Revitalizing Discolored Anterior Restorations

Restoring Class IV Fractures with New Composite Resin

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> **"It is not desirable to place invasive crowns on a young patient when an anterior tooth is fractured."**

Abstract

The ability to properly execute minimally invasive restorations on young patients is vital. The use of composite in such cases, requiring only a small amount of tooth reduction, is much more conservative than a crown or veneer. This article describes the treatment of a young adult patient who presented with large discolored Class IV composite restorations on her maxillary central incisors. The teeth were restored with a new composite resin material. Shade selection, layering techniques, and finishing and polishing are described in detail.

Key Words: Class IV composite restorations, fractured maxillary central incisors, minimally invasive, shade selection, layering

Introduction

It is not desirable to place invasive crowns on a young patient when an anterior tooth is fractured. Because it is very important to preserve these teeth as much as possible for the rest of the patient's life, the ability to properly execute minimally invasive restorations on young patients is vital. Composite is a useful and minimally invasive solution that can be replaced over time, when necessary. A Class IV composite is much more conservative than a crown or veneer, requiring only a small amount of tooth reduction.[1-3]

Patient History

The patient, a 21-year-old female, presented with discolored Class IV composite restorations on her maxillary central incisors (#8 and #9) **(Figs 1 & 2)**. The fillings had been placed on her fractured central incisors when she was a child and she now wanted a brighter and more beautiful smile. Her medical health was excellent. However, she had attention deficit disorder (ADD) and an understanding of this was very important in treating her dental condition. She sometimes found the necessary adjustments and photography sessions to be time-consuming and challenging but she was compliant and did her very best to accommodate the clinical situation. Her dental health and oral hygiene were good. Her jaw was uneven but that did not bother her. The occlusion was asymptomatic and functioned well.[4] Neither orthodontic nor periodontal treatment was necessary. No temporomandibular problems were noted.

Diagnosis

Teeth #8 and #9 were stained and the Class IV restorations were fractured. Both teeth were asymptomatic and showed no signs of endodontic issues. The midline was canted and #9 was overcontoured **(Figs 3 & 4)**.

A composite mock-up was made to help establish the line angles, incisal edge position, symmetry, size, and shape. The mock-up was adjusted and impressions were taken to create a stone model. This stone model can be further modified in wax and a stent can be made from the putty material. Photographs were taken to evaluate the esthetics and help plan the case. Bleaching was performed several weeks prior to restoring #8 and #9.

Figure 1: Preoperative frontal smile view of discolored and fractured central incisors.

Figure 2: Postoperative frontal smile view.

Figure 3: Preoperative occlusal view, large Class IV fractures.

Figure 4: Postoperative occlusal view.

Treatment

Shade Selection

The patient was anesthetized with local anesthetic (2% lidocaine with 1:100,000 epinephrine). Shade matching was done at the beginning of the appointment, before the teeth became dehydrated. It is helpful to place the desired composite shade on the tooth and light-cure for the best possible shade match. Dentin and enamel shades were selected by using a composite button technique. Dentin buttons were placed on the cervical part of the teeth and enamel buttons were placed as an extension of the teeth **(Fig 5)**. This technique is helpful in achieving an accurate shade match and to create a polychromatic restoration.

Composite Selection

Essentia composite (GC Europe; Leuven, Belgium) was chosen to restore the Class IV fractures on #8 and #9. Essentia is based on a duo-layering concept that, according to the manufacturer's manual, aims to simplify "everyday" dentistry **(Fig 6)**.[5]

Figure 5: Composite shade mock-up.

