

Versatility Without Compromise

Composite resin technology increases profitability while ensuring predictability

Jeffrey W. Horowitz, DMD

What is the best universal composite? This is perhaps one of the most commonly asked questions at a restorative lecture, and yet, it is one of the most difficult to answer. The evolution of direct resins has provided dentists with the ability to choose the ideal material for most clinical applications. As comforting as this may sound, the reality is that the typical practitioner simply cannot afford to maintain a sufficient inventory of products in order to provide the ideal material in each situation. Although some products boast about bioactivity for caries-susceptible patients, others cite polishability and highly esthetic outcomes as their distinctive edge. In some instances, biomechanical properties may be of primary interest, particularly in areas of high stress or functional demand. With so many variables, it becomes evident that there has always been a need for truly “universal” direct materials that can live up to all of these esthetic, biomechanical, and functional demands.

Case 1: Two Surface Posterior Composite (High Functional Demand)

After a 40-year-old man was diagnosed with a carious occlusal and buccal groove on tooth No. 31, he was anesthetized, and the tooth was prepared (Figure 1). The preparation

was microabraded using an air abrasion unit (PrepStart™, Zest Dental Solutions) with 37-µm aluminum oxide powder for disinfection and optimization of the adhesive protocol.¹ After a 15-second selective enamel etch² with 35% phosphoric acid solution (Ultra-Etch™, Ultradent Products, Inc.) (Figure 2), a seventh generation single-step bonding agent (BeautiBond®, Shofu Dental) was generously applied with a ballpoint applicator (Ball-Point Applicators™, Kerr Dental) and carefully scrubbed over the dentin for 15 seconds (Figure 3). The solvent was then blown off using a warm air dryer (Warm Air Tooth Dryer, A-dec, Inc.),³ and the bonding agent was light cured for 20 seconds (Figure 4). Next, a

nanohybrid composite resin (Beautifil® II LS, Shofu Dental) was placed into the occlusal and buccal preparations, shaped, and light cured. This material was chosen because of its biomechanical properties, including a volumetric shrinkage of 0.85% and a polymerization shrinkage stress of 2.7 MPa.^{4,5} These values result from the combination of a new, higher molecular weight monomer and a highly filled (ie, 83% by weight) matrix of prepolymerized glass.^{4,5} These same surface pre-reacted glass particles are responsible for the active ion exchange of fluoride as well as five other ions, creating a bioactive environment to further reduce the potential for recurrent decay.^{6,7} Initial finishing on the occlusal surface was



FIG. 1



FIG. 2



FIG. 3



FIG. 4

(1.) View of prepared tooth No. 31 following decay removal from carious occlusal and buccal grooves. (2.) Etching for 15 seconds with 35% phosphoric acid. (3.) Bonding agent applied with ballpoint applicator and scrubbed for 15 seconds. (4.) Bonding agent being light cured for 20 seconds.



**JEFFREY W.
HOROWITZ, DMD**

Fellow
Academy of General Dentistry

Diplomate
American Sleep and
Breathing Academy

accomplished with a football-shaped diamond bur (NeoDiamond 3923 VF, Microcopy), and the buccal surface was finished with a carbide bur (NeoBurr NB10-EF9, Microcopy). The final polish was achieved on both surfaces using only a silicone polishing point (Brownie Polishers, Shofu Dental) at 15,000 rpm with irrigation. The final restoration exhibited no white lines and felt very smooth to the patient (Figure 5).

