



ESTHETIC RESTORATION OF ERODED TEETH USING PORCELAIN LAMINATE VENEERS WITH DIFFERENT PREPARATION TECHNIQUES: CASE REPORT

AŞINMIŞ DİŞLERİN FARKLI KESİM TEKNİKLERİYLE PORSELEN LAMİNATE VENERLER KULLANILARAK ESTETİK RESTORASYONU: OLGU SUNUMU

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Makale Kodu/Article code: 448
Makale Gönderilme tarihi: 29.11.2010
Kabul Tarihi: 10.02.2011

ABSTRACT

Porcelain laminate veneers are one of the most conservative and aesthetic techniques that can be applied when restoring the mouth for improved aesthetics. The longevity of the veneers is good, and they are durable, especially if the right indications are in place and the correct techniques are applied. However, limited information is available regarding the influence of preparation design on the longevity of laminate restorations. This clinical report describes a patient treated with porcelain laminate veneers and outlines the role of the different preparation techniques in clinical performance.

Key words: Porcelain laminate veneer; esthetic restoration; preparation technique.

ÖZET

Porselen laminate venerler ağızda estetiği geliştirmek amacı ile yapılan en konservatif ve estetik uygulamalardır. Porselen laminate venerler, özellikle doğru endikasyon ve uygun teknikler ile uygulandığında klinik ömürleri oldukça uzun ve dayanıklıdır. Bununla birlikte porselen laminate restorasyonların preparasyon tasarımlarının klinik ömürleri üzerine etkisi ile ilgili kısıtlı bilgi vardır. Bu klinik raporda porselen laminate venerler ile tedavi edilen bir hasta sunularak preparasyon tekniklerinin klinik performans üzerinde etkilerinin altı çizilmektedir.

Anahtar kelimeler: Porselen laminate veneer; estetik restorasyon; preparasyon tekniği.

INTRODUCTION

The increasing demand for aesthetic anterior teeth requires sophisticated treatment strategies. For many years, the most predictable results for anterior tooth restoration have been achieved with full crowns. Undoubtedly, this approach is most invasive due to the substantial removal of large amounts of sound tooth substance and possible adverse effects on the pulp and adjacent periodontal tissues.¹

The use of laminate veneers has become popular as a less invasive and conservative treatment modality for non-esthetic defects caused by erosion and discolorations of anterior teeth.^{1,2} The introduction of indirect resin composite laminate veneers provided a more conservative approach to the problem.

These restorations did not require extensive tooth preparation. However, they were not capable of providing lasting aesthetic results. The lack of natural translucency frequently led to a dull exhibited low abrasion resistance, making them more prone to wear, surface staining, and plaque accumulation.³

Porcelain laminate veneers (PLVs) have high abrasion resistance and color stability. Additionally, the properties of PLVs such as color, form, surface, individual characterization through internal and external staining, and the fact that these restorations can be further color-corrected during cementation with special cement colors make PLVs an attractive treatment option.⁴

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The implemented material and the type of preparation are key factors in the prognosis of PLVs.^{1,2} Regarding the design of the preparation, four basic types have been described: the window, the feather, the bevel, and the overlapped incisal edge preparation.¹ Unfortunately, there are few clinical studies examining the preparation design of laminate veneers reported in the literature.⁵ Whether different tooth preparation designs can affect the fracture strength of ceramic veneers or whether one configuration of tooth preparation is superior to another remains controversial.⁶⁻¹²

This clinical report describes the fabrication of all-ceramic laminate restorations prepared according to the two different preparation designs.

CASE REPORT

A 50-year-old female was referred to the prosthodontics clinic with esthetic concerns related to discoloration, abrasion, and attrition on her maxillary central incisors (Figure 1). Before treatment, a detailed dental, medical, and social history was obtained from the patient. Among the treatment options provided, the patient preferred insertion of two porcelain laminate veneer restorations with minimal reduction of enamel surfaces. The diagnostic casts and wax models simulating the porcelain laminate veneers were prepared, and consent to the treatment protocol was obtained from the patient.



Figure 1. Pretreatment view of the central incisors.

Different preparation techniques were planned on the maxillary central teeth due to irregular occlusal relationship. Right maxillary central preparation included the reduction of the incisal edges by approximately 1.5 mm. Left central preparation included the reduction of the buccal surface without

incisal overlapping. Each tooth preparation was dictated by the enamel thickness of the teeth because the reduction of approximately 0.5 mm results in more esthetic restorations. The interproximal regions were prepared with slice preparations (Figure 2).



Figure 2. Different preparation techniques.

