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A new veneer technique with prefabricated composite denture teeth combined with the “Biologically Oriented Preparation Technique” (BOPT) – a case report

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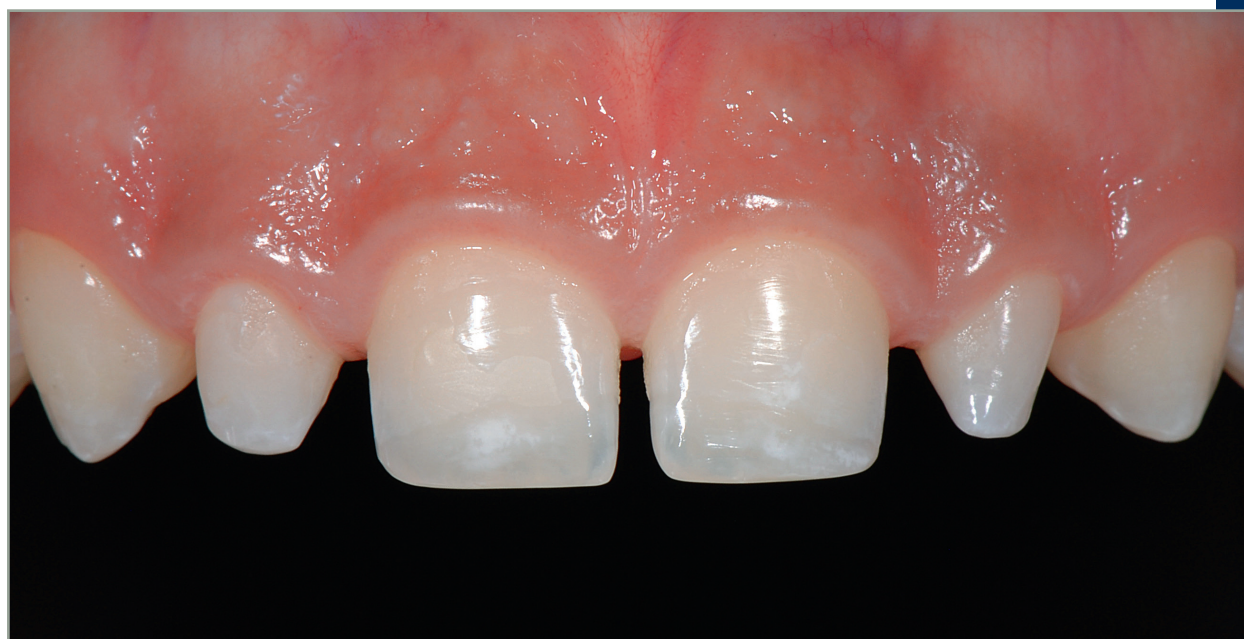
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Abstract

This clinical report describes the step-by-step protocol for novel, 100% non-prep, custom-modified, prefabricated composite veneer restorations in the case of an esthetic rehabilitation of a patient presenting peg-shaped lateral incisors and undersized maxillary cen-

tral incisors. A correct diagnosis, comprehensive treatment plan, and an interdisciplinary approach are necessary to obtain optimal conservative and predictable esthetic results.

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Introduction

The purpose of this case report is to introduce a new technique of prefabricated composite veneers (PCVs)¹⁻¹² derived from commercial composite denture teeth (Phonares II, Ivoclar Vivadent). This case report focuses on the Minimally Invasive Restoration (MIR)¹³⁻¹⁶ of microdontia, but the technique may also be used for the restoration of any other esthetic/functional problem of anterior or posterior teeth in need of veneering.

The proposed method is an interesting alternative to direct composite restorations or classic ceramic laminate veneers, prefabricated veneers (in porcelain or composite), and computer-aided design/computer-aided manufacturing (CAD/CAM) solutions, following a simple protocol of fabrication, adhesion, and cementation.

Acrylic denture teeth have been carved for many years for setups/wax-ups,^{17,18} but this report describes a technique where composite denture teeth are used as definitive prefabricated laminate veneers.

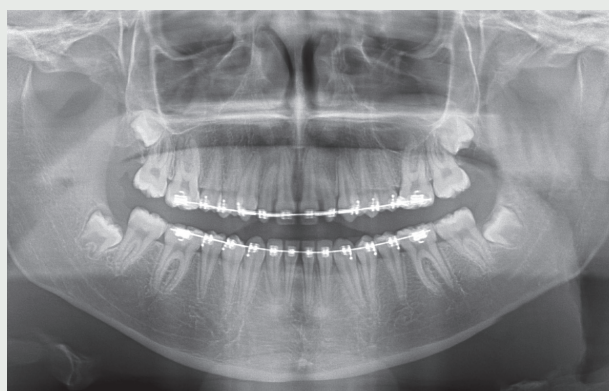


Fig 1 Orthodontic treatment orthopantomography.

