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By Sonny Oliva, DDS, and Yuki Momma, RDT

Creating the Illusion of a Straighter, Whiter Smile with Lithium Disilicate Veneers

Introduction

Patients today are becoming increasingly aware of conservative approaches to enhancing their smile when alignment and color disharmony issues are present. Among the restorative options available to satisfy their needs are minimal-preparation veneers.[1,2] Providing such treatments, however, is predicated on detailed and thorough records taking, and communicating those case details with the laboratory ceramist.

Figure 1
Preoperative full facial view of the patient. Note diastema between teeth #8 and #9.

Figure 2
Shade was taken and determined to be B1.

In particular, the use of diagnostic models, wax-ups, intraoral mock-ups, and silicone guides have been shown effective in designing and ultimately delivering veneer restorations fabricated from lithium disilicate (e.g., IPS e.max Press, Ivoclar Vivadent, Amherst, NY) that enhance the esthetics, color, alignment, and harmony of the smile in a conservative manner.[3] Such records, diagnostic, and treatment planning tools are also invaluable for ceramists when fabricating lithium disilicate veneers to specifically close diastemas in the anterior esthetic zone.[4]

In terms of available materials for fabricating minimally invasive yet highly characterized and natural-looking restorations, lithium disilicate (e.g., IPS e.max Press) empowers ceramists with a variety of options for creating incisal effects, translucency, and surface morphology.[5] Further, with a range of translucent and opaque ingots to select from, in addition to durable and predictable strength and material characteristics, lithium disilicate is a proven restorative material for addressing color discrepancies in the esthetic zone.[6]

Case Presentation

A 35-year-old female presented with the chief request of wanting straight and even, slightly lighter teeth (**Fig. 1**). She was also concerned about the spacing between her front teeth, which she mentioned

was starting to get wider. The patient also indicated that she wanted the white spots on her front teeth corrected. The patient was an account executive with a history of orthodontic treatment.

A thorough examination and oral evaluation was performed that included a full mouth series of radiographs and digital intraoral and extraoral photographs. No medical history or dental anomalies or pain were found that would contraindicate dental restorative treatment. The patient was diagnosed with anterior spacing and hyper-calcification/fluorosis.

Preliminary alginate impressions (AccuDent XD, Ivoclar Vivadent) were taken, from which a stone diagnostic model and wax-up were fabricated. A digital intraoral impression scan (Trios, 3Shape) was also taken for verification.[7]

Based on the diagnosis and wax-up, it was determined that the patient's smile could be conservatively enhanced by placing six minimally invasive lithium disilicate veneers (IPS e.max, Ivoclar Vivadent) on teeth #6 through #11. The incisal anatomy of the mandibular anterior teeth would be followed to create a symmetrical and harmonious smile line.

A DSD app was used to explain the proposed treatment plan and anticipated outcome to the patient. The patient accepted the treatment plan.

Clinical Protocol

During the preparation and provisionalization appointment, a preoperative shade was taken and found to be B1 (**Fig. 2**). An intraoral bis-acryl mock-up was performed using a self-curing and moldable composite (Telio CS C&B, Ivoclar Vivadent) to demonstrate the potential color, shape, and length changes that would be possible with the proposed veneer treatment (**Fig. 3**).

An alginate impression (AccuDent XD) was made of the intraoral mockup and then used to fabricate a stone model for creating a silicone putty matrix. The putty matrix would be used to create direct chairside provisional restorations.

Depth cutters were then used to establish an initial depth guide within the intraoral mockup, after which a conservative, 3-plane preparation was performed (**Fig. 4**). In particular, a 1-mm chamfer margin was created, and the preparations were finished using a series of fine and medium depth cutting diamonds, coarse and gold plated tapered diamonds (Brasseler USA), and finishing disks (Poli-Pro Disks™, Premier).

Stump shades of the preparations were taken and found to be ND2 (**Fig. 5**). Final impressions of the preparations were also made using a polyvinyl siloxane

Figure 3
View of the intraoral mockup.

Figure 4
View of the tooth preparations.

Figure 5
A stump shade was taken of the preparations and found to be ND2.

