

Layering and Blending Composite

Conservative and Esthetic Restoration of a Class IV Fractured Central Incisor

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Figure 1: Preoperative full-face smile. The stained, old restoration is visible from a distance.

Introduction

Esthetic anterior restorations are necessary in today's appearance-conscious society. Many of the cosmetic challenges that dentists currently face relate to patients who present with a history of childhood trauma that resulted in the restoration of one or more anterior teeth. As they age, anterior restorations begin to stain and fracture and the need for a highly esthetic replacement restoration becomes a priority.

Patient History and Chief Complaint

The patient, a 27-year-old male, presented with a stained and fractured Class IV restoration on tooth #8. He wanted the restoration to be replaced with a more esthetic one. The tooth had been fractured during a fall when the patient was 11. The original restoration was placed soon after the trauma and had not been replaced.

The tooth was asymptomatic, and showed no signs of pulpitis or pulpal necrosis secondary to trauma and the subsequent restoration of the tooth. Clinical examination revealed good oral hygiene and healthy periodontium. Previous dental work included amalgam restorations in the posterior and the Class IV composite on #8. The patient, who was in excellent general health, had no temporomandibular joint symptoms and was asymptomatic upon load-testing the joints in centric relation; minor wear facets were noted in the anterior (Figs 1-3).

Diagnosis and Treatment Plan

The diagnosis was a defective and discolored composite restoration on the mesial incisal of tooth #8. The existing composite was stained and fractured. The maxillary midline was deviated to the left, causing the maxillary centrals to lack symmetry and dominance. The treatment plan consisted of take-home whitening with full-arch custom trays, and restorations of #8 and #9 with composite resin. Tooth #9 was included in the treatment plan to close the existing diastema and achieve symmetry of the maxillary central incisors. The patient requested conservative treatment options and refused periodontal surgery or orthodontics. One of the major goals of restorative treatment was to close the “black triangle” between #8 and #9. Care was taken to avoid blunting the papilla and to have the gingival levels be in harmony with the adjacent teeth. Composite was placed as close as possible to close the black triangle and the gingiva responded favorably.

Treatment

Preoperative

Photographs were taken to assess the existing restoration and formulate the sequence for treatment. Impressions were made to fabricate the take-home full-arch custom bleach trays and to create a diagnostic wax-up. The patient was given the trays, a two-syringe take-home bleaching kit (Zoom NiteWhite 16% calcium phosphate, Philips Oral Healthcare; Los Angeles, CA), fluoride gel (Relief Gel, Philips), and written and verbal directions for their use. He was instructed to wear the bleach trays overnight for six consecutive nights. The patient returned three weeks later for replacement of the composite restorations on #8 and #9.

Bonding, Layering, and Blending

The patient was anesthetized with 2% lidocaine with 1:100,000 epinephrine (Henry Schein; Melville, NY). The existing unesthetic restoration was removed. The tooth was prepared with a scalloped bevel extending into the middle third of the tooth to enhance the blending of the finish line.¹ There was no recurrent decay noted. A 40% phosphoric acid gel etch (Henry Schein) was used as directed. The bonding agent, Optibond FL (Kerr; Orange, CA), was then applied. The use of a fourth-generation bonding agent with the total-etch technique was preferred due to the high enamel content of the cavity preparation and resulting high bond strength.² Charisma composite resin (Heraeus Kulzer; South Bend, IN) and IPS Empress Direct (Ivoclar Vivadent; Amherst, NY) were placed



Figure 2: Preoperative retracted frontal image (1:2). The difference in axial inclination of the central incisors is apparent.



Figure 3: The x-ray shows the completed restorations on #8 and #9.

