

Ceramic Laminate Veneers: A Conservative Approach To Esthetics.

Abstract

Ceramic laminate veneers have been developed as one of the best methods for conservative anterior esthetic restorations. In comparison to other veneer materials like composite resin, ceramic laminates offer various advantages like: Color stability, Life like translucency, High strength, Resistance to abrasion, Enhanced bond strength. This restorative modality can be used in a wide array of situations ranging from diastemata to age related changes. The case we present here showed generalized spacing in the maxillary anterior region following orthodontic treatment for malaligned teeth. Use of ceramic laminate veneers for the closure of diastemata spaces was planned. The final restoration resulted in an esthetically pleasing smile with complete closure of diastemata spaces.

Key Words

Ceramic Laminate Veneer

¹ Mukesh Dhanda
² Maneesh Srivastava
³ Ashwani Dobhal
⁴ Neeraj Sharma

¹ MDS (Prosthodontics), Professor and Head, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

² MDS (Prosthodontics), Sr. Lecturer, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

³ MDS (Conservative & Endodontics), Professor and Head, Department of Conservative & Endodontics, Seema Dental College and Hospital, Rishikesh

⁴ MDS (Prosthodontics), Sr. Lecturer, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

Address For Correspondence:

Dr. Mukesh Dhanda
Seema Dental College and Hospital, Virbhadra, Rishikesh
PIN-249203 Phone- 0135- 2453465, 9897053730
E-mail- drmdhanda@gmail.com

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INTRODUCTION

One of the very first dental practitioners to address esthetics and the "Perfect Smile" was California's Dr. Charles Pincus. In the 1930's his practice was involved in creating the perfect smiles for Hollywood film actors. Pincus understood the importance of "Hollywood Smile" and how it enhanced image and personality. Thin facings made of air fired porcelain were used by Pincus as esthetic temporary restorations. These facings were held in place temporarily by adhesive denture powder, for actors who needed to change their smile while in front of the camera.¹

By the mid 1970s and early 1980s composite resin restorative materials had evolved. These were added directly to the facial surfaces of tooth to restore malformed, fractured or discolored permanent incisors in a procedure known as "bonding".² The use of "bonding" presented several problems such as monochromatic appearance, loss of luster over time and staining. As these restorations did not employ any tooth preparation, a bulk of material was necessary to obtain a pleasing appearance thus leading to gingival inflammation due to overcontoured restorations.³

Next in evolution came the procedure referred to as "laminating" where veneer facings were bonded to etched tooth structure.³ Hollow ground denture teeth, preformed stock laminates,

and custom fabricated laminates of processed acrylic resin were commonly used.^{4,5} Laminating was a definite improvement over bonding but color instability, surface staining, loss of surface luster, low abrasion resistance, biologic incompatibility, and a poor bond between the veneer and the tooth still persisted.^{6,7}

In the early 1980s a method of bonding porcelain to acid etched enamel was developed. Etching the porcelain with hydrofluoric acid or a derivative increases the shear bond strength between composite resin luting agent and the porcelain veneer by a factor of four when compared to unetched porcelain.⁸

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.

Porcelain Veneers: Glazed porcelain is one of the most esthetic and biocompatible materials used in dentistry. It is well tolerated by gingival tissues and its abrasion and stain resistance are excellent. Etched Porcelain exhibits high tensile bond strength to composite resin as reported by Simonsen and Calamia.⁹ Porcelain laminate

veneers, although being technique sensitive give exceptional surface texture, color, fluorescence, and overall esthetics.

Advantages:

Porcelain presents various advantages over other veneering systems and acts as an excellent replacement for unesthetic tooth substance.

Conservative approach: Laminate veneer preparations are much more conservative of tooth structure than either porcelain fused to metal or all porcelain full coverage restorations.

Color: Porcelain offers better inherent color control, translucency, natural look and color stability

Bond Strength: Etched porcelain bonds to enamel surface much better than any other veneering system.

Resistance to abrasion: Porcelain is known for its exceptionally high wear and abrasion resistance as compared to composite resins.

Strength: Porcelain veneer restorations develop high shear and tensile strengths when veneer is luted to the enamel.

Periodontal Health: Highly glazed porcelain surface resists plaque accumulation as compared to any other veneer system thus maintaining periodontal health.

Esthetics: Much better esthetics than any other veneer material as it enables control of color and surface texture. Both internal and superficial stains can be used with porcelain and the natural fluorescence lends a certain vitality.

Resistance to fluid absorption: Porcelain absorbs fluid to a lesser degree than any other veneering material.

Disadvantages:

Cost: Additional cost incurred when compared to direct restorations due to laboratory involvement and additional chair-side time required. The cost will also depend on difficulty of patients problem, the time, level of skill, artistic requirements, and planning involved.

