

COMBINING “PREP-LESS” AND CONSERVATIVELY PREPARED VENEERS TO CORRECT ENAMEL DEFECTS AND ASYMMETRY



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INTRODUCTION

Cosmetic dentists today are realizing restorative success with less technique sensitivity, less reduction of tooth structure, and greater esthetics and durability. The ultimate goal of minimally invasive techniques is to reduce the amount of repeated restoration and tooth preparation required by the patient over the long term.¹⁻³ When such restorative therapies have been undertaken and have endured for many years, it then becomes the patient's choice whether to pursue other options that, although not as conservative, are still less aggressive than other modalities.

The patient was looking for a more long-term solution, as well as one that would give her teeth a more even and full appearance.

For example, the literature notes that the preparation philosophies for laminate veneers, in particular, have come full circle, and the emphasis today is on minimal or no tooth reduction. This philosophy is most likely due to the teachings of respected cosmetic dentists who recommend the use of minimal or no tooth preparation whenever possible, depending on the patient's clinical condition and the desired result.^{4,5}

Additionally, laboratory technicians today are able to process pressed ceramic veneers to dimensions requiring little or no tooth reduction,⁵ which also contributes to the conservative potential of this modality. Talented ceramists can press veneers as thin as .4 mm to enable cosmetic dentists to realize such benefits as conservative preparations, reduced postoperative sensitivity, healthy gingival response, and better bond strengths, among others.⁵



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Figure 1: Preoperative portrait view.



Figure 2: Preoperative close-up view of the smile.

Even when the underlying tooth structure for proposed thin veneers is stained, this restorative alternative still may be employed if the patient undergoes vital tooth whitening to successfully remove the discoloration. Although the causes of tooth discoloration and stains—as well as their location and severity in one or multiple teeth—are varied,^{6,7} a number of in-office and take-home whitening products can be used for treating intrinsic and extrinsic stains.⁸⁻¹¹ However, the literature states that there should be at least one week between tooth whitening and restorative procedures to allow time for color/shade rebound before shade matching, as well as to ensure predictability of any adhesive bonding agents that might be used.^{12,13}

This article addresses the case of a bride-to-be who, because her future husband was a dental laboratory technician (and co-author of this article), had seen many beautiful cases for other people. She had

been thinking for some time about enhancing her smile, and believed there was no better time or reason than her upcoming Napa Valley wine country wedding—which was two months away—to get started. She wanted the least amount of tooth structure removed as possible, as well as restorations that appeared natural.

CASE PRESENTATION

A 28-year-old female patient presented desiring a fuller, brighter smile. She disliked the appearance of the old composite bonding previously placed on teeth #8 and #9 to correct enamel defects that left large pitted and discolored concavities (Figs 1 & 2). The bonding would stain and had been replaced many times. Additionally, she noted that she was unhappy with the shape of her canines, as well as the slight rotations present.

The patient was looking for a more long-term solution, as well as one that would give her teeth a more even and full appearance. Because the staining was becoming visible again, her fiancé suggested she consider porcelain veneers as a more permanent solution. However, she was concerned about the loss of tooth structure and that her new teeth would not appear very natural.

A full comprehensive examination was performed; this included an occlusal analysis, study models, facebow, stick bite, periodontal examination, radiographs, and clinical photographs. Her periodontal health was good, and she exhibited no occlusal issues.

The study models were mounted on an articulator and used to perform a diagnostic wax-up based on the patient's desired esthetic and functional results.^{14,15} This also would be used later to create the temporary restorations.

RESPONSIBLE ESTHETICS

RESPONSIBLE ESTHETICS

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we will be the primary dental resource for patients as they strive to maintain their health, function, and appearance for their lifetime . . .

we will clearly state and acknowledge that esthetic dentistry must complement the overall general and oral health of the patient, and do no harm . . .

we will strongly encourage that treatment decisions are based on the foundation of evidence-based protocols combined with sound clinical judgment . . .

we will strongly encourage that cosmetic dentistry integrates interdisciplinary medical and dental treatment to enhance outcomes and minimize the loss of healthy human tissue . . .

we will champion and provide minimally invasive treatment protocols, when and where appropriate, that are consistent with the long-term health and needs of the patient . . .

we will encourage the utilization of innovation in technology and materials to deliver dentistry that is predictable and long lasting.



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Figure 3: Preoperative right lateral view of the smile.



Figure 4: Preoperative left lateral view of the smile.



Figure 5: Preoperative retracted facial view of the maxillary and mandibular arches.



Figure 6: Preoperative close-up retracted view of the maxillary anterior dentition.

ESTHETIC EVALUATION

The elements necessary for an esthetic and functional smile that were evaluated included symmetry across the midline, anterior and central dominance, and regression proportion.^{5,16} Overall, the patient demonstrated good gingival height and proportions, but the midline was left of center and canted. Although the initial position of the midline could not be corrected given the patient's desire for conservative restorations, the cant could be corrected. It was evident that #7 and #10 were rotated slightly and, compared to her centrals, seemed

a bit large. Tooth #11 exhibited a large bulge from the middle body down and was facially positioned compared to the rest of her smile.

