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Bioactive Materials: Stacking the Deck in Our Favor

CASE PRESENTATION | 15

A 29-year-old woman presented with a chief concern of food becoming trapped on the lower left side of her mouth. Clinical exam revealed that the distal marginal ridge of tooth No. 19 had fractured due to a cohesive failure; radiographic evidence suggested recurrent caries violating the distal marginal seal as well as the mesial marginal seal. Her adjacent teeth also showed evidence of significant marginal leakage and failure at the enamel/restorative interface. After discussing the benefits and consequences of indirect vs. direct restorations, the patient opted for a direct resin restoration, primarily for financial reasons. She also was informed that tooth No. 18 could benefit from a new restoration as well; however, she opted to forego the treatment, again due to financial constraints.

Knowing that the patient had a history of moderate to poor hygiene and dietary habits, we decided to place a bioactive resin that has a history of being more favorable in harsh environments. To this end, a direct MOD composite was placed on tooth No. 19 using Beautifil-Bulk Flowable and Beautifil II (Shofu). These restorative products leverage the benefits of the GIOMER technology, which uses a GIOMER technology, surface pre-reacted glass particles that release beneficial ions over a sustained period of time and have been shown to have an anti-plaque and remineralization effect.

To maximize the benefit of the material and decrease the patient's high caries rate, the patient was placed on 5000 ppm neutral sodium fluoride toothpaste (Fluoridex, Philips Sonicare) and was instructed to use a pea-size amount of toothpaste twice per day. In addition, the patient was counseled on her poor oral hygiene and dietary habits, so that she could take a pro-active approach in her own care.

In this case, the patient's oral hygiene and dietary habits created a non-favorable oral environment, and a restorative material was needed to help combat this. An 8-year study at the University of Florida showed Shofu's GIOMER technology demonstrated very good results and Shofu's internal research has shown the ability of Beautifil II to release fluoride and recharge when exposed to fluoride.



Figure 1—A Gow Gates mandibular block was administered using 2% lidocaine with 1:100,000 epinephrine (Lidocaine, Henry-Schein). After confirming profound anesthesia, the quadrant was isolated using a rubber dam (Hygenic Elasti-Dam, COLTENE) and a 13A clamp (Ivory, Heraeus Kulzer).

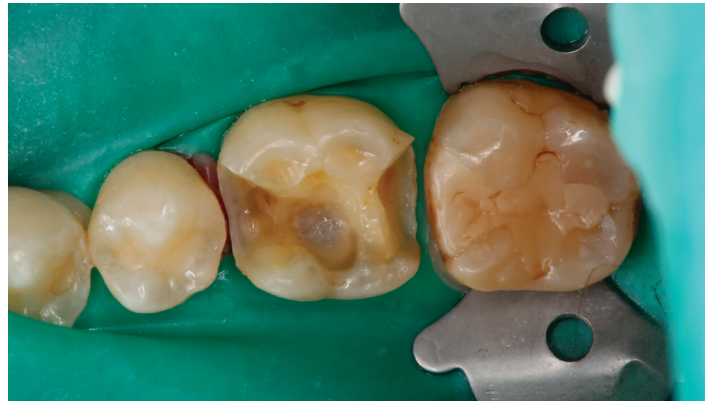


Figure 2—Existing resin and caries were removed with a coarse diamond bur (6838.010, Brasseler USA). Nearing completion of the preparation, it was noted that the distal margin contained demineralized enamel, which was removed with a fine flame shaped diamond (8889.009, Brasseler USA).