To speed up this novel restorative technique, a new kind of virtual smile design was used to reduce the time and work steps involved. The result was a good-quality esthetic rehabilitation.

Case presentation

The patient was a 16-year-old female who had just completed orthodontic treatment (Fig 1). Both of her maxillary lateral incisors were peg-shaped, and her maxillary central incisors were undersized.¹⁹⁻²⁷ She wished to improve the esthetic aspect of her anterior dentition (Fig 2).

The patient and her parents gave their informed consent for the use of adhesive techniques and individually modified, commercially available Phonares II composite teeth to obtain individually customized, prefabricated, 100% non-prep veneers.

Before the restoration, a virtual smile design study was performed with a new, low-cost, intuitive, and fast Apple app (SmileApp)²⁸⁻³⁰ (Fig 3) to visualize the most appropriate tooth shapes and to calculate their correct dimensions as a guide for the wax-up, in order to choose the right tooth shapes within the Phonares II scale (Fig 4).

The need of a mock-up was avoided due to the SmileApp and the dental technician, who individually shaped the Phonares II teeth on laboratory casts mounted in an articulator.



Fig 2 Preoperative maxillary central and lateral incisors, facial view.

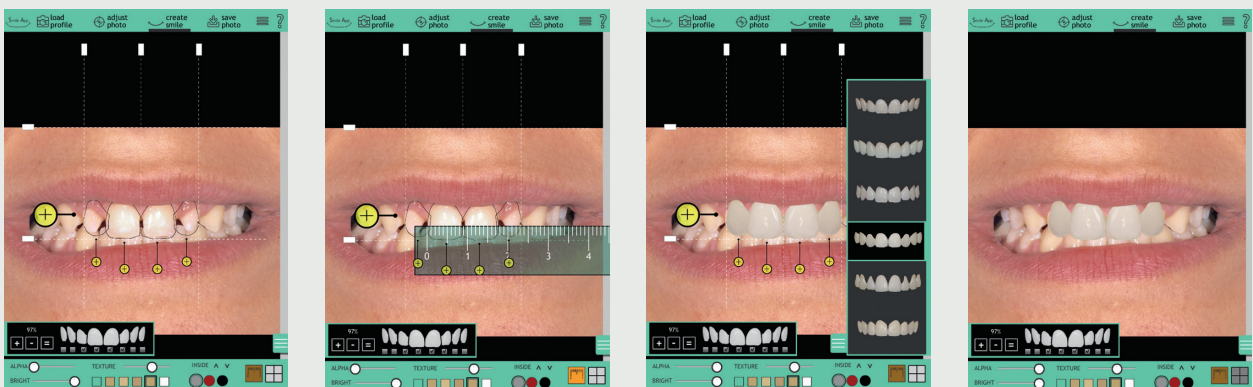


Fig 3 Virtual smile design steps by SmileApp.



Fig 4 The dental technician chooses the right tooth shapes within the Phonares II scale.



Fig 5 Cutting the Phonares II composite teeth.

