

REVIEW ARTICLE



Porcelain laminate veneers: A review

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Abstract

The evolution of porcelain veneers started by Pincus, who attached thin labial porcelain veneers temporarily with denture adhesive powders to enhance the appearance of Hollywood stars close-up photographs has now become one among the most recommended treatment for a dentist and a requested treatment by many of the patients. They are considered as the first alternative to improve the esthetics of the anterior teeth and by consequent-related quality of life. Successful results of porcelain veneers depend on the clinical and laboratory steps involved, along with the understanding of the scientific background of procedure. Therefore, porcelain veneers have to be reviewed and discussed in detail. The purpose of this article is to review literature and present important parameters such as case selection, shade selection, tooth preparation, provisionalization, cementation, and patient maintenance for long-term success of porcelain veneers.

Introduction

The prettiest thing anyone can wear is a perfect smile. The restoration of unesthetic anterior teeth has always been a problem, involving large amounts of sound teeth structure, with adverse effects on the pulp and gingiva. Laminate veneers are a conservative alternative to full coverage restorations for improving the appearance of anterior teeth and have evolved over the last several decades to become esthetic dentistry's most popular restoration. The esthetic and mechanical qualities and biocompatibility of the porcelain, preservation of the tooth structure, durability and reliability of the treatment and improved strength of bonding made veneers a recommended treatment for the dentist, and a requested treatment for many patients.^[1]

The purpose of this article is to review literature and presents important parameters such as case selection, shade selection, tooth preparation, provisionalization, cementation, and patient maintenance for long-term success of porcelain veneers.

Method of Data Collection

An electronic search of publications was made using electronic databases, Medline, and PubMed. The language of choice was English in this review and the keywords used include laminate veneers, ceramic veneers, porcelain veneers, and dental ceramics.

All articles from both electronic databases were collected and duplicates were deleted.

Literature sources also include textbook references.

In general, the selected articles met the following inclusion criteria: Clinical trials, case reports, review or systematic reviews, and prospective studies, all written in English.

Indications

Porcelain laminate restorations are recommended in case of:

- Extreme discolorations in the anterior teeth, which include tetracycline staining, fluorosis, devitalized teeth, and teeth darkened by age, which are not conducive of bleaching.
- Small enamel defects say cracks can be masked by veneers.
- Diastemas and multiple spacing between the teeth are better treated by laminate veneers.
- Laminates can be further used to restore localized attrition and root sensitivity due to cemental exposure.
- A functionally sound metal ceramic or all ceramic restoration with unsatisfactory color can be repaired by veneers.
- Malpositioned teeth and abnormalities of shape: Peg laterals and rotated teeth can be esthetically restored by porcelain veneers.^[2]

Contraindications

- Full coverage restorations are preferred over veneers in case of insufficient coronal tooth structure. A fractured teeth, with more than one-third of loss of tooth structure, are a poor case for veneers.^[1]

- Actively erupting teeth should not be subjected for veneering.
- Patients with parafunctional habits like bruxism should hardly receive veneers.^[1]
- Endodontically treated teeth are again not recommended for veneers as they present a poor receptive surface for bonding and full coverage restorations are indicated.

Case selection for Porcelain Laminate Veneers

- A static and dynamic occlusal relationship is of prime concern in the patients receiving veneers. Since the usual mode of failure is the fracture at the incisal edges, the incisal tips should be placed in such a manner that they do not contact the opposing dentition at rest position.
- As any other restoration, a healthy periodontium forms a sound foundation on which the restoration rests. Mouth breathers are considered as poor candidates for veneers.
- Degree of discoloration of teeth along with the extent of preexisting caries lesion and the restorations, if any, should be examined before the treatment. Absence of enamel or a large restoration that denies to give a proper surface for bonding makes the teeth again a poor candidate to receive veneers.
- Patient's attitude and motivation to maintenance makes the treatment more successful.
- Oral habits say nail biting should be corrected before initiation of the treatment to avoid the shear stress on the ceramics after the cementation of veneers.

All Ceramic Systems used for Porcelain Laminate Veneers

- Conventional ceramics.
- Castable ceramics.
- Machinable ceramics.
- Pressable ceramics.
- Infiltrated ceramics.

Shade Selection

Tooth color has an intimate relation with the color of eyes, skin, and hair as all of these elements have the same embryonic origin and is considered in shade selection. Instead of precisely matching the shade, a shade of lower chroma and higher value can be selected. This provides the dentist latitude and allows for slight darkening attributable to increase translucency with polymerization of the composite luting cement.^[2] Increased thickness of the porcelain makes the conventional shade guides such as vita porcelain shade guide non-ideal for veneers.

Tooth Preparation

Two major principles governs tooth preparation sounds

- Preparation must be conservative and
- Retention is solely by adhesion rather than tooth preparation.

