

# AESTHETIC PORCELAIN ALTERNATIVES

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For decades, metal- and all-ceramic restorations have been placed in the anterior region without gingival inflammation caused by microleakage. Conventional crown and bridge cements are generally better equipped to tolerate minor amounts of moisture in the sulcus during cementation when compared to resin cements, which require an absolutely dry field to function properly. While clinicians may select metal-ceramic restorations for their strength in certain instances, all-ceramic options may be considered for their aesthetics in different applications. It is rare, however, that both types of crowns are fabricated and tried in to verify which restoration will provide optimal results. The case presentation described herein compared five types of metal- and all-ceramic restorations. The restorations were evaluated for aesthetics, durability, and ability to be cemented using conventional protocols.

## PATIENT PRESENTATION

A 25-year-old male patient presented with two failing all-ceramic crown restorations that demonstrated circumferential microleakage on teeth #8(11) and #9(21) (Figures 1 and 2). Discoloration was visible at the facial

margin, and gingival inflammation was also evident. The microleakage of the pre-existing restorations was attributed to contamination of the resin cement with crevicular fluids due to the subgingival placement of the margins. Preoperative clinical and radiographic evaluation indicated that sufficient leakage had created pulpal insult that necessitated endodontic treatment. Although this leakage may have occurred with the use of conventional cementation techniques, the situation may not have been as advanced if a resin-reinforced glass-ionomer cement (eg, Fuji Plus, GC America, Alsip, IL; PermaCem, DMG/Zenith, Englewood, NJ; Rely-X, 3M ESPE, St. Paul, MN) had been used.

A ceramic fracture was also evident on the cervical third of the lingual surface of tooth #8. While the central incisors had received endodontic treatment subsequent to the original crown placement, both access openings were sealed with a light-cured composite material. Although the influence of this endodontic access opening on the defect remains undetermined, the fractured portion of ceramic material ended at the access opening, which indicated that the opening was at least partially responsible for this occurrence.



FIGURE 1. Preoperative facial view of the existing all-ceramic crown restorations demonstrated microleakage at the facial margin and subsequent gingival irritation.



FIGURE 2. Lingual view of the existing restorations showed microleakage on the lingual surface and a porcelain fracture adjacent to the endodontic access opening.



FIGURE 3. Significant tissue healing and the absence of microleakage were evident 3 weeks following provisionalization.



FIGURE 4. Care was taken to isolate the subgingival margins during try-in of all-ceramic (IPS Empress 2, Ivoclar Vivadent, Amherst, NY) restorations.



FIGURE 5. Facial view during try-in of the second group of all-ceramic restorations (IPS Empress 2, Ivoclar Vivadent, Amherst, NY) demonstrated aesthetic incisal translucency.



FIGURE 6. A pressed ceramic was placed directly on a metallic substructure (BioPress, Glidewell Laboratories, Newport Beach, CA) and used for the third set of aesthetic restorations evaluated.



FIGURE 7. Facial view following placement of all-ceramic crowns fabricated with an aluminous oxide coping (Procera, Nobel Biocare, Yorba Linda, CA).



FIGURE 9. Occlusal view of the definitive all-ceramic restorations. Note the absence of microleakage and aesthetic harmony between the hard and soft tissues.



FIGURE 8. Porcelain-fused-to-gold restorations were subsequently tried in. The gold substructure transmitted natural warmth to the gingival tissues.



FIGURE 10. Postoperative facial view demonstrates enhanced aesthetics provided by the definitive all-ceramic (Procera, Nobel Biocare, Yorba Linda, CA) restorative option.

