

# All-ceramic fixed bridges



**DR. ROSS W. NASH**

With the advent of strong all-ceramic bridge materials, we have more options to offer our patients who consider esthetics a high priority in their restorative treatment. While porcelain-bonded-to-gold and even conventional PFM fixed bridges can be very esthetic, the esthetics of an all-ceramic bridge is hard to surpass.

By Dr. Ross W. Nash

**T**his age of esthetic awareness has spurred a quest for materials that are strong enough for the functional requirements of fixed bridgework yet offer a natural appearance. Used for many years, conventional porcelain-fused-to-metal restorations require enough preparation to accommodate a metal substructure, an opaque layer of porcelain to cover the metal, and several layers of esthetic porcelain.

## Beyond PFMs

Modern products that use a thin gold understructure allow thicker layers of porcelain and more realistic appearances due to the warm gold color of the core.

Products with white or tooth-colored aluminous cores offer an alternative to metal substructures and provide more realistic looking bridgework. CAD/CAM technology is used to create these substructures in several systems. High-strength pressed ceramics have been developed by several manufacturers that recommend them for fixed bridgework.

## Zirconia substructure

A currently available system, Cercon from Dentsply Ceramco, uses pure zirconia as a CAM-milled core. Reportedly strong enough for fixed posterior bridgework, it requires only already-known techniques of PFM design to create metal-free cementable restorations with a fit comparable to PFM alternatives.

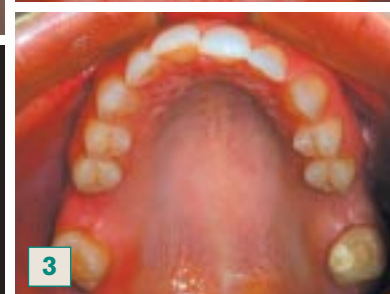
According to the manufacturer, zirconia exhibits “transformation toughening” which strengthens the material and allows it to resist crack growth. The veneering ceramic is said to have engineered compatibility with the core material as well as high translucency, vitality, and light dynamics. This system was used in the following case to fabricate two 3-unit maxillary posterior fixed bridges to replace missing first molars. A low-fusing stacked porcelain (Finesse, Dentsply Ceramco) was used to fabricate bonded laminates for 16 other teeth.



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**2**



**3**

**(1)** Pre-treatment full-face view. **(2)** Teeth have an orange hue and translucent enamel. **(3)** Preoperative occlusal view of upper arch.

## Clinical case

The patient in **Figure 1** was unhappy with the appearance of her smile. In **Figure 2**, you can see that her teeth exhibited an orange hue and enamel that was very translucent; there was a mesio-incisal fracture of the right maxillary central incisor. Her maxillary first molars were missing and a provisional crown was in place on tooth 15, as seen in **Figure 3**. Her mandibular incisors were small with multiple diastemas and incisal wear. The occlusal view of the lower arch can be seen in **Figure 4**. The patient had excellent periodontal health.

## Treatment plan

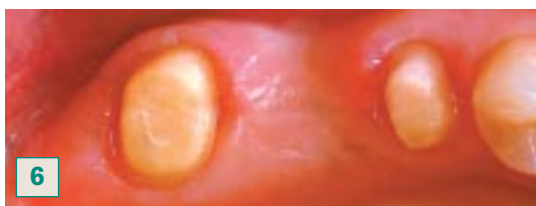
The patient’s primary goal was to improve her smile. She did not wish to lose any more teeth but decided against implants for replacements of her maxillary first molars. Orthodontic treatment was considered but ruled out by the patient. She chose a restora-



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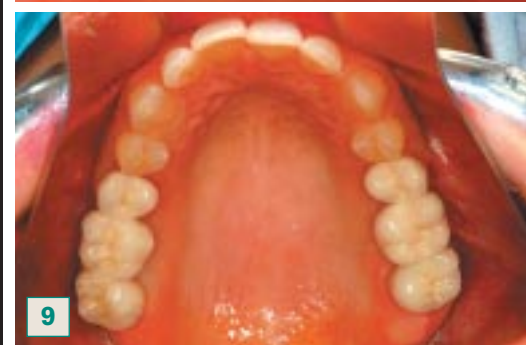


**7**

**(4)** Preoperative occlusal view of lower arch. **(5)** Unprepared abutment teeth for right-side 3-unit bridge. **(6)** Abutment preps feature chamfer margins slightly into the gingival sulcus. The bridge cemented in place. **(7)** The zirconia core of the bridge is lighter in color than the outer surface. **(8)** The left-side 3-unit bridge cemented into place. **(9)** The maxillary occlusal view shows both 3-unit bridges. **(10)** The maxillary occlusal view showing the veneer preparations.