Time: Veneering is a highly technique sensitive procedure and thus time consuming. Multiple visits also demand more time.

Fragility: Veneers are extremely fragile and difficult to manipulate during try-in and cementation stages.

Repair: Repairs are difficult once veneers are luted to the enamel.

Color: It is difficult to modify color once the veneer has been luted to the enamel surface, also precise shade matching is difficult.

Technique sensitive: Fabrication of veneers is an indirect process requiring accurate impression making and high quality laboratory work.

Indications:

Use of porcelain veneers offers clinical solutions that are both conservative of tooth structure as well as esthetically pleasing. Ceramic laminate veneers can be used in cases which are traditionally restored using composite resin veneers or full coverage crowns.

Diastema: Unsightly spaces between teeth can be closed.

Discoloration: Discolored or stained teeth due to, tetracycline staining, devitalization, fluorosis and age related changes can be masked.

Enamel defects: Different types of enamel hypoplasia and malformations can be masked.

Malaligned teeth: Visual appearance of rotated or malpositioned teeth can be improved by developing the esthetic illusion of straight teeth. In cases where orthodontics is not sought by the patient or is not indicated, porcelain laminate veneers can be used.

Poor restorations: Teeth with numerous, shallow, unesthetic restorations on the labial

surface can be covered and dramatically restored.

Age related changes: Aging results in color changes and wear in teeth, these can be esthetically restored using porcelain veneers.

Wear patterns: Cases which exhibit slowly progressive wear patterns can be restored using porcelain laminates if sufficient enamel remains and the desired increase in length is not excessive.

Malocclusion: The configuration of lingual surfaces of anterior teeth can be changed to develop increased guidance or centric holding areas in malocclusions or periodontally compromised teeth.

Time constraint: In cases of time constraint on the patients part or when the patient is not willing to undergo long term orthodontic treatment.

Contraindications:

Available enamel: Ideally, there should be enamel around the whole periphery of the laminate, so as to seal the veneer to the tooth surface. Studies show that bond strengths to dentin decline over time, and porcelain veneers placed in intraenamel preparations offer the best long term results.

Oral habits: Patients with tooth to tooth (bruxism) or tooth to foreign object habit patterns may not be ideal candidates for veneer restorations. The porcelain may not withstand shearing stress generated by such habits.

Crowding: Crowded teeth should first go for orthodontic treatment to attain proper alignment before starting veneer treatment.

Clinical Report:

A 26 years old male patient reported to the clinic with chief complaint of unesthetic appearance due to spacing in upper front teeth. History revealed that the patient had malaligned teeth and had undergone orthodontic treatment for the same. As the total tooth material was less, he was referred to the department of prosthodontics for closure of diastemata using porcelain laminate veneers.

Extra oral examination:

On extra oral examination esthetic appearance seemed satisfactory, lateral profile was slightly convex.

Intra oral examination:

Intra oral examination revealed diastemata between the maxillary central incisors, lateral incisors and the canines. The tooth structure showed no deformity, enamel defects or wear patterns. Gingival health was satisfactory.



Fig.1. Preoperative intraoral view.

Tooth Preparation:

Minimal tooth preparation is required for porcelain laminate veneers. The preparation should ideally be limited to the enamel but still sufficient enamel thickness must be removed to provide adequate space for a correctly contoured restoration. 10 A 0.5 mm (incisal half) and 0.3 mm (gingival third) reduction with slight chamfer finish line at the level of gingival crest was planned. 11,12

Facial Reduction:

A depth cutting diamond bur with three 1.6 mm diameter wheels mounted on a 1.0 mm diameter noncutting shaft (PR13 834-016, FG Diamond, Strauss & Co.) was used for making depth orientation grooves in the gingival half of the labial surface. This provided a 0.3 mm reduction in the gingival third area of facial surface. A second three wheeled diamond depth cutter with 2.0 mm diameter wheels mounted on 1.0 mm diameter noncutting shaft (PR12 834-019, FG Diamond, Strauss & Co.) was used in the incisal half of the facial surface thus providing a 0.5 mm reduction in the incisal half.

The remaining tooth structure between the depth orientation grooves was removed using round end tapered diamond. The tip of round end tapered diamond was used to establish a slight chamfer finish line at the level of the gingiva.



Fig.2. Anterior view of tooth preparation.

Proximal Reduction:

The facial reduction was extended into the proximal area using round end tapered diamond (C4 850-021, FG Diamond, Strauss & Co.) It was ensured that the diamond was parallel with the long axis of the tooth so as to avoid uneven finish line.

Fig.3. Right lateral view of tooth preparation.



