

# Ceramic veneers with minimum preparation

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## ABSTRACT

The aim of this article is to describe the possibility of improving dental esthetics with low-thickness glass ceramics without major tooth preparation for patients with small to moderate anterior dental wear and little discoloration. For this purpose, a carefully defined treatment planning and a good communication between the clinician and the dental technician helped to maximize enamel preservation, and offered a good treatment option. Moreover, besides restoring esthetics, the restorative treatment also improved the function of the anterior guidance. It can be concluded that the conservative use of minimum thickness ceramic laminate veneers may provide satisfactory esthetic outcomes while preserving the dental structure.

**Key words:** Ceramic veneers, dental ceramics, dental esthetics

## INTRODUCTION

The esthetic treatment of anterior teeth has always presented a challenge in clinical practice. With the improvement of dental materials, many restorative options such as resin composites, all-ceramic crowns, and ceramic veneers became available. In these circumstances, dentists and patients must choose the best alternative to improve oral condition and esthetic results.

Ceramic laminate veneers may be indicated when there is anterior dental wear and enough remaining sound dental structure. This treatment option has been used due to ceramics' color stability, biocompatibility, mechanical properties, and esthetic outcome.<sup>[1]</sup> The idea of minimally invasive dental restorations is essential for successful restorations.<sup>[2,3]</sup> Thus,

minimum thickness ceramic laminate veneers have been increasingly indicated.

Such esthetic treatments, however, must not be conducted without an appropriate restorative planning. The preparation design and the amount of remaining dental structure have significant effects on load to failure of ceramic veneers.<sup>[4]</sup> This concept of planning may be used to assist the cosmetic intervention and develop esthetically beautiful smiles. Therefore, the dentist and laboratory technician must follow a proper protocol to achieve higher clinical success rates. It is important to emphasize that the clinician should have a good understanding of the ceramic type to establish the appropriate cementation procedure that will contribute to long-lasting restorations.<sup>[5]</sup> Hence, the aim of this paper is to describe minimum thickness ceramic

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laminate veneers as a restorative solution to improve the esthetics of the smile.

## CASE REPORT

A 34-year-old female patient with enamel hypoplasia on anterior upper incisors was referred to treatment. Radiographic images and clinical exam were conducted. Clinically, enamel hypoplasia and discrepancies in shape, form, and color were observed [Figure 1a-c]. Diagnostic casts and waxed-up restorations to define shape and form were previously obtained to assist the treatment planning. Due to the case characteristics, ceramic laminate veneers of minimum thickness were indicated for the four maxillary incisors.

Dental preparation consisted of slightly grinding the incisal edges of the lateral incisors and left central incisor with a #2135-diamond bur (KG Sorensen, Barueri, SP, Brazil) [Figure 2]. Enamel surfaces were then polished with sequential aluminum oxide discs from coarse to ultrafine (3M Sof-Lex, 3M ESPE, Seefeld, Germany). At the same appointment, in-office bleaching was performed with 35% hydrogen peroxide (Mix One, Villevie, Joinville, SC, Brazil) following the manufacturer's instructions [Figure 3]. The bleaching agent

was applied three times on both maxillary and mandibular anterior teeth.

No provisionals were required due to the minimal preparation performed, with no dentin exposure. On a subsequent appointment after 2 weeks, shade selection was performed and impression taken using retraction cords (Ultrapak Cord #000, Ultradent Products Inc., South Jordan, UT, USA) [Figure 4]. This technique was selected to provide gingival sulcus enlargement without using impregnated cords with hemostatic or astringent solutions. The impressions were taken using a vinyl polysiloxane material (Express XT, 3M ESPE, Seefeld, Germany). The trays were loaded with the heavy-bodied impression material, while the light-bodied impression materials were simultaneously spread on the teeth.

Ceramic laminate veneer restorations were fabricated with a lithium disilicate-reinforced glass ceramic material (IPS e.max Press, Ivoclar-Vivadent, Liechtenstein), using the heat press technique. A layering ceramic (IPSe.max Ceram, Ivoclar-Vivadent) was further applied to improve the incisal edge optical characteristics [Figure 5a].

The veneers' internal surfaces to be bonded were etched with hydrofluoric acid (Porcelain Etchant



**Figure 1:** (a) Preoperative view of patient's smile with enamel hypoplasia. (b) Close-up view of the anterior teeth. Note the compromised esthetics due to enamel hypoplasia and anatomic discrepancies of form, shape, and color. (c) Close-up view of the right maxillary anterior teeth



