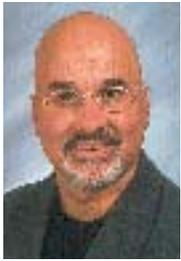


Discolored Porcelain Veneer Easily Replaced With Direct Resin Bonding: A Case Report



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Patient demand for esthetic dentistry with minimally invasive procedures has resulted in the extensive use of freehand bonding of composite resin to anterior teeth.¹ It is important for the dentist to have a working knowledge of conservative tooth preparation coupled with an understanding of composite resins and their placement in incremental layers. Incremental buildup of teeth with specific materials will provide the patient with the most natural result. With the numerous composite resin systems available, the dentist must be able to determine when to use a hybrid and/or microfill. In addition, an understanding of tints and opaquers will allow the dentist a virtually unrestricted ability to match adjacent teeth. Today's composite resins exhibit dramatically improved physical and optical properties, rendering them the ideal materials to facilitate restorations that are indistinguishable from natural dentition.

One of the advantages of a direct resin restoration over a porcelain restoration is that the dentist is able to maintain control and customize the materials throughout the procedure. With porcelain, any modification means a return to the laboratory for correction. When choosing the proper shade of composite for a direct composite veneer

ABSTRACT

Achieving natural esthetics by harmoniously matching the shape, surface texture, and color of a single anterior tooth is one of the greatest challenges in restorative dentistry. Direct composite resin bonding offers a predictable and conservative restorative treatment option. An understanding of the fundamental layering, contouring, and polishing principles is paramount to the success of any direct composite restoration.

LEARNING OBJECTIVES

After reading this article, the reader should be able to:

- Explain the layering technique for natural esthetics.
- Explain where and how to use opaquers and tints.
- Create surface texture and anatomy.
- Perform proper finishing and polishing for long-term success.

restoration, the dentist must first understand the hue, chroma, and value. Hue is commonly understood as the name of the color or the basic shade. Chroma can be defined as the intensity of a color or the degree of hue saturation. The most important of the color dimensions is value,² which distinguishes light from dark colors. The value can be defined as the brightness of color. The dentin imparts the color of the tooth and the enamel acts as a fiber optic structure that conducts light through its rods to capture the color.³ What will assist the dentist in creating the desired esthetic result is the use of an opaque hybrid overlaid with a microfill and customized with opaquers and tints. This combination of materials will mimic natural tooth structure far more effectively than a hybrid composite system will.

CASE PRESENTATION

A 35-year-old, out-of-state patient presented to my office with the desire to change the color of what she described as "old bonding." [QA. Why did she travel out of state to your office to have this done?] Without pre-

vious clinical evaluation of her dentition, what presented was slightly different. Her "bonding" was actually porcelain veneer that appeared discolored after the patient had bleached her teeth (Figure 1). After a brief clinical analysis, the treatment plan formulated was to replace the old veneer with a direct composite veneer. Luckily, her dentition was very sound with sufficient enamel and intact interproximal contacts. To properly restore and match her adjacent teeth, a combination of hybrid, opaquer, tint, and microfills were determined to be the best choice of materials. Most hybrid systems consist of dentin and enamel shades with the primary difference being the degree of opacity in each. It is the opinion of the author that the differences in the opacity of most hybrid systems do not match natural tooth structure as well as that of a microfill/hybrid sandwich technique. In addition, from an esthetic longevity standpoint, microfills hold their polish for many years whereas hybrids often lose their polish prematurely.

CLINICAL TECHNIQUE

After anesthetic was adminis-

tered, the porcelain veneer was removed using a course grit chamfer diamond (Brasseler USA®). When the veneer was removed, the preparation was smoothed with a medium grit chamfer diamond to an appropriate depth of 0.9 mm, which exposed some areas of dentin. The incisal was reduced by approximately 1.5 mm because of a previously existing fracture (Figure 2). The lingual margin was prepared with a chamfer approximately 0.5 mm in depth to allow for sufficient thickness of hybrid to ensure long-term strength. The cervical margin was placed equigingivally on the facial to preserve tissue health. If the tooth had been darker, the margin would have been placed 0.5 mm subgingivally to prevent a dark "shine-through." Care was taken not to break the interproximal contact because the dental team was dealing with a color change and not a tooth shape or size discrepancy. Matrix strips were placed interproximally to isolate the adjacent teeth from the etchant. The total-etch technique was used because of its ability to minimize the potential of microleakage while enhancing



Figure 1—The patient's "bonding" was actually a porcelain veneer that appeared discolored after the patient had whitened her teeth.