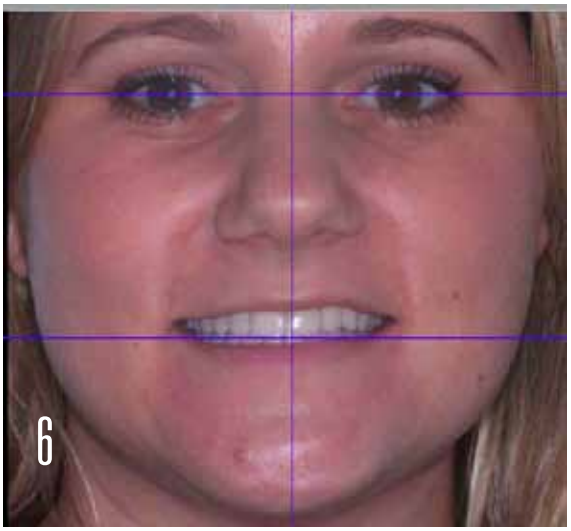
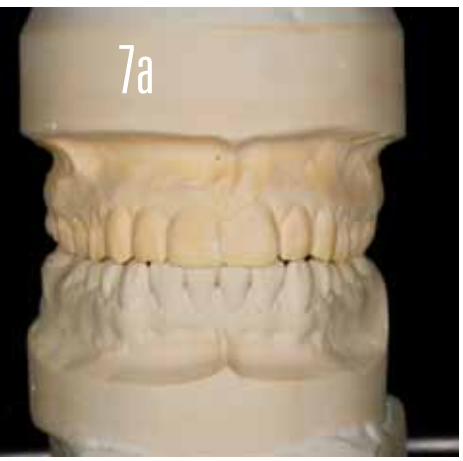


Figure 6
Facial analysis was performed to determine ideal midline and incisal edge position.



Figures 7a and 7b
At the laboratory, the midline and incisal position were analyzed and compared on the preoperative (7a) and preparation (7b) models.

impression material (Virtual XD, Ivoclar Vivadent). Subsequently, direct provisional restorations were created using the silicone putty matrix and a self-curing and moldable composite (Telio CS C&B) in shade B1. Once the provisional restorations were in place, facial analysis was performed to determine ideal midline and incisal edge positions (**Fig. 6**).

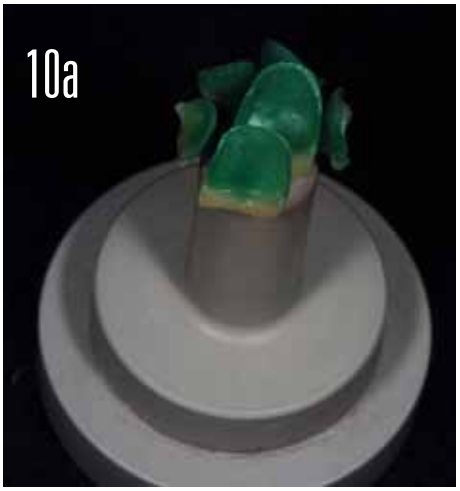
Laboratory Fabrication

At the laboratory, the midline and incisal positions were analyzed and compared on the preoperative and preparation models (**Figs. 7a-7b**), after which the case was waxed up on the model to the desired contour and position. In particular, two different waxes (i.e., soft and hard wax) were used (**Fig. 8**), and two wax-ups were made.

The hard wax was ideal for the incisal third, since it maintains its shape when verifying the occlusion. The softer wax was better for fitting the restorations, since it does not significantly shrink after investment. The first wax-up was made to verify the shape, then cut back to allow room for the application of effect and enamel layering (**Figs. 9a-9b**). The second wax-up verified the fit.

Figure 8
Soft and hard waxes were used for the wax-ups; hard for the incisal third and soft for fitting the restorations.

Figures 9a and 9b
One wax-up was cut back to allow room for the application of effect and enamel layering, while the other was used to verify the fit.



Figures 10a and 10b
The case was pressed with a lithium disilicate HT BL4 ingot, then divested.

Figure 11
The cutback was verified on the model for ceramic and effect layering with an OE1 powder.

The margins were then sealed and verified, after which the wax-up was sprued and invested. Once the ring was burned out, the case was pressed with a lithium disilicate HT BL4 ingot, and the plunger loaded to complete the pressing (**Figs. 10a-10b**).

The restorations were placed on the model, de-sprued, and the cutback verified for ceramic and effect layering with an OE1 powder (**Fig. 11**). The restorations were then removed from the dies, lightly sandblasted, and steam cleaned.

