Recreating Mother Nature With Direct Resin Restorations

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Over the years, the utilization of composite resin systems for intracoronal restorations in posterior teeth has increased dramatically due to the improvements in physical and mechanical properties of these resin systems and patient demand for tooth-colored restorations. Restorative dentistry continues to evolve through innovations in bonding systems and restorative materials that help the clinician establish proper function, shape, contour, and color. Because of these advancements, contemporary restorative materials and techniques allow minimal preparation of tooth structure and improvement in the longevity and aesthetics of the restoration.

There have been many different posterior composite techniques described in the literature that utilize different opacities of composite (dentin, enamel, translucent) in layers to mimic the multiple layers in a tooth. Personally, I have found this to be a time consuming process in a busy general practice, requiring a larger assortment of composite material. However, the light-scattering effect of several new composite formulations now makes it possible to use a simpler technique involving a single shade of composite to restore most posterior teeth with excellent aesthetic results. This article describes a simplified technique to consistently restore posterior composite restorations in a fast, easy, and predictable manner.

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CASE REPORT

A patient presented with discomfort in the upper left region of her mouth. Upon clinical examination, it was evident that tooth No. 13 had a large amalgam restoration that was fractured with recurrent decay. Tooth No. 14 presented with interproximal decay (Figure 1). The radiograph exhibited some recurrent decay beneath the restoration extending close to the pulp on tooth No. 13. The patient complained of discomfort upon biting hard foods and experienced occasional sensitivity to cold. Once the images of the failing amalgam restoration were captured on the monitor, I asked the patient a series of questions. "Mrs. Smith, how long ago was this amalgam restoration placed?" The patient answered that it was hard to remember exactly, but she thought it was placed more than 20 years ago. Using the DemoDent patient education model (DemoDent) (Figure 2), I then described the portion illustrating what can happen to a tooth when a restoration starts to fail. "Mrs. Smith, nothing lasts forever, especially when it is subject to the harsh conditions in the mouth—ie, hot and cold, biting forces, chewing, and acidic changes; it appears that your filling is cracked which has been allowing bacteria to leak underneath the filling. Often, the damage is not seen immediately because there are no major symptoms until the decay reaches the nerve of the tooth. Our experience with replacing these fillings has shown us it is best to remove the filling and clean out the decay before the nerve is affected. If there is enough tooth structure remaining after cleaning the decay out, then a new filling material can be placed. If there is not enough healthy tooth structure remaining after cleaning out the decay, then the tooth may need a core and crown to restore it to proper form and function." After explaining the situation using the image on the screen and the anatomical model, I have found that patients seem to understand their dental condition better and are very eager to get started. The patient elected to have the restorations replaced with bonded composite restorations.

Prior to administration of a local anesthetic, the occlusal contacts were recorded to help guide placement of the composite material (to avoid areas of centric contacts). An appropriate shade (A1) was chosen. After anesthetic was administered, a carbide bur (KOMET USA) was used to remove

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Figure 1. Preoperative condition showing failing amalgam restorations.

Figure 2. DemoDent patient education model illustrating the presenting condition.

Figure 3. Removal of the amalgam restorations.

Figure 4. Caries still present under the restorations.

the defective amalgams (Figure 3). Upon removal of the amalgams, it was found that caries were present in the deepest regions of the preparations (Figure 4). This was carefully removed using a slow-speed handpiece and large round bur (Cerabur [KOMET USA]) (Figure 5). The preparations were extended to remove the caries in the palatal fissure region for tooth No. 14, and the interproximal areas for both teeth Nos. 13 and 14 (Figure 6). A sectional matrix band (V3 Ring [TrioDent]) was placed over the mesial margin of tooth No. 14 such that its position and shape would enable placement of a composite with an optimal mesial contour (Figure 7).

For optimal contour, gingival seal, and tooth separation, a wedge was inserted between teeth Nos. 13 and 14. Using the V3 forceps, the V3 ring was placed over the wedge. It was important to burnish the band in the desired contact area against the adjacent tooth and make sure there was no springback of the band. This would ensure an excellent contact. Once tooth No. 14 was isolated by the matrix band, it was dried and a seventh generation adhesive (OptiBond All-In-One [Kerr]) was applied to all internal aspects of the preparation, including the cavosurface margins, for 20 seconds (Figure 8). The solution was gently agitated with a regular microbrush applicator tip. Because no rinsing of a separate etchant is required when using a self-etching technique, the collagen network is not subjected to the potential collapse associated with over-drying the dentin or being too wet after rinsing the etchant off the substrate. As mentioned, over-drying can cause collapse of the delicate collagen network, which is then a barrier to the monomers in the primer adhesive that must infiltrate through this organic zone to the etched dentin surface resulting in sensitivity. Another layer of bond was placed, dried, and then cured for 15 seconds with an LED curing light (Demi [Kerr]). In order to reduce polymerization shrinkage stress, a flowable resin (shade A1) (Premise Flowable [Kerr]) was placed as the initial layer of composite material. Flowable composites have a relatively low modulus and act as an elastic gradient between the dentin and the stiffer microhybrid, thus moderating polymerization shrinkage stress at the margins. Their low viscosity also wets the internal surfaces of the prepared cavity and helps ensure a well-adapted first layer.

