

Minimally Invasive Smile Enhancement with Mixed Media

With greater public awareness about smile enhancements, dentists are often faced with greater challenges. They need to be well equipped and their techniques constantly need to be up to date. Furthermore, dentists must be more skillful verbally to address their patients' ever-increasing desires as a result of media-driven standards. As ethical dentists, they must also preserve tooth strength, periodontal health, and proper function.¹ Furthermore, all this has to be harmonious with their non-dental requirements such as comfort, budget, and time availability.² A conscientious esthetic dentist takes all these into consideration and educates his/her patients on all possible alternatives. Quite often, minimally invasive procedures such as bleaching and bonding can be useful at meeting all of the above requirements.

Performing minimally invasive procedures requires creative solutions that dentists must pull from their myriad of skills. Often minimally invasive procedures gives dentists (and their patients) more control in creating dental anatomy, color, and gingival contour positioning; they also gain a deeper understanding of the complexities of smile enhancement. Without a doubt, mastering these minimally invasive procedures and techniques allows an

esthetic dentist to orchestrate a symphony of disciplines that often are multidisciplinary in scope and dictate indirect restorations.³ The following case report demonstrates the use of several conservative techniques putting the above minimally invasive procedures into reality.

Case Report

A 28-year-old US Army veteran was finishing his career in the military and he wanted to enhance his smile before he sought a job in the private sector. He wanted to remove his engraved gold crown as well as brighten his other teeth. He

Performing minimally invasive procedures requires creative solutions that dentists must pull from their myriad of skills.

also desired better uniformity of shapes (Figures 1 and 2). Because of his impending move and desire to start a family, he and his wife also desired a conservative plan that would fit into their time as well as financial budget.

Diagnosis

Clinical codiagnostic examination of the patient revealed a great deal of findings. Esthetically, the gold crown on tooth No. 8 was a liability. Furthermore, a reverse smile line was not pleasing. Because of the patient's military career and masculine hobbies (racing cars, sports, etc), the round teeth were deemed too soft looking; the

patient desired them to be squarer. The surrounding teeth were mildly discolored teeth at about Vita shades B1 and B2. The patient desired closer to Chromascop 030/040 (Ivoclar Vivadent, Inc). Periodontally and biologically, the surrounding tissues were sound. Some slight deviations from ideal were noted with papilla shapes in the anterior sextant (Figure 3). Functionally, the arches had a class I relationship with short slide from centric relation to maximum intercuspation. No muscular or temporomandibular joint discomfort was palpated. Except for some

moderate breakdown in the wisdom teeth, the rest of the dentition was very strong.

Digital photographs, radiographs, and preoperative study models were made to further review the patient's conditions. Lastly, the patient chose a Smile Style 53 from the Discus Smile Guide (Discus Dental, Inc). All these materials were used to collaborate with the patient about his future dental goals.

Treatment Plan

At a review of the findings with the patient and his wife, the author discussed several options with them. Given the clinical factors and



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their circumstances, a minimally invasive strategy was devised. The outcome agreed upon would be to create a brighter appearance with a more masculine shape and more pleasing smile line. Indirect laminates were presented as more durable options to provide better cuspid guided excursions. However, because of the patient's budget, focus would be placed on teeth Nos. 7 through 10 restoratively while harmonizing the occlusal relationships as much as possible. The laterals would be augmented with direct bonding for conservativeness, timeliness, and economics. The centrals would both be made indirectly to maximize esthetics and decrease chances of untimely shade mismatches and remakes. Slight gingival sculpting and retraining would improve the esthetic proportions. Home whitening would raise the value of the surrounding teeth.

A very critical part of this plan was to choose a durable composite to augment teeth Nos. 7 and 10. Strength suitable for the stress bearing of an incisal edge was required, and a very esthetic, polishable material would create esthetic neighbors to match porcelain augmentation of the central incisors.

Venus (Heraeus Kulzer, Inc) universal microhybrid was chosen because of its many beneficial characteristics⁴:

- High flexural strength of 128 MPa approaching enamel
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Figures 1 and 2—The patient wanted to remove his engraved gold crown as well as brighten his other teeth. He also desired better uniformity of shapes.



