

PROFILE



Robert C. Margeas, DDS

Current occupation

Private Practice
Adjunct Professor, Department of
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Education

DDS, University of Iowa College of
Dentistry, 1986
Residency, University of Iowa College
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Academic and other affiliations

University of Toronto Esthetic
Continuum
Guest Instructor, The Kois Center for
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Professional memberships

Academy of Operative Dentistry
Academy of General Dentistry
American Dental Association

Positions held

Editorial Advisory Board member for
Compendium of Continuing
Education in Dentistry
Editorial Advisory Board member for
Inside Dentistry
Consultant to Oral Health in Canada

Honors/awards

Board Certified American Board of
Operative Dentistry
Fellow, the Academy of General
Dentistry
Fellow, the International Team of Oral
Implantologists
OKU Honor Society
Past President, Iowa Academy of
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Publications

Authored or co-authored 49 articles

Hobbies/personal interests

Wine, art, travel

Notable contribution(s) to dentistry

Patent Holder: Rapid Simplified Veneer
Provisional Technique (RSVP)
Developer of Cosmecore Composite
Build-up material
Designer of Dental Instruments

Masters of Esthetic Dentistry

Keys to Success in Creating Esthetic Class IV Restorations

ROBERT C. MARGEAS, DDS*

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 Preservation of remaining tooth structure and using as much enamel to bond to have made the procedure very predictable. In order to achieve maximum esthetics, the dentist must be able to use multiple layers of composite to mimic tooth structure. Since no single monochromatic composite resin can duplicate the complex orientation of the colors evident in the natural dentition, the ability to select a variety of appropriate composite resin shades must be acquired.²

The clinician must have an understanding of color in order to replicate natural teeth. In natural teeth, differing colors are distributed through the enamel and dentin; hence, a variation in hue, chroma, and value renders the tooth polychromatic.³ Hue, the “name of color,” constitutes the first dimension of the polychromatic effect

and corresponds to the wavelength of light reflected by teeth.⁴ The second dimension, chroma, can be defined as the intensity of a color or the dimension of hue saturation. Value is represented as the brightness of color⁵ and is the most important of the three dimensions of the polychromatic effect. If the value is too low, the tooth will appear gray or dark. Too high a value renders the tooth white or opacous. The color of the final restoration is very important, but if the anatomical shape is not correct, the result will not look natural. Oftentimes, you are able to have a very esthetic result even if the color is slightly different, as long as the shape is ideal. The use of composites means little or minimal tooth structure needs to be removed in order to achieve a natural result.

Composite resins require skill and practice in order to be proficient. Clinicians cannot take hours to complete one restoration and still be profitable. Composite resins for anterior teeth need to be as good

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Figure 1. Pre-op smile.



Figure 2. Pre-op close up.

as porcelain veneers or porcelain crowns in every way. In contrast to indirect restorations, composite resins can be completed in a single treatment session, with no added laboratory cost.

The individual characteristics of natural teeth include the quality of the tooth surface, the thickness of the individual hard tissue layers, and the optical characteristics of each of those layers (translucency, transparency, opacity, opalescence, and fluorescence),⁶ together with the marks of wear and tear resulting from the daily stresses placed on the teeth.

An individual tooth looks esthetically pleasing if its contours, proportions, and color appear natural. Line angles, point angles, and developmental depressions need to be considered when finishing and polishing a restoration. All these affect the way light is reflected and

refracted from the restoration. In order to make a tooth appear wider, you move the transitional line angles more to the interproximal and use horizontal lines for surface texture. If the lines run vertically, this can give the tooth a narrower appearance. Embrasures can be altered to change the apparent width. Opening the incisal embrasures will lead to visual narrowing, whereas closing the embrasures will lead to widening. All of these effects will render the most naturally appearing restoration.

In fractures of teeth, the extent of the trauma must be assessed clinically and radiographically before treatment is rendered. If the fracture is too large for a direct composite restoration, then an indirect restoration could be used.

CASE PRESENTATION

A 35-year-old patient presented to the office following a motor

vehicle accident. The upper right central incisor had a horizontal fracture that did not involve the pulp (Figures 1 and 2). The treatment that was offered to the patient was a direct composite restoration. This restoration would be created using different layers of composite resin, along with some tints to recreate a polychromatic restoration. A 2-mm bevel was placed on the facial (Figure 3) with a flame-shaped diamond bur and an approximate 1.5-mm bevel/chamfer on the lingual. Due to its ability to minimize the potential of microleakage and enhance bond strength to dentin and enamel, the “total-etch” technique was utilized.⁷ The preparation was etched for 15 seconds using a 35% phosphoric acid gel (Figure 4). A clear matrix band was used to prevent the acid from contacting the adjacent teeth. This would be left in, until the bonding agent and first layer of composite resin are



Figure 3. Long bevel placed.

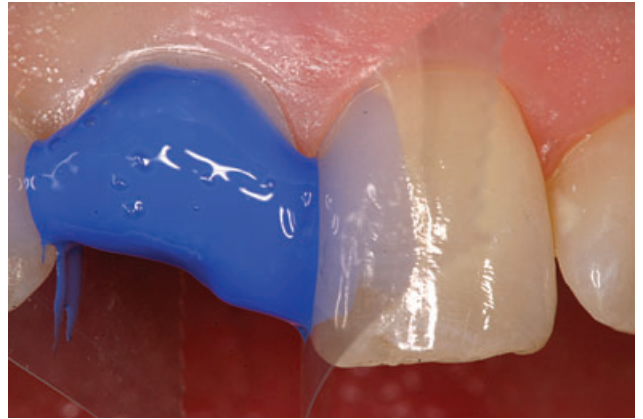


Figure 4. Acid etching for 15 seconds.



Figure 5. Application of bonding agent.



Figure 6. Lingual wall free hand sculpted.

applied. A lingual matrix made out of silicone putty could have been utilized to help create an ideal lingual contour, but this was not possible because of the emergency nature of the case. The tooth was rinsed for 15 seconds and lightly air-dried, but not enough to desiccate the tooth. The enamel did appear frosty. The dentin could be rewetted with a wetting agent, but

this was not necessary. A fifth-generation bonding system was utilized and applied in several coats (Figure 5) over a 20-second period and lightly air-thinned to remove the solvent. This was light-cured for 20 seconds. The first material used for the lingual backing was a nanocomposite resin material with a medium value to simulate enamel. This was applied

freehand in a layer approximately 0.5-mm thick (Figure 6). This first layer was placed just to the leading edge of the bevel, but not over the bevel. This must be viewed carefully from the incisal, so that the layers will not be too thick. This was light-cured for 20 seconds. If more incisal translucency was needed, the material could have been slightly cut back to make it



Figure 7. Placement of opacous composite to hide the fracture line.



Figure 8. Placement of composite over the bevel along with tints.



Figure 9. Final placement of a translucent composite resin.



Figure 10. Use of a sofex disk to create the primary anatomy.

thinner and allow more light to pass through the incisal area. Because of the minimal incisal translucency of the adjacent tooth, this was not necessary. The next layer of composite placed was a more opacous material. This was placed onto the bevel, but not over it (Figure 7). Dentinal lobes were placed in the incisal area, and a more translucent material was intersculpted between them and

light-cured. An enamel-like composite material with more translucency was placed over the bevel and blended into the tooth. This must be placed over the bevel and thinned out so the restoration will disappear. Following 20 seconds of light-curing, some tints were placed to simulate some of the nuances of the adjacent tooth. Some white and gray tint was placed and then light-cured for an additional 10

seconds (Figure 8). Tints cannot be placed on the surface of the restoration or they will be polished away when finishing. A clear incisal composite was placed in a very thin layer to cover the tints and light-cured for 40 seconds (Figure 9). When finishing and polishing this layer, the tints will begin to show through. Finishing with a disk (Figure 10) will allow us to develop some primary anatomy



Figure 11. Fine diamond used to create surface texture.



Figure 12. Use of silver powder to show reflective and refractive zones.



Figure 13. Final restoration on day of placement.



Figure 14. Post-op smile.

and place the line angles where they can match the adjacent tooth. This takes some time, and drawing on the teeth with a pencil can help. A medium-grit flame-shaped diamond on low speed and high torque works well to create the surface texture (Figure 11). The movement of the bur is similar to a windshield wiper. Moving the bur mesial to distal in a half-moon direction will create a nice effect.

Care must be taken to not remove the surface texture that was just created. A silicone- or diamond-impregnated brush will polish the surface and remove any scratches left from the diamond. Using a silver glitter powder found in theatrical shops will help reveal the light-reflecting and light-refractive areas. The teeth are slightly moistened, and the glitter is placed (Figure 12). This is easily

removed, and a felt-type polishing disk with aluminum oxide polishing paste works well to create a high shine. To create a more natural-looking tooth, incisal notching can be placed. The final result on the day of completion is shown in Figures 13 and 14.

Without the proper use of the materials described in this article, it would be difficult to achieve a

highly esthetic result. Polychromatic teeth cannot be recreated using one shade of composite. Proper finishing and polishing will allow the patient to maintain the restoration for several years. Direct composite resins require a certain amount of skill, and therefore, hands-on courses and daily practice will allow the clinician to reach a high level of proficiency.

REFERENCES

1. Dietshi D. Freehand composite resin restorations: a key to anterior aesthetics. *Pract Periodontics Aesthet Dent* 1995;7:15–25.
2. Kim HS, Um CM. Color differences between resin composites and shade guides. *Quintessence Int* 1996;27:559–67.
3. Rinn LA. Applied theory of color. In: Rinn LA, editor. *The polychromatic layering technique—a practical manual for ceramics and acrylic resins*. Chicago (IL): Quintessence Publishing; 1990. pp. 11–30.
4. Sproull RC. Color matching in dentistry. Part 1. The three-dimensional nature of color. *J Prosthet Dent* 1973;29:416–24.
5. Fahl N, Denehy J, Jackson R. Protocol for predictable restoration of anterior teeth with composite resins. *Pract Periodontics Aesthet Dent* 1995;7:13–21.
6. Vanini L. Light and color in anterior composite restorations. *Pract Periodontics Aesthet Dent* 1996;8(7):673–82.
7. Kanca J. Improving bond strength through etching of dentin and bonding to wet dentin surfaces. *J Am Dent Assoc* 1992;123(9):35–43.

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