The material selected for the composite restoration was the enamel form of Herculite Ultra (Kerr) which is slightly more translucent than the dentin or opaque forms, allowing it to blend in with the rest of the tooth surface. Even with these latest generations of composite materials, there is significant stress that is placed on the tooth/resin interface due to shrinkage of the resin, so it was important to place the composite restoration with an incremental technique. The first layer was placed on the gingival floor and proximal box over the flowable composite, the second and third layers were placed diagonally, and the last increment was used to complete the filling in the occlusal portion of the cavity. It was essential to cure each layer completely for 20 seconds before placing the next level of composite. Also, it was important to remember that composite resin, which is bounded on all sides by cavity walls and placed in simultaneous contact with those walls and cured, is associated with the highest stress at the bond (Figure 9).

Once tooth No. 14 was completely built up, cured, trimmed, and polished, the sectional matrix was placed on tooth No. 13. Care was given to follow the same protocol as discussed previously with restoring tooth No. 14 (Figure 10). Prior to implementing that technique, since this preparation was in such close proximity to the nerve after cavity removal, a small layer of resin modified glass ionomer (Riva Light Cure [SDI]) was placed as a base. The patient was informed that, if the tooth caused persistent pain, it might require endodontic therapy. Once the restoration was filled and cured it was shaped, trimmed and finished using carbides (Q-Finishers, KOMET USA).

Finally, the occlusion was checked and verified making sure there were no interferences in lateral and protrusive movements (Figure 11). The patient was so pleased with the restorations that she had professional tooth whitening on her teeth (Pola, In-Office [SDI]) to further enhance her smile.

CONCLUSION

This case is a wonderful example of how one can achieve an acceptable aesthetic result using a single shade of composite material. The composite system utilized is an example of one of the newer materials available that blends in with the surrounding tooth structure with no need to use of 2, or even 3, different shades. In a busy practice, use of a universal composite not only saves operator time, but allows for a predictable and long-lasting option when preservation of tooth tissue is of paramount importance.

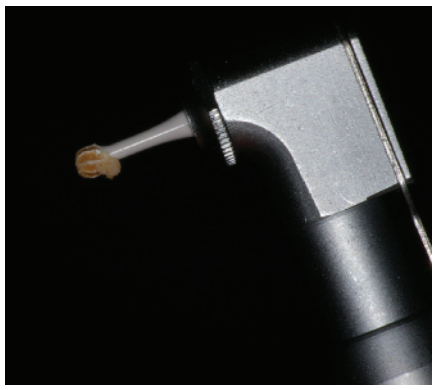

Figure 5. A round bur (Cerabur [KOMET USA]) was used for removing remnant decay.

Figure 6. Full removal of decay.

Figure 7. Placement of V-3 Band (Kerr) and ring.

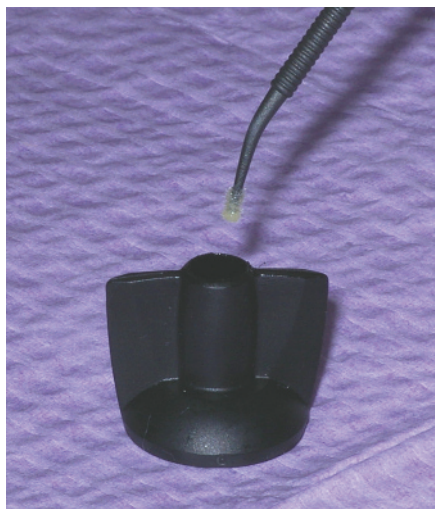

Figure 8. Bonding agent (OptiBond All in One Bond [Kerr]) was placed.

Figure 9. Composite (Herculite Ultra [Kerr]) cured on No. 14.

Figure 10. Composite restoration (Herculite Ultra [Kerr]) completed on No. 13.

Figure 11. The final restorations; finished and polished.

Dr. Nazarian is a graduate of the University of Detroit-Mercy School of Dentistry. Upon graduation, he completed an AEGD residency in San Diego, California with the United States Navy. He is a recipient of the Excellence in Dentistry Scholarship and Award. Currently, he maintains a private practice in Troy, Michigan, with an emphasis on comprehensive and restorative care. His articles have been published in many of today's popular dental publications. Dr. Nazarian also serves as a clinical consultant for *The Dental Advisor*, Dental Compare, and Catapult, testing and reviewing new products on the market. He has conducted lectures and hands-on workshops on aesthetic materials and techniques throughout the United States. He can be reached at (248) 457-0500, or visit the Web site demo--dent.com.

Disclosure: Dr. Nazarian is also the creator of the DemoDent patient education model.