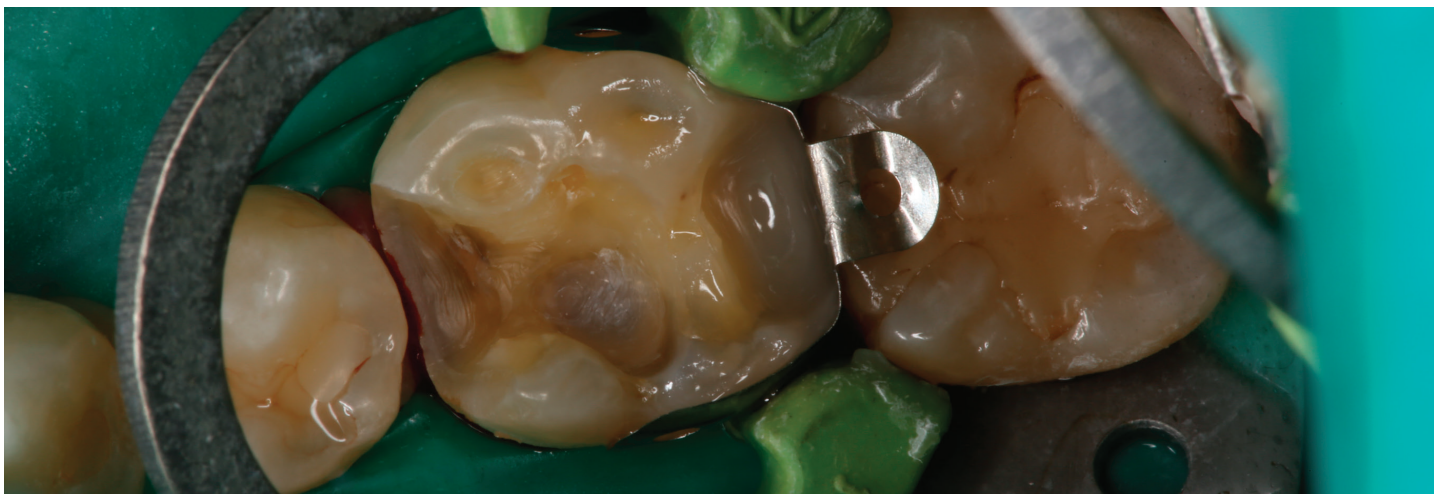


Figure 3—To achieve optimal proximal contacts, the mesial and distal portions of the preparation were restored separately. A sectional matrix and ring system (V3, Ultradent) were used with an anatomically contoured wedge (Palodent Plus Wedge, DENTSPLY Caulk) to create a proper contact. The enamel was etched for 15 seconds and the dentin was etched for 10 seconds using a 35% phosphoric acid (Ultra-Etch, Ultradent Products). After rinsing with water and blot drying, a 5th generation adhesive (OptiBond Solo Plus, Kerr) was applied to the dentin. The adhesive was air-thinned and cured for 20 seconds with an LED curing light (Demi Ultra, Kerr). The distal box form measured 5 mm in depth and a decision was made to place a 3 mm thick layer of Beautifil-Bulk Flowable (Shofu, depicted above). This layer was cured for 20 seconds. Next, a 2-mm layer of a fluoride-releasing nanohybrid composite (Beautifil II, Shofu) was placed and sculpted.



Figure 4—The 2-mm layer of Beautifil II was then cured for 20 seconds from the occlusal surface. After this initial cure the sectional matrix, wedge, and ring were removed, and then a 20-second cure from the buccal and lingual distal line angles was completed. The mesial box form was isolated in the same manner as was described for the distal margin. Ultra-Etch was then placed on the enamel, followed by the dentin.



Figure 5—After rinsing and blot drying, OptiBond Solo Plus was applied to the dentin. The adhesive was air-thinned and cured for 20 seconds. A 3-mm layer of Beautifil-Bulk Flowable (depicted above) was placed in the mesial box form as well as the pulpal floor of the preparation. This layer was cured for 20 seconds. Next, a 1.5-mm layer of Beautifil II was placed and sculpted. This layer was cured for 20 seconds from the occlusal surface. After this initial cure, the sectional matrix, wedge, and ring were removed and then a 20-second cure from the buccal and lingual mesial line angles was completed.

