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Porcelain Laminate Veneers: An Aesthetic Shift from Gaps to Glam — A Clinical Case Report

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ABSTRACT
Porcelain laminate veneers (PLVs) have revolutionized the approach to anterior tooth esthetic rehabilitation. This report presents a conservative, patient-centered treatment for anterior spacing using CAD/CAM-fabricated PLVs. The clinical protocol, from diagnosis to final cementation, highlights minimal preparation, advanced digital workflows, and esthetic excellence. The case emphasizes the advantages of PLVs in achieving aesthetic outcomes with minimal tooth reduction, thereby ensuring optimal preservation of the natural tooth structure while meeting the patient's functional and esthetic needs.
Keywords: Porcelain laminate veneers, esthetic dentistry, CAD/CAM, diastema, minimal preparation, prosthodontics.

I. INTRODUCTION

The increasing demand for cosmetic dentistry has led to the rise of minimally invasive procedures. Porcelain laminate veneers (PLVs) have emerged as one of the most effective and popular treatments for enhancing the appearance of anterior teeth, particularly in cases of diastema (anterior spacing) and other esthetic concerns. These veneers offer a non-invasive solution to close gaps, correct tooth shape, and improve overall facial aesthetics with minimal tooth preparation. CAD/CAM technology has significantly improved the precision and predictability of veneer fabrication, enabling dentists to achieve consistent and highly esthetic results.

Porcelain laminate veneers provide both functional and cosmetic benefits, allowing for conservative tooth preparation, which is essential for preserving the integrity of natural teeth. The use of digital technology in designing these veneers ensures that they match the patient’s natural tooth morphology and color (Moynihan, 2018). Moreover, PLVs offer excellent durability, wear resistance, and a natural appearance, making them a long- term solution for patients seeking esthetic enhancement.

Veneers replicate the natural fluorescence and optical behavior of teeth, offering a superior esthetic alternative to traditional crowns. Minimal tooth preparation, combined with digital fabrication, supports the delivery of precise and durable restorations. Feldspathic porcelain and lithium disilicate (e.max) materials allow variable thickness based on esthetic demands, ranging from 0.3–0.6 mm, preserving enamel and enhancing longevity (Pini et al., 2012; Rosenstiel et al., 2015).

II. CASE REPORT

Patient Details

A 37-year-old female patient who was employed as an Anganwadi worker from Supela, Bhilai, Chhattisgarh, India. Reported to the Department of Prosthodontics and Crown & Bridge, Rungta College of Dental Sciences and Research Bhilai, with a chief complaint of spacing between her upper anterior teeth.

Clinical Examination

On extraoral examination, the patient presented with a symmetrical face and showed no signs of temporomandibular joint (TMJ) pathology. Intraorally, spacing was observed between the upper anterior teeth, specifically between teeth 13, 12, 11, 21, 22, and 23. Additional findings included the presence of prosthetic restorations in teeth 35, 45, and 46, along with signs of attrition in teeth 33, 34, and 44.

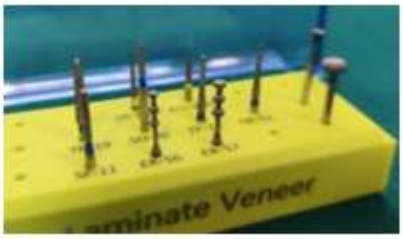
Diagnosis and Treatment Plan

The patient was diagnosed with a maxillary anterior diastema, which is characterized by a noticeable gap between the upper front teeth. Several treatment options were discussed with the patient, including orthodontic treatment, composite restorations, full coverage crowns, and porcelain laminate veneers (PLVs). After carefully considering the available options, the patient opted to proceed with PLVs and declined orthodontic treatment.

For aesthetic precision, shade selection for the veneers was performed using the VITA 3D-Master shade guide. Furthermore, a diagnostic wax-up and mock-up were carried out to visualize the potential result and assist in treatment planning. A facebow record was taken, and diagnostic mounting was completed to ensure accurate alignment and occlusion. Additionally, mock preparations and wax-up procedures were done to assess the final appearance and fit of the veneers before proceeding with the cementation.

Armamentarium

The procedure required the use of a veneer bur kit for preparation of the teeth. Elastomeric impression material was utilized to capture accurate impressions of the prepared teeth. A CAD/CAM system (Dentsply Sirona) was employed for the design and fabrication of the porcelain laminate veneers.



Tooth Preparation

1. On the third visit, tooth preparations were carried out after the placement of a rubber dam to ensure a clean and dry working environment.
2. The cervical borders of the preparations were positioned at the gingiva's level, achieving an equigingival margin.
3. The initial Depth orientation grooves were placed (0.5–0.6 mm labially and 1.5 mm incisal) on all six teeth to guide the preparation.
4. A chamfer finish line was created at the equigingival level to provide a smooth and precise transition for optimal veneer bonding.

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Final Impression and Provisional Restoration

A final impression was made using polyvinyl siloxane (PVS) as the wash material, employing the two-step impression technique. The master cast was then poured with dental stone to create an accurate model of the prepared teeth. In the interim, provisional restorations were provided to the patient to maintain esthetics and function until the permanent veneers were ready.