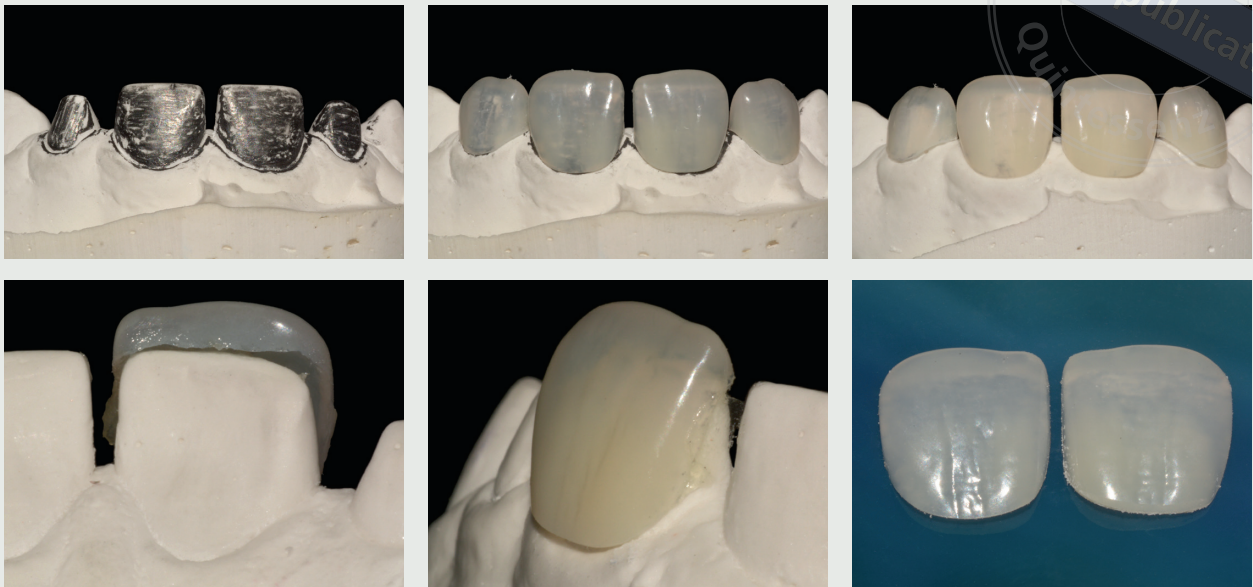


Fig 6 Carving the Phonares II veneers.



Fig 7 The carved veneers relined with SR Nexco Paste hybrid composite.

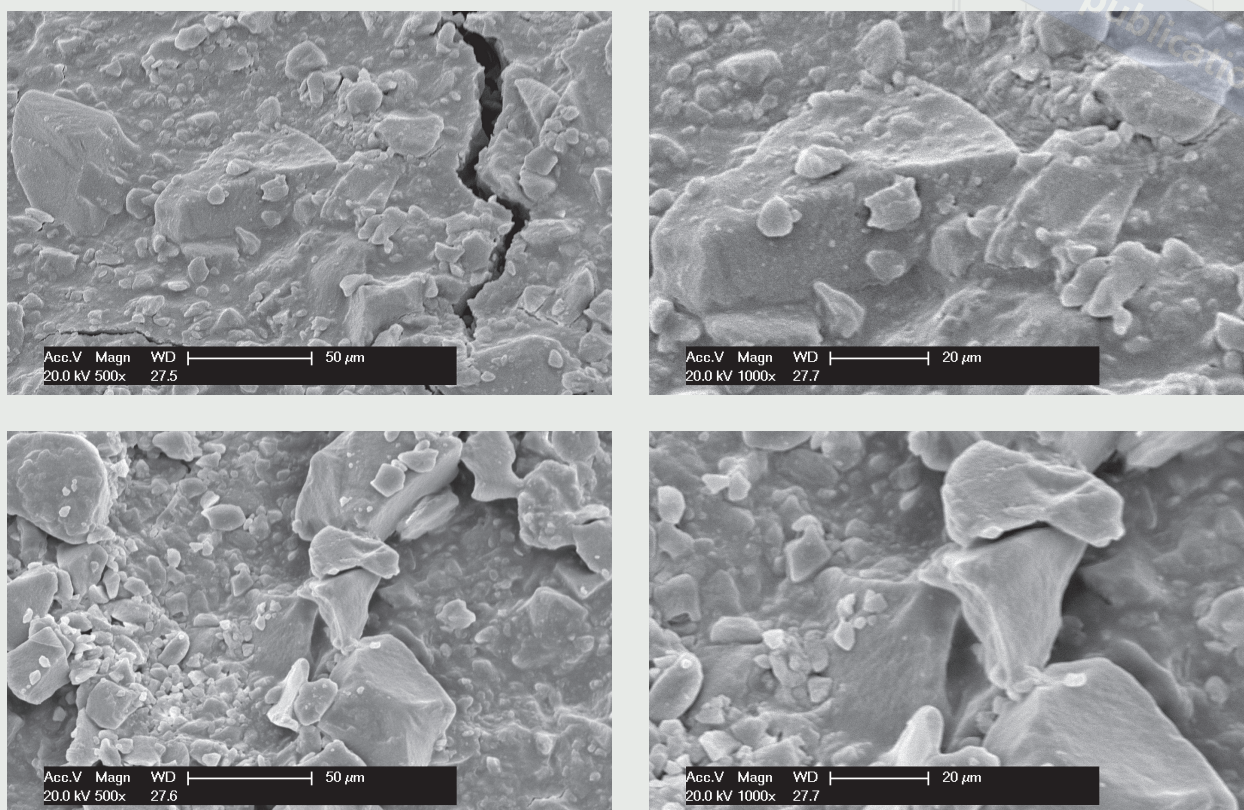


Fig 8 SEM microscope images of the Nexco composite reveal a hybrid composite with prepolymerized particles. The top two images show dentin (D) samples, and the bottom two images show incisal (E) samples.

