus of the flowable must be established before it is subject to the contraction stress of the successive layers of the restorative resins. Increasing the exposure time of the flowable, or whatever type of resin lies at the bottom of the restoration is critical to success.

The restorative resin chosen for this case is Vit-1-escence, from Ultradent. Vit-1-escence is a highly durable and esthetic resin composite. The tooth will be restored in increments as incremental restoration continues to be preferred.10* The mesial and distal walls are first established using the Pearl Neutral shade. The increment was light activated for 10 seconds (Fig. 8). The central increment with a thickness of about 2mm is then inserted into the cavity and it is light activated for 10 seconds (Fig. 9). The occlusal increment is then inserted and it is light-activated for three seconds, in a modification of the pulse activation protocol11-15 (Fig.10).

Pulse activation is a method of slowing down the rate of resin polymerization in class I and class II posterior resin restorations. Pulse activation is meant for the most occlusal layer of resin composite. It is not meant for the deeper portions of the restoration. It is not necessary to fully activate a resin when it is first inserted. It is only important that the resin ultimately receive the proper amount of energy. Pulse activation allows for the energy to be distributed over time rather than applied all at once. This causes the conversion, or polymerization, to occur over time, and consequently the contraction stress to be similarly distributed.

The matrices and the wedges are removed (Fig. 11) and the marginal ridges are disked to remove the excess (Fig. 11). Initial anatomy is carved into the restoration with a specialty bur (8905-031, Brasseler USA, Savannah, GA), (Figs. 12-15). The resin is then light activated for another three seconds to further harden the resin. The rubber dam is removed and the occlusion is adjusted with another specialty bur (274-014, Brasseler). Figure 16 shows the restoration with the occlusion complete.

The restoration is then polished with a Jiffy brush (Ultradent) to generate a high gloss and luster (Fig. 17). The final step is to seal the restoration. Sealing margins of posterior restorations has been shown to improve the marginal integrity.16 The Simplicity adhesive is first applied and air-thinned, and a specific composite sealer is applied to the tooth and thinned out (Fig. 18). The composite restoration sealer selected was Permaseal (Ultradent). The restoration is then light activated for 20 seconds on the occlusal surface, and 10 seconds on the buccal and lingual surfaces.

Research has shown that there is a difference in hardness between top and bottom surfaces of resin, even within a 2mm thickness.17 Since occlusal adjustment exposes resin surfaces below that to which the light has direct access, post curing is necessary (Fig. 19). Post curing assures that the resin composite surfaces exposed by adjusting the occlusion receive the energy needed to harden the resin to provide optimal wear resistance.18 The completed restoration is seen in Figure 20.

CONCLUSION

This article demonstrates one method of creating a class II resin composite restoration, reliably being able to generate good interproximal contacts and eliminating post-operative sensitivity. It shows how to employ a flowable resin and how to activate a posterior resin in a manner that reduces polymerization stresses. Attention to detail will help clinicians enjoy highly successful restorative efforts.

*Disclosure: *Dr. John Kanca I*
II is the inventor of Simplicity Resin Adhesive. A video of the application method can be viewed and downloaded at www.simplicityadhesive.com or at www.apexdental.com.

Oral Health welcomes this original article.

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