## MATERIAL SELECTION

Since the longevity of a restoration can be influenced by the cement and restorative materials, these parameters were considered during the treatment planning phase. The presence of pre-existing subgingival margins that were not conducive to isolation and moisture control influenced the availability of restorative options. All-ceramic (IPS Empress and IPS Empress 2, Ivoclar Vivadent, Amherst, NY; Procera, Nobel Biocare, Yorba Linda, CA), ceramic (IPS d.Sign, Ivoclar Vivadent, Amherst, NY) fused to gold (Captek, Precious Chemicals, Altamonte Springs, FL), and metal-ceramic (BioPress, Glidewell Laboratories, Newport Beach, CA) options were evaluated.

## PROVISIONALIZATION

Since the presence of gingival inflammation would significantly complicate seating of the definitive restoration, indirectly fabricated provisional restorations (BioTemps, Glidewell Laboratories, Newport Beach, CA) were used to maintain the existing tissue contour, reduce gingival inflammation, and provide acceptable aesthetics (Figure 3). To ensure sufficient reduction of the gingival inflammation, the provisional restorations remained in place for a 3-week healing period. Once adequate tissue healing was confirmed, custom tray impressions (Capture, Glidewell Laboratories, Newport Beach, CA) were obtained and forwarded to the laboratory.

## PREPARATIONS

To accommodate placement of the metal- and all-ceramic restorative options selected, all-ceramic preparations with modified shoulder margins were accomplished using a diamond bur kit

(Full Ceramic Logic, Axis Dental, Irving, TX). The five crown restorations were tried in and demonstrated an excellent marginal fit. The proximal fit of the restorations was tight due to the slightly open contact between the two restorations that was left by the dental auxiliary, and the interproximal contacts were adjusted prior to cementation.

## INITIAL CEMENTATION

A small retraction cord was placed into the pre-existing subgingival margins, and rubber dam isolation was used to ensure proper moisture control during cementation of two all-ceramic (IPS Empress and IPS Empress 2, Ivoclar Vivadent, Amherst, NY) restorations. The use of a conventional cementation protocol was critical to the maintenance of a sufficiently dry field within the subgingival margins (Figures 4 and 5). A pressed ceramic was directly placed on a metallic substructure (BioPress, Glidewell Laboratories, Newport Beach, CA) to constitute the third set of crown restorations (Figure 6). Although these restorations contain a 360-degree porcelain margin, conventional crown and bridge cementation techniques can be utilized for definitive placement. Since this porcelain material can also be used to fabricate all-ceramic restorations, clinicians can place metal-ceramic restorations adjacent to all-ceramic restorations with similar shade and property results.

An all-ceramic material fabricated with an aluminous oxide coping (Procera, Nobel Biocare, Yorba Linda, CA) was used for the fourth set of restorations (Figure 7). Once the master model work was completed, the dies were scanned with a laser scanner. The

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information obtained was then forwarded to the computer-assisted milling unit via modem, and the copings were pressed, fired, and milled. This coping was transferred to the laboratory technician for application of the ceramic material. The ceramic crown was cemented using conventional cementation procedures.

The final restorations were fabricated using a ceramic material (IPS d.Sign, Ivoclar Vivadent, Amherst, NY) fused to a 22-karat reinforced high-noble gold coping (Captek, Precious Chemicals, Altamonte Springs, FL). The restorations were cemented using conventional modalities and demonstrated a warm hue that eliminated gray margins generally associated with traditional metal-ceramic restorations (Figure 8). The copings also provided the restorations with an antimicrobial property that is significant for patients

with subgingival margins or patients who are prone to periodontal disease.

## CONCLUSION

Although the five restorations evaluated demonstrated enhanced aesthetics, form, and durability, the subgingival location of the pre-existing margins required the use of conventional resin cement modalities to maintain a dry field. While each of the restorative options presented a reliable treatment option for various indications, an all-ceramic option (Procera, Nobel Biocare,

Yorba Linda, CA) that enabled maintenance of the subgingival margins and durability with a pleasing aesthetic result was finally selected (Figures 9 and 10). Maintenance and healing of the gingival tissues were facilitated by sufficient provisionalization, and microleakage was not evident following placement of the definitive restorations. ■

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