Figure 3—Some slight deviations from ideal were noted with papilla shapes in the anterior sextant.



Figure 4—A wax-up was created on mounted diagnostic models with a Stratos 200 articulator.

Case Study



Figure 5—A putty matrix made with Sil-Tech on the wax-up to create a “scaffold” to build contours.



Figure 6—Shades are best taken preoperatively to avoid inaccuracies caused by dehydration.



Figures 7 and 8—Using a digital caliper, ideal proportions can be created in the provisionals.



and matrix that allows Venus to take on the shade of the adjacent tooth structure

- Two layer shade system that allows for a layered shade guide made from Venus composite that is extremely accurate.

These features would greatly contribute to helping us achieve a predictable, esthetically pleasing, and durable result.

Step-by-Step Technique

A wax-up was created on mounted diagnostic models with a Stratos 200 articulator (Ivoclar Vivadent, Inc) (Figure 4). This blueprint provided a guide to functional incisal edge position. It gave the patient and the dentist a guestimate of relative proportions of teeth Nos. 7 through 10. Lastly, it provided a (3-D) starting point for creating labial and lingual contours.

During the time the wax-up was being constructed, the patient was home bleaching with Discus Dental, Inc's Day White (7.5% peroxide strength) and being equilibrated using conservative coronoplasty aided by the T-Scan II (Tekscan).

A putty matrix made with Sil-Tech (Ivoclar Vivadent, Inc) was adapted to the lingual and incisal surfaces of the wax-up to create a scaffolding to guide placement of the respective contours (Figure 5). This was certainly important esthetically, but it also more densely adapted the composite to the teeth.

Before beginning treatment, shades were taken to plan the revitalization of teeth Nos. 7 through 10. This is best done beforehand to avoid dehydration of the teeth, which takes place during dental procedures (Figure 6). The Venus 2 Layer shade system was extremely helpful because the shade tabs were made of real composite and make

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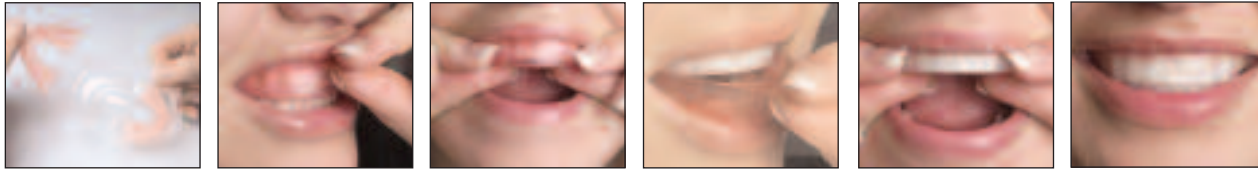
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Figure 9—Readapting the matrix with the ideal provisionals helped visualize the amount of augmentation needed with composite.



Figure 10—The dead soft matrix isolated the lateral incisors during the bonding procedures.



Figure 11—An opaque dentin layer was placed on the index and adapted to lingual of the tooth for sculpting.



Figure 12—Incisal coloring and anatomy were aided by the matrix and varying incisal/opaque composites.



Figure 13—Establishing the central incisors provisionals before the bonding enhanced the creation of ideal proportions in the smile.



Figure 14—Photographs of the preparation shades allow the laboratory to recreate the color layering needed for a natural result.



Figure 15—A silicone matrix generated from the provisional model allows for precise functional and anatomic contours.



Figure 16—The patient projected greater confidence because of his transformation.

bonding simpler with its hand-layered shade tabs. Because we were using a layering technique of building opacities, the incisal portion of the shade tab was used as we planned our bonding 3-D. Because the patient had been less compliant than planned with the home whitening, a warm body shade of Venus SB1 was selected for the body shade.

Lastly, the author preoperatively noted a slight frenum pull on the central papilla. A minor frenectomy would be performed using the Waterlase (Biolase Technology, Inc) to prevent any instability of our gingival architecture.

