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# An Internship Seminar Porcelain Laminate Veneers

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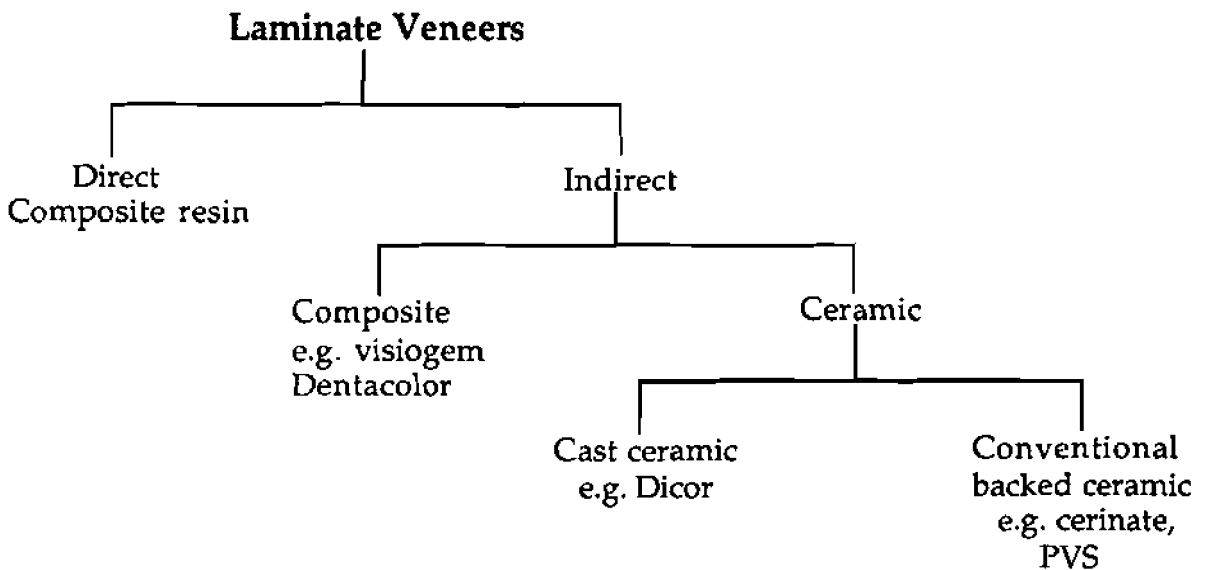
# Introduction

One of the most popular techniques in recent years has been the bonding of porcelain laminates to anterior teeth for improved esthetics.<sup>(6)</sup>

In the past few years, the art of veneering teeth has been introduced as a conservative approach to improve the esthetics appearance of anterior teeth. The laminate veneers offer alternative solution in conditions where previously the full coverage was the only treatment available.<sup>(25)</sup>

Porcelain laminate veneers were first used as esthetic alternatives to direct and indirect composite resin veneers.

This esthetic correction of discolored teeth present one of the most difficult challenges for dental practitioner.

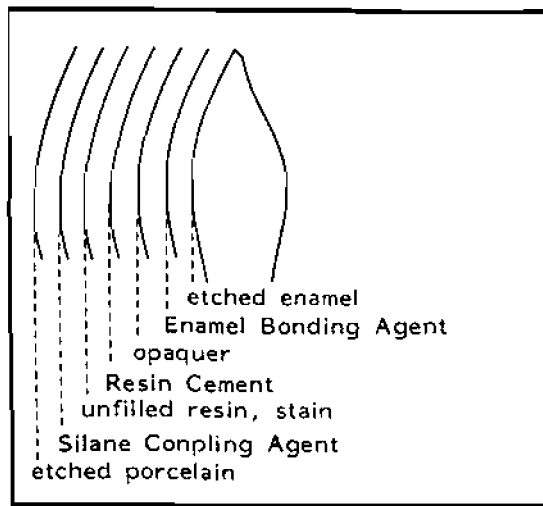


## Porcelain Laminate Veneers

It is a thin porcelain facing (0.4 - 0.7 mm) usually made to cover the labial aspect of an anterior tooth. The veneer is cemented onto the etched enamel surface with bonding agent and composite resin.<sup>(26)</sup>

Porcelain in the glazed state is the most esthetic restoration in dentistry, it is non porous resist the accumulation of debris, excellent in resistance stain and abrasion and better tolerated by the soft tissue.