**8**



**9**



**10**

tive treatment plan for its expediency and predictability.

The plan consisted of placing two 3-unit fixed bridges to replace her missing maxillary molars. Her anterior teeth would receive laminate veneers to improve alignment and lighten the color. The patient desired a very white color but wanted to widen her smile. Both fixed bridges would be visible in the smile zone. An all-ceramic bridge material was chosen for its ability to blend with the porcelain veneers.

#### Bridge preparations

**Figure 5** shows the abutment teeth for the maxillary right 3-unit bridge. Routine preps with 1.5 mm of axial reduction and 2.0 mm of occlusal reduction were performed. Chamfer margins just slightly into the gingival sulcus were prepared (**Figure 6**). The lighter-colored zirconia core of the all-ceramic bridge can be seen in **Figure 7**; the bridge in place after cementing with a resin-ionomer cement is shown in **Figure 8**.

Abutment teeth on the opposite side were also prepared. **Figure 9** is the occlusal view of the maxillary arch after both bridges have been placed. The incisal fracture at tooth 8 was temporarily repaired with composite resin.

#### Veneer preparations

The maxillary six anterior teeth were prepared for 360° porcelain laminate veneers by removing only 0.5 mm of axial and 1.0 mm of incisal tooth structure. Gentle chamfer margins were prepared at the level of the tissue and all angles were rounded.

The first premolars were prepared for facial laminate veneers by removing only surface enamel and defining a chamfer margin because we desired to widen the buccal corridor for improved esthetics. Shallow seating grooves were prepared in the facial surfaces of the premolars.

The occlusal view of the maxillary prepared teeth can be seen in **Figure 10**.

The mandibular four incisors were prepared for 360° porcelain laminates with 0.5 mm of facial and 1.0 mm of incisal reduction. Gentle chamfer margins at the level of the tissue were extended into the interproximal and around to the lingual so that the interproximal porcelain would have both facial and lingual support. Both premolars and the canine teeth on each side were prepared for laminates with 0.5 mm of facial and 1.0 mm of incisal reduction. The final preps from the occlusal view can be seen in **Figure 11**.

Eighteen laminate veneers, each with etched internal surfaces and glazed outer surfaces, were fabricated using a low-fusing stacked porcelain (Finesse, Dentsply Ceramco). Some laminates wrap all the way around the tooth, while others cover only the facial and incisal surfaces, but all are only 0.5 mm in thickness on the axial aspect and 1.0 mm in thickness over incisal edges and occlusal surfaces (**Figure 12**).

#### The final result

**Figure 13** is the retracted facial view of the finished case 30 days after delivery. Even though the patient chose "Hollywood White" as the shade, the porcelain exhibits ample vitality. Subtle incisal translucency outlines internal developmental lobes in the maxillary incisors. The diastemas and worn incisal edges in the mandibular anterior area were corrected with the laminate veneers. The color blend of the bridges and veneers is excellent.

The finished case can be seen from the maxillary occlusal view in **Figure 14** and from the mandibular occlusal view in **Figure 15**. A digital radiograph of some of the maxillary laminate veneers can be seen in **Figure 16**. The radiograph in **Figure 17** illustrates the radiographic resemblance to metal that the zirconia core exhibits. It also illustrates the excellent marginal adaptation.

A close up view of the right all-ceramic bridge and some of the laminate veneers shows the excellent color match, anatomical form and tissue



**(11)** The final occlusal view of the mandibular veneer preparations. **(12)** The 18 laminates have etched internal surfaces and glazed outer surfaces. **(13)** The finished case a month after delivery. **(14)** The finished case: A maxillary occlusal view... **(15)** ...and a mandibular occlusal view. **(16)** A radiograph of the veneered teeth. **(17)** A radiograph reveals that the radiopacity of the zirconia cores is similar to that of metal substructures. **(18)** The right bridge exhibits optimal color match and anatomy. **(19)** An occlusal view of the right sextant. **(20)** A pretreatment right-side view shows a dark corner... **(21)** ...that was corrected by widening the buccal corridor. **(22)** The new smile is shown in a full-face view.

health (**Figure 18**). A close up occlusal view of the same sextant can be seen in **Figure 19**. A right-side view of the patient's smile before treatment shows the dark corner (**Figure 20**). After her new restorations her buccal corridor was widened and her smile broadened (**Figure 21**). Finally, the patient's new look is shown in the full-face portrait in **Figure 22**. **DPR**

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