After the gold anterior crown was removed, teeth Nos. 8 and 9 were prepared conservatively for full coverage and a veneer respectively. After margins were shaped and polished under magnification (Orascopic Corporation), the central incisors were designed to be the “star attractions” for the smile. Using a digital caliper, an ideal width-to-length ratio could be created with the provisionals made of Luxatemp Plus (Zenith/DMG). Furthermore, the gingival tissues would be trained by refining the gingival margins and contours. By subtly molding the papilla, the author created 3-D support for this fluid-filled area and an ideal esthetic progression from the middling to the posterior. Most importantly,

these ideal contours allowed the author to refine intraorally an ideal appearance for the lateral incisors (Figures 7 and 8).

The uncemented central transitionals were replaced but not cemented. The previously made matrix was readapted to the upper teeth to check for fit. Furthermore, it was an excellent way to begin the functional steps—perfecting the transitionals for teeth Nos. 8 and 9. A final benefit was the ability to visualize the amount of composite need-

placed carefully in 3 consecutive coats, gently rubbing for 30 seconds each time. Gentle air pressure was applied to remove any acetone and water solvent. The treated teeth were light-cured with a halogen unit for 20 seconds (Figure 10).

The putty matrix was replaced onto the maxillary teeth after being lightly lubricated with unfilled resin and an ample amount of Venus SBO dentin/opaque shade placed predominantly on the lingual aspect of the index. It was critical that

Instead of creating a compromised result or the patient electing to decline treatment, the author was able to create a predictably healthier and esthetically pleasing result.

ed on the laterals. This greatly aided tooth preparation, which was a minimally invasive and precise chamfer veneer preparation (Figure 9).

A dead soft matrix was applied to the completed tooth preparations to isolate them from adjacent teeth during bonding. A seventh-generation, single-component, no-mix, one-step application dental adhesive was used. IBond (Heraeus Kulzer, Inc) has physical reliable characteristics that have bond strengths in the low to mid 20-MPa range.⁵ The single dose version was

interproximal aspects were filled in to create a wrap for consistent color, blockout, and strength. A thin interproximal embrasure area and mild mamelons effects were carefully sculpted using an 8A-L titanium coated composite instrument (Cosmedent, Inc). The composite was then cured for 20 seconds from the facial aspect. The matrix was carefully removed and then the lingual was cured (Figure 11).

The labio-incisal component was placed with a combination of semitranslucent enamel shades B1

and SB1 (warm) for the body and a translucent T2 with the SB1 shade for the incisal colors. Thin layers of enamel were placed cervically (B1) and central body (SB1) at varying thicknesses to create a vital, natural-looking tooth. Care was taken to blend the shades with a sable brush and not to encroach on the incisal anatomy that had been created. Because the mamelons were conservative in nature to avoid too youthful a tooth for this patient, less translucent shade was necessary as we built the incisal effects. With the matrix replaced to control incisal edge position, a small cylinder of T2 was pressed into the mamelons area to intersperse a clear medium for translucency. This layer was kept just shy of the incisal-labial edge of the stent and cured for 20 seconds. Then a very thin layer of SB2 was placed to fill the gap to create the color for a natural-looking incisal halo. Both were blended into the body material using a sable brush wetted with unfilled resin⁶ (Figure 12).

The transitionals were carefully loosened, which allowed for fine finishing of the bonding with H135TDF safe end (Axis Dental

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Case Study



Figure 17—Better balance and composition made this smile more attractive.

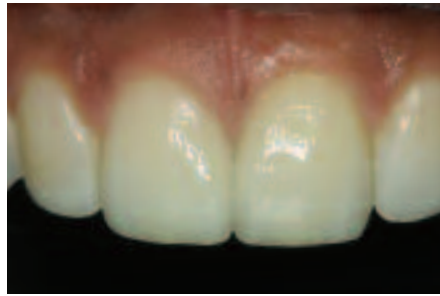


Figure 18—Carefully using varying materials and techniques created better bioesthetics.

Corporation) and H3179 football burs (Axis Dental Corporation) and FlexiDiscs (Cosmedent, Inc) and Enamelize (Cosmedent, Inc). Having access to the proximals allowed for total control of gingival margins. Creating the central incisors beforehand made it much easier to develop natural propor-

could be duplicated simultaneously with building the incisal effects in layering the porcelain. Gingival contours were perfected by using a solid model of nonretracted tissues.