The surface texture (the ability to adjust final color during placement allows maximum flexibility in final shade adjustment), color, fluorescence and over all esthetics of porcelain laminate veneers is better than any other veneering material.<sup>(8)</sup>



### History:

Porcelain, an esthetic material has long been in use for fixed and removals prosthodontics. As excellent simulation of the optic properties of teeth, color stability, stain and wear resistance, soft tissue compatibility warranted the search to find a mechanism of attachment of enamel that would be durable.

In 1983, Simonsen and Calamia reported an invitro test which investigated the feasibility of retaining porcelain laminate to enamel by the acid-etch technique.<sup>(9)</sup>

A further study conducted by Calamia and Simonsen showed that treatment of two etched porcelain veneer with a silane coupling agent produced a chemical bond that enhanced the porcelain/composite resin mechanical bond.<sup>(10)</sup>

### **Indication:**

1. **Discoloration:** Teeth discolored by tetracycline staining, devitalization and fluoresis, and even teeth darkened with age can benefit the process.
2. **Enamel defects, e.g., enamel hypoplasia, enamel hypocalcification and malformation.**
3. **Enamel fracture or chipped and lesions caused by erosion and abrasion.**
4. **Diastema closure, gap and other multiple unsightly spaces can be closed.**
5. **Malpositioned teeth:** Teeth that are slightly rotated can receive the appearance of straightening easily by veneering them specially if the patient have sound teeth but do not wish to undergo orthodontic treatment.
6. **Poor restorations:** Teeth with numerous shallow unesthetics restoration on labial surfaces can be restored with porcelain laminate veneers.
7. **Wear patterns:** Porcelain laminates are also useful in those cases that exhibit slowly progressive wear patterns. If sufficient enamel remains and the desired increase in length is not excessive.
8. **Agensis of the lateral incisor:** In the problem of the canine erupting adjacent to the central incisor (in case of missing laterals) the veneer can be used to develop better coronal form in the canine, thus simulating a lateral incisor.
9. **Repairing cerametal fixed bridges.**

## **Contraindication:**

1. Poor oral hygiene
2. Oral habits: If the person have heavy occlusion, he will exert forces on veneers that can break them (patient with certain habits such as tooth-to-tooth habit patterns, e.g., bruxism or tooth-to-foreign-objects habits).
3. Available enamel (enamel thickness): There should be sufficient enamel available for bonding, because it is difficult to obtain optimal bonding to large areas of tooth structure that have only dentine present.
4. Ability to etch enamel: Patient with highly fluoridated teeth may not etch effectively (need longer etching time), also the retention problems may be present.
5. Class III occlusion.
6. High caries rate.
7. Malpositioned teeth where a direct-access line of insertion cannot be secured.
8. Large spaces or diastema where closure would result in a bell-shaped contour.

## **Advantages of Porcelain Laminate Veneers**

1. It is very conservative in preparation.
2. The porcelain offers better inherent color control and a natural look as well as the on-going stability of these colors.
3. Tissue tolerance is excellent because of the highly glazed porcelain surface provides less of a depository area for plaque accumulation.
4. Less staining.
5. The bond of the etched porcelain veneer to the enamel surface is considerably stronger than any other veneering system.

