

Multi-Shade Composite Layering

Replacing a Single-Shade Class IV Anterior Composite in an Adolescent Patient

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Abstract

Fractured anterior teeth are common in young patients.¹ Due to its low cost and conservative nature, composite resin is the restorative material of choice for most such patients.² Placing a full-coverage crown on a teenager should be avoided, however, to preserve as much natural tooth structure as possible.³ While single-shade composite resin can look acceptable if the fracture is small enough (depending on the tooth's color), it is not always the most esthetic option for patients who have very translucent enamel. Many manufacturers offer composite in different opacities, which can be blended to mask anterior fractures.⁴ These composites can exhibit an accurate reproduction of the chroma, opacity, and translucency of natural dentin and enamel.⁵ Providing a patient with a multi-shade anterior composite can increase their self-esteem.⁶ This article discusses the use of a multi-shade layering technique in a 15-year-old patient.

Key Words: Class IV anterior composite, multi-shade composite layering, freehand resin bonding, anterior tooth fracture, color matching, Case Type IV

Introduction

Children and adolescents often fracture their front teeth.¹ Freehand composite resin bonding is the quickest, most conservative and affordable method to repair minor tooth fractures and replace old anterior fillings.⁷ Thanks to improvements in color and strength, the dentist has ultimate control over the final outcome of this transformation.⁸ Layering of different colors and opacities allows the composite to mimic natural dentin and enamel.⁹

Case Report

Patient History, Evaluation, and Findings

A healthy 15-year-old female presented for an initial checkup and evaluation (**Fig 1**); she was changing dentists because she had moved from out of state. Her last dental prophylaxis and examination had occurred more than a year earlier. A comprehensive examination and a full mouth series of radiographs showed no abscesses, no caries, and no periodontal disease. She had some gingival inflammation due to not having had a prophylaxis for 12 months and not angling her toothbrush correctly at the gum line to facilitate plaque removal (**Fig 2**). An oral cancer screening was performed and found to be within normal limits. She exhibited generalized crowding of the upper and lower teeth but had no history of clicking, popping jaw joints, headaches, or temporomandibular joint disease.

She had fractured tooth #8 in a swimming accident several years earlier and her previous dentist had repaired it with a composite resin filling. The filling was unsightly, chipped at the junction of the facial margin (**Fig 3**), and very opaque (**Fig 4**). The natural color of adjacent tooth #9, however, had a great deal of translucency. Both maxillary anteriors were determined to be vital, with normal response to cold.

Chipped front teeth commonly are restored with a single shade of composite resin; this approach can sometimes work if the chip is very small. When a fracture is larger or the tooth is highly translucent, however, a multi-layer technique is required and can result in a very esthetic and long-lasting restoration.^{10,11} Artistically inclined dentists can differentiate themselves to patients by explaining how a multi-layer technique produces more lifelike results.¹² This technique takes only a little more time than the single-shade method and is well worth the effort.



Figure 1: Preoperative full-face smile (1:10).



Figure 2: Preoperative retracted frontal view (1:2) showing monochromatic, opaque Class IV restoration and gingival inflammation.



Figure 3: Preoperative frontal view (1:2) showing failing single-shade Class IV restoration.



Figure 4: Preoperative retracted intraoral frontal view (1:1); open margin and lack of translucency are evident.



Figure 5: Postoperative frontal smile view (1:2); seamless composite resin restoration with lifelike properties.

Treatment Plan

The patient was told of the open margin on #8 and the benefits of replacing the filling, which included restoring the tooth to a lifelike color as well as sealing the junction between the filling and the tooth to prevent recurrent decay. Because there was so much crowding and some gingival inflammation, she was informed of the health benefits of orthodontics and was referred to an orthodontist for a consultation. The treatment plan was geared toward restoring her to ideal dental health with a focus on prevention while improving esthetics. As the patient was a minor, the treatment plan was also discussed with and agreed to by her father. She received a prophylaxis with brushing and flossing instructions and her missing sealants were replaced. The composite filling on #8 would then be replaced with a multi-layered resin that would provide an ideal seal and a more natural-looking restoration (Fig 5).

