The Use of Both Porcelain Veneers and All-Porcelain Crowns in Restoring Anterior Teeth

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"Clinical Showcase" is a series of pictorial essays that focus on the technical art of clinical dentistry. The section features step-by-step case demonstrations of clinical problems encountered in dental practice. If you would like to propose a case or recommend a clinician who could contribute to this section, contact editor-in-chief Dr. John O'Keefe at jokeefe@cda-adc.ca.

Over the past 2 decades, the use of nonmetallic crowns for the restoration of anterior teeth has gained popularity. Unlike metal-and-ceramic crowns, all-porcelain crowns are esthetically pleasing, with a lifelike appearance. Some recently introduced porcelain materials and new techniques for fabrication of such crowns can result in long-lasting restorations that have a minimal risk of fracture when used for anterior teeth. The all-ceramic crowns used in this case are copings with 99.9% densely sintered aluminum oxide veneered with dental porcelain.[1] A 5-year clinical trial involving 100 crown restorations of this type had a high success rate, and none of the crowns placed on anterior teeth underwent fracture.[1]

The porcelain veneer technique was introduced to the profession more than 20 years ago by Calamia.[2] It is a conservative technique that can improve the esthetics of anterior teeth. Veneer preparations require minimal tooth reduction (no more than 0.5 mm), and the preparations must terminate in enamel. Preparations of anterior teeth typically involve the facial surfaces with little or no involvement of the lingual surfaces. In the following case, a combination of porcelain veneers and all-porcelain crowns was used to restore and improve the esthetics of maxillary anterior teeth.

Case Report

The maxillary anterior teeth of a 39-year-old woman had a less-than-ideal appearance because of discoloration and recurrent carious lesions (**Fig. 1**). Intraoral and radiographic examination revealed that teeth 11, 12 and 13 had undergone endodontic treatment, which was the most likely cause of the discoloration (**Fig. 2**). Although the remaining maxillary teeth had not undergone endodontic treatment, they had become shortened through excessive wear (**Fig. 3**).

Examination of the lingual surfaces of the teeth revealed that teeth 11, 12 and

Figure 1: The patient's maxillary anterior teeth had incisal wear that resulted in significant reduction in the cervico-insical length. Teeth 11, 12 and 13 had undergone endodontic treatment and had become discoloured.

Figure 2: Intraoral facial view of teeth 11, 12 and 13 shows evidence of discoloration because of loss of vitality and recurrent caries. There is also evidence of excessive incisal wear.

Figure 3: Tooth 21 appears too wide because of shortening that occurred with excessive incisal wear.

Figure 4: Lingual view of the maxillary anterior teeth shows evidence of recurrent caries and incisal wear on teeth 11, 12 and 21 around existing composite restorations. Teeth 22, 23 and 13 had new proximal caries and incisal wear.

Figure 5a: Maxillary diagnostic model.

Figure 5b: A diagnostic wax-up was made to analyze and determine the shape and size of the restorations. The wax-up was used for case presentation to and discussion with the patient.

Figure 6: A model of the lower teeth was used to verify occlusion and ensure that the degree of overlap of the lengthened maxillary teeth was within acceptable limits.

Figure 7: A silicon impression of the waxed-up model was made using a sectional disposable anterior tray. This impression was used for fabrication of the provisional crowns and veneers.

Figure 8: Following restoration of the proximal carious lesions in resin composite, teeth 21, 22 and 23 were prepared to receive porcelain veneers. Preparation depth did not extend beyond the enamel to optimize bonding and retention.

21 had recurrent caries around existing composite restorations, whereas teeth 22, 23 and 13 had new proximal caries (**Fig. 4**). Alginate impressions of the upper and lower arches were obtained, and study models were poured in dental stone. The maxillary anterior teeth on 1 model were waxed up to new anatomic form (**Figs. 5a** and **5b**). A model of the lower teeth was used during this process to verify occlusion and to ensure that incisal lengthening of the teeth was within acceptable limits of the anterior overbite (**Fig. 6**). The waxed-up model was used for case presentation to the patient. Using a sectional disposable anterior tray, a silicon impression was made of the waxed-up maxillary model (Splash putty, Discus Dental, Culver City, Calif.) (**Fig. 7**). This was later used for fabrication of provisional crowns and veneers after preparation of the teeth.

