Esthetic Long-Span Bridge Using BruxZir

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By Mark Omomie, DMD

One of the challenges that we face in dentistry today is how to build a long-span bridge with maximum esthetics in mind. In the age of implants, we can usually shorten the span by adding in a few implants or eliminate the need for a bridge altogether by using implants to replace those missing teeth. However, what about cases where we don't have the quality or quantity of bone that we need, a medical history that won't allow implant surgery such as from previous jaw re-alignment surgery or a risk host such as a poorly controlled diabetic, smoker, etc.? Often times a patient's desire for a long-span bridge and the complex surgery of a sinus lift or bone graft to make an acceptable site for implants.

Patients should be given the options and risks associated with each approach and allowed to make an informed decision with the dentist's guidance. For a missing tooth there could be five or more options presented to the patient as ways to restore the space.

A case history

In 1998, a 39-year-old female presented with an abnormally loose tooth #12. Upon radiographic and clinical examination, it was noticed that she was little to no root left on teeth #10–13. Teeth #8 and #9 appeared normal as did tooth #14. Her gingival health was optimal and her medical history was unremarkable, and she was taking no medications at the time.

The patient recalled that when she was 14 years old she was hit in the face right above those teeth with a gold club during a friends' backskating, which probably lead to the resorption of the roots of the teeth in question. All options and risks were explained to the patient.

The sinus floor was 3 to 4 mm from the crestal bone. Implants with a sinus lift to allow room for placement were offered, but the patient did not want to undergo this surgery and the healing time would be a non-removable restoration. She would have the permanent restoration.

The patient choose to do a long-span bridge, double abutting on teeth #8 and #9 with pontics to replace teeth #7 and #10–13 and using tooth #14 as a distal abutment. Implants with a sinus lift to allow room for placement were offered, but the patient did not want to undergo this surgery and the healing time would be a non-removable restoration. She would have the permanent restoration.

The patient was able to get on with her day and made it on time to her meeting (Fig. 5). You can see the repair on the distal of #9.

Material selection

The in the pre-op photos (Figs. L 3) you can see there is the telltale sign of a metal allergy to the metal that is in the bridge. The dreaded "black gum" look. In addition, there is a difference in the height of the gingeva on teeth #8 and #9. The patient had already made the choice of a bridge, now we had to decide which material to use. The patient reported that she has metal allergies to jewelry unless it is gold. So odds are high that any metal we use that is not 80 percent gold or more is going to cause a metal allergy and the dark gingiva. However, a metal that high in gold will bend on this long of a span, so we ruled out the use of metal. By eliminating the metal, the "black gum" look will go away (Figs. 5, 6).

BruxZir was the material of choice for this case. BruxZir is a solid zirconia material that is sold to laboratories in a pre-sintered disk. CAD/CAM technology is then used to design and mill anterior restoration.

BruxZir Zirconia exceeds the flexural strength of typical zirconia (up to 1,465 MPa versus 1,200+ MPa for typical zirconia). BruxZir exhibits three to six times the fracture toughness (also known as the KIC value) of typical zirconia.

To better understand this concept, consider that a piece of steel or lead has high fracture toughness, whereas glass or brittle materials have a low KIC value. This property gives it high impact resistance. It also has excellent resistance to thermal shock. This low thermal expansion means the restorations will remain very stable in the mouth.

BruxZir is available in all the Vita shades. Due to the esthetic demands of the patient, a mono- or pressable ingot using the lost wax technique. IPS e.max CAD blocks have a flexural strength of 360 MPa versus 400 MPa for the e.max press.

Blocks and ingots are available in various shades and levels of opacity to achieve a final shade match. A stump shade is recommended for IPS e.max due to the level of translucency. IPS e.max press was used for the veneer and is indicated for anterior crowns and bridges with one pontic as well as posterior single units. A gingival recontouring procedure to match gingival heights was performed on teeth #8 and #9 using radiopaque electrolytic.

Lab portion

This case was sent to Oral Arts Dental Laboratories, a full-service lab located in Huntsville, Ala. I took a stick bite to establish the horizontal plane along with full upper and lower impressions and bite. Once the model work was completed, the models and dies required digital scanning. BruxZir is a CAD/CAM fabricated material and thus must be digitally designed by a technician using a digital scanner and design software.

