Esthetic Long-Span Bridge Using BruxZir

By Mark Omomie, DMD

In 1998, a 30-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 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 these teeth with a golf club during a friend’s backswing, which probably led to the resorption of the roots of the teeth in question. All restorative and risks were explained to the patient.

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The patient did not like the idea of surgery and the healing time discussed. The patient did not like the idea of surgery and the healing time discussed. However, what about those 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 free biologic, a high risk host such as a poorly controlled diabetic, smoker, etc. Often times a patient doesn’t desire 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.

Case history

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In January 2012, the patient, who was now 52 years old, presented with a broken tooth. She was eating a peppermint, incised it with the distal of tooth #8 and fractured the porcelain in an incisal gingival direction. About 2 mm of porcelain came off toward the distal contact. The metal substructure of the bridge was showing. The piece of porcelain was intact. She was on her way to a meeting she could not get out of and desired a temporary fix. I tried the piece of porcelain in and found it to be adequate but not an exact match for #8. Some of the porcelain had chipped away and was lost. I roughened the surface of the bridge in her mouth in the area that needed repair then placed K-rich Cat by Kuraray to clean the area. I used Alpha Primer from Kuraray on the metal substructure. On the porcelain, I placed Clearfil Ceramic Primer. Clearfil Majesty flowable composite was placed on the metal and on the piece of chipped porcelain. I refit the porcelain and light cured. All of these materials to do the repair are readily available in the Clearfil Repair Multi-Purpose kit from Kuraray. It makes life simple to have everything you need in one place. The patient was able to get on her way and made it on time to her meeting (Fig. 3). You can see the repair on the distal of #8.

Material selection

In the pre-op photo (Figs. 1, 3, 5) 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 gingiva 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 90 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).

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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 the 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 Classic shades. Due to the esthetic demands of the patient, a mono- lithic colored restoration would not be acceptable. By performing a “cut back” on the face of the bridge, we could achieve the desired esthetics and have the necessary strength. The advantage of BruxZir zirconia over other zirconia frameworks with overlay porcelain is that the lingual and occlusal surfaces do not have the opportunity to de-bond or chip.

The old bridge had metal lingual on #8 and #9 (Fig. 3) and a metal occlusal surface on tooth #14. This allowed minimal tooth reduction. Using BruxZir allows us to use the same minimal reduction, as low as 0.5 mm, thus conserving tooth structure. In addition, BruxZir allows us to have the esthetics desired with no additional reduction (Figs. 3, 4).

If using a zirconia framework system that required full-contour porcelain, we would need to reduce tooth #14 substantially. This theoretical reduction would give a clinical height on the prep of around 1 mm. This would be an insufficient abutment for a bridge of this length. Minimal preparation of the tooth structure, especially on #14, makes BruxZir an ideal material. Additional considerations were given to try to balance this smile. The patient wanted to change the anatomy of #7 and add a little more length. A re- nce was added to this case on tooth #7. IPS e.max lithium disilicate by Focal Viveral was chosen for the veneer material. IPS e.max lithium disilicate is an all-ceramic material that is available in a millable block 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 IPS e.max press material.

Black and ingots are available in various shades and levels of opacity to achieve a final shade match. A shade guide 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 electro- scintigraphy.

Labi portion

This case was sent to Oral Arts Dental Laboratories, a full-service laboratory located in Huntsville, Ala. I took a stick bit 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 BruxZir, thus allowing more visibility of the cement and tooth that is prepared.

The cement chosen for the bridge was Panavia SA Cement, a self-adhesive resin cement. I choose a self-adhesive resin cement for the bridge because it has ease of use in that it can be light cured, 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 Clearfill Esthetic Cement EX, a resin cement. Veneer preps do 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. Clearfill 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.

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. Clearfill Esthetic Cement 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-evestach gel was used to clean both restorations; the abutments were cleaned using a prophyl cup and simple flour pumice with no fluorine. 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 BruxZir 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 curing light to the cement through the material it will auto-cure in five minutes 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 Clearfill Esthetic cement in the Universal shade and light cured, then the excess cement was cleaned up.

The answers and critiques published herein have been checked carefully and represent authoritative opinions about the questions concerned.

References are available from the author.