Subsequently, the following steps were carried out by the dental technician:

- The Phonares II teeth were cut to the right length, and the acrylic part on the commercial teeth was removed (Fig 5).
- The teeth were further carved to obtain thin vestibular laminate veneers, using the study casts covered with graphite as a reference (Fig 6).
- SR Nexco Paste hybrid composite³¹ (Ivoclar Vivadent) was used to reline the carved Phonares veneers, following the manufacturer's recommendations (Fig 7).
- The SEM analysis of the SR Nexco Paste revealed a hybrid composite with prepolymerized particles (Fig 8),

which usually gives high strength, a non-sticky consistency, relatively low shrinkage, and a good surface gloss.

- The composite lining was finished without touching the frontal Phonares surface, by creating the cervical emergency profile according to the BOPT^{32,33} (Fig 9).

At the next clinical appointment, rubber dam (OptraDam, Ivoclar Vivadent) was applied, and the inner surfaces of the Phonares veneers as well as the tooth surfaces were sandblasted. The enamel surfaces were then etched for 40 s with 35% phosphoric acid (Ultra-Etch, Ultradent), rinsed, and dried (Fig 10).³⁴⁻³⁷



Fig 9 The creation of the cervical emergency profile according to the BOPT.



Fig 10 The steps to achieve 100% non-prep veneers.



Fig 11 Sandblasting, silanization, bonding, and composite coating of the veneer.



Fig 12 The BOPT emergency profile 1 week after luting.

Subsequently, the teeth and the Phonares veneers were coated with adhesive resin (Optibond FL Adhesive, Kerr) and, according to the Geneva University adhesive protocol, left unpolymerized until the luting material (Beautifil Flow Plus F00, Shofu) was applied to the teeth. The restorations were then definitively seated by finger pressure (Fig 11). In this case, as adhesion was established exclusively on the enamel, Immediate Dentin Sealing (IDS)^{36,37} was not necessary.

After the removal of the excess composite, initial light polymerization was performed at $> 1000 \text{ mW/cm}^2$ (Bluephase, Ivoclar Vivadent) for 60 s per restoration. All margins were subsequently covered with an air-blocking gel (KY Jelly, Johnson & Johnson), and the composite was polymerized for another 20 s through this gel to avoid an oxygen inhibition layer. The margins were finally finished and polished with composite silicone polishers (Kerr).³⁸⁻⁴³ The fine shaping of the cervical emergency profile according to the principles of the

BOPT^{32,33} was subsequently performed by using fine diamond burs and silicone polishers (Fig 12).

Discussion

Phonares II are prefabricated, artificial, industry manufactured prosthetic composite teeth made out of a radiolucent hybrid composite. They may be cut as veneers and lined with the light-cured laboratory hybrid composite SR Nexco Paste (only slightly radiopaque), which allows modification of their form to fit the individual anatomy of a specific tooth. The Phonares II industrial layering assures a natural appearance, shine, and a high level of translucency.

After analyzing the pros and cons of these novel veneers in comparison to classic alternative techniques, we can point out that they are less “operator dependent” and have a better surface quality than direct composite restorations. They are also less expensive and more conservative for hard dental tissue than



Fig 13 A biomimetic aspect. **(a and b)** view at start of treatment; **(c to e)** view at 1 year; **(f to h)** view at 3 years.



traditional (ceramic laminate) veneers, easier to adapt to the tooth surface than industrial prefabricated veneers, and presently less expensive than CAD/CAM solutions.

The adhesive luting materials and protocols are the same as those for classic adhesive techniques. These materials and protocols are well known and easy to apply. As the veneer material is composite, these veneers are repairable in the patient's mouth with any composite material. By using the BOPT on the cervical margins of these veneers, good control of the gingival biotype and its growth may be realized, allowing for correct pink esthetics.

The original, untouched, and pretreated Phonares frontal surface, with its natural texture, gives a biomimetic and natural aspect to these veneers (Fig 13).⁴⁴⁻⁴⁹ In the case of the BOPT with full crowns, it is the emerging profile of the crown that controls the tissues, whereas when applying the principles of the BOPT to Phonares veneers, the tissue behavior is controlled on the frontal-cervical emergence profile of the veneers (see apical radiograph in Figure 13, where this frontal emergence profile is visible). The said emerging profile is naturally anatomical and is thus conducive to correct oral hygiene.

Conclusion

It is evident that the present article describes a new procedure but does not provide long-term clinical results. This new interpretation of veneers needs to be tested and confirmed in future in terms of durability and esthetics. However, even without long-term clinical results, it is the authors' opinion that the proposed technique is a pertinent example of an economic and good-quality restoration that is especially suitable for the huge segment of the population with esthetic demands and a limited budget.

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