

Esthetic Rehabilitation with Ceramic Laminate Veneers and a Zirconia Crown with Ceramic Veneering on a Metal Substrate: A Clinical Case Report

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Abstract

Smile esthetics is one of the main demands in contemporary dentistry. Minimally invasive rehabilitations with ceramic laminate veneers have been widely used to correct esthetic and functional disharmonies. However, cases involving darkened substrates or teeth with a metal post require differentiated restorative strategies. This case report presents an esthetic rehabilitation using ceramic laminate veneers combined with a zirconia crown with ceramic veneering on tooth 11 with a cast metal post. The protocol included digital planning, intraoral scanning, virtual diagnostic waxing, esthetic mock-up, minimally invasive preparations, and adhesive cementation. The final outcome demonstrated esthetic integration, functionality, and high patient satisfaction. This work highlights the importance of appropriate material selection and digital technologies to optimize clinical outcomes in complex cases.

Keywords: Dental laminate veneers; Zirconia; Esthetic rehabilitation; Digital planning; Darkened substrate.

Introduction

Esthetic dentistry has advanced significantly in recent years, offering highly conservative and effective restorative alternatives to meet the growing patient demand for natural and functional outcomes. Among these

solutions, ceramic laminate veneers and zirconia crowns with ceramic veneering stand out for combining technology, esthetics, and clinical longevity. These minimally invasive techniques can completely transform a patient's smile while respecting the principles of tissue preservation and facial harmony [1].

The choice of zirconia to mask the metal substrate was based on scientific evidence demonstrating its excellent mechanical strength, biocompatibility, and favorable optical properties, even at reduced thickness [1]. Monolithic zirconia exhibits efficient light transmission and adequate irradiance distribution, features that are fundamental to achieving a natural tooth-like mimicry [1]. In addition, its use in combination with layered ceramics enables customized adjustments that elevate the esthetic quality of the result.

Conversely, the optical durability of milled ceramics in the face of environmental factors is also crucial. Esthetic CAD/CAM materials maintain translucency stability even after UV aging, which supports their indication for cases with high esthetic demands and constant light exposure [2]. Complementarily, the incorporation of digital technologies, such as intraoral scanning and 3D planning, optimized every stage of treatment. Both additive and subtractive digital manufacturing have brought predictability and precision to modern prosthetic dentistry, reducing failures and increasing clinical efficiency [3].

The present clinical case reports the esthetic rehabilitation of a patient with multiple esthetic complaints, including diastemas, unsatisfactory

tooth shape, and the presence of a metal post in tooth 11. The complexity of the case required the combined use of milled ceramic laminate veneers for the natural teeth and a zirconia crown with ceramic veneering for the tooth with a cast post, ensuring esthetic and biomechanical uniformity. The primary challenge was to harmonize different dental substrates without compromising the final esthetics.

Case report

A young adult male patient presented to the dental clinic with a chief complaint of esthetic dissatisfaction due to diastemas in the maxillary anterior teeth, discrepancies in tooth shape and color, and the presence of a tooth with a metal post (tooth 11). The initial clinical examination revealed good periodontal health and no tooth mobility. Tooth 11 exhibited a cast metal post and a grayish discoloration of the underlying substrate, posing an additional esthetic challenge (Figure 1A).

In medical history, the patient reported no systemic diseases, parafunctional habits, or known allergies. The proposed treatment aimed primarily at esthetic and functional smile rehabilitation using a minimally invasive and predictable approach. The treatment plan included milled ceramic laminate veneers on the anterior teeth and a zirconia crown with ceramic veneering on tooth 11, with the goal of

harmonizing color, luster, and translucency.

Intraoral scanning of both maxillary and mandibular arches was performed, followed by digital mounting of the models in a virtual semi-adjustable articulator, enabling precise occlusal simulation and three-dimensional smile planning (Figure 1D). Shade selection was conducted with a VITA guide, choosing BL2 as the initial reference (Figure 1B). Based on the digital diagnostic wax-up, a mock-up was fabricated for the patient's esthetic and functional evaluation, and the patient approved the final design prior to tooth preparation.

