



## AESTHETIC SMILE DESIGN : A CASE REPORT

## Dental Science

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## ABSTRACT

The success of aesthetic rehabilitation never depends on clinical procedures only but also a proper dental technique is required as well as the respect for some biomimetic principles to obtain the aesthetic final result. The use of porcelain laminate veneers to solve esthetic and/or functional problems has been shown to be a valid management option, especially in the anterior esthetic zone. In cases when patients decline orthodontic treatment, adhesively bonded porcelain veneers are a reliable treatment option to modify the appearance of tooth. Aim of this case report is to introduce an alternative method to orthodontic approach for the management of crowded anterior teeth.

## KEYWORDS

## INTRODUCTION

The treatment of healthy but unesthetic teeth has always presented a challenge for the dental practitioner. The acid-etch technique by Buonocore(1) and the development of composite resin by Bowen(2) expanded the options for treatment of healthy teeth that were of improper shape, deficient in size, or unesthetic in color.

Since the early 1980s, the development and application of porcelain bonded to tooth restoration using a Porcelain laminate veneers (PLV) has enjoyed widespread enthusiasm and success and has now become a widely accepted and popular procedure. PLV demonstrates excellent clinical performance and as materials and techniques have evolved, it has become one of the most predictable, most esthetic, and least invasive modalities of treatment(2).

In attempting to provide a solution for cases that have been compromised by malpositioned anterior teeth, clinicians traditionally decide orthodontic approach. But advances in ceramic materials and veneering techniques allow practitioners to restore function and aesthetics using conservative and biologically sound methods as well as promoting long term oral health(1). As early as 1937, Pincus developed thin facings made of air-fired porcelain(5). He tried improving the appearance of the Hollywood actors for their close-up photographs by attaching these thin labial porcelain veneers temporarily with denture adhesive powder. Simonsen and Calamia as well as with Horn that the interest in porcelain veneers was reactivated by introducing special acid etching procedures that substantially improved the long-term porcelain veneer retention(3). Porcelain veneers have superior aesthetics especially over the longer term. Due to the biocompatibility and non-porous nature of the porcelain, this minimises plaque adherence, with no adverse effect on gingival health in well-maintained mouths. Laminate veneers came as a good alternative when full veneer crowns were cemented to the teeth after extensive preparation, which put the tooth vitality into jeopardy.

## CASE REPORT:

A 30-year-old male patient reported with the chief complaint of misaligned upper front teeth. He was not comfortable in smiling due to the presence of the crowding in anterior tooth region and he was not willing for any orthodontic treatment (Fig. 1). After ensuring that the patient is a good candidate for porcelain laminate veneer treatment, it is

crucial that a complete oral examination is done to make sure that the veneer therapy is appropriately chosen. After discussing with the patient, porcelain veneers were planned on teeth 11, 12, 21 and 22.



Fig. 1: Preoperative view

## DISCUSSION

Veneers can be used for functional and cosmetic correction of the following conditions:

1. Stained or darkened teeth
2. Hypocalcification
3. Multiple diastema's
4. Peg laterals
5. Chipped teeth
6. Lingual positioned teeth
7. Malposed teeth not requiring orthodontics

## Contraindications for Veneer Placement Include:

1. Insufficient tooth substrate (enamel for bonding)
2. Labial version
3. Excessive interdental spacing
4. Poor oral hygiene or caries
5. Parafunctional habits

## Advantages of Veneers Include:

1. Minimal tooth preparation required
2. Porcelain veneers are stronger and more durable than composite veneers
3. Alternative to full coverage restoration in case of incisal fractures or tooth discoloration
4. Color stability

**Disadvantages of Veneers Include:**

1. Potential for over-contouring
2. Requires laboratory procedures
3. Porcelain enamel margins may be thin and difficult to finish
4. Brittle margins
5. Pitting by acidulated fluoride treatment
6. Cannot be repaired easily
7. Can sometimes be difficult to temporize
8. Colour cannot be altered substantially after placement
9. Placement is difficult and time consuming

**The appointment records must have**

1. Preoperative intra- and extraoral photographs
2. Periodontal probing of the entire oral cavity
3. Decayed, missing, filled teeth index is noted
4. Complete hard and soft tissue examination
5. Existing occlusion is checked
6. Impressions of maxillary and mandibular arches for study model fabrication
7. Bite registration; a face bow transfer used for mounting on an articulator
8. Patient's interview regarding goals and expectations(7)

**TOOTH PREPARATION**

Goal is to remove a uniform layer of the tooth structure:

- Using burs with calibrated diamond rings
- Reducing diagnostic steps
- Intrinsic principle is to recreate the initial form and function

The preparations must satisfy the following four basic principles of functional, biological, and esthetic integration to be achieved: stabilization, reinforcement, retention, and adhesion. After tooth preparation, (Fig. 2) shade selection was done using Vitapan Classical Shade Guide (Vita Zahnfabrik, Germany) with patient's consent. Full arch impression was made using poly-vinyl siloxane material using putty reline technique, impression was then poured in type IV gypsum product (Fig. 3) and die preparation was done. The shade selection can be challenging due to the thin and translucent nature of the veneer. The final colour is a result of the underlying tooth colour, the luting resin and the opacity/translucency of the porcelain used. Temporary restoration was fabricated meanwhile. The porcelain veneers (IPS E-MAX) were laboratory fabricated. The trail of the veneer was done for the shade, fit, marginal adaptation, shape, size, symmetry, and contacts (Fig. 4). Then, under proper isolation, veneers were cemented onto the prepared tooth using self-curing resin-based luting cement and extra cement was removed (Fig. 5)



