

Case Report

RESTORATION OF ESTHETICS USING CERAMICS LAMINATE VENEER; CLINICAL REVIEW: A CASE REPORT

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Abstract:

This case report describes the restoration of the anterior dentition with porcelain laminate veneers. The advances in bonding of porcelain to tooth structure make this treatment a feasible alternative to restore teeth with alteration in shape and position in cases in which the esthetic demand is high. The rationale for various choices in this treatment protocol is detailed with reference to the pertinent literature. Thus, the clinical success of the technique depends on the correct identification of a case for which this treatment is appropriate and the successful execution of the clinical steps involved.

Keywords: Ceramics, dentin-bonding agents, esthetics

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INTRODUCTION

Since their introduction in the early 1980's ceramic veneers have gained wide acceptance as a primary mode of restoration in esthetic dentistry.¹ As patients' aesthetic expectations continue to increase, dental teams are challenged to identify a systematic approach for achieving natural oral and facial aesthetics with ceramic veneers. 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.^{2,3}

Aesthetics, treatment planning and clinical care should be considered in accordance with the interrelationship between the teeth, gingival tissues, lips and face. Consideration as to how the facial and

psychological parameters can influence a natural smile design must also be taken into account. Because ceramic veneers are primarily indicated for the improvement of aesthetics, the design of the smile should respect the symmetry and the harmonious arrangement of dento-facial elements.^{4,5} The laminate veneer facings have greatly evolved and presently can be divided into two broad categories:

Indirect veneers and Direct veneers. Indirect veneers: Indirect veneers include- Preformed laminates, Lab fabricated acrylic resin, Microfill resin and Porcelain veneers. Direct veneers: Composite resin veneers which are free-hand placed.⁶

Porcelain veneers are more stable and have better esthetics. If a porcelain veneer is bonded with a correct adhesive technique and optimal oral hygiene care is maintained,

studies have shown that the long-term survival rate of veneers is very high.⁶⁻⁸

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 (clenching, bruxism)
6. Moderate to severe malposition or crowding

Advantages of Veneers Include:

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

Disadvantages of Veneers Include:

- Potential for over-contouring
- Requires laboratory procedures
- Porcelain enamel margins may be thin and difficult to finish
- Brittle margins
- Pitting by acidulated fluoride treatment
- Cannot be repaired easily
- Can sometimes be difficult to temporize
- Color cannot be altered substantially after placement
- Placement is difficult and time-consuming

Fortunately, a truly conservative approach to veneers with many substantial advantages has been developed. This approach,

frequently referred to as the “no prep technique,” is characterized by little or no preparation of the teeth. In many cases, there is literally no preparation of the teeth, and in some cases, there is minor adjustment of the enamel at selected locations. Either way, this approach to veneers is highly simplified and preserves natural tooth structure.⁹⁻¹¹ The no prep technique was made possible by advances in custom-designed bonding systems and in porcelain technology that allow exceptionally thin veneers because of new exceptionally high strength porcelain. The veneers can be made with thicknesses in the range of 0.3 mm to 0.5 mm. In this thickness range, there is no need to cut down the facial surfaces of the teeth to accommodate the thickness of the veneers. Rather, the veneers can be simply bonded to the surfaces of the teeth with an excellent cosmetic result and with no problem of awareness of thickness by the patient.^{2,4,10,11,12}

Laminate veneering is an ultra conservative method of restoring the appearance of discolored, pitted teeth and diastemas. It provides extremely good esthetic results and longevity of laminates have been reported to be approximately over 8 years and a suitable alternative to more extensive restorative procedures.¹²⁻¹⁴ One of the important factors for patients and practitioners in the selection of porcelain veneers as a treatment modality is the conservation of tooth structure, function and esthetic demand⁴. Porcelain veneers have become the ultimate option for esthetic smile rehabilitation and are now evolving into more functionally and esthetically dynamic restorations.^{13,15}

CASE REPORT:

A 53-year old female patient reported with the chief complaint of poor esthetics due to discolored anterior maxillary teeth. Extra orally the only abnormality was the unaesthetic smile of the patient. Intraorally the left incisor was discolored with apparent shade difference to the adjacent teeth.