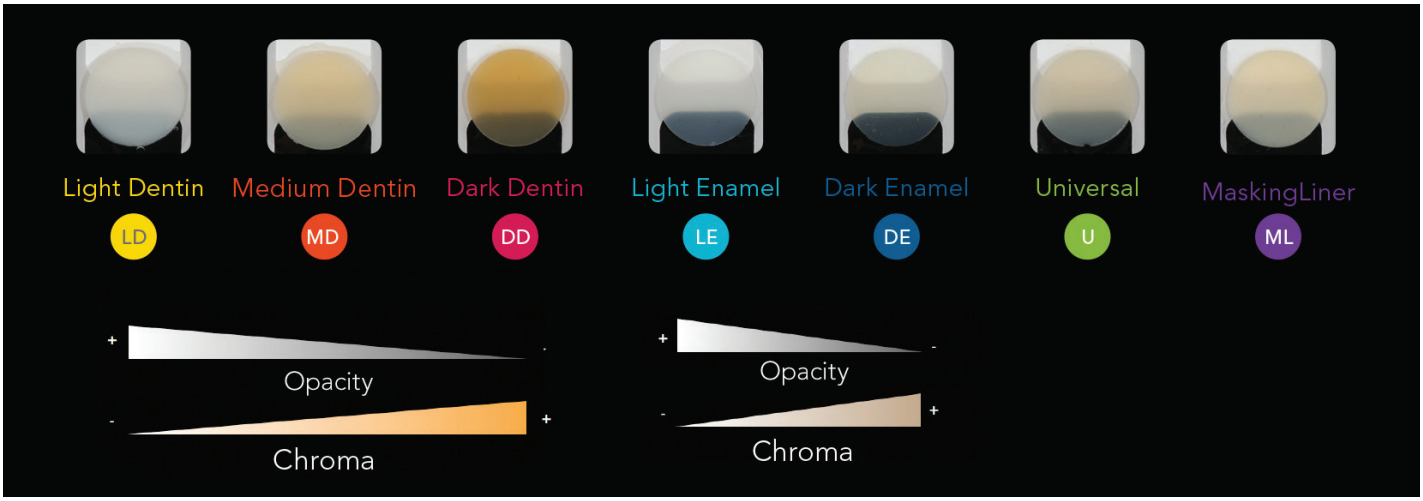

Figure 6: Slide showing how to layer Essentia to achieve a polychromatic restoration. *(Image reprinted with permission of GC Europe.)*

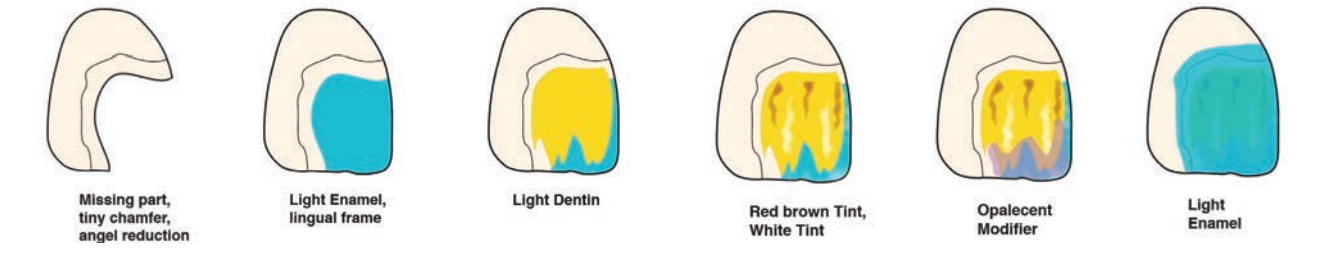

Figure 7: Composite steps.

Light Dentin (LD), a soft microhybrid composite that can be easily sculpted with a brush, was selected for the dentin shade. LD has higher opacity and lower chroma value, to mimic young teeth. Light Enamel (LE) was selected for the enamel shade. LE is a nanohybrid composite with a mix of ultra-fine glass fillers and high-performance prepolymerized fillers for polishability and gloss retention. Because Essentia's enamel shades are slightly stiff, they can be handled with both brushes and carvers. The different formulation of materials (micro and nanohybrids) helps to mimic nature and light scattering. The composition allows the use of dentin and enamel shades in the same thicknesses that exist in the dentin and enamel in a natural tooth **(Figs 7-9)**. Opalescent Modifier (OM) enamel shade was chosen to create translucency in the incisal third of the teeth.