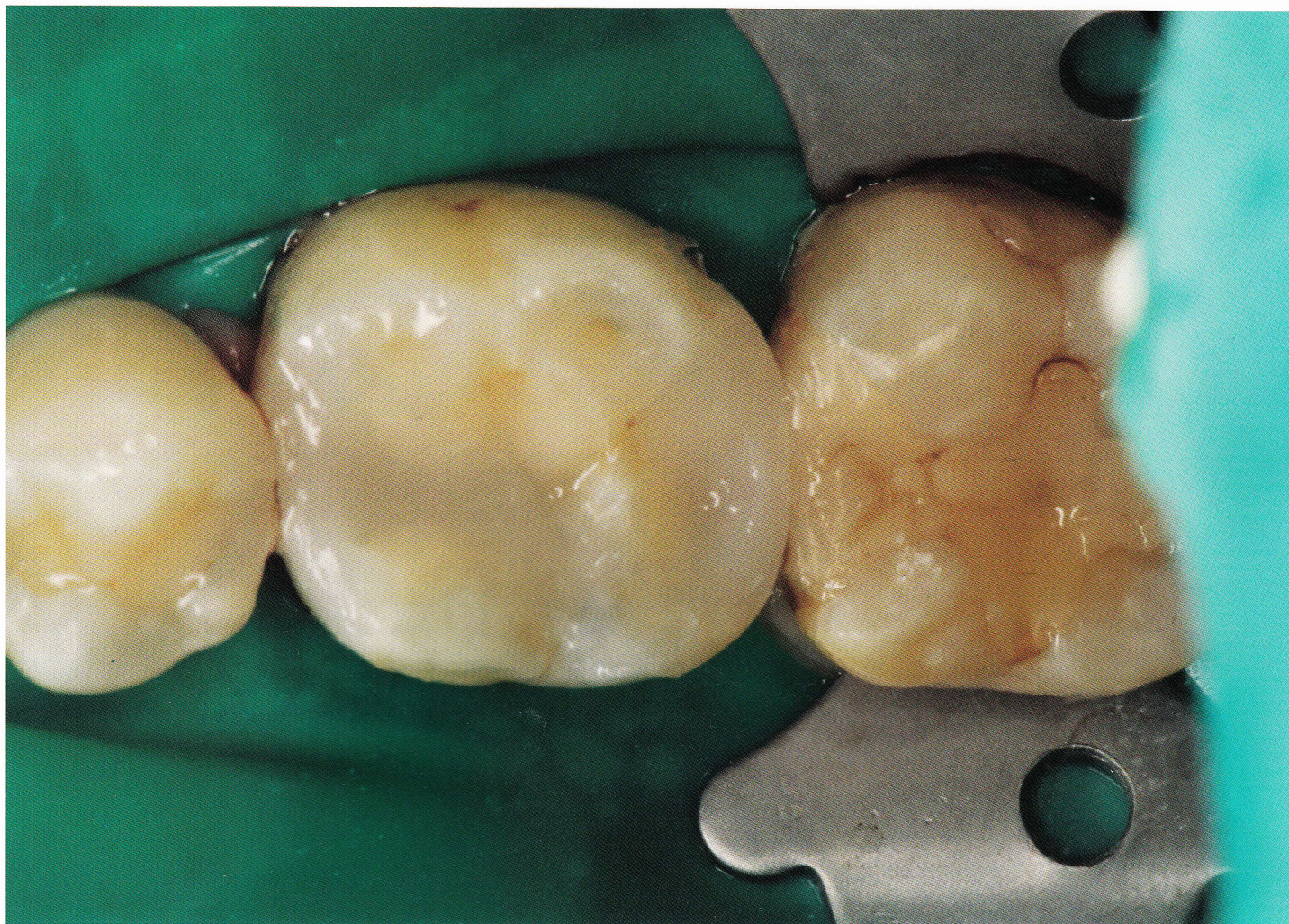


Figure 6—Upon examining the fully cured composite, it was noted that only minimal finishing and polishing was needed and a decision was made to take off the rubber dam and complete these steps. After checking occlusion in centric and lateral excursions, a minor occlusal adjustment was made in the central fossa using an ultra-fine football diamond (368EF.023, Brasseler USA Diamond). The occlusal surface was then polished with a 1-step aluminum oxide flame shaped polisher (OneGloss PS, Shofu) and the line angles were finished and polished using 12-mm fine and superfine aluminum oxide discs (Super-Snap X-Treme, Shofu).

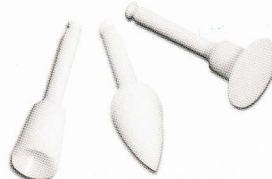
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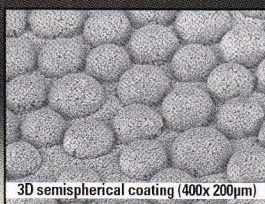
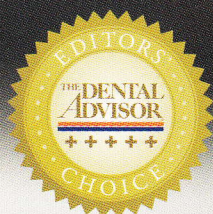
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