Teeth #4 and #5, and #12 and #13 were recessed, creating a negative space when the patient smiled (Figs 3-6). Her central incisors were flared slightly, with the incisal edges slightly anterior to the desired "ideal" position (Figs 5 & 6).

TREATMENT PLAN

Based upon the examination findings, several treatment options were discussed with the patient. These included orthodontics and

restoring #8 and #9 with either new composite resin bonding or two veneers; minimal preparation veneers on the premolars to fill out the buccal corridors; or 10 veneers. The option of restoring the patient's teeth with 10 veneers would provide more central dominance while facilitating correction of the mesial-distal tooth size discrepancy between the two central incisors. However, in order to bring #11 into contour, more preparation would be required.

The patient declined any orthodontic treatment and instead agreed to restore ##4-13 with



Figure 7: Close-up left lateral view of provisionals.



Figure 8: Close-up right lateral view of provisionals.

pressed ceramic veneers (IPS Empress Esthetic, Ivoclar Vivadent; Amherst, NY), with the premolars being placed without any preparation except slight alteration using a fine sandpaper disc over the height of contour on #5 and #12 prior to impression taking. The pressable material selected for this case requires less tooth preparation than earlier pressable veneer materials.¹⁷

MATERIAL SELECTION

When selecting materials and determining shades for the final restorations, it is beneficial to minimize or eliminate superficial stains. This is best accomplished in consultation with the ceramist in order to select the most appropriate ingot for the case. Taking note of previous cases helps illustrate the differences in various ingots and the results they produce in terms of shade and vitality.

Several other factors influence the color outcome, including thickness of the restorations, underlying dentin shade, shade of cement used, and amount of stain applied to the restoration during glazing. Proper ingot selection and uniform reduction can easily eliminate two of

these factors. Controlling the final shade is more predictable from one tooth to the next if the veneer thicknesses are as close as possible.

Overall, the patient demonstrated good gingival height and proportions, but the midline was left of center and canted.

In this case, despite the fact that the patient's teeth exhibited a fairly light color, she desired that her final restorations be a bit brighter. Therefore, she was scheduled for in-office bleaching (Zoom, Discus Dental; Culver City, CA), which was to be completed one week prior to her restorative treatment. The Vita 3D Master Shade Guide (Vident; Brea, CA) then was used to determine the most accurate shade. However, the Ivoclar Vivadent bleach guide was used to select the appropriate ingot; the patient chose shade BL2 and the Empress E01 ingot, due to its ability to produce natural-looking esthetics.

PREPARATION AND TEMPORIZATION

Sometimes the most important phase of the treatment occurs before a drop of wax has been placed or the

bur first hits enamel. In conservative cases such as this, nothing could be truer. In particular, several aspects of this case were examined prior to tooth development of the diagnostic wax-up and tooth preparation.

First, function was evaluated to determine if it could be improved. Cuspid guidance was lacking on #11 due to its facial inclination. Additionally, the guidance on #6 and #8 was verified in order to prevent #7 from fracturing after restoration, to a more ideal height. It was determined that #7 was short due to its mesial rotation, and that when placed in the proper position, it would function as intended.

However, the problem areas in the case that would require space for the porcelain and to bring the veneers in line with the adjacent teeth were both the distal of #7 and the facial of #11. These areas would be prepared and reflected in the wax-up, which was used for creating reduction and temporary matrices.

During the provisionalization appointment, the patient was anesthetized using prilocaine plain and lidocaine with epinephrine 1:100,000. A reduction stent (Sil-Tech, Ivoclar Vivadent) was used



Figure 9: Right lateral view of the wax-up created for the maxillary veneer restorations after injection and refinements.



Figure 10: Left lateral view of the wax-up created for the maxillary veneer restorations after injection and refinements.

to facilitate visualization of the amount of reduction necessary.¹⁸ Because #11 was facially positioned, it was necessary to reduce slightly more from that tooth, as described. The preparations were finished using diamond burs and refined with discs (3M ESPE; St. Paul, MN). Photographs were then taken of the preparations with the shade tabs (Ivoclar Vivadent) in order to convey the base shade to the laboratory.

A lip and cheek retractor (Optiguard, Ivoclar Vivadent) was placed during impression taking. A polyvinyl impression was taken using wash and heavy-body material (Aquasil, Dentsply Caulk; Milford, DE), and additional bite records were taken.

Prior to taking final impressions, two sets of temporaries were made in order to verify that there was sufficient reduction and that no "show-through" was present in the provisional restorations. To fabricate the temporaries, another stent (Sil-Tech) was used. To retract and dry the tissue reduction, Expasyl (Kerr Corp.; Orange, CA) was applied and rinsed thoroughly after four minutes, after which the impression was taken using a light- and heavy-body impression material (Aquasil).

To place the temporaries, the teeth were isolated, and a desensitizing agent (Systemp. desensitizer, Ivoclar Vivadent) was applied and dried. The teeth were then spot-etched using a 35% phosphoric acid (Ivoclar Vivadent), rinsed, and dried. A small spot of a fourth-generation adhesive (Scotchbond, 3M ESPE) was then placed on the teeth and cured for 10 seconds using a light-emitting diode (LED) (Kerr LE Demetron; Orange, CA).