Case 2: Fractured Central Incisor (High Esthetic Demand)

A 20-year-old college student, who was also the son of a corporate dental executive, was referred for an emergency visit after fracturing tooth No. 9 at a campus event (Figure 6). Both the patient and his mother wanted an immediate esthetic solution. Because time was of the essence, the decision was made to place a direct composite restoration using a single shade option. The direct composite resin (Beautiful® II LS [shade A1], Shofu Dental) was chosen for its ability to blend well with the natural surrounding tooth structure as well as its polishability and strength. After achieving local anesthesia with a 2% lidocaine with epinephrine solution, a lip and cheek retractor (OptraGate®, Ivoclar Vivadent) was placed to prevent contamination and provide isolation. Next, the sharp edges from the fracture were smoothed with a diamond chamfer bur (NeoDiamond 1116.10, Microcopy), and the enamel and exposed dentin were air abraded (PrepStart™, Zest Dental Solutions) with 37-μm aluminum oxide powder to provide disinfection and improve adhesion. The enamel was then selectively etched for 15 seconds and rinsed. A single-step bonding agent (BeautiBond®, Shofu Dental) was applied to the dentin and enamel, and the material was scrubbed into the dentin with a ballpoint applicator for 15 seconds. After scrubbing, the solvent was blown off and the material was thinned using a warm air tooth dryer. Next, the adhesive was light cured for 20 seconds, and the A1 shade of the composite restorative was applied in two light-cured increments. Initial finishing was performed on the facial and interproximal surfaces with carbide burs (NeoBurr NB10-EF9 and NeoBurr EF9UF, Microcopy) and on the lingual surface with a football-shaped diamond bur (NeoDiamond 3923 VF, Microcopy). For most esthetic anterior composite restorations, final polish can



(5.) Final restoration showing no white lines and smooth finish. (6.) Pretreatment view of fractured tooth No. 9. (7.) Posttreatment view of final restoration.

be achieved by following a disk protocol (eg, Super-Snap X-Treme™, Shofu Dental); however, due to the time constraints presented by this case, it was decided to achieve final polish using spiral-shaped polishing wheels (A.S.A.P.® All Surface Access Polishers, Clinicians Choice) at 20,000 rpm. The patient was dismissed overwhelmed at our ability to provide such an esthetic result in such an efficient manner (Figure 7 and Figure 8).

Conclusion

Use of a universal nanohybrid composite resin provided an excellent outcome for the patients in these cases—one with high functional demands and the other with high esthetic demands. And considering the reasonable cost per application, composite resin technology not only provides excellent results, it also allows clinicians to increase profitability without compromising predictability. 🌸

References

1. Erkut S, Yilmaz B, Bagis B, et al. Effect of different surface-cleaning techniques on the bond strength of composite resin restorations. *J Prosthet Dent*. 2014;112(4):949-956.
2. Oz FD, Ergin E, Canatan S. Twenty-four-month clinical performance of different universal adhesives

in etch-and-rinse, selective etching and self-etch application modes in NCCL - a randomized controlled clinical trial. *J Appl Oral Sci*. 2019;27:e20180358. doi: 10.1590/1678-7757-2018-0358.

3. Ogura Y, Shimizu Y, Shiratsuchi K, et al. Effect of warm air-drying on dentin bond strength of single-step self-etch adhesives. *Dent Mater J*. 2012;31(4):507-513.
4. Firla M. Durable restorative material for class I and II cavities. Dentistry.co.uk web site. <https://www.dentistry.co.uk/2018/10/15/durable-restorative-material-class-ii-cavities/>. Published October 15, 2018. Accessed August 9, 2019.

5. Shofu: Shofu R&D Presentation: 'Beautiful II LS.' Shofu Inc., Kyoto 605-0983, Japan: 2017.
6. Ito S, Iijima M, Hashimoto M, et al. Effects of surface pre-reacted glass-ionomer fillers on mineral induction by phosphoprotein. *J Dent*. 2011;39(1):72-79.
7. Kamijo K, Mukai Y, Tominaga T, et al. Fluoride release and recharge characteristics of denture base resins containing surface pre-reacted glass-ionomer filler. *Dent Mater J*. 2009;28(2):227-233.

FOR MORE INFORMATION, CONTACT:

Shofu
shofu.com
800-827-4638
Circle 32 on Reader Service Card