6. The wear and abrasion resistance is exceptionally high compared to composite resin.
7. The veneer itself is rather fragile, but once it is luted to enamel, the restoration develops both high tensile and shear strengths, the cohesive strength of porcelain is considerably great.
8. The esthetics are considerably better than any other veneering material because of the ability to control color and surface texture with ceramic. Porcelain can be stained internally and superficially and has a natural fluorescence, lending a certain vitality. Texture is readily developed on the veneer surface to simulate that of adjacent teeth and can be maintained indefinitely.
9. Porcelain laminate veneers are fabricated indirectly in a laboratory.

### **Disadvantages of Porcelain Laminate Veneers**

1. The placing of veneers is technique sensitive and therefore time consuming.
2. The veneers cannot be easily repaired once they are luted to the enamel.
3. It is difficult to modify color once the veneers are luted in position on the enamel surface.
4. The veneers are extremely fragile and difficult to manipulate.
5. Expensive.

# Technique and Construction of Porcelain Laminate Veneers

## Steps:-

1. Selection of the case
2. Shade Selection
3. Enamel Reduction
4. Impression and Temporization
5. Laboratory Techniques
6. Veneer Placement - (a) (Try-in, (b) Color evaluation, (c) Cementation
7. Posttreatment consideration.

### 1) Selection of the Case:-

- The first requirements in case selection are a high standard of oral hygiene and dental health and the presence of an adequate area of sound enamel available for etching.<sup>(27)</sup>
- Patients should be instructed that they are expected to maintain their veneers properly for optimal esthetics and longevity.
- The gingival contour should be normal and healthy.
- There should be enough enamel around the whole periphery of the laminate to seal the veneer to the tooth surface.
- Teeth that have been excessively fluoridated may not etch effectively. They may require special measures (longer etching time "2 minutes" - to be successful with porcelain laminates). The patient should be advised of potential veneer retention problems with highly fluoridated teeth.

- Patients with certain tooth-to-tooth habit patterns, such as bruxism or tooth-to-foreign object habits may not be ideal candidates for veneers.

## 2) Shade Selection:

The dentist should select the shade of the tooth to be treated prior to tooth preparation. Color selection is very important for achieving successful esthetic results.

In general it is advisable to select a shade that is slightly lighter than that desired by the patient, subtle shade modification is possible using the various composite resin systems, it is somewhat easier to darken any given shade than to lighten it, so in general, select a shade that is higher in value and lower in chroma.

It is suggested that the color selected be written in the patient's record and also on an instruction sheet given to the patient for future reference and repair.

## 3. Enamel Reduction:-

There are different opinions regarding the type of tooth preparation porcelain laminate veneers require. Some clinicians are of the school of thought that little or no tooth reduction is required. Whereas others at the opposite end of the spectrum, advocate a full, deep chamfer preparation on the labial aspect of the teeth and most or all of the way through the interproximal contact areas.

If it is possible to place a veneer without tooth preparation and still develop good esthetic form with no subsequent periodontal changes, then this is obviously the ideal. If not, some form of enamel reduction becomes essential.

There is therefore no single answer or ideal way to prepare teeth for porcelain laminates. The decision of whether to reduce enamel should depend on the following biological and technical factors:

**Esthetics:** If there is no tooth preparation, somewhat larger teeth more labially positioned will result when laminates are placed.

**Relative tooth position:** If one or more of the teeth are out of line with respect to the others, this will influence the degree of preparation necessary.

**Masking of tetracycline stain:** This complex problem requires very specific preparation modifications.

**Marginal placement:** This should be consider relative to gingival margin.

**Age:** The age of the patient and the proximity of the pulp to the surface needs to be taken into account.

**Phyche:** The attitudes of the patient relative to esthetics in general.

**The potential for periodontal changes:** The patient should be evaluated for the ability to remove plaque at a porcelain/tooth interface.

David A. Garber (March 1991)<sup>(4)</sup> stated that tooth preparation is essential for predictable esthetic changes and long term clinical efficacy.