Shade B1 of a provisional material (Luxatemp, Zenith DMG; Englewood, NJ) was placed in the stent that had been made from the diagnostic wax-up, and allowed to harden on the patient's teeth for one minute to "shrink-fit" the acrylic to the preparations. Because a trial set of temporaries was made beforehand, a predictable fit was anticipated. Upon removal of the stent, the temporaries were cured for 20 seconds per tooth using the LED curing light, after which they were adjusted using discs and fine diamonds.

The patient was scheduled two days later to evaluate the function and esthetics of the temporaries. At this appointment, another impres-

sion and additional photographs were taken after all adjustments had been made, in order to convey minor changes to the laboratory (Figs 7 & 8).

LABORATORY FABRICATION

At the laboratory, the veneers were waxed by injecting liquid wax into the matrix of the temporaries seated on the preparation model (Figs 9 & 10). The units were then measured against the temporaries, and the incisal edge positions were verified using the model of the mounted temporaries. No variations could be found in either instance. Minimal refining was done in wax, after which the margins were sealed and the case was pressed from the IPS Empress E01 ingot.

After divesting and finishing, the six anterior restorations were cut back in the incisal one-third to allow room for layering and effects porcelains (Fig 11). A wash bake was fired, with stain placed at the mesial and distal corners, the apex of the mamelons, and at the lowest point in between.

The incisal was built using blue, white, and the high translucent opal effects powders. Both the internal



Figure 11: View of the cutback performed on the veneer restorations. Internal effects were added using blue, orange, and high-value wash paste prior to buildup.



Figure 12: View of the IPS Empress thin veneer restorations on the model after final glazing and polishing.

stain and incisal effects were subdued, taking into consideration the bright shade desired.

At this stage, the case was near completion, with only the incisal portion requiring contouring into the correct position. The restorations were given their final surface texture, the contacts verified, and the veneers glazed to a high polish (Fig 12). They were then etched and ready for delivery.

CEMENTATION APPOINTMENT

The veneers were inspected on both the individual dies and the solid model. The provisional restorations were carefully removed, and the preparations were lightly disced on the facial surfaces to remove the bond that was placed. The teeth were then cleaned and dried.

The veneers were tried in one at a time for fit and then tried in together. Two different try-in pastes were used, and the decision was made to seat ##4-7 and ##10-13 with a clear cement (Ensure Clear, Cosmedent; Chicago, IL), and #8 and #9 with a shaded cement (BO.5, 3M ESPE). The veneers then were cleaned with alcohol to remove the try-in pastes, etched (Ultra-Etch, Ultradent Prod-

ucts, Inc.; South Jordan, UT) for 30 seconds, and silanated with primer (Kerr). The respective cements were then applied to the internal aspects of the veneers prior to seating.

The teeth were etched (Ultra-Etch) for 15 seconds, rinsed, and lightly dried with a warm air dryer. An adhesive bonding agent (Optibond Solo, Kerr) was applied to the teeth and light-cured for 20 seconds, after which the veneers were placed two at a time, beginning with the central incisors. A micro-brush was used to remove as much excess resin as possible. They were then cured for 60 seconds per tooth.

A blade was used to remove any excess luting resin from the margins. After removal of excess resin, the occlusion was evaluated (Figs 13 & 14). Ceramic polishers (Dialite, Brasseler USA; Savannah, GA) were then used to smooth out the lingual margins, where necessary (Figs 15-18).

CONCLUSION

With cases such as this where the patient starts out with a smile that has relatively few problems, the expectations are typically very high. A

patient with a “nice” preoperative smile can be more critical of small changes that often go unnoticed in a more dramatic “before and after” scenario. It is because of such high expectations that temporaries must be adjusted and perfected prior to the fabrication of the final restorations. Ceramists can produce more accurate results when shown—rather than merely being told—what the patient wants and expects. When the provisionals are as close as possible to the final desired result, miscommunications are a rarity.

Today, the field of dentistry is a fun and rewarding profession. It is a great honor when patients refer their friends and family for smile enhancements, but even more so when colleagues entrust their families to our care.

Because cosmetic restorative therapies can be achieved with less technique sensitivity, greater conservation of tooth structure, and can be delivered with lifelike esthetics and outstanding function, all of the patient’s concerns in this case were addressed, and she was thrilled with her beautiful smile (Figs 19 & 20). To be able to give our patients a new smile or improve on something they



Figure 13: Postoperative retracted view of the maxillary and mandibular arches following placement of the definitive veneer restorations.



Figure 14: Postoperative close-up retracted view of the final restorations.



Figure 15: Postoperative retracted left lateral view of the final restorations.



Figure 16: Postoperative retracted right lateral view of the final restorations.



Figure 17: Postoperative left lateral view of the natural smile.



Figure 18: Postoperative right lateral view of the natural smile.



Figure 19: Close-up facial view of the natural smile.



Figure 20: Postoperative portrait view.

are unhappy with makes us fortunate to be practicing dentistry today.

AACD Acknowledgment

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