Replacing worn restorations using a Pressed and Layered Lithium Disilicate material

by Rafael Santrich, CDT

Patients presenting with chipped restorations, excessive wear, and fractures often seek correction for a more esthetically pleasing smile. More often than not, patients are educated consumers desiring minimally invasive treatments reflective of the best in smile design. These restorative goals are possible with material and technological advancements. In order to achieve success, comprehensive treatment planning, multidisciplinary ›

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Figures 1-3 Preoperative views of the patient presenting with worn anterior restorations, and teeth nos. 7 and 10 lacking vertical dimension.

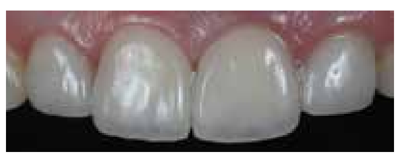

Figure 4 Close-up preoperative view.

Figure 5-6 Preparations were performed.

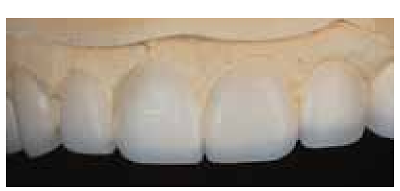

Figure 7 A full diagnostic wax-up was created.

approach, and provisional restorations are incorporated into restorative procedures. Because patients are able to test-drive their restorations, clinicians and technicians gain a better understanding of their desires while simultaneously ensuring accuracy and predictability of the final outcomes.[1]

Restorative cases are often dependent upon material selection, and even with an oversaturation of different materials on the market, not every material is appropriate for every case. Consequently, restorative materials must be carefully examined and considered in order to provide predictable long-term results that meet patient demands. Ceramists and dentists must select a material that withstands masticatory forces placed upon it and is appropriate for use in the specific region of the oral cavity being restored.[2] Lithium disilicate (IPS e.max Press, Ivoclar Vivadent, Amherst, NY) demonstrates a flexural strength of 400 MPa, superior wear characteristics, and life-like esthetics, making it an ideal choice for restorative procedures. Demonstrating a low refractive index, excellent dimensional stability[3] and optimized optical properties including natural translucency, lithium-disilicate can be used for even the most challenging esthetic cases and can be adhesively bonded or conventionally cemented.[4,5] Additionally, by using IPS e.max Press, clinicians can exercise minimal preparation techniques while enabling ceramists to cut back, layer, and thin down the material when needed.[6]

Ceramists are challenged by many caveats when fabricating predictable, reliable, and long-lasting restorations. In the instance of a full-mouth reconstruction, forces that result in wear (e.g., breakage, joint dysfunction, or malocclusion) should be addressed in the early stages of treatment planning before any procedural work begins. Occlusal instability has the potential to break down restorative dentistry, resulting in the need for re-cementation of crowns, re-bonding of veneers, and the repair of fillings and broken restorations.[7] By working in collaboration with the clinician, stable and balanced occlusion can be achieved, as well as the restorations' esthetic and functional success.[8]

Case Presentation

A 35-year-old woman presented with worn anterior restorations on teeth nos. 7 through 10. Previously teeth nos. 7 and 10 were broken and, although restored, lacked vertical dimension and were esthetically displeasing (*Figures 1 through 4*). A variety of alternative treatment plans were discussed with the patient. The first included restoring the anterior segment of teeth nos. 6 through 11 with monolithic crowns fabricated with a lithium disilicate material (IPS e.max) to maintain strength. The second alternative, as part of a combination case, would include performing a full maxillary reconstruction, placing posterior monolithic crowns enhanced with staining and glazing, restorations in the anterior, and conducting incisal modification. The patient choose the second alternative, which entailed restoring seven posterior teeth with full-contour monolithic crowns that would be stained and glazed, one onlay, and six pressed anterior crowns that would be fabricated using the cut-back and layer technique.

The patient's teeth were prepared (*Figures 5 and 6*). After approving the full diagnostic wax-up created to demonstrate the anticipated final results, a duplicate was made for use in fabricating provisional restorations (*Figure 7*). In this particular case, the traditional impression technique was not used. Instead, for the purpose of fitting properties, an ITero Model was utilized. First, the full-contour posterior IPS e.max Press lithium disilicate crowns were seated into the Itero Model for a test fit (*Figures 8 and 9*), the same was repeated with the full-con-

Figures 8-9 Full-contour posterior IPS e. max pressed crowns were seated onto the iTero Model to test fit.

Figure 10 Full-contour anterior IPS e.max pressed crowns were seated onto the model to test fit.

Figure 11 The anterior crowns were cut-back.

Figure 12 Incisal view of the anterior crown showing the contours from the distal to mesial areas.