Layering

The existing restorations were removed and moderate beveling was done to blend the restoration into the natural enamel of the teeth. A 38% phosphoric acid gel (Top Dent, DAB Dental; Gothenburg, Sweden) was used to etch the enamel. A bonding agent (All-Bond Universal, Bisco; Schaumburg, IL) was then applied and light-cured for 15 seconds. The palatal frame was created using a thin layer of LE on the putty stent. A clear mylar strip was used to create the mesial sides with LE. The dentin shade, LD, replaced the missing dentin and the mamelons were created with a brush. A small amount of red-brown tint was placed on the mamelons in a more central/apical position, which imparts more chroma to the tooth. OM was placed in between the mamelons incisally to achieve an opalescent incisal effect. A subtle white tint was placed to enhance line angles and incisal area for higher value. The enamel layer was restored with LE. Brushes and a carver were used to sculpt and shape the enamel layer. Care was taken to minimize the amount of overhang interproximally, which reduced the amount of contouring and polishing necessary. All layers were light-cured for at least 15 seconds **(Figs 10-12)**.[6,7]

> **"Dentin and enamel shades were selected by using a composite button technique."**

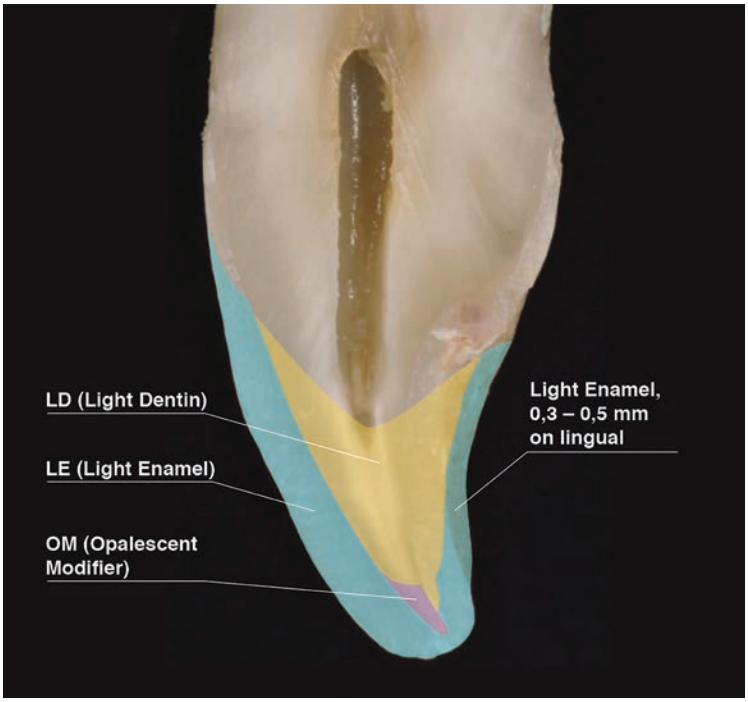

Figure 8: Color map side view showing the thickness of each layer. *(Image edited and reprinted with permission of Prof. Marleen Peumans, Leuven, Belgium.)*

Figure 9: Natural tooth side view. *(Image reprinted with permission of Prof. Marleen Peumans, Leuven, Belgium.)*

Figure 10: Preoperative 1:2 retracted frontal view.

Figure 11: The restorations were made to final contour, but were lacking high polish.

Figure 12: Restorations on #8 and #9 with a natural high polish that blends into the natural tooth surface.