Figure 2—The incisal was reduced by approximately 1.5 mm because of a previously existing fracture.



Figure 3—The hybrid was tucked at the cervical margin first, and then slowly worked towards the incisal.



Figure 4—Restricted to the shine-through areas, opaquer of the same shade was feathered in incrementally.



Figure 5—B1 microfill was placed in thicknesses of between 0.3 mm and 0.5 mm and feather blended to the middle one third of the tooth.



Figure 6—The SuperBrite layer was sculpted, mamelons were developed, and then the layer was light-cured for 20 seconds.



Figure 7—A violet tint was applied in a very thin wash layer, placed vertically in the intrasculpted microfill later, and light-cured for 20 seconds.



Figure 8—An incisal light microfill was then sculpted and reverse feathered towards the gingival margin and light-cured for 60 seconds.

bond strength to dentin and enamel.⁴ The preparation was etched for 20 seconds with 37% G₃PO₄ with BAC (Etch-37™, BISCO, Inc), then rinsed for 10 to 15 seconds, and finally air-thinned to avoid desiccation. A fourth generation bonding agent (All-Bond® 2, BISCO, Inc) was applied with five primer coats and lightly dried to remove excess solvent. Unfilled resin (D/E Bond Resin, BISCO, Inc) [QA. **What other products could have been used here, to satisfy our fair play policy.**] was applied, brushed thin, and then light-cured for 20 seconds.

Because of a slight discoloration of the dentition, a hybrid composite was chosen as the first layer. Renamel® Universal Microhybrid B1 (Cosmedent®, Inc) has brighter strength and opacity than other hybrid materials making it a good choice to block shine-through and to increase the incisal length. Using a Cosmedent® 8A nonstick composite placement instrument, the hybrid was tucked at the cervical margin first and then slowly worked towards the incisal (Figure 3). At the cervical, the hybrid thickness started at approximately 0.5 mm and was thinned to approximately 0.3 mm at the incisal. Applying too thick of a hybrid layer at the incisal will

not allow room for placement of the microfill. Using the same instrument, excess length should be cleaved off to form the incisal edge. After curing the first hybrid layer for 20 seconds, the tooth should be visually inspected for shine-through of the discolored dentition. Often shine-through will appear as a slightly gray hue. Restricted to the shine-through areas, opaquer (Creative Color, Cosmedent®, Inc) of the same shade was feathered in incrementally (Figure 4) or until a uniform color is achieved and then cured for 20 seconds.

The enamel replacement stage begins with the placement of microfill at the cervical third of the tooth. Typically in the cervical area there is more chroma because of the relatively thin enamel. B1 microfill was placed in thicknesses of between 0.3 mm and 0.5 mm and feather blended to the middle one third of the tooth (Figure 5). Next, Renamel® SuperBrite 3 (Cosmedent®, Inc) was blended from the middle third to the incisal edge, still allowing room for the final incisal shade to be placed. SuperBrite microfill shades were developed especially to match bleached teeth. The SuperBrite layer was sculpted, mamelons were developed, and then the layer was light-cured for 20 sec-

onds (Figure 6). To prevent over building, it is imperative to constantly monitor the thickness of the composite material from the incisal aspect.

To recreate the natural translucency of the enamel shades, a violet tint was applied in a very thin wash layer, placed vertically in the intrasculpted microfill layer (Figure 7), and light-cured for 20 seconds. To achieve the proper value and match the adjacent central, an incisal light microfill was then sculpted and reverse feathered towards the gingival margin (Figure 8) and light-cured for 60 seconds. Feathering each layer will prevent any lines of demarcation. Care should be taken to thin out each layer.

The finishing and polishing stage of any anterior composite restoration is crucial to achieving the desired result. Often, using a series of discs will result in a flat, nontextured surface that will not appear natural. Sequentially, the use of discs, carbide burs, polishing points, and polishing brushes will create a restoration that is highly polished, contoured, and yet has a natural surface texture to mimic the adjacent tooth. The incisal edge was reduced first using a coarse FlexiDisc (Cosmedent®, Inc) (Figure 9). The interproximal areas were con-