Figure 13 After the cut-back technique was performed, the crowns were ready to be glazed in the laboratory with Essence stains (e.g., crème, copper, ocean, profundo, and shade 1) at special program 810c.

Figures 14-17 The posterior crowns were also stained and glazed with Essence stains at 810c.

Figures 18-20 Several IPS e.max Ceram powders (OE1, OE4, Clear, OE5, TI1, TI2, Intercisal White, Blue Incisal Edge) were layered on the anterior crowns, then baked at 750c.

tour anterior e.max crowns (*Figure 10*). Then digital impressions were taken of both sets of restorations.

Technique

After obtaining all essential information from the dentist, the case was ready to be pressed from lithium disilicate glass-ceramic (IPS. emax Press). To begin fabrication, the ideal wax-up was produced, and a matrix was formed using the wax-up model. The wax was sprued, invested, burned-out, and pressed using a low translucency shade of lithium disilicate (IPS e.max LT). Then, the anterior crowns were cut-back (*Figures 11-12*), and the completed lithium disilicate anterior crowns examined against the model. Once deemed satisfactory, the restorations were ready for staining.

The anterior crowns were glazed with careful consideration taken to mimic the patient's natural internal tooth effects. Crème, copper, ocean, profundo, and shade 1 (*Figure 13*) were used. IPS e.max Ceram Glaze Paste (Fluo) was applied to impart fluorescence to the restorations. Once completed, the crowns were fired at 810c. Glazing facilitated bonding between the lithium disilicate material and the IPS e.max Ceram fluorapatite veneering ceramic. The stain, characterization, and glaze firing were repeated again with the posterior crowns, although some of the Essence Stains differed. Shade 1 and 2, copper, crème, white, and mahogany were used (*Figures 14 through 17*).

Several layers of IPS e.max Ceram were layered to build up the anterior restorations' incisal edges. In particular, shades OE1, OE4, Clear, OE5, TI1, TI2, Interincisal White, and Blue were applied (*Figures 18 through 20*). The build ups were baked at 750c. The same pattern was repeated for the posterior crowns.

The restorations were sent back to the dental office for a try-in (*Figures 21 and 22*). The restorations underwent a thorough examination regarding position, contours, occlusion, color, value, and texture. Once the patient and dentist approved the restorations, they were returned to the laboratory for completion.

By hand, and using a diamond paste and pumice, the ceramist polished the anterior crowns. This created the desired surface texture. Once completed, the crowns were fired at 770c (*Figures 23 and 24*). Then the posterior crowns were stained, glazed and fired. The purpose of using stain and glaze in the posterior is to take advantage of the strength (400 MPA) for more durable restorations (*Figures 25 and 26*).

Figures 21-22 The patient received the restorations for a try-in conducted in the dental office. A thorough check for position and occlusion was performed.

Figures 23-24 The anterior crowns were already glazed at 770c. The ceramist placed the polish by hand.

Final Seating

After receiving the IPS e.max Press crowns from the laboratory, the dentist prepared the dentition and restorations for final cementation. The temporaries were removed and the preparations cleaned. A mixture of Multilink Self-etching Primer was applied to the patient's teeth. The anterior preparations were scrubbed for 15 seconds and air dried. Multilink Automix Cement was loaded into the restorations and then seated into place (*Figures 27 and 28*). The excess cement was partially cured using an LED Bluephase Style Curing Light (Ivoclar Vivadent). All excess cement was removed with a scaler from the proximal and gingival margins and a final cure was conducted for 20 seconds from all sides of the restoration. This process was repeated for the posterior crowns.

The patient was checked again for articulation and occlusion. The completed restorations displayed exceptional fit, function, and esthetics. The patient was pleased with the final results (*Figures 29 through 32*) of her new smile.

Conclusion

The dentist and ceramist satisfied the patient's expectations and the esthetic goals of this case by using a lithium disilicate material (IPS e.max). Minimally invasive and adaptable to all varieties of restorations, lithium disilicate remains an idyllic choice for full-contour restorations. Despite advancements in restorative dentistry, cases may still present challenges. However, by implementing a multidisciplinary approach and careful treatment planning, success is achievable, resulting in functional and esthetically pleasing restorations.

Figures 25-26 The posterior crowns were stained and glazed in place, then cemented with Multilink Automix Cement.

Figures 27-28 Lateral view of the anterior crowns cemented with MultiLink Automix Cement.

Figure 29 Front view of completed anterior crowns.

Figure 30 Postoperative view of the restorations in centric relation displaying excellent esthetics.

Figure 31 Postoperative view of the patient's new smile displaying the lithium disilicate crown and filter.

Figure 32 The patient returned a few months later for a follow-up and was still pleased with the final results.

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