Laminate preparations were made in the abutment teeth using a laminate preparation set (Laminate Veneer Kit 4151, Komet, Lemgo, Germany). After the tooth preparations, complete mandibular and maxillary arch impressions were taken with a polyvinyl siloxane (Elite H-D, Zhermack SpA, Badia Polesine, Italy). Shade was selected and provisional restorations were cemented with eugenol-free temporary cement (Cavex Temporary Cement, Cavex, Haarlem, Holland). This procedure was preferred to simulate a template to determine any necessary changes in the final restoration.

The laminate restorations were fabricated in the laboratory with lithium disilicate glass ceramic material (IPS Empress 2, Ivoclar Vivadent, Schaan, Liechtenstein) according to the manufacturer's instructions (Figure 3).



Figure 3. Fabricated laminate veneers.

The PLVs were tried to check the fit of the restorations. The inner surface of the PLVs was etched with 4.9% hydrofluoric acid for 15 seconds (IPS Ceramic Etching Gel, Ivoclar Vivadent). A layer of silane compound (Monobond-S, Ivoclar Vivadent), used as a coupling agent on the restorations, was allowed to air dry. An unfilled resin-bonding agent (Heliobond; Vivadent) was applied with a brush and thinned with an air syringe for 5 seconds. The prepared tooth surfaces were etched for 45 seconds with 37% phosphoric acid (Total Etch, Ivoclar Vivadent). The primer (Syntac Primer, Ivoclar Vivadent) and the adhesive (Syntac Adhesive, Ivoclar Vivadent) were applied consecutively, and each was allowed to act for 15 seconds. An unfilled resin (Heliobond, Ivoclar Vivadent) was then applied with a brush and homogeneously sprayed with air. A dual polymerizing resin cement (Variolink II, Ivoclar Vivadent) was mixed and applied. The resin cement was light polymerized (Hilux 350, First Medica, Greensboro, USA) for 40 seconds each from the cervical, buccal, and palatal surfaces. After polymerization, the excess resin composite was removed with a fine polishing disc (Sof-Lex; 3M ESPE, St. Paul, MN, USA). Occlusion and articulation were carefully checked (Figure 4).

The patient was satisfied with the esthetics and function of the restorations after treatment. As part of the maintenance, the patient was recalled at 6-month intervals for reinforcement of oral hygiene and evaluation of oral function. The laminate veneer restorations have been functioning satisfactorily for 4 years.



Figure 4. Definitive restorations

DISCUSSION

There is no consensus in the literature as to whether the incisal edge should be included in the preparation for a PLV.⁷⁻⁹ Several authors described incisal preparation as appropriate to increase the mechanical resistance of a veneer against incisal fracture.⁶⁻¹⁰ For instance, in a photoelastic study, Highton et al¹⁰ claimed that an incisal reduction provides suitable stress distribution and increases the longevity of laminate veneers. Conversely, Gilde et al,¹³ Hui et al,⁷ and Hahn et al¹² reported that porcelain veneers without overlap demonstrated more resistance to load, when compared with overlapping laminate veneers. On the other hand, Meijering et al⁴ and Stappert et al¹ found no correlation between the survival rate and different incisal preparation designs.

For aesthetic or functional reasons, it may be necessary to include the incisal edge in the preparation. In this case, aesthetic parameters and the contact relationship between the incisors and canines in centric occlusion and during excursive movements, respectively, are major determining factors for the position of the porcelain finish line at the incisal level. If the occlusion permits, the incisal edge of the tooth should not be routinely covered as the preparation is then more conservative and does not alter the patient's natural incisal guidance/tooth contacts.^{12,13}

The incisal edge of the maxillary central incisors is the most important determinant in smile creation. Once the incisal edge is determined, it serves to establish the proper proportions of the teeth and the levels of the gingiva.¹⁴

Sometimes, altering the incisal edge position is often necessary to produce a more youthful and attractive appearance.^{15,16} Moreover, when lengthening anterior teeth, the clinician must consider phonetics and occlusion in addition to the esthetic evaluation.¹⁷

When a patient desires to change the size, shape or contours of teeth, the clinician must pay detailed attention to preparation design.¹⁷ The clinician should make sure that the patient is aware of the esthetic restrictions that can arise from asymmetrical or misaligned teeth, and the patient must also understand that the width of the teeth being restored cannot be significantly altered.¹⁸⁻¹⁹ Therefore, veneer thickness, which relates to tooth

reduction, is largely determined by tooth position for esthetics.²⁰

PLVs can be considered one alternative when dealing with the aesthetic treatment of anterior teeth. The sensitivity of the technique demands meticulous attention to detail before, during, and after treatment. According to the results of the 4-year follow-up, there were no significant differences between the different laminate preparation designs in clinical performance.

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