**Rationale for enamel preparation:** Enamel preparation may be performed for several reason:

1. To provide for an adequate dimension of available space for the porcelain material.
2. To remove convexities and provide for a path of insertion in those situations where either the incisal or the interproximal areas are to be included in the veneer; the best path of insertion is that which will require the least amount of enamel reduction, as modified by esthetic demands of the patient.
3. To provide space for adequate opaquing where necessary and for the composite resin luting agent.

4. To provide a definite seat to help position the laminate during placement.
5. To prepare a receptive enamel surface for etching and bonding the laminate.
6. To facilitate sulcular margin placement in severely discolored teeth.

**Enamel reduction should be considered from five aspects:**

- a) Labial reduction.
- b) Interproximal extension.
- c) Sulcular extension and marginal placement.
- d) Incisal or occlusal modification.
- e) Lingual reduction.

a) **Labial Reduction:-**

The labial reduction required is a minimum of 0.5 mm, a thickness of ceramic readily managed by ceramists.<sup>(6)</sup>

The preparation should remain within the enamel whenever possible and most certainly at the peripheral marginal areas to ensure an adequate seal to enamel.<sup>(3)</sup>

- There are several methods to gauge the amount of enamel reduced.<sup>(2)</sup>

(1) The most effective method by using the "LVS"<sup>1</sup> depth cutter diamond (the dimensions are 0.5mm for most situation and 0.3mm for small teeth).

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<sup>1</sup> Brasseler Laminate Veneer System (LVS).

(2) By using around-ended diamond burs. The path of insertion is usually labial and slightly towards the incisal.

- The remaining enamel between the grooves must now be reduced to the level of the depth cuts over the entire labial surface. The labial reduction should directed toward two distinct facets:-

(1) The bulk of the reduction should be done with a coarse diamond in order to facilitate added retention and better refraction of the light being transmitted back out through the laminate.

(2) At the marginal area, its desirable to use a fine-grit diamond that will create a definitive, smooth finish line to enhance the seal at the periphery. The finish line should be right at the gingival margin in most instances.

b) Interproximal Extension:-

The interproximal extension is developed for two reasons:-

(1) To improve the adhesion of the laminate to the underlying tooth surface.

(2) To hide the interface between the new veneer in the desired shade of porcelain and the discolored tooth, in a non-visible area.

To increase bonding strength, the veneer should have adhesive bounds at right angle to the possible direction of displacement. The displacement tends to be in a labial direction, and bonds at right angles can be developed only by extending the cut interproximally. This

should extended two third of the way from the buccal towards the lingual.<sup>(3)</sup> (Figure 1).

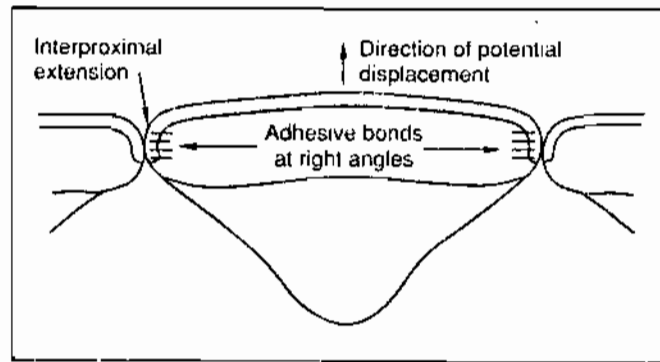


Fig. 1: Diagrammatic representation of adhesive bonding at right angles to direction of displacement.

The contact should be modified prior to impression making by passing a very fine, one-sided diamond abrasive strip through the adjacent teeth, dental floss passed through these contact areas should still just catch, so the arch integrity and stability are not disturbed.

c) **Sulcular Extension and Marginal Placement:-**

It is desirable to place the finish line just within the sulcus by using the "LVS" two grit-diamond. The margin should be visible for finishing of the porcelain laminate and the resin luting agent.

The only time that it is desirable to go further subgingivally is when preparing extremely dark, tetracycline-stained teeth for veneers.<sup>(4)</sup>

It would appear that the most desired form of finish line is a modified chamfer as created by the "LVS" two-grit diamond or one of similar shape.