Patient had no sensitivity to hot and cold. She was not comfortable in smiling due to the presence of the incisal discoloration and the pulp test was confirming of pulpal death. (Figure 1)

After careful examination of the tooth it was decided to treat the case with root canal therapy followed by an all ceramic laminate fabricated with E-Max. Patient was informed about the method of restoration involving a minimum reduction of about 0.5-1.0mm. Patient was of average built, normal gait and stature and showed characteristic feature of a reduced social interaction and general confidence. She was also habitual in hiding her mouth during the act of smiling or laughing and was also embarrassed about the fact that her smile shows a discolored tooth in the front of her face. This phase included the endodontic treatment of the tooth and education of the patient about the methods of maintenance of the laminate and the precautions to be taken during use. Figure 2(a-b), 3 (a-b)

The preparation of the tooth was done. The preparation was done in the prescribed pattern of first placing the depth grooves horizontally perpendicular to the long axis and in two planes (cervical 3rd and incisal 2/3rd). The enamel was then removed between the grooves to achieve the required reduction in uniform depth. The gingival finish line was taken subgingivally after retraction of the gingival. A broad rounded shoulder (Radial shoulder) was made as the finish line and was kept restricted to the labial surface as no change of anatomy was required. The preparation was finished with finishing burs and pumice paste abrasive. Designed by Dr. George A. Freedman, this kit contains specific instruments to assist in all aspects of porcelain veneer placement. There were many options available as far as the choice restorative material was concerned. For this patient it was decided to restore the incisor with IPS Empress ceramic laminate.

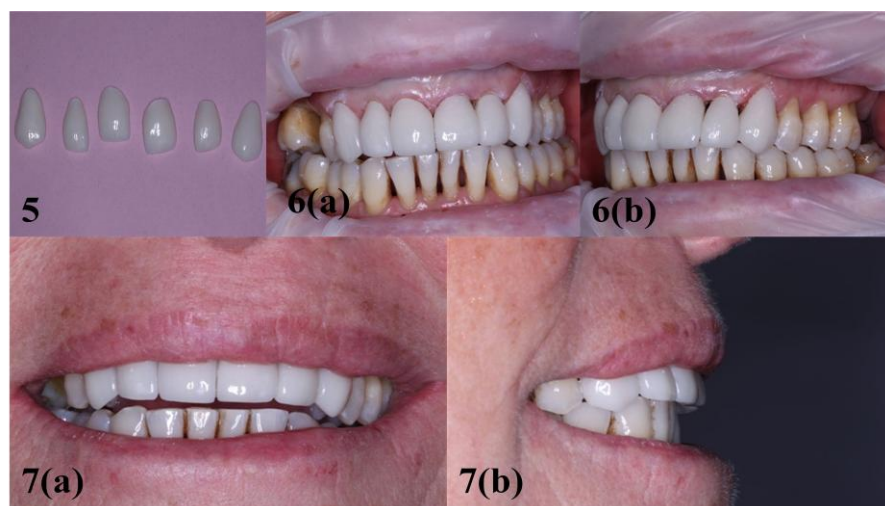
The final impression of the incisor was made after gingival retraction procedure

which was done using knitted cord soaked in aluminum chloride. The final impressions were made with polyvinyl siloxane impression material using putty wash technique. Since the preparation remains in enamel, most patients will not require a provisional restoration. For patients who insist upon a "temporary" veneer, light-activated micro filled composite resins may be utilized. The prepared tooth was temporized with light cure composite resin without etching the surface of the tooth. The fabricated laminate was then subjected to bisque trial. At the bisque trial stage, the laminate was adjusted to achieve the desired esthetics and to check the protrusive contacts which have to be avoided in this case to ensure the longevity of the laminate. The laminate was then glazed and taken up for the process of cementation. Figure 4 (a-d)

The cementing surface of the laminate is etched with hydrofluoric acid 9.5% for one minute and then is rinsed thoroughly and then gently air dried. This is followed by the application of silane coupling agent one drop spread and air blown to evenly spread on the surface of the laminate. The laminate is now ready for the cementation. (Figure 5) The tooth surface is first cleaned with pumice or polishing paste and rubber cups, this is followed by isolating the tooth by placing cellophane strips between the contacts. The surface is now treated with single step etching and bonding agent G-BOND (GC). The luting cement Self-Adhesive Resin Cement is then dispensed and mixed. The material is loaded into the laminate taking care not to incorporate any air bubbles, the laminate is then gently placed with little pressure till it is completely seated till the finish line, and the excess cement is removed with a sharp instrument. After the complete setting of the cement the margins were finished with ceramic finishing kit. The patient was given all the instruction necessary for the proper maintenance of the laminate. Figure 6 (a-b)