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CAD/CAM Fabrication

Cast scanning was performed using the Dentsply Sirona system. A digital design was finalized and Emax porcelain laminate veneers were milled using CAD/CAM. A bisque trial was completed and necessary corrections made before final glazing (Pini et al., 2012).

Bisque Trial & Corrections

The bisque trial was conducted to assess the marginal fit and overall accuracy of the veneers. Any necessary corrections were made during this stage to ensure optimal fit and function. After the veneers were glazed, they were carefully evaluated for their aesthetic appearance. Upon the patient's approval, the cementation protocol was then followed to securely bond the veneers in place.

Cementation Armamentarium

For the cementation procedure, the following materials were used:

1. **37% Phosphoric Acid** - This was applied for etching the enamel to create a rough surface for bonding.
2. **5% Hydrofluoric Acid** - Used to etch the internal surface of the veneers, enhancing adhesion between the porcelain and the resin cement.
3. **Silane Coupling Agent** - Applied to the internal surface of the veneer to improve the bond between the porcelain and the bonding agent.
4. **Bonding Agent** - This was applied to the prepared tooth surface to ensure a strong bond between the tooth structure and the veneer.
5. **Luting Cement** - The base and catalyst components of the luting cement were mixed and used for final seating of the veneers.
6. **Curing Light** - A curing light was used to polymerize the resin cement, ensuring a strong and durable bond.

Cementation Procedure

1. The internal surface of the veneer was etched with 5% hydrofluoric acid for 20 seconds to create a micro-roughened surface, enhancing the bond between the veneer and the resin cement.
2. Following the etching, a silane coupling agent was applied to the internal surface of the veneer to improve the adhesion between the porcelain and the resin cement.
3. The enamel of the tooth was then etched with 37% phosphoric acid for 15 seconds to prepare the tooth surface for bonding.
4. After the enamel etching, a bonding agent was applied to the prepared tooth surface to ensure a strong bond between the tooth and the veneer.
5. Dual-cure resin cement was applied to the veneer, and the veneer was carefully seated in its proper position on the tooth.
6. Excess cement was promptly removed from the margins and surrounding areas.
7. Light-curing was performed from all surfaces to ensure the resin cement was fully polymerized and the veneer was securely bonded to the tooth.

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Postoperative Instructions

The patient was advised to avoid biting hard foods with the anterior teeth to prevent any undue stress on the veneers. It was recommended that she use a soft-bristled toothbrush along with non-abrasive toothpaste to ensure gentle cleaning and avoid damaging the veneers. The patient was also instructed to floss gently around the veneer margins to prevent any damage to the bonding. Additionally, she was asked to return for a follow-up review after one week and to maintain biannual follow-ups to monitor the condition of the veneers and ensure their longevity.

III. DISCUSSION

Porcelain laminate veneers (PLVs) have become a cornerstone in minimally invasive esthetic dentistry. Their primary advantage lies in the preservation of natural tooth structure while significantly enhancing smile esthetics. In this case, a young female patient with anterior diastema declined orthodontic treatment, thus making PLVs an ideal conservative solution.

Patient selection remains a critical determinant in the long-term success of veneers. The presence of intact enamel, absence of parafunctional habits, and a healthy periodontium are key factors in prognosis (Pini et al., 2012; Dumfahrt & Schäffer, 2000). Enamel offers a stronger and more durable bond compared to dentin, and bonding directly to enamel reduces microleakage and debonding risks (Peumans et al., 2000).

The chosen ceramic material—lithium disilicate (IPS e.max)—was selected for its high flexural strength (~400 MPa), optical properties, and predictable clinical performance (Alothman & Bamasoud, 2018; Zarone et al., 2011). It allows for thin restorations (0.3– 0.6 mm), reducing the need for aggressive preparation. In our case, a 0.5 mm labial and 1.5 mm incisal reduction was adequate for esthetic and functional demands.

CAD/CAM technology provides a streamlined and standardized workflow. Digital scanning, design, and milling eliminate several variables seen in conventional methods. Studies have shown higher marginal accuracy and reduced fabrication time with CAD/CAM restorations (Miyazaki et al., 2009; Bindl & Mörmann, 2005).

The bonding protocol followed current best practices for etched ceramics: hydrofluoric acid etching, silane application, and resin cement bonding (Blatz et al., 2003). Proper bonding enhances fracture resistance and clinical durability, especially when bonded to enamel (Fradeani, 2004).

Patient education plays an essential role post-treatment. Instructions were given to avoid biting into hard foods, maintain hygiene, and attend follow-ups. With proper maintenance, PLVs have demonstrated a survival rate of over 90% after 10 years (Beier et al., 2012).

This case reinforces the value of integrating digital dentistry and evidence-based protocols in delivering predictable and esthetically pleasing outcomes using PLVs.

IV. CONCLUSION

Porcelain laminate veneers are a minimally invasive, esthetically driven solution for anterior spacing. With proper technique and patient compliance, they offer long-term success. CAD/CAM technology further enhances the efficiency and accuracy of the workflow (Hemant et al., 2023).

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