**Benefits of the Modified Chamfer finish line:**

1. An increased bulk of porcelain at the margin and hence increased strength without over contour.
2. Correct enamel preparation exposing correctly aligned enamel rods for increased bond strength at the cervical margin.

3. A well-defined finish line for the laboratory yet without too great a potential for porcelain sinetering shrinkage-increased accuracy of fit.
4. Greater ease for the dentist to obtain a correct gingival finish line after insertion.
5. A definitive slop to aid in seating the laminate in the correct position on the tooth.
6. An accurately fitting restoration with sound marginal seal due to the use of the fine-grit diamond at the tip of the two grit bur.

d) **Incisal Modification:-**

The form of this enamel modification depends on two factors:-

1. Whether the clinician intends to increase the length of the tooth or maintain the existing length.
2. The buccolingual width of the incisal edge.

If the desired esthetic change is not in tooth form , but only in color, it may not be necessary to overlap the incisal edge of the tooth, particularly if there is sufficient buccolingual width. In this situation, the modification will incorporate the removal of an additional 0.5mm to 1mm of porcelain across the incisal tip.

If the incisal edge is not sufficient thick bucco-lingually, overlapping the incisal edge into the lingual surface would be required.

If it is desired to increase the length of the crown by adding to the incisal aspect, it is important to overlap the incisal edge.

In general, its important not to terminate the incisal preparation in situations where excursive movements of mandible will cause shearing stresses at the junction of porcelain and tooth surface.

e) **Lingual Reduction:-**

Lingual Reduction will depend on the type of occlusion of the individual patient. Any reduction of the incisal edge may necessitate some lingual/enamel modification, a rounded chamfer should be present at the incisal/lingual junction, this will help to prevent the porcelain from shearing away from the incisal edge during function. It also ensures:

1. Increased thickness of porcelain in this critical lingual area that is being used for incising and guidance.
2. Enamel bonds at right angles to those on the incisal edge.
3. Increased strength.

4. **Impression and Temporization**

a) **Tissue Management**

Tissue displacement is accomplished with fine cotton cord impregnated with astringent agent such as aluminum sulfate, this allow the operator to visualize the refinement of the final finish line just within the sulcus.

b) **Impression:**

Commonly used materials are polysulfide, polyether, vinyl polysiloxane elastomeric, and hydrocolloid impression materials.

A labial special tray with stops on the buccal of the premolars may be used, with a reduced palatal extension allowing removal in a more labial direction.

The impression material used should be of two viscosities: Light and heavy, the light material should either be syringed into the sulcus or in the case of hydrocolloid, simply be placed over the preparation, this

will facilitate the heavy body moving the light body up into the sulcus and embrasures, to pick up the periphery of the preparation.

Insert the tray from an oblique buccal direction to make certain all labial and gingival relationship are properly recorded.

c) **Temporization**

Provisional restoration are generally not required since only the superficial enamel has been reduced, and the dentinal tubules are not exposed, therefore there should be little or no sensitivity and only minimal esthetic compromise.

Also, temporary veneers for the most part are undesirable because they may by their nature cause gingival inflammation.

Temporization may become necessary when:

1. There is some areas of exposed dentin that require temporary veneers because of sensitivity.
2. Mandibular teeth with incisal reduction should also be prevented from erupting by some form of temporary veneer.
3. Those situations where the reduced teeth are just too unesthetic for the patient to function adequately, would also require temporization.

There are four basic techniques for developing the temporary veneers:

I) **Direct Composite Resin Veneer:**

Place a shade selected anterior composite without either etching or unfilled resin and gently contour the material to fill in the areas of tooth modification, appropriate exposure to a visible light source should be done, this system will work nicely for one or two individual units.

II) Direct Composite Resin Veneer Utilizing Vacuform Matrix

The vacuform matrix is