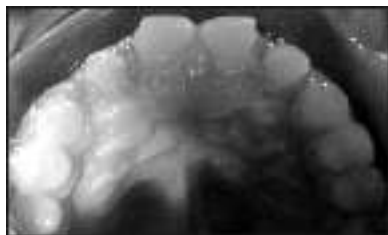
Fig.4. Left lateral view of tooth preparation.



Incisal Reduction:

An incisal overlap design was prepared on all the four teeth. The incisal overlap design acts as a vertical stop and aids in proper seating of the veneer. A multiple wheel diamond (PR12 834-019, FG Diamond, Strauss & Co.) was used to make 0.5 mm depth orientation grooves on the incisal edge. Round end tapered diamond was used to remove tooth structure between the grooves. The incisal edge configuration was maintained.

Fig.5. Palatal view of tooth preparation.



Lingual Reduction:

The round end tapered diamond was used to create lingual finish line. A 0.5 mm slight chamfer was prepared by holding the diamond parallel to the lingual surface. The finish line was prepared approximately one-fourth the way down the lingual surface.

Finishing:

Sharp angles at the junction of incisal angle and lingual surface were removed using round end tapered diamond.

Impression:

A "00" retraction cord (Ultrapak, Ultradent Products, Inc.) was used for gingival retraction on all prepared teeth. An impression was made using Poly vinyl siloxane impression material (Reprosil, Caulk Dentsply, USA). Temporary restorations were not given as the preparations were shallow and involved only the enamel. The

patient was instructed not to bite on hard objects, keep the area clean and to expect some mild sensitivity to hot and cold.

Final Restoration:

Completed veneers (IPS Empress Esthetic) were inspected for cracks, overextended margins and adequate internal etching. The prepared teeth were cleaned with a pumice slurry, rinsed and dried. Isolation was accomplished using cotton rolls and retraction cords. The veneers were tried on the teeth for proper fit and contour and appropriate shade of resin cement was selected.

The two central incisors were etched and adhesive was applied to etched enamel and the tooth side of porcelain veneer. A thin layer of light cured resin cement (Calibra, Caulk Dentsply, USA) was placed on tooth side of the veneer. Light finger pressure was used to place the veneer on the tooth, accurate seating was verified by examining the veneer margins using No.2 explorer. Excess cement was removed and the veneer was exposed to curing light for 60 seconds each from facial and lingual directions. The above procedure was repeated for lateral incisors. Final finishing was done using abrasive rubber and porcelain polishing cups. Surface luster was obtained by using porcelain polishing paste with rubber prophyl cup.

Fig.6. Anterior view of final restoration.



Fig.7. Right lateral view of final restoration



Fig.8. Left lateral view of final restoration



Discussion:

Porcelain presents various advantages for its use

in anterior tooth restorations. Porcelain laminate veneers offer a conservative approach to restoring anterior teeth. The incorporation of ceramic veneers has resulted in restorations with improved strength, durability, periodontal health preservation, marginal integrity, wear resistance and color match & stability.

Conclusion:

The final restoration by porcelain veneers resulted in an esthetically pleasing smile without the need of extensive loss of tooth structure. The final result, showed complete closure of diastemata, taking advantage of an excellent material like porcelain with a much conservative approach.

References:

1. Garber DA, Goldstein RE, Feinman RA: Porcelain Laminate Veneers, Quintessence Publishing Co., Inc. 1988, p 11.
2. Goldstein R: Diagnostic dilemma: To bond, laminate or crown? Int J Periodont Rest Dent 1987; 5:9-29.
3. Faunce FR, Myers DR: Laminate veneer restoration of permanent incisors. J Am Dent Assoc 1976;93:790-792.
4. Horn HR: Porcelain laminate veneers bonded to etched enamel. Dent Clin North Am 1983; 27:671-684.
5. Boyer DB, Chalkley Y: Bonding between acrylic laminates and composite resin. J Dent Res 1982;61:489-492
6. Horn H: A new lamination: Porcelain bonded to enamel. NY State Dent J 1983; 49:401-403.
7. Calamia JR: Etched porcelain facial veneers: A new treatment modality based on scientific and clinical evidence. NY State Dent J 1983; 53:255-259.
8. Hsu CS, Stangel I, Nathanson D: Shear bond strength of resin to etched porcelain. J Dent Res 1985;64:296.
9. Simonsen RJ, Calamia JR: Tensile bond strength of etched porcelain. J Dent Res 1983.
10. Jordan RE: Esthetic Composite Bonding. Philadelphia, DC Decker Inc, 1987, Ch 3.
11. Calamia JR: Etched porcelain veneers: The current state of the art. Quintessence Int 1985; 16:5-12.
12. Quinn F, McConnell RJ, Byrne D: Porcelain laminates: A review. Br Dent J 1986; 161:61-65.