A wash bake was then performed (**Fig. 12**), after which internal stains were applied while building up the porcelain (**Fig. 13**). The veneer restorations underwent a second bake (**Fig. 14**). This step is required to build up a translucent layer over the internally stained layer, which included applications of DDBL1, DDBL4, DD Orange, PD A1, MM Light, MM Yellow Orange, T Blue, PD BL T2, T Clear, and T Neutral.

Surface anatomy and morphology were then established to blend the restorations with the surrounding natural teeth. This was accomplished by first drawing red lines on the restorations using a red

Figure 12
A wash bake was then performed.

Figure 13
Internal stains were applied while building up the porcelain.

Figure 14
The translucent layer was built up over the internally stained layer, after which a second bake was performed.

pencil to indicate where ridges should be placed (**Fig. 15**). The veneer restorations were then re-contoured and adjusted to their ideal based on these lines using a series of diamond burs, stones, and disks (TR-25 Red/Blue diamond bur, MANI; Meister Cones, small green, Noritake; Pink High Shine 200 disk, NTI).

The contacts, occlusion, embrasures, and fit were then verified after returning the veneer restorations to the model. The restorations were then lightly sandblasted and steam cleaned. Then, a polishing paste for zirconia, lithium disilicate, porcelain, and composite materials (Zircon-Brite, Dental Ventures of America) was then used for glazing and polishing the veneer restorations (**Fig. 16**). The veneer restorations were then tried onto removal dies on a soft-tissue model to confirm fit, marginal integrity, and harmony with the surrounding gingiva (**Fig. 17**).

Figure 15
Red lines on veneers on model.

Figure 16
View of the IPS e.max Press restoration on the model after final glazing and polishing.

Figure 17
The veneer restorations were tried onto removal dies on a soft-tissue model to confirm fit, marginal integrity, and harmony with the surrounding gingiva.

QUIZ

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Cementation

During the cementation appointment, the provisionals were removed, the preparations cleaned and dried, and the veneers tried in. Upon removal, the restorations were cleaned with a universal cleaning paste (Ivoclean, Ivoclar Vivadent) to remove contaminants.

Isolation was established using a flexible lip and cheek retractor (Optragate, Ivoclar Vivadent). The preparations were then etched, after which a single component light-cured adhesive (Adhese, Ivoclar Vivadent) was applied to the preparations, thinned, and light-cured.

A universal primer for conditioning restoration surfaces (Monobond Plus, Ivoclar Vivadent) was applied to the intaglio surface of the restorations for 60 seconds, after which the excess was evaporated. Then, a light- and dual-curing luting composite (Variolink Esthetic, Ivoclar Vivadent) was loaded into the restorations, after which they were seated onto the preparations. The restorations were tack cured at the margins, excess cement was removed, and the interproximal areas flossed. A glycerin gel (Liquid Strip, Ivoclar Vivadent) was applied to the margins to prevent the oxygen-inhibited layer, after which the restorations underwent a final cure. The occlusion was the checked and refined.

Conclusion

This case has demonstrated the manner in which pressed lithium disilicate veneers can be fabricated to conservatively transform the whiteness and alignment of a patient's smile (**Figs. 18-20**). By using a pressable lithium disilicate material (IPS e.max Press) and internal effect powders and stains, the ceramist was able to create

Figure 18
Postoperative closeup retracted view of the completed veneers on teeth #6 through #11.

Figure 19
Postoperative closeup smile view of the completed IPS e.max veneer restorations.

Figure 20
Full-facial postoperative view of the patient in her natural smile.

esthetic, lifelike progressions of natural tooth characteristics that differentiated these veneers from otherwise overly white and unnatural-looking restorations. **JDT**

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About the Authors

Sonny Torres Oliva, DDS is an accomplished dentist in private practice in New York, N.Y., specializing in cosmetic and reconstructive dentistry, with an emphasis on optimal patient experience. He is a seasoned dental technician with thirty years of experience in ceramics and laboratory management. Dr. Oliva lectures and has been featured in many publications. He received his DDM from Manila Central University, Philippines and DDS from New York University College of Dentistry, N.Y.

Yuki Momma, RDT was born in Japan and graduated from dental technician school in 1998. He also finished his dental ceramic school while he was working at a Japanese dental laboratory and clinic. He moved to Boston, Mass., in 2009 and worked for Gnathos Dental Studio before opening Ceramic Artisan Dental Lab in Weston, Mass. in 2017.