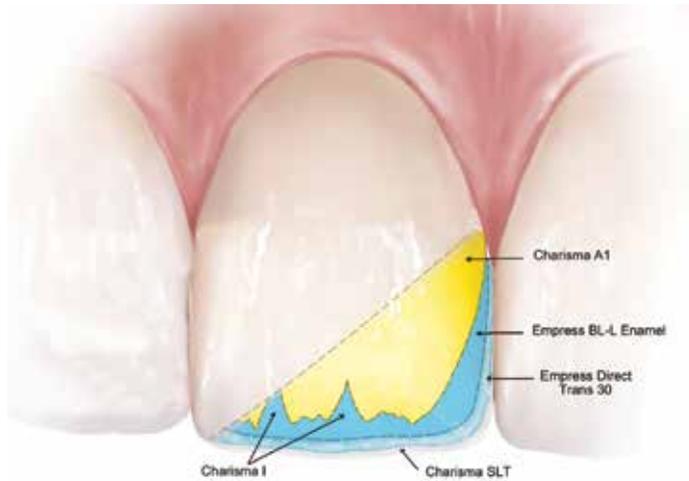


Figure 4: Color map of the various layers of composite from a frontal view. (Illustration by Zach Turner)

COLOR MAP - CLASS IV COMPOSITE

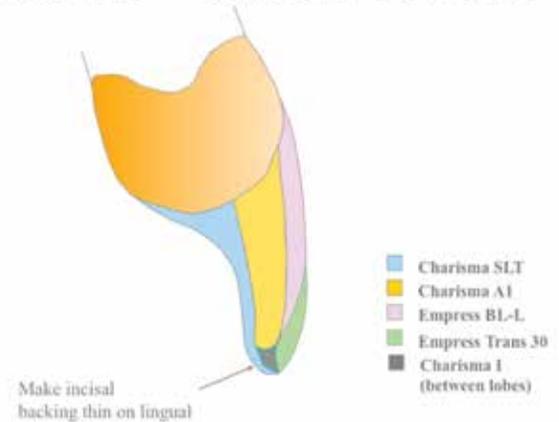


Figure 5: Color map of the various layers of composite from a side view. (Illustration by James H. Peyton, DDS, FAACD)

in incremental layers to simulate the various anatomic layers of the tooth. Thus, a dentin shade replaces the dentin layer, an enamel shade replaces the enamel layer, and a translucent or effect shade replaces the incisal area of the tooth. The incremental layering process results in a natural-looking, polychromatic restoration.^{3,4} All increments were cured with a BluePhase G2 LED curing light (Ivoclar Vivadent) (Figs 4 & 5).

Composite resin was placed slightly subgingivally to support the papilla at the top of the interproximal connector, along the mesiofacial of #8 and #9. Care was taken to prevent the formation of sharp “elbows” of composite that floss could snag on, which potentially could fracture the composite or inflame the gingival tissue. A clear matrix strip (Contour-Strip, Ivoclar Vivadent) was used to create a smooth contact between #8 and #9 (Fig 6). The strip was formed and “tacked” into place using a clear, unfilled resin (HelioBond, Ivoclar Vivadent) (Fig 7). The outside edge of the strip was shaped with the handle of a composite instrument to form a “beak” that could be tucked slightly subgingivally. Once the matrix was tucked in and formed an inverted U-shape, it was held in place by unfilled resin placed on the outside of the strip and cured. This method allows for the placement of composite subgingivally without sharp angles or corners, and allows the resin to transition smoothly from the cervical to the mesial interproximal interface.⁵

The initial layer of Charisma shade SLT (Heraeus Kulzer), a microhybrid composite, was placed to build the lingual shelf. The lingual shelf layer is a very thin layer of milky-white enamel that is semi-translucent. This layer replicates the lingual layer of enamel and serves as a foundation upon which subsequent layers will be formed. The lingual shelf also precisely replicates the incisal edge and lingual contours of the tooth.^{6,7} Charisma shade A1 was used to build mamelons and mimic the dentin layer. This dentin layer was placed up to the fracture line and



Figure 6: Preoperative retracted anterior image (1:1). The lack of symmetry in the width of the central incisors is evident.



Figure 7: Postoperative retracted anterior image (1:1). The width of the central incisors appears symmetrical. Translucency has been incorporated into the layers of the new restorations.



Figure 8: Preoperative retracted left lateral image (1:1).