Tooth preparations were performed conservatively, preserving as much dental structure as possible. For tooth 11, due to the metal substrate, a full-coverage zirconia crown with layered ceramic veneering was selected to completely mask the internal discoloration. The remaining restorations were fabricated from milled glass-ceramic (laminate veneers) in shade OM1 (VITA®), ensuring chromatic harmony and natural translucency. Luting was performed with a dual-cure resin cement under rubber-dam isolation, following a complete adhesive protocol (acid etching, silanization, and controlled light polymerization).

The final outcome demonstrated satisfactory esthetic and functional integration, with harmonious gingival

contours, smile symmetry, and natural mimicry between the zirconia crown and the ceramic veneers (Figure 1C). The patient reported a high level of satisfaction with the esthetic result and no postoperative sensitivity.

Discussion

Anterior esthetic rehabilitation with ceramic laminate veneers and zirconia crowns require meticulous esthetic-functional planning, especially when different dental substrates are involved, such as natural teeth and teeth with a metal post. This clinical case illustrates how advances in CAD/CAM materials and digital planning have made it possible to achieve highly esthetic results even in the face of significant clinical challenges.

The selection of different restorative materials, lithium disilicate veneers and a zirconia crown with ceramic veneering, was guided by their specific optical and mechanical properties. Monolithic zirconia on the post-retained tooth was essential to mask the darkened substrate, while the layered veneering ceramic allowed matching of gloss, form, and surface texture to the neighboring teeth restored with milled ceramic veneers.

Indeed, studies show that even with zirconia, customized ceramic layering can achieve natural mimicry with adjacent teeth [1, 4]. Another critical aspect for esthetic success was controlling the final color and

translucency of the restorations. The literature indicates that factors such as ceramic thickness, substrate color, and resin cement shade directly influence the final visual outcome [5]. Reduced ceramic thickness is more susceptible to the influence of the underlying substrate

and cement, requiring careful planning to avoid color discrepancies [5]. In the present case, strategic thickness, shade OM1 (VITA®), and light-value-compatible resin cement were chosen to optimize chromatic integration.

