Prefabricated Composite Resin Veneers – A Clinical Review

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ABSTRACT

Objective: This clinical technique article is focused on the use of prefabricated veneers to enhance the esthetic appearance of the anterior dentition in patients who needed an alternative esthetic solution more affordable than traditional porcelain veneers.

Clinical considerations: Because prefabricated composite veneer systems have been recently introduced, they are not widely used. The Componeer system (Coltene, Altstätten, Switzerland) contains thin pre-polymerized hybrid composite shells, several shades of a direct hybrid composite resin, an etch-and-rinse adhesive system, and restorative accessories including finishing points and disks. The prefabricated restorations can be customized in the mouth for color and shape. The technique described in this article can be used to restore function and esthetics in one office visit.

Conclusions: The prefabricated composite veneer technique has some of the advantages of direct composite restorations, as only one session is required without the need to take impressions to send to the dental laboratory. This new treatment option may open new opportunities for dental professionals and their patients. However, it is paramount to carry out controlled clinical studies with this restorative technique prior to recommending it without restrictions in general practice.

CLINICAL SIGNIFICANCE

The clinical technique described in this paper has the potential for being used routinely to lengthen anterior teeth, to correct malpositioned teeth, to mask discolorations, and to close diastemas. The technique can also be used to restore extensive caries lesions and tooth fractures, and to refurbish large old anterior restorations, especially when other treatment options are out of reach for the patient for financial reasons.

INTRODUCTION

The increasing demand for esthetic restorative treatments and recent advances in adhesive dentistry have led to the development of materials and techniques aimed at restoring the natural tooth appearance, especially in the anterior segment.

Ceramic crowns have been considered a predictable and durable treatment option for anterior teeth. However, crowns require an aggressive tooth preparation that may cause adverse effects to the pulp and periodontal tissues.1 Dental ceramic materials have demonstrated excellent properties, such as biocompatibility, esthetics, and chemical and wear resistance.2 Nevertheless, their mechanical limitations such as brittleness, low fracture toughness, low tensile and flexural strengths, and the wear inflicted to the opposing dentition have been described as potential shortcomings.3

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After the pioneer work of Dr. Pincus in 1938 to enhance movie stars’ smiles, the turning point in porcelain veneer technique optimization started with the work by Rochette and, thereafter, improved by Simonsen and Calamia. The introduction of ceramic etching and adhesive cementation became a standard procedure for porcelain veneers. This treatment modality gained widespread popularity because of its esthetic outcome, as well as durability, biocompatibility, and minimal tooth preparation. Bonded porcelain restorations mimic the biomechanical properties and structural integrity of the original tooth resulting in good clinical performance.

Some of the mechanical properties of indirect composite resin veneers versus ceramic veneers are the lower elastic modulus and higher capacity to absorb functional stresses of composite restorations. Indirect composite veneers may allow better absorption of the polymerization stresses generated by the cement during cementation procedures. In spite of being considered less esthetic than ceramic veneers, indirect composite veneers are easy to finish and polish, can be modified before luting without compromising either their adhesive potential or their mechanical properties. Additionally, the corresponding laboratory procedures are easier, thus lowering the manufacturing cost. New laboratory-made composite restorations with improved wear resistance have widened the indications of composite resins to extensive restorations.

Prefabricated composite resin veneers have been recently introduced. Componeer (Coltene, Altstätten, Switzerland) prefabricated veneers are thin composite resin shells (0.3 mm cervically and 0.6–1.0 mm to the incisal edge). These prefabricated veneers are made of a pre-polymerized hybrid composite resin, Synergy D6 (Coltene). The veneers are cemented with the same hybrid composite resin that they are made from, which has the potential of making the complete restoration as a monoblock unit. These veneers can be trimmed and bonded to the tooth structure using direct hybrid composite resin. One Coat Bond (Coltene) is the dentin adhesive included in the system, which is used to bond the prefabricated composite shells to the tooth structure using an etch-and-rinse bonding strategy.

The purpose of this case report paper is to describe clinical cases step-by step, in which the patients’ smiles were restored with prefabricated composite veneer shells.

**CASE PRESENTATIONS**

*Shade and Size Selection*

The shade is selected with the use of the Componeer Synergy D6 Shade Guide (Coltene). The color guide comes with six dentin cores and two enamel shells (Figure 1). After teeth are cleaned, the enamel and dentin shades are evaluated separately. The enamel shell guide is superimposed over the dentin core to determine the approximate final color. The size of the composite shell for a specific patient is selected with Componeer Contour Guides (Figure 2). A wider and longer size is recommended rather than a short and narrow shape, as the clinician will have the possibility of trimming and customizing the prefabricated veneer with an abrasive disk to match the shape of the natural tooth as close as possible (Figure 3).