Finishing and Contouring

Finishing and contouring was accomplished with Sof-Lex XT disks (3M ESPE; St. Paul, MN). The first step in the finishing and polishing protocol is to establish the facial-incisal line angle. The putty matrix can be used to verify the incisal edge length and position. The next step is to shape the mesial corners and line angles and embrasures (red Sof-Lex XT). The buccal and lingual anatomy was corrected with burs and a green stone. The surfaces and angles were smoothed with progressively less abrasive Sof-Lex XT discs (orange, orange-yellow, yellow), which can be flexed to remove sharp angles. Green stone leaves a velvety finish and, with a little more pressure, enhances the buccal texture and groves. Diacomp Plus Twist pink and white wheels (EVE Ernst Vetter GmbH; Pforzheim, Germany) were used to obtain a higher polish. Diamond strips (Edenta AG; Au, St. Gallen, Switzerland) with a saw and Epitex finishing strips (GC America; Alsip, IL) were used to contour and shape interproximally as well as to remove subgingival overhangs. Function, articulation, and occlusion were checked and corrected as necessary.

After the primary and secondary anatomy had been established, a close inspection of the facial surface confirmed the presence of some surface characterizations. Surface characterizations in a young patient are very common and need to be created in the final composite restoration to match the natural tooth structure.[8,9] Using a 90-µ low-speed bur one time from side to side (mesial-distal) from cervical to the incisal made the upper teeth appear more youthful by mimicking the perikymata.

Diacomp Plus Twist pink and white wheels were used on prominent incisal-cervical surfaces and prominent parts of the buccal surface, helping the teeth to regain shine. Gradia DiaPolisher polishing paste (GC Europe) was used with a goat hair brush **(Figs 13 & 14)**.

Summary

The large Class IV fractures on teeth #8 and #9 were restored with a new composite resin material, Essentia. [Editor's note: Essentia is not yet available in the U.S.] The surface texture was slightly overpolished and the perikymata was polished away. As shown in the "after" images, composite resin can be a beautiful restorative material; it certainly was the best treatment for this patient and her clinical situation. Both the patient and the dentist were extremely pleased with the results. This beautiful young woman now smiles all the time thanks to her new front teeth.[10-12] **(Fig 15)**.

Figure 13: Preoperative 1:1 frontal view.

Figure 14: Postoperative 1:1 frontal view; line angles reestablished.

Figure 15: A smiling, happy patient.

References

1. Byoung SI. Principles of adhesion dentistry. A theoretical and clinical guide for dentists. Newton (PA): AEGIS; 2013.

2. American Academy of Cosmetic Dentistry (AACD). A guide to Accreditation criteria. Madison (WI): AACD; 2014.

3. American Academy of Cosmetic Dentistry (AACD). Photographic documentation and evaluation in cosmetic dentistry: a guide to Accreditation photography. Madison (WI): AACD; 2015.

4. Dawson PE. Functional occlusion: from TMJ to smile design. St. Louis: Mosby; 2006.

5. Peumans M, Guadix JT. Aesthetics brought back to the essentials. Essentia from GC clinical guide. Available from: http://www.gceurope.com/pid/184/manual/en_Manual.pdf

6. Fahl N Jr. A solution for everyday direct restorative challenges: mastering composite artistry to create anterior masterpieces—part 1. J Cosmetic Dent. 2010 Fall;26(3):56-67.

7. Fahl N Jr. Step-by-step approaches for anterior direct restorative challenges: mastering composite artistry to create anterior masterpieces—part 2. J Cosmetic Dent. 2011 Winter;26(4):42-55.

8. Peyton JH, Arnold JF. Six or more direct resin veneers case for Accreditation: hands-on typodont exercise. J Cosmetic Dent. 2008 Fall;24(3):38-48.

9. Peyton, James. Finishing and polishing techniques: direct composite resin restorations. Pract Proced Aesthet Dent. 2004 May;16(4):293-8.

10. Hatkar P. Preserving natural tooth structure with composite resin. J Cosmetic Dent. 2010 Fall;26(3):26-36.

11. Snyder TC. Conservative replication of nature with a Class IV direct composite. J Cosmetic Dent. 2012 Spring;28(1):22-8.

12. Tirumalasetty PS. Layering and blending composite: conservative and esthetic restoration of a Class IV fractured central incisor. J Cosmetic Dent. 2014 Fall;30(3):16-22. **jCD**

Dr. Omo owns a private practice in Stockholm, Sweden.

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