Composite restorations were made according to standard technique for the carious lesions in teeth 21, 22, and 23. The teeth were then prepared to receive porcelain veneers (**Fig. 8**). Preparation depth was no more than 0.5 mm and was kept within the limits of the enamel for optimum bonding. Teeth 11, 12 and 13 received post-and-core restorations (**Figs. 9** to **11**). Nonmetallic posts (ParaPost Fiber White, Coltene Whaledent, Langenau, Germany) were used in conjunction with a self-etching adhesive (Clearfil SE Bond, Kuraray Medical Inc., Okayama, Japan) and a dual-cured resin cement (Panavia F 2.0, Kuraray Medical Inc.). Initial polymerization of the resin cement was started when light-curing was applied. Core build-ups

Figure 9: Under rubber dam isolation, teeth 11, 12 and 13 were first restored with nonmetallic posts (ParaPost Fiber White 1.25 mm). These posts were supplied with colour-coded O-rings for easy sizing. In this photograph the 3 posts are being tried in after length adjustment.

Figure 10: Rubber dam isolation was maintained, and the post on tooth 13 was cemented with dual-cure resin cement (Panavia F 2.0).

Figure 11: A core build-up was created using a composite resin (Z100). The teeth were then prepared to receive the all-porcelain crown restorations.

Figure 12: Teeth 11, 12 and 13 after restoration with post-and-core buildups and preparation for all-porcelain crown restorations.

Figure 13: Facial view of all prepared teeth. There is clear evidence that the veneer preparations are much more conservative than the porcelain crown preparation. If the restorations of teeth 21, 22 and 23 were to be made in all-porcelain crowns rather than veneers, they would be prepared in a manner similar to the procedure followed for teeth 11, 12 and 13, with much more tooth reduction.

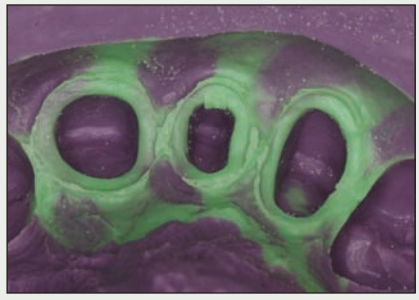

Figure 14: An impression was made using silicon impression material (Splash). Note the all-round shoulder finish line, necessary for all-porcelain crowns.

were then made using a hybrid composite (Z100, 3M, St. Paul, Minn.) and the same bonding agent. The teeth were then prepared to receive porcelain crowns (**Fig. 12**) with an all-round shoulder finish line, which is necessary for proper support of the porcelain.

There was clear evidence in the facial view of all prepared teeth (**Fig. 13**) that the veneer preparations required much less tooth reduction than the all-porcelain crown preparations. A final impression was taken with silicon impression material and a putty/wash technique (Splash half-time, Discus Dental) (**Fig. 14**).

Provisional restorations were made using the silicon impression made of the waxed-up model and an injectable provisional restorative material (PerfecTemp II, Discus Dental). These restaurations were cemented with a temporary cement (**Fig. 15**).

A new shade guide (Vitapan 3D-Master, Vita Zahnfabrik, Bad Sackingen, Germany) was used to select an appropriate shade, and 3 Procera AllCeram crowns (Nobel Biocare AB, Gotenborg,

Figure 15: Facial view of the patient after provisional restorations were inserted.

Figure 16: Three Procera AllCeram (Nobel Biocare AB) crowns were fabricated for teeth 11, 12 and 13, and 3 IPS-Empress (Ivoclar) porcelain veneers were fabricated for teeth 21, 22 and 23.

Figure 17: The fit of the restorations was checked first on the cast.

Figure 18: Intraoral view immediately after cementation of the restorations. A resin cement (Nexus 2) and a bonding agent (Prime and Bond NT) were used. The selected shade of the resin cement was adjusted to colour-match the veneers to the crowns.

Figure 19: Close-up of the 3 Procera AllCeram crowns after cementation. There is excellent colour-matching with the rest of the teeth and superior lifelike esthetics. Initial marginal gingival inflammation in the area of tooth 12 was expected to resolve within 2 weeks.

Figure 20: Postoperative appearance of the patient. There is good colour match between the veneer and crown restorations.

Sweden) and 3 IPS-Empress porcelain veneers (Ivoclar, Schaan, Liechtenstien) were fabricated at a commercial dental laboratory (**Fig. 16**). The fit of the restorations was first checked on the model (**Fig. 17**). At the next appointment, the restorations were tried in and cemented with a dual-cure resin cement (Nexus 2, Kerr Corp, Orange, Calif.) and a bonding agent (Prime and Bond NT, Dentsply, Konstanz, Germany) (**Fig. 18**). The 3 crowns were first cemented with the selected shade of the resin cement. The 3 veneers were then tried in with different shades of resin cement until a perfect match to the crowns was achieved. The veneers were then cemented. Each restoration was light-cured with a light-curing unit (IQ Smartlite, Dentsply) for 40 seconds from both facial and lingual aspects. A superior esthetic result was achieved with the 3 nonmetallic crowns on teeth 11, 12 and 13 (**Fig. 19**). **Figure 20** shows the patient after completed treatment.

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