*Tooth Preparation*

The tooth preparation must be uniform and, whenever possible, restricted entirely to the enamel. A #2 round bur is used to delimit the cervical margin (Figure 4). Subsequently, the buccal surface is prepared as for porcelain veneers using a tapered-cylinder, round-end diamond bur. Metal abrasive strips may be used to create a separation between the teeth in the proximal area to facilitate the definition of the proximal margin and the correct positioning of the composite shells. It is important to try the prefabricated composite shells on the teeth a few times to guide the gradual tooth reduction.

Abrasive aluminum oxide disks and an extrafine, tapered-cylinder, round-end diamond bur are used to smoothen the preparation and round the angles (Figure 5). After making adjustments to the prefabricated composite veneer, the final try-in is carried out. If it is deemed necessary to mock-up the
final esthetic result, the composite shells can be filled with Synergy D6 according to the dentin shade previously chosen, without light-curing.

**Clinical Case 1**

A 24-year-old female patient had major complaints about the appearance of her smile. This patient specifically requested an improvement in the appearance of her discolored maxillary anterior teeth (Figure 6). After clinical examination and taking the patients’ medical history, a radiographic assessment was performed. Teeth #7, 8, and 10 were root canal treated (Figure 7), with multiple composite restorations in need of replacement.

Patient’s oral hygiene and periodontal condition were excellent. The ideal treatment included fiber posts and composite build-ups, followed by all-porcelain crowns for teeth #7, 8, and 10. However, due to financial limitations, patient declined this treatment plan. Prefabricated composite veneers were then proposed as
an alternative and the respective limitations were explained to the patient.

The dentin shade selected from the Synergy D6 color guide was A1/B1, while the enamel shade was white opalescent (Figure 8). With the help of the contour guides, size “L” was selected (Figure 9). After local anesthesia and rubber dam application, teeth were prepared (Figure 10). The prefabricated veneers were customized with abrasive discs (SwissFlex, Coltene) and tried-in. One Coat Bond was applied to the intaglio and left undisturbed without light-curing (Figure 11). After the preparations were etched with 35% phosphoric acid for 15 seconds (Figure 12), the etchant was thoroughly rinsed for 20 seconds. The bonding substrate was gently air-dried followed by the active application of One Coat Bond for 15 seconds (Figure 13). The adhesive was then gently air-dried from cervical to the incisal aspect and light-cured for 20 seconds (Figure 14). An opaquer (Paint-on Color, Coltene) was applied to mask the tooth discolorations (Figures 15 and 16). The white opaque tint was mixed with the yellow tint in a proportion of 50/50 and applied with a sable brush over the cured adhesive. The same mixture was applied to the yellow-brown enamel spots of teeth #6 and 11 (Figure 17). After the masking agent was light-cured for 40 seconds, Synergy D6 dentin composite was applied on to the tooth surface (Figure 18), while the enamel composite was applied on the intaglio surface of the
veneers (Figure 19). Starting with teeth #8 and 9, the prefabricated veneers were gently placed (without excessive pressure). The restorations were then aligned with the midline and the incisal position was double-checked for symmetry (Figure 20). If spaces are created between the composite shell and the tooth structure, they are filled with the same enamel hybrid composite resin used to seat the prefabricated composite shells.

While holding the veneers in position, the obvious excess was removed and the composite smoothly adapted to the Componeer with a sable brush. The entire restorative complex was then light-cured from the lingual side for at least 40 seconds, and from the facial side for 40 seconds cervically and 40 seconds incisally. For the finishing steps, the margins can be adjusted with Proxoshape oscillating diamond-coated files (Intensiv SA, Montagnola, Switzerland) as shown in Figure 21. Finishing and polishing strips were used for the interproximal areas. Flexible aluminum oxide discs are ideal to adjust the incisal angles. Silicone rubber polishers (prepolishers and polishers or two-stage polishers) were used for the polishing steps (Figure 22).

The other veneers were inserted in pairs as described for teeth #8 and 9 (Figures 23 and 24). Figure 25 shows the patient’s smile 2 weeks after the restorative procedure.

In case any old restorations are removed first, the direct dentin-shaded composite resin is used to restore the corresponding preparations as in a conventional direct composite restoration, prior to cementing the prefabricated veneer. The same dentin-shaded composite resin is then applied to the buccal surface of the tooth and the prefabricated veneer loaded with the enamel composite and inserted as described above. If needed, direct composite resin may be applied to the interproximal areas that are not covered with the prefabricated veneer, especially when

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FIGURE 7. Radiographies of upper central and lateral incisors.

FIGURE 8. Shade selection with the enamel shade tab superimposed over the dentin shade tab.
FIGURE 9. Size selection using the contour guide.

FIGURE 10. Preparation for the prefabricated composite veneers.

FIGURE 11. Adhesive was applied to the intaglio and left uncured.

FIGURE 12. Preparations were etched with 35% phosphoric acid for 15 seconds.

FIGURE 13. Application of the dentin adhesive to the preparations.

FIGURE 14. Adhesive was light-cured for 20 seconds on each surface.
closing a diastema. Sable brushes may be used to smoothen the composite and adapt it to the margins.

