A direct composite resin stratification technique for restoration of the smile

Juan Carlos Pontons-Melo, DDS, MSc1/
Adilson Yoshio Furuse, DDS, MSc, PhD2/
Jose Mondelli, DDS, MSc, PhD3

Composite resins can be used to improve the esthetics of the smile at a low cost and with relatively high clinical performance. The aim of this article was to describe an approach to restore and enhance the esthetic appearance of the anterior dentition through vital tooth whitening and the direct layering of composite resin during predictable esthetic procedures. (Quintessence Int 2011;42:205–211)

Key words: composite restoration, dental esthetics, layering technique

Nowadays, the cosmetic and esthetic parameters dictated by society have compelled patients to seek dentofacial harmony and improve their physical appearance. Additionally, the evolution of dental materials has increased the indication of esthetic restorative procedures. In this context, composite resins occupy a paramount position among restorative materials for anterior teeth because they offer good predictability, acceptable longevity, and the possibility of more conservative procedures at a lower cost than indirect restorations.1–6

In addition, during the replacement of decayed or missing dental tissue, composite restorations allow either minimally invasive or no preparation. They also provide an excellent esthetic outcome, due to the variety of available colors and effects.7–10

The range of composites allows the use of different combinations of shade, hue, translucency, and opacity. Thus, specific details and aspects that exist in the patient’s natural dentition may be obtained. This restorative approach of layering approach has been called an “anatomic buildup technique,”11 a “trendy three-layer concept,”12 or a “natural layering concept.”3 The goal of these methods is to mimic the natural anatomy of enamel and dentin.13

The application of a layering concept through the use of separate composite resin masses that mimic the natural tooth anatomy presents clear advantages for the clinician and makes the entire procedure more efficient and predictable.5 When evaluating the polychromatic characteristics of a tooth, age should also be taken into account. With increasing age, there is an increase in chroma, a decrease in value, and probably a change in hue. Actually, phenomena such as wear, acquired or dysplastic discoloration, and cracks or microfractures will require an individual approach for the restorative work.7 Thus, as is true of all art, a heightened sense of observation is required.14 The excellence in esthetic dentistry demonstrates further confirmation
of Leonardo Da Vinci’s belief that “art and technology are one and the same.”

In addition to composite resin restorations, vital dental bleaching may be employed to increase dental esthetics. Two techniques are currently available: in-office and “walking” bleaching. Both techniques may be employed, as the procedure is considered simple, safe, and incapable of causing major alterations of enamel and dentin structure.\textsuperscript{15,16}

The aim of this article is to describe an uncomplicated approach with which to restore and enhance the esthetic appearance of the anterior dentition via tooth whitening and direct composite resin restorations with the aid of a layering technique for predictable esthetic procedures.

**CASE REPORT**

A 35-year-old woman presented for treatment. She complained of dissatisfaction with her smile, especially with the position of her maxillary central incisors (Fig 1). A clinical examination revealed worn maxillary incisors and compromised color, as well as old, defective composite restorations (Fig 2). Radiographs and diagnostic casts were taken.

Vital in-office bleaching was proposed and conducted with 35% hydrogen peroxide (Lase Peroxide Sensy, DMC) (Fig 3). At the 1-week follow-up appointment, the patient did not report any tooth sensitivity at any point during the bleaching treatment. After 3 weeks, which is the recommended
amount of time to wait before creating an adequate bond after the bleaching process, new tooth positions and restorations were planned with the aid of a waxed dental cast. Enhanced predictability of the treatment can be obtained with a silicone index (Fig 4).

To avoid any interference in the chroma and opacity evaluations due to tissue dehydration, tooth shade was determined first. Cosmetic contouring was performed to correct the alignment of the maxillary central incisors (Fig 5). After tooth prophylaxis, modified rubber dam isolation and a retraction cord were placed. The compromised old restorations were removed, and circumferential chamfer bevels were created (Fig 6). Prior to the restorative procedure, 15 seconds of etching with 37% phosphoric acid, followed by a water rinse, was applied. Then, an adhesive system (Adper Single Bond 2, 3M ESPE) was applied in accordance with the manufacturer’s guidelines (Fig 7). Using a composite resin instrument...
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(IPC-T, Cosmedent), a thin layer of translucent enamel composite (YT, Filtek Supreme, 3M ESPE) was spread on the silicone index as a lingual shelf to establish the palatal contour and new incisal edge. The excess material was removed, and the composite resin was light cured in position for 20 seconds. The artificial dentin (shade A2 dentin, 4 Seasons, Ivoclar Vivadent) was placed over the facial portion and sculpted in the shape of mamelons. The halo effect (ie, a thicker volume along the incisal edge) was sculpted with shade A2 dentin (4 Seasons). To mimic the opalescent effect of natural enamel, a small increment of Blue Effect (4 Seasons, Ivoclar Vivadent) was applied to the region of the incisal third between the mamelon spaces (Fig 8).