**Fig. 2: Tooth preparation in 11, 21, 21 and 22**



**Fig. 3: Cast after tooth preparation**



**Fig. 4: All ceramic veneers on dental cast—labial view**



**Fig. 5: Postoperative view**

**Considerations:**

- Maintain the preparation within enamel
- Provide a finished preparation, which is smooth and free of any sharp internal line-angles, which may cause stress concentration within the ceramic
- Provide a margin from which the dental technician can create a normal emergence of the veneer from the gingival margin
- Provide definite seating landmarks making proper seating of the veneer
- Provide enough thickness for the porcelain for sufficient fracture resistance

**CEMENTATION**

Cementation is a crucial step in the process of ensuring the retention, marginal seal, and durability of indirect restorations. Either adhesive or nonadhesive cementing procedure can be followed. Adhesive cementation involves the use of an agent to promote bonding of the restorative material to the substrate; it is a combination of adhesive chemical bonding and micromechanical interlocking. A luting agent is used in nonadhesive (conventional) cementation, to cover the space between the restoration and the natural tooth and relies entirely on micromechanical retention.

**1. Step 1: Restoration Conditioning**

- Etching: Apply IPS Ceramic Etching Gel (5% HF acid) for 20 seconds to bonding surface of the restoration (to increase micromechanical retention).
- Rinse thoroughly and keep it dry.
- Place silane over the etched surface to increase the wettability of the resin cement and to interact chemically with both the resin matrix and the hydroxylated porcelain surface.
- Apply Universal Primer to the bonding surface of the restoration
- Allow to react for 60 seconds and then completely air dry

**2. Step 2: Tooth Conditioning**

- Etching Tooth: Apply total etch 37% phosphoric acid etching gel (15 seconds on dentin, 30 seconds on enamel)
- Rinse and dry leaving prepared surface moist.
- Priming Tooth: Apply bonding agent to moist the preparation (Prime & Bond NT)

**3. Step 3: Cementation**

- Mix and dispense cement into the restoration
- Adhesive cementation to enamel or dentin requires the use of an adhesive system, followed by application of resin cement. (Calibra, Densply)
- Adhesive systems can be either self-etching or total etching. (8)

**4. Step 4: Clean-up**

- After seating, each quarter surface is light cured for 1 to 2 seconds. The cement will achieve a gel-like consistency for easy clean-up.
- Finishing was done using rotating abrasive disks (Soflex discs)

Selection of patients with deformed smile is a key feature for Porcelain laminates as they are more concerned with the shear forces, pulp chamber and minimal preparation of tooth surface. Absence of parafunctional habits, normal over jet and overbite, favorable lip line are the objectives for laminates to be made, to achieve ideal smile. The advantages of using these restorations are they are biologically acceptable to the body owing to their increased chemical stability, lesser cytotoxicity and reduced risk of causing irritation or sensitivity. Also, the glazed surface of the crown helps in minimal deposit of plaque. (11,12,13)

Owing to their ceramic thickness (0.3 -0.5mm), the PLVs can be easily fractured even before they are bonded. However, once bonded to the etched enamel surface they integrate with the tooth structure and

become extremely durable. Any how these laminates when bonded to enamel the monoblock effect from the ceramic veneers to tooth surface will acquire the sufficient strength to sustain the shear forces and dissipate to the surrounding periodontium in the oral cavity. The union of etched enamel and porcelain, combined with the bonding composite resin luting agent with a silane-coupling agent provides a long lasting restoration (11,12). PLVs should be avoided when enamel is insufficient, on composite restorations, parafunction habits, unsuitable anatomical presentation of teeth and poor dental hygiene. The risk factors for veneer failure are bonding on to pre-existing composites is that if large composite restoration with laminates veneers placed on the top of that, because of uneven coefficient of thermal expansion and contraction result into the veneers to experience uneven stress and may result in fracture of veneers or debonding(11)

## CONCLUSION

Tooth veneering is a minimally invasive procedure that enables the practitioner to apply biomimetic principles in cosmetic dentistry, finding a balance between ceramic and enamel. Porcelain veneers have been shown to offers an excellent combination of hardness, resistance, and resilience and to be a good conservative and aesthetic treatment option. The IPS Empress Esthetic ceramic system used in the case contains leucite crystals dispersed in a glass matrix, forming a homogeneous interlocking structure that prevents internal crack propagation. The use of modern dental materials and a justifiable reliance on the predictable artistic abilities of the dental technologist allows the fabrication of both esthetic and durable restorations (9). The variables that have been associated with optimal and predictable results: dental/remnant bleaching prior to veneer application, use of opaque ceramic systems, careful selection of the most appropriate luting system and of adequate shades/colors, try-in stage using appropriate pastes, use of hydrosoluble gel or water prior to final luting with composite cement. Porcelain laminate veneers are a versatile treatment option and can prove to be a solution to many problems, but they may not always be the best solution. Appropriate decision and good communication are the keys to victory with porcelain laminate veneer therapy(4,10)

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