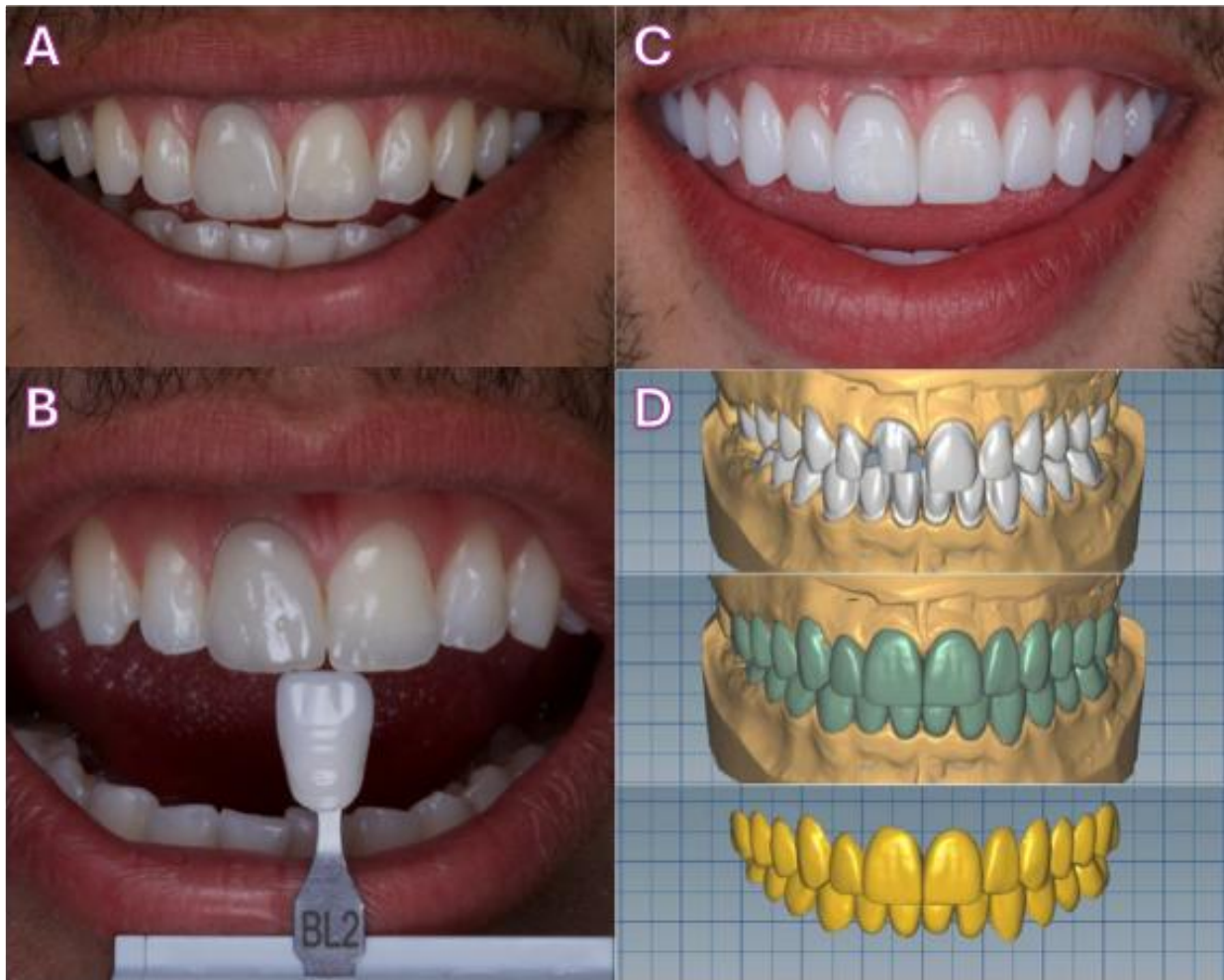


Figure 1. A. Initial smile showing diastema and asymmetry of the anterior teeth. B. Shade try-in using the VITA BL2 guide to standardize ceramic shade. C. Final result with ceramic veneers and a zirconia crown with ceramic veneering, shade OM1 (VITA®). D. Three-dimensional digital planning with scanned maxillary and mandibular models, diagnostic wax-up, and final smile design.

The application of digital technology, through intraoral scanning, virtual diagnostic wax-up, and CAD

/CAM milling, brought predictability to the restorative process. Additive and subtractive manufacturing systems in

prosthetic dentistry provide excellent fidelity of anatomical details and precise marginal adaptation [4]. The digital workflow also facilitates communication between clinicians and laboratories and enables prior simulation and patient approval of the mock-up, reducing rework and increasing satisfaction with the result.

Additionally, the interaction between ceramic translucency and ambient lighting plays an essential role in esthetic perception. Small variations in material translucency and opacity can lead to perceptible changes in the restoration's final color [7]. For this reason, individualized ceramic layering over zirconia on tooth 11 was crucial to compensate for the material's lower intrinsic translucency and to achieve visual uniformity with the other elements restored with glass-ceramic.

Conclusion

This clinical case demonstrates that excellent esthetic and functional outcomes are achievable even in complex situations involving different dental substrates, such as natural teeth and teeth with a metal post. The strategic combination of materials—lithium disilicate ceramic laminate veneers and a zirconia crown with ceramic veneering, together with digital planning, 3D wax-up, and CAD/CAM

milling, was decisive for treatment success.

Careful selection of shade, ceramic thickness, and adhesive protocol, along with customized ceramic application over zirconia, enabled complete mimicry and a natural esthetic. The use of digital technologies favored precision, predictability, and clinical efficiency. This case underscores the importance of a multidisciplinary and digital approach in modern esthetic dentistry and highlights the fundamental role of materials science in individualized clinical decision-making.

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