**Figure 2:** The teeth preparation was limited to enamel



**Figure 3:** Application of 35% hydrogen peroxide gel on the surface of the anterior teeth



**Figure 4:** Retraction cords in position previously to the impression technique

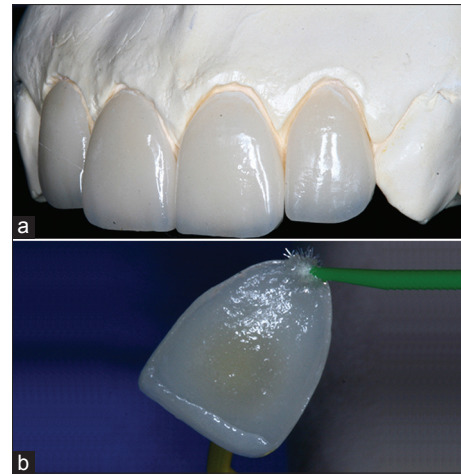
9,5%, Bisco Inc., Schaumburg, IL, USA) for 20 seconds, washed under running water, dried with an air syringe, and primed (Porcelain Primer, Bisco Inc., Schaumburg, IL, USA). A try-in paste (RelyX Veneer Try-in, 3M ESPE, Seefeld, Germany) was used to select the proper color of the luting cement. The color TR was selected. The laminate veneers were then washed to remove try-in paste and excess of silane<sup>[6]</sup> and carefully air-dried. One coat of the bonding resin of Adper ScotchBond (3M ESPE, Seefeld, Germany) was applied and light-cured [Figure 5b]. During the cementation, veneers were cemented separately one-by-one by conditioning with phosphoric acid and applying the same bonding resin on the tooth surface. The laminate veneer restoration was bonded with a light-curable resin-based luting agent (RelyX Veneer, 3M/ESPE, Seefeld, Germany). The cement was applied to the veneers that were gently seated with finger pressure. Excess cement was removed with an explorer and a microbrush. The light polymerization was performed with a LED-curing unit (Radii-cal SDI, Bayswater, Victoria, Australia) for 30 s from buccal, incisal, mesial, and distal aspects of each tooth.

Restorations were checked for any occlusal interference. The final restorative phase was achieved by polishing the marginal areas with a silicone instrument (rubber point Jiffy, Ultradent Products Inc., South Jordan, UT, USA). Immediate final restorations can be observed in Figures 6a-d. Figure 7 shows the 10-month-follow-up treatment.

## DISCUSSION

When ceramic veneers are considered, different restorative approaches have been proposed, depending on the thickness of the veneer and the color of the remaining dental structure. In the case of improving esthetics by changing the form and texture of teeth with no severe discoloration, veneers of smaller thickness may be indicated. After being informed about advantages and disadvantages of each restorative option, the patient opted for the conservative ceramic veneers of minimum thickness. The long-lasting esthetics and little preparation of the underlying dental structure were among main reasons for this decision. Thus, in the presented clinical situation, the dental preparation was restricted to the enamel.

Besides the optical characteristic similar to the dental structure, glass-ceramic materials have good bonding characteristics to the dental structure. This increased retention is mainly related to the use hydrofluoric



**Figure 5:** (a) Completed minimum thickness anterior porcelain laminate veneers restorations on the working cast. (b) Application of the bonding system



**Figure 6:** (a and b) Frontal and close-up views of the anterior teeth after placing the veneers. (c and d) Frontal and lateral views of the smile



**Figure 7:** (a) Palatal view of the seated restorations after 10 months. (b) Facial view of the restorations 10 months after seating

acid to etch their internal surfaces, associated with the use of silane-coupling agents.<sup>[7]</sup> Moreover, when the dental preparation is restricted to the enamel, improved and more reliable bonding may be obtained.<sup>[8]</sup>

In the present case report, the dental bleaching was conducted at the same appointment of the dental preparation. This procedure, however, could be considered controversial due to the fact that bleaching may influence the extent of dental preparation. The decision of bleaching at the same clinical was based on the idea that ultrathin veneers were planned from the beginning. Dental bleaching may be considered a safe treatment<sup>[9]</sup> and may be associated with other therapies as demonstrated in the present case. Since practically no dental preparation was conducted, the patient reported no post-treatment pain. It is important to note that the color selection should be delayed, as bleached teeth usually appear whiter and chalky immediately after bleaching.

The try-in paste was used to select the cement color only after the application of the silane-coupling agent. This paste helps obtaining a more predictable final result.<sup>[10]</sup> The try-in paste was removed by rinsing with water spray, followed by air-drying. This protocol of using and rinsing the try-in paste after the application of the silane coupling agent has been proposed to improve the bond strength of the resin-based cement to the ceramics.<sup>[6,11]</sup> While rinsing, the excess of unreacted silane was removed. This excess has been reported to be washable with water at room temperature, and, if not removed, could compromise the coupling of the luting material to the ceramic by hydrolysis. The inner layer attached to the glass-ceramic is considered hydrolytically stable due to its covalent links to the silica and is not removable by the rinsing procedure.<sup>[12,13]</sup>

A light-cured resin-based cement was employed. This type of cement is an appropriate choice for luting indirect veneers in terms of bond strength and increased working time.<sup>[14,15]</sup> The working time is considered critical for the positioning and adaptation of the veneer. The use of light-cured materials for the cementation of veneers, however, is based on the idea that the light could easily pass through the indirect restoration due its translucency and reduced thickness. A concern related to light transmittance through ceramic materials and its influence on cement degree of conversion and mechanical properties has been raised.<sup>[16]</sup> It should be noted that even when dual-cured resin cements are employed, the light activation plays an important role on material's degree of conversion.<sup>[17]</sup> Another aspect to be considered when cementing veneers with materials that relies on the ability of light transmission through the ceramics is that not all light-curing devices are equal<sup>[18]</sup> and that different curing properties may be

achieved for the same curing unit if used with a fiber optic or a polymer light guide tip.<sup>[19]</sup> For this reason, light-cured resin cements should be light activated carefully, both at cervical, medium and incisal areas of the veneer.

The ultimate success of esthetic treatments is only achieved when the patient is educated and motivated to maintain good oral health. The patient contribution and periodic control by the dentist is imperative to the long-term success of the treatment.

## CONCLUSION

The minimum thickness anterior ceramic laminate veneers may be a conservative and esthetic alternative to reestablish the form, shape, and color of anterior teeth.

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