After trying in the porcelain restorations individually, they were viewed together with translucent Variolink Tryin Gel (Ivoclar Viva-

Using the modalities of direct and indirect restoratives allowed us to conservatively improve this patient's smile efficiently and with sensitivity to his nondental issues.

tions for the smile (Figure 13). A polyvinylsiloxane impression was taken of the upper arch with an accurate LuxaBite (Zenith/DMG) bite registration.

With the transitionals loosened, a preparation shade of ST9 (Ivoclar Vivadent, Inc) was photographed for the laboratory to create the porcelain restorations (Figure 14). A custom shade tab of the bonding and photographs were added to the recipe of materials. An approved provisional model and a stick-bite were also provided to maximize achieving functional results (Figure 15).

The laboratory technician created a new putty matrix using the model of the transitionals. Precise functional and anatomic contours

dent, Inc). The patient was very excited about how natural they looked. After obtaining his written approval, the porcelain restorations were bonded with Variolink II cement. To avoid bridging to the laterals, a lubricant was placed on the surfaces of teeth Nos. 7 and 10. Great care was taken to clean the margins.

Results

The patient was beaming with joy over his transformation (Figure 16). His self confidence was greatly enhanced with his wife's overwhelming excitement when she came into the treatment area to celebrate the completion of treatment. The overall composition of the smile (Figure 17) became esthetically pleasing from replacing the gold crown and

from the minimally invasive enhancement of the smile line, embrasure forms, lengths, and colors. The naturalness of contours and textures, and the layering of materials created dramatic improvements bioesthetically (Figure 18).

Conclusion

Using the modalities of direct and indirect restoratives allowed us to conservatively improve this patient's smile efficiently and with sensitivity to his nondental issues. Instead of creating a compromised result or the patient electing to decline treatment, the author was able to create a predictably healthier and esthetically pleasing result. The Venus composite system was very instrumental in achieving these goals. Lastly, by careful planning with wax-ups and matrices, as well as executing the techniques intraorally, the indirect procedures were improved. The blending of these disciplines was extremely gratifying for the restorative team and the patient. ■

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Product References

Products: Day White, Discus Smile Guide
Manufacturer: Discus Dental, Inc
Location: Culver City, California
Phone: 800.422.9448
Web site: www.discusdental.com

Products: Venus, iBond
Manufacturer: Heraeus Kulzer, Inc
Location: Armonk, New York
Phone: 800.431.1785
Web site: www.heraeus-kulzer-us.com

Products: Chromascop 030/040, Stratos 200 articulator, Sil-Tech, ST9, Variolink
Manufacturer: Ivoclar Vivadent, Inc
Location: Amherst, New York
Phone: 800.533.6825
Web site: www.ivoclarvivadent.us.com

Product: T-Scan II
Manufacturer: Tekscan
Location: South Boston, Massachusetts
Phone: 800.248.3669
Web site: www.tekscan.com

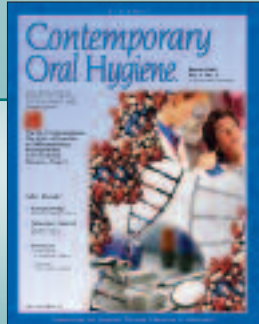
Product: Waterlase
Manufacturer: Biolase Technology, Inc
Location: San Clemente, California
Phone: 888.424.6527
Web site: www.biolase.com

Product: Magnification system
Manufacturer: Orascoptic Corporation
Location: Middleton, Wisconsin
Phone: 800.369.3698
Web site: www.orascoptic.com

Products: Luxatemp Plus, LuxaBite
Manufacturer: Zenith/DMG
Location: Englewood, New Jersey
Phone: 800.662.6383
Web site: www.zenithdmg.com

Products: 8A-L, FlexiDiscs, Enamelize
Manufacturer: Cosmedent, Inc
Location: Chicago, Illinois
Phone: 800.621.6729
Web site: www.cosmedent.com

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