Figures: (1) Pre-operative photograph of the teeth-Frontal view; 2(a) Baseline front view and detailed view of the left anterior maxillary teeth; 2(b) Baseline front view and detailed view of the right anterior maxillary teeth; 3 (a) Pre-operative photograph of the teeth Occlusal view; 3(b) Mandibular view; 4(a) Final preparations with single retraction cord ready for final impression; 4(b) Final preparations with single retraction cord ready for final impression anterior view; 4(c) Final preparations with single retraction cord ready for final impression left view; 4(d) Final preparations with single retraction cord ready for final impression.



Figures: (5) Laminate thickness and color shades; 6(a) Post-operative photograph of the teeth; 6(b) Final veneers. Note detailed, natural morphology, texture and characterization; 7(a) Final veneers bonded in place; 7(b) Smile with a natural and esthetically pleasing appearance, reestablishment of tooth shape and color

DISCUSSION

Porcelain veneers have been shown to be a good conservative and aesthetic treatment option. However they do have limitations and it has been shown that lack of enamel is one of the main causes of failure. Before treating a patient with porcelain veneers, the favourability of the environment should be assessed. If this is not favourable and margins will be on dentine or if excessive enamel will need to be removed, then alternative/adjunctive treatment options should be considered eg orthodontics and or periodontics.

It is important to follow correct treatment protocols and strive for clinical and laboratory composite thickness ratio of above 3:1. When this ratio is large, the forces created by the polymerisation shrinkage of the luting cement may cause fracture of the thin porcelain veneer. Post bonding cracks are an acknowledged, albeit rare, complication of porcelain veneers.^{1,6,7,9}

Based on literature it appears that if the veneer precision. This ensures minimal damage to tooth and gingivae and ensures optimal long term prognosis. Despite following all precautions, because of the delicate nature of porcelain veneers, a possible post-operative complication is cracking. If the veneer has been well bonded to the underlying enamel and is not an aesthetic concern, the patient should be informed and the veneer should be left in place.^{3,7,8,14,15}

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. The great majority of restorative procedures violates the balance between enamel and dentin in natural teeth. Unlike these procedures, the use of porcelain laminate veneers offers an excellent combination of hardness, resistance, and resilience.^{15,16} According with Magne and Belser¹³, a tooth restored with a porcelain laminate veneer that is subjected to posterior-anterior force

recovers 89 to 96% of its coronary stiffness when compared with a healthy tooth.

The IPS Empress Esthetic ceramic system used in our case contains leucite crystals dispersed in a glass matrix, forming a homogeneous interlocking structure that prevents internal crack propagation.¹⁷⁻¹⁹ The composition and injection molding mechanism of this system provide an increase in flexural strength and fracture resistance when compared with the conventional ceramic system. These characteristics contribute to an easier and faster execution of the clinical and laboratory steps involved in restoration. They also enable the production of very thin veneers, further reinforcing the minimally invasive aspect of the technique. Clinical factors such as remnant/substrate color, laminate thickness and luting system are known to potentially interfere with the final esthetic result. That said, the professional may resort to clinical interventions prior to optimizing esthetic results, as well as promote the use of minimally invasive or conservative techniques.^(20,21) Figure (7a-b) Conversely, the following variables 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 cements.¹⁷⁻²¹

CONCLUSION

Etched porcelain veneer technology has demonstrated long-term clinical success. It has proved to be one of the most successful modalities of treatment that modern dentistry has to offer. The minimally invasive, conservative porcelain laminate veneer technique here described is an extremely versatile clinical procedure, with excellent esthetic results when performed according to a well-designed treatment plan and a strict protocol during the clinical and laboratory stages. Ceramic veneers can be a

better choice as compared to composites as it is more esthetic and more conservative than full veneer crown.

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