Types of preparation

Three different types of preparation include:

- Type 1: Contact lens preparation in which the preparation does not cover the incisal edges.
- Type 2: Classic or conventional preparation, which is commonly used by the practitioners. Here, the preparation covers the incisal edge and terminates lingually.
- Type 3: Wrap around preparation, which is almost similar to that of full coverage preparations, which is indicated for extensive color and contour.^[3]

Armamentarium

A diamond depth cutter with a wheel diameter of 1 mm, another depth cutter with a wheel diameter of 1.6 mm, a round bur, a round end tapering bur, finishing diamond burs, and Airotor handpiece contributes to the armamentarium.

Procedure

- Facial reduction: Since the amount of enamel decreases at the cemento-enamel junction, some teeth permit less reduction at the gingival finish line to a standard of 0.3 mm and the reduction at the incisal half and incisal edge to a standard of 0.5 mm. The two diamond cutting burs of diameters 1.6 mm and 1.0 mm will create the exact depth orientation grooves and the remaining tooth structure is removed with round end tapered diamond. The tip of the diamond establishes a slight chamfer finish line at the gingiva.^[3,4]
- Proximal reduction: Proximal extension is just a continuation of facial reduction with the round end tapered diamond. Adequate reduction is recommended at the line angle and uneven finish line is avoided by keeping the bur parallel with the long axis of the teeth.
- Incisal reduction: There are two techniques for the placement of incisal finish line. The one in which we are terminating our preparation at the incisal edge and the second technique in which the incisal edges slightly reduced and the porcelain overlaps the incisal edges. As the porcelain is stronger in compression than in tension, the wrap around preparation will place the veneers in compression and will provide better results. The multiwheel diamond burs are used to create 0.5-mm deep orientation grooves in the incisal edge and the remaining tooth structure is removed by round end tapered diamond.^[4]
- Lingual reduction: Lingual finish line is created by round end tapered diamond by holding the bur parallel to the lingual surface and forming a slight chamfer of 0.5-mm deep. Moreover, the lingual finish line depends on the thickness of the teeth and the patient's occlusion. Finishing is done further.

Provisional Restoration

Provisional restorations for laminates may not be essential as there is no exposure to the dentin and the proximal contacts are

maintained. However, most often it may be necessary for the patient to maintain their social engagements and if the proximal contacts are broken. The two methods of provisionalization include direct method using composite resin with central spot itching and autopolymerizing acrylic resin and indirect method after the cast fabrication.^[5]

Laboratory Procedures

Good communication with the laboratory with laboratory prescription, pre-treatment models, photographs of the teeth, and accurate impressions should be done. Laboratory fabrication techniques include:^[6]

- Platinum foil technique
- Refractory die technique and
- Computer-aided design-computer-aided manufacturing milling. Hydrofluoric acid is applied to the fitting surface after fabrication, which provides bonding strength by partly dissolving the glassy matrix of the porcelain. Foggy appearance is noted for the proper itching and the etched veneers are not placed back on the master cast to avoid contamination and not to compromise with the bonding strength.^[6]

Veneer Try-in

Major three steps in try-in procedure include:

- Dry try-in for marginal fit, where a retraction cord is placed to prevent the sulcular moisture or bleeding and each veneer is tried on the dry tooth surface for the marginal accuracy.
- Wet try-in for proximal fit, where the itched surface with water-soluble glycerin to minimize the vertical dislodgement is tried with all the teeth together for the assessment of proximal fit.
- Resin cement try-in done for color matching where if the color is acceptable cementation goes smoothly. If the veneers are lighter than that of intended shade, resin cement that is darker or approximately same degree is recommended. If it is darker than the intended shade, one part of light opaque resin cement and 10 parts of light translucent resin cement are recommended.

Cementation

Choice of resin cement is according to the shade of the veneers and cementation is followed by proper retraction to avoid moisture control and contamination. Incisally wrapped veneers require first facial and then gingivally directed pressure for complete seating. Excess composite at the margins is removed carefully and the entire laminate is cured for 1.5–2 min, depending on the thickness, color, and opacity of laminate. Fine grit is used to remove any excess cement and final polishing is accomplished by diamond polishing pastes. Patient should be advised to avoid highly colored foods, tea or coffee, hard foods, and extreme temperature for another 72–96 h.^[7-9]

Maintenance

Success of any restoration depends on how the patient maintains it. Maintenance on the other hand should be a combined effort of dentist as well as the patient. Patient should be motivated:

- To avoid ultrasonic scaling and to undergo routine hand scaling.
- Abrasives and highly fluoridated toothpastes should be avoided.
- Excessive biting forces and nail biting and other habits should be under control.
- Soft acrylic mouth guards can be used during contact sports.^[10,11]

Recent Advances

Lumineers that are made from a special patented Cerinate porcelain that is very strong but much thinner than traditional laboratory fabricated veneers are currently in trend. The thickness is comparable to contact lenses. Lumineers are a reversible procedure and it hardly requires removal of tooth structure. They will bond directly to the tooth making the bond very strong and the longevity is more as up to 20 years.^[12] However, after all the treatment is confined to ideal patients.

Conclusion

Ceramic laminate veneers remain as prosthetic restorations that best comply with the principles of present-day esthetic dentistry. These are pleasing to the soft tissues and possess excellent esthetic quality yet a conservative restoration can be called as “bonded artificial enamel.”

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