Clinical Case 2

A 34-year-old male patient, extremely unhappy with his smile, had a major concern with “the space between his front teeth.” A clinical examination revealed several diastemas, multiple carious lesions, discolored restorations, and a size and shape discrepancy (Figure 26). After the treatment options were discussed with the patient, and taking into account the patient’s financial restrictions, the decision was made to restore the six maxillary anterior teeth with prefabricated composite veneers to reestablish the size and the shape of the teeth and enhance the esthetics of his smile.

The dentin shade selected was A2/B2 and the enamel shade white opalescent (Figure 27). As with clinical case 1, size “L” was chosen with the help of contour guides (Figure 28). After local anesthesia and rubber dam application, teeth were prepared. After etching, rinsing, and application of the adhesive (Figures 29 and 30), the adhesive was light-cured. Dentin-shaded composite resin was free-handed and recontoured from the lingual aspect of the veneers to close the diastema, followed by light-curing from the lingual for 40 seconds. All the
subsequent clinical steps were identical to those of clinical case 1, except for the restorative steps to close the midline diastema. Postoperative views are shown in Figures 31 and 32. Figure 33 shows a non-retracted view 2 weeks after the bonding procedure.

DISCUSSION

Composite resins are available in different shades and opacities to match the optical characteristics of enamel and dentin. Most current composite resins replicate the appearance of a natural tooth when used with the natural layering technique. One of the advantages of free-handed direct composite veneers is the need of fewer appointments compared with laboratory-processed veneers, as no impression is required for direct composite veneers. Several clinical reports have corroborated the success of composite resins in direct veneers and large anterior restorations. However, direct composites have been reported to suffer from surface and marginal discoloration, wear, and marginal chipping.

The concept of one-visit prefabricated resin-based veneers is not new. In the early 1980’s, prefabricated acrylic veneers were introduced as Mastique Laminate Veneer System (Caulk, Milford, DE, USA). The intaglio surface of Mastique veneers was etched with polyacrylic acid and then adapted to acid-etched enamel using a
light-curing composite and an unfilled bonding resin. Mastique veneers had limited success because of technological limitations and poor surface qualities.\textsuperscript{19,20}

Clinical studies have confirmed good performance of porcelain veneer restorations, with excellent esthetics, overall patient satisfaction, and no adverse effects on the periodontal tissues.\textsuperscript{1} A recent study\textsuperscript{21} evaluated 318 ceramic veneers in 84 patients over 10 years. The estimated survival probability was 93.5\% at 10 years. Whereas the main reason for failure was fracture of the ceramic, increased failure rates were associated with bruxism and nonvital teeth.
No significant differences in absolute failures were found between indirect composite veneers and ceramic veneers at up to 36 months. Surface quality changes were more frequently observed in the composite veneer material, which required more maintenance over time. The group of composite laminate veneers in this study had two cohesive fractures indicating that the adhesive strength of the interface was greater than the cohesive strength of the indirect composite material. An in vitro study had also described cohesive fractures as being the predominant failure mode for the same indirect resin composite tested in the clinical study.

The clinical outcome of indirect veneers depends on the strength of two interfaces—the tooth/resin cement and the veneer/resin cement interfaces. A recent bond strength study reported that Componeer prefabricated veneers resulted in microshear bond strengths statistically similar to those of etched IPS e.max Press (Ivoclar Vivadent, Schaan, Liechtenstein) when the respective adhesive and luting composite were applied to the intaglio surfaces.

The high bond strengths obtained between the Componeer intaglio surface and the respective hybrid composite may be a result of two mechanisms:

1. A strong adsorbed layer of polymer material forms on the intaglio surface. This adsorption is a consequence of an initial increase in the ionization...
rate of the carboxylic groups in One Coat Bond because of the production of acid via the photoinitiator.24,25

2 – Residual reactive methacrylate functionalities on the intaglio surface may form a network with the bonding agent after polymerization, which, along with the wetting characteristics of 2-hydroxyethyl methacrylate26,27 in One Coat Bond, may explain the relatively high bond strengths associated with the adhesive joint formed by the prefabricated veneer, the dentin adhesive, and the direct hybrid composite resin.

The clinical technique described in this paper has the potential for being used routinely to lengthen anterior teeth, to correct malpositioned teeth, to mask discolorations, and to close diastemas. The technique can also be used to restore extensive caries lesions and tooth fractures, and to refurbish large old anterior restorations, especially when other treatment options are out of reach for the patient. Although this technique has shown promising results, controlled clinical studies are essential to validate the general use of this technique in clinical practice.

CONCLUSION

Prefabricated composite veneers have some of the advantages of direct composite restorations, as only one session is required without the need to make impressions or laboratory work. Additionally, the restorations can be customized (color and shape) and are more affordable than other indirect restorations, resulting in a very esthetic outcome. It is crucial to assess the clinical behavior of this restorative technique prior to recommending it in general practice.

DISCLOSURE STATEMENT

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REFERENCES


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