Once the final contours and design...
are complete, the file is “nested” or positioned on the zirconia disk (Figs. 10, 11) and milled to a full contour approximately 30 percent larger than the final restoration. Once the restoration is milled and removed from the disk, it is dipped in the appropri- ate coloring solution and init in an oven for 6.5 hours at 1,530 degrees Celsius where it shrinks to its final size. I requested that Oral Arts e-mail me the initial design for my approval before milling (Fig. 7). The case met my expectations on design and we proceeded with fabrication. On large- complex cases, I enjoy the option of approving digital case design via e-mail before case completion. After the bridge framework was sintered and checked for accuracy of fit and margins (Fig. 8), IPS e.max Ceram was stacked and baked on the facial surfaces for enhanced esthetics. IPS e.max Ceram is a stackable ceramic powder within the IPS e.max system. The veneering ceramic is the key to highly esthetic results, both on lithium disilicate and on zirconium oxide (Fig. 9). The veneer was then waisted to a cut-back shape with mamelons, invested, burned out using the lost wax tech- niques and pressed using IPS e.max Press lithium disilicate. Once the veneer was dovetailed, it was layered using IPS e.max Ceram to further improve esthetics.

Final delivery and cementation

One of the challenges of cementing a case like this is the fact there are two dental materials side by side. Teeth #7 has an IPS e.max veneer and teeth #8 and 9 will be BruxZir with porcelain facials. IPS e.max is more translucent than the BruxZir, thus allowing more visibility of the cement and tooth that it is prepped.

The cement chosen for the bridge was Panavia SA Cement, a self-adhesive resin. I choose a self-adhesive resin cement for the bridge because it has ease of use in that it can be light cu- red, but if the light doesn’t penetrate the zirconia completely it will auto cure. This gives strength but also keeps the cementing process simple; it also would work on a full crown made of IPS e.max. The cement for the veneer was Clearfil Esthetic Cement EX, a resin ce- ment. Veneer prep does not have a re- ten tive and resistant form. The veneer needs to have the maximum strength that resin bonding can give. I can get light though the veneer to fully cure the cement so an auto-cure option is unnecessary. Clearfil Esthetic Ce- ment EX is one of the strongest bonds available and will work excellently on this veneer or a full crown made from IPS e.max.

Both restorations, the veneer and bridge, were tried in and contacts and occlusion checked. The colors were very close to exact between the two restorations. Clearfil Esthetic Ce- ment EX comes with try-in paste, so we used the try-in paste and found that Universal colored try-in paste on both the bridge and veneer made a perfect match.

K-etchant gel was used to clean both restorations, the abutments were cleaned using a prophyl cup and sim- ple flour pumice with no fluoride. Panavia SA Cement was placed in the bridge abutments and the bridge was placed on the teeth. There is no need for a silinating agent on Brux- Zir because Panavia SA Cement will bond to the zirconia. Then it was light cured in place and the excess cement cleaned off.

An advantage to this type of cement is that it gives the benefits of resin bonding, and if you can’t get the cu- ring light to the cement through the material it will auto-cure in five minu- tes on its own, thus giving the benefit of a resin cement but the ease of use of a glass ionomer. The veneer was treated with ceramic primer before resin bonding using Clearfil Esthetic cement in the Universal shade and light cured, then the excess cement was cleaned up.

Fig. 7: The screen shot of the design from Oral Arts Dental Lab in Huntsville, Ala.

Fig. 8: Full-contour aron-cut-out to allow porcelain on the facial to increase esthetics.

Fig. 9: Porcelain facial applied to the BruxZir.

Fig. 10: Layout of crowns on a design computer to be milled in BruxZir.

Fig. 11: BruxZir die with the crowns ‘heated’ and fully milled.

Fig. 12: The cement for the veneer was Clearfil Esthetic Cement EX, a resin cement. Veneer prep does not have a retentive and resistant form. The veneer needs to have the maximum strength that resin bonding can give. I can get light though the veneer to fully cure the cement so an auto-cure option is unnecessary. Clearfil Esthetic Cement EX is one of the strongest bonds available and will work excellently on this veneer or a full crown made from IPS e.max.

The bottom line

In 2011, many labs reported the number of metal-free restorations surpassed the number of porcelain fused-to-metal restorations for the first time. Most of these metal-free restorations are full-contour zircon- ia and lithium disilicate. Porcelain fused-to-metal restorations have enjoyed as the pre-eminent tooth- colored, indirect restorations for 50 years, so they have a long, successful history. On the other hand, BruxZir has a much shorter history and most labs have only had it available for less than four years. The demand on the dentist to place esthetic restorations that are strong and will last has lead to BruxZir’s large market share. Learn- ing new ways to employ this ma- terial is a must, and new innovative techniques can evolve to meet our patients’ demands.

References are available from the author.

Contact Information

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