toured with a medium FlexiDisc to accentuate the line angles (Figure 10). The facial contouring was initiated with an 8-fluted ET® 9 finishing bur (Brasseler USA®). The ET® 9 is easily controlled and allows for the development of primary anatomy that accentuates the previously sculpted mamelons (Figure 11). Secondary anatomy, consistent with the adjacent central, was created using a flame-shaped bur (Figure 12). After the anatomy development is complete, FlexiPoints (Cosmedent®, Inc) are used to polish the secondary anatomy starting with the medium grit and finishing with the fine (Figures 13 and 14). To maintain this anatomy while continuing to polish, a Jiffy® Polisher (Ultradent Products, Inc) was used (Figure 15). A football-shaped OS1 (Brasseler USA®) was then used to shape the lingual incisal edge while maintaining a thickness of the hybrid for strength (Figure 16). For the final polish, Enamelize™ Composite Polishing Paste (Cosmedent®, Inc) was used in conjunction with FlexiBuff discs (Cosmedent®, Inc) (Figure 17). FlexiBuffs are mylar-coated melt discs that, when used with Enamelize™, create an ultrafine and glossy surface, while ensuring the surface texture is maintained (Figure 18).



Figure 9—The incisal edge was reduced first using a coarse FlexiDisc.



Figure 10—The interproximal areas were contoured with a medium FlexiDisc to accentuate the line angles.



Figure 11—The ET[®] 9 was easily controlled and allowed for the development of primary anatomy that accentuates the previously sculpted mamelons.



Figure 12—Secondary anatomy, consistent with the adjacent central, was created using a lame-shaped bur.



Figures 13 and 14—FlexiPoints were used to polish the secondary anatomy starting with the medium grit and finishing with the fine.



Figure 15—To maintain this anatomy while continuing to polish, a Jiffy[®] Polisher was used.

Completed restoration is shown in Figure 19.

CONCLUSION

Truly natural esthetic results are achieved when combining conservative preparations with a choice of materials that provide long-term strength, natural opacity, and color transmission. However, equally important and yet often overlooked is the development of an enduring polish that maintains a natural surface texture. Traditional hybrid composites alone often do not provide all of the elements necessary to match and retain such a natural-looking result. Using a combina-



Figure 16—A football-shaped OS1 was then used to shape the lingual incisal edge while maintaining a thickness of the hybrid for strength.



Figure 17—For the final polish, Enamelize™ Composite Polishing Paste was used in conjunction with FlexiBuff discs.



Figure 18—FlexiBuffs used with Enamelize™ create an ultrafine and glossy surface while ensuring the surface texture is maintained.



Figure 19—Completed restoration.

tion of hybrids, opaquers, tints, and microfills, and using a simple, yet multilayered, technique will dramatically improve any dentist's results and provide the patient with his/her desired outcome. ○

DISCLOSURE

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REFERENCES

1. Dietshi D. Freehand composite resin restorations: A key to anterior aesthetics. *Pract Periodontics Aesthet Dent.* 1995;7(7):15-25.
2. Touati B, Miara P, Nathanson D. *Esthetic Dentistry and Ceramic Restorations.* London, UK: Martin Dunitz; 1999:39-60.
3. Fahl N Jr, Denehy GE, Jackson RD. Protocol for predictable restoration of anterior teeth with composite resins. *Pract Periodontics Aesthet Dent.* 1995;7(8):13-21.
4. Kanea J. Improving bond strength throughout etching of dentin and bonding to wet dentin surfaces. *J Am Dent Assoc.* 1992;123(9):35-43.

Product References

Products: Coarse grit chamfer diamond, ET® 9 finishing bur, Football-shaped OS1

Manufacturer: Brasseler USA®

Address: 1 Brasseler Boulevard
Savannah, Georgia 31419

Phone: 800.841.4522

Fax: 888.610.1937

Products: Etch-37™, All-Bond® 2, D/E Bond Resin

Manufacturer: BISCO, Inc

Address: 1100 West Irving Park Road
Schaumburg, Illinois 60193

Phone: 800.247.3368

Fax: 800.959.9550

Products: Renamel®, nonstick composite placement instrument, Creative Color, Renamel® SuperBrite, FlexiDisc, FlexiPoints, Enamelize™ Composite Polishing Paste, FlexiBuffs

Manufacturer: Cosmedent®, Inc

Address: 401 North Michigan Avenue
Chicago, Illinois 60611

Phone: 800.621.6729

Fax: 312.644.9752

Product: Jiffy® Polisher

Manufacturer: Ultradent Products, Inc

Address: 505 West 10200 South
South Jordan, Utah 84095

Phone: 800.522.5212

Fax: 800.842.9024