Figure 9: Postoperative retracted left lateral image (1:1).

slightly beyond to make the fracture line disappear and blend into the composite.³ A small amount of Charisma shade I (Incisal) was placed in between the lobes to create translucency and contrast. The last layers of IPS Empress Direct Enamel BL-L and Trans 30 were used to recreate the enamel layer and incisal edge of the restoration. A final layer of BL-L was used to recreate the enamel layer of the restoration; this composite was extended beyond the scalloped bevel to blend and transition the finish line into existing tooth structure. The Trans 30 was used to incorporate translucence to mimic the existing incisal translucency of #9. The procedure to restore #9 was similar, but only BL-L composite was used, given the minimal amount of space that was needed to close the diastema. A fine-grit flame diamond bur was used to create primary and secondary facial anatomy. A graphite pencil was used to mark the line angles of #8 and #9. The pencil was very useful in achieving symmetry and developing the mesiofacial line angles.⁸ Carbide burs #7406 and #7901 (Brasseler USA; Savannah, GA) were used with an electric handpiece to finish margins and adjust the occlusion. The occlusion was checked and adjusted to ensure that the patient had smooth, even anterior guidance on both #8 and #9 in protrusive and excursive movements, with posterior disclusion (Figs 8 & 9).⁹

Finishing and Polishing

EP finishing discs (Brasseler) were used to finish the restoration and establish primary anatomic form. The putty matrix was also helpful in visualizing the incisal edge position and incisal embrasures. Visualization of the restoration from the incisal view can detect irregularities in the facial contour and proximal line angles. From the postoperative occlusal view, one can see that the facial contours are correct.^{6,7} Polishing was accomplished with Dialite composite polishing points

(Brasseler), followed by application of Enamelize paste with a FlexiBuff wheel (Cosmedent; Chicago, IL). Teeth #8 and #9 had areas of pitted enamel that were smoothed and polished after the restorations were placed. Final polish was achieved with a plain cotton buff wheel (Brasseler), using a staccato motion with a slow-speed straight cone handpiece (Figs 10-13).¹⁰

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Figure 10: Preoperative retracted maxillary occlusal image (1:2). A midline cant is evident.



Figure 11: Postoperative retracted maxillary occlusal image (1:2). The midline cant and appearance of the papilla between the central incisors is improved.



Figure 12: Postoperative retracted frontal image (1:2). The central incisors appear to have a symmetrical, harmonious slight mesial-axial inclination.



Figure 13: Postoperative full-face smile. The new restoration blends in well enough to “disappear” in this view.



Figure 14: Preoperative frontal natural smile. A black triangle is noticeable.



Figure 15: Postoperative frontal natural smile. The black triangle is no longer visible.

Postoperative

The patient was recalled several weeks after the initial placement of the restorations to examine the shape and health of the papilla. Oral hygiene instructions were reviewed, considering the contact between #8 and #9 was previously light. The patient was able to floss the new contact between #8 and #9 easily and did not shred or snag floss.

He was very happy with the esthetic outcome of the restorations, and had no postoperative sensitivity. At the six-month recall appointment, he demonstrated the ability to maintain the health of the papilla between #8 and #9, and the shape of the restorations without fracturing the newly restored incisal edges.

Summary

Composite resin was the material of choice for the restoration of #8 and #9 because of the conservative nature of the bonding process and minimal preparation required.^{11,12} There are many excellent composite systems on the market today. However, through repeated use, one or two particular shades of composites taken from a particular kit or manufacturer may become the “go-to” shade or shades. In this case, composites from two different manufacturers (Heraeus Kulzer and Ivoclar Vivadent) were used. The translucency achieved was due solely to the layering of shades of composite, without the use of tints (Figs 14 & 15).³

High bond strengths can be achieved using a fourth-generation bonding agent.² The midline cant was improved and central dominance was achieved with the use of direct resin. Challenges to achieving esthetic results included blending the finish line, restoring symmetric line angles, and obtaining the necessary surface luster to match the existing dentition. Also, consideration of the adjacent papilla heights played a role in determining the length of the contact point between #8 and #9. It was imperative to close the midline diastema conservatively without blunting the papilla. Several different lengths were attempted before achieving a balance between preservation of the papilla and closure of the existing triangle.

The pleasing esthetic results realized here demonstrate that direct composite resin should be considered as a definitive final material for replicating natural tooth structure and obtaining a lifelike, polychromatic restoration.

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Dr. Tirumalasetty maintains a private practice in Chicago, Illinois.

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