Treatment

Shade Matching: The existing filling on #8 was contoured to an ideal incisal lingual form using diamond burs. A putty mold (VP Mix Putty, Henry Schein; Melville, NY) was fabricated from the lingual and incisal shapes of #8 and #9; this was a critical step in designing a blueprint for the framework in which the layering would reside. A body shade of A1 (Vita Classical shade guide, Vita North America; Yorba Linda, CA) was taken from the unrestored #9. The composite material itself was placed on the tooth and light-cured to verify the correct shade. (This was done because composite shades rarely match the commercial shade guides.¹³ The most accurate shade guide would be one that is composed of the actual composite material.)¹³

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The patient was anesthetized with 1.7 ml lidocaine hydrochloride 2% with epinephrine 1:100,000. Isolation was achieved with an Optragate (Ivoclar Vivadent; Amherst, NY). The entire filling on #8 was removed and confirmed to be caries-free. A 2-mm bevel was placed facially to serve as a plane on which to blend the internal and external colors of composite with the natural dentin and enamel shades.

Etching and Bonding: Tooth #8 was etched with 37% phosphoric acid (Etch gel, Henry Schein) for 12 seconds and then rinsed with water for 12 seconds. The acid etch was applied to the entire prepared surface and carried past the bevel. A bonding material was applied to #8 with a micro brush (Solo Optibond Plus, Kerr; Orange, CA). The bonding agent was scrubbed in for 10 seconds, then air-dried and light-cured for two 10-second intervals (Demi LED, Kerr).

Layering: IPS Empress Direct nanohybrid composite (Ivoclar Vivadent) was chosen for all layers of the restoration due to its strength, color, and polishability. The evolution of nanohybrid composites, a combination of small and large particle fillers, has given dentists the opportunity to obtain excellent esthetics and strength.¹⁴

A very thin layer of Empress Direct A1 Enamel was placed directly into the putty mold outside of the mouth and sculpted to form a lingual shelf and incisal edge using an interproximal carver (TNCVIPC, Hu-Friedy; Chicago, IL). The lingual shelf layer was sculpted as thin as possible without perforating the composite, into the putty. The putty mold was then placed back into the mouth, making sure the composite adapted to the tooth and light-cured for two 10-second intervals.

The putty mold was removed and the thin transparent lingual shelf remained bonded to the lingual enamel of #8. A layer of A2 Dentin was placed to recreate the dentin lobes and was carried up just over the bevel to hide the fracture line. The lobes were shaped to mimic the lobes on #9, which is important for esthetics.¹⁵ This layer was cured for two 10-second intervals. A layer of translucent shade (Trans 30) was used to fill in the area between the lobes at the incisal and distal portion and cured for two 10-second intervals. The translucent layer was used to preserve the dentin lobe effect and impart incisal translucency. A layer of A1 Enamel was used to cover the incisal portion of the dentin and a layer of A3 Enamel was placed midfacial over the dentin to blend with the more chromatic area of the tooth's central aspect. This layer was cured for two 10-second intervals. Finally, a layer of Trans 30 was placed over the entire section of the composite to recreate the facial enamel form (Fig 6). This was cured for two 10-second intervals.

Contouring and Polishing: The Optragate was removed and the composite was shaped and contoured with a red-striped, flame-shaped diamond bur (Henry Schein). The line angles and incisal edge position were traced with a pencil to mimic the angles of #9.¹⁶ The primary anatomy was formed using coarse and medium FlexiDiscs and FlexiStrips (Cosmedent; Chicago, IL). Contours were checked from right, left, and incisal views. Occlusion was verified for adequate protrusive and lateral excursions with AccuFilm II (Parkell; Edgewood, NY). Polishing was completed in three sequential steps, the sequential aspect being key to composite longevity.¹⁷ A fine (yellow) FlexiDisc was used first, then a super-fine (pink) FlexiDisc, alternating between dry and wet fields. Finally, a FlexiBuff felt polishing disc was used with Enamelize polishing paste (Cosmedent).

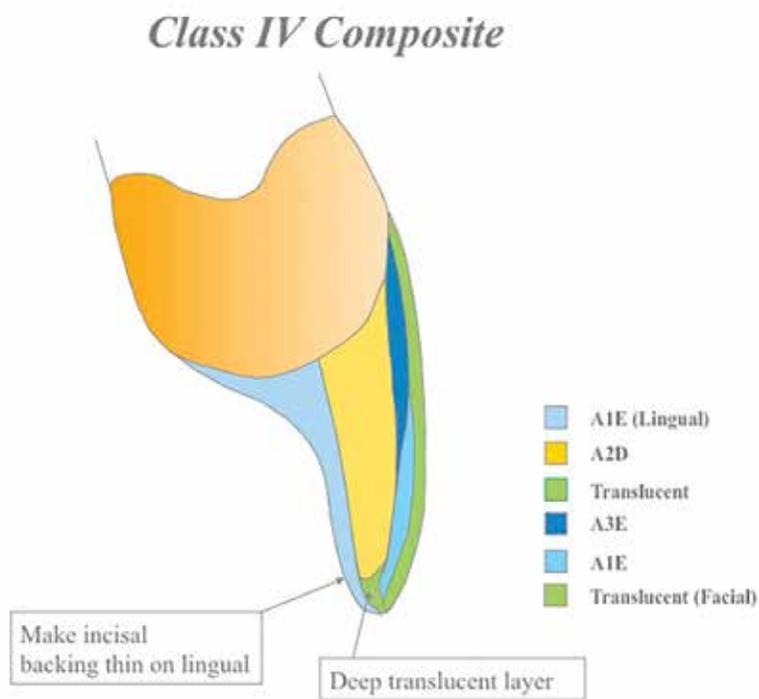


Figure 6: Shade map for tooth #8; layering technique used to rebuild the tooth with the goal of designing an undetectable Class IV resin composite restoration to match the natural characteristics of tooth #9.

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Discussion

Shade matching is paramount in achieving an esthetic outcome in cases such as this.¹⁸ Placing small amounts of various colors of composite and curing them on top of the enamel before selecting shades can help clinicians determine which composite colors might work and which might not. Proper magnification is essential for shade selection, manipulation of material, and finishing and polishing of the final restoration. When restoring an anterior single-shade composite restoration, it is often difficult to choose the correct shade. It is generally better to choose the lighter of the two shades when working on the centrals. It is also important to select the shade at the very beginning of the appointment before the tooth has a chance to dehydrate, causing it to become higher in value and resulting in inaccurate shade selection.¹⁹ In this case, in which a multi-layered technique was necessary, the body shade of the unprepared tooth was A1. However, after the existing filling was removed and the bevel placed, it was found that the center of the tooth under the enamel was an A3 shade. It was necessary to use as much translucent shade as possible around and on top of the dentin shade to mimic tooth #9 (Figs 7 & 8).

Summary

Multi-layered resin restorations are a conservative approach to correcting patients' cosmetic and functional issues.²⁰ Anterior tooth fractures are extremely common in younger patients and multi-shade resin restorations can maintain excellent esthetics for many years. These restorations offer the patient an affordable solution in one to two visits and, although they take a few steps to complete, the dentist can mimic the shape and opacity of both dentin and enamel, which will provide a more natural look (Fig 9). In this particular case, the putty stent was essential to building the framework in which to layer the composite. At a time when many clinicians are still restoring fractures such as these with single-shade solutions, cosmetic dentists can distinguish themselves from others by providing patients with a multi-shade, truly lifelike restoration.

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Figure 7: Postoperative retracted frontal view (1:2).



Figure 8: Postoperative retracted intraoral frontal view (1:1); improved harmony and translucency between the two central incisors.



Figure 9: Postoperative full-face smile portrait (1:10); smile rejuvenated with conservative esthetics.

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Dr. Harris owns a private practice in San Ramon, California.

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