The final layer, which corresponded to the artificial enamel, was restored with shade A2 enamel (4 Seasons) for the cervical third; shade A1 enamel (4 Seasons) for the medium third; and High Value (4 Seasons) for the incisal third (Fig 8). All composites were carefully applied with a flat spatula and blended with the aid of a no. 4 flat-tipped brush (Kota). Increments of composite resin were light cured for 20 seconds for each layer. A Mylar strip was placed interproximally and pulled through to help create a tight contact point and the correct facial embrasure forms (Fig 9).

Finally, both the buccal and palatal surfaces were light cured for 40 seconds. Before polishing, excess material at the margins was removed with a no. 12 surgical scalpel blade.

Fig 8  (a) Application of translucent resin to reproduce the palatal portion of the teeth with the aid of the silicone index. (b) Application of dentin shade to create mamelons and reproduce the region that corresponds with the deepest dentin. Dentin can be applied and placed precisely in relation with the future incisal edge. (c) Application of shades A1 and High Value for the layer that corresponds to the facial surface. (d) Artificial enamel of the final desired shade is applied from the cervical third to the middle and incisal thirds.

Fig 9  (left) Completed restorations before removing rubber dam isolation.
(Swann-Morton). A coarse-gritted disk (Sof-Lex Pop-On, 3M ESPE) was used to produce the primary anatomy and achieve symmetry between similar teeth. After the desired cervicoincisal and mesiodistal lengths were reached, symmetric light-reflection areas and light-deflecting zones were outlined with pencil and the distance was checked with a sharp-ended caliper.

The facial and palatal surfaces were finished with a coarse silicone cup (Astropol, Ivoclar Vivadent) to prepare for the macro surface texture. Lines along the facial surface were created with the aid of a fine-grit diamond bur (1190F, KG Sorensen) on a 1:4 increaser contra-angle (T2 REVO, Sirona) for optimal operative control. The entire restoration was then buffed with a silicone cup to eliminate some of the accentuated texture (Fig 10). The final natural gloss was achieved with Astrobrush (Ivoclar Vivadent), a felt wheel and an aluminum oxide polishing paste (Enamelize, Cosmedent), and abrasive strips for refining and polishing the interproximal areas.

To evaluate the occlusion, the patient was placed in an upright position. The centric occlusion and the protrusive and lateral movements were examined. Any equilibration that was required to improve harmony was accomplished with a finishing diamond bur, and the final polishing procedures were repeated whenever necessary. Finally, a protection bite splint was indicated for nighttime use (Fig 11). Figure 12 demonstrates the final result.
DISCUSSION

Due to the evolution of composite resins, the old concepts of indication that limited their use in several clinical situations have changed. This transformation may be attributed to the evolution of the materials' properties, such as their durability, load resistance, esthetics, color stability, and predictability. The clinical performance has also yielded favorable results. These qualities allow for a greater conservation of tooth structure compared to indirect restorative materials.19–22

Frequently, the dental practitioner is challenged to modify the configuration of the smile by applying an artificial material to replace missing tooth structures or eventually rearranging the disposition of the teeth. A good treatment must respect and simulate the spatial arrangement, relation, and appearance of natural tissues.7 The success of this procedure, however, depends on an understanding of the intimate structure of natural teeth.23

Despite the many advantages of composite resin, there are still some difficulties in regard to color selection. This aspect is considered a paramount element for achieving esthetic success in a restoration, but if the anatomical shape is not adequate, the result will not appear natural and harmonious within the dentofacial complex. Often, it is possible to achieve an esthetic result, even if the color is slightly different, as long as the shape, surface texture, and opacity are harmonic.24 The shade of a tooth is determined by the correlation among enamel, dentin, and light during the process of light refraction and reflection.11 Color matching is a problem, especially when there is a lack of opacity in the dentin shade of the material. Such a situation decreases the value of the restoration.25 This problem is more likely to be noticed than a mistake in hue.26 During the procedure of finishing and polishing multiple anterior restorations, it is recommended that light reflection and deflection areas be outlined in pencil and checked with a sharp-ended caliper. This procedure will enable the restorations to be as symmetric as possible.27

Some procedures should be addressed. Before the restorative procedure, an in-office bleaching treatment was performed. When bleaching is indicated prior to adhesive restorative treatments, it is important to wait at least 24 hours before bonding to prevent any negative effects of bond strength of composite resin to the dental structure.16 A modified rubber dam isolation technique as well as a retraction cord were employed. This technique allows clinicians to have free access to the gingival area while keeping the field free of saliva. Further, only compromised old restorations were removed. Old restorations that were not compromised by discoloration, marginal staining, or recurrent caries were repaired while seeking to improve esthetics so that sound dental structure was not eliminated.

The patient should be aware that the shade and texture of the material will change over time. Restorations also require periodic maintenance. Additionally, oral hygiene protocols should be emphasized. The color of esthetic restorations can be maintained for longer periods by introducing some restrictions on the patient’s dietary habits.19

CONCLUSION

Direct composite resin restorations have the potential to reproduce the appearance of a natural tooth with highly esthetic outcomes. Additionally, this procedure is a good treatment option that is less costly than other indirect approaches. Therefore, this simplified approach has the potential to extend the benefits of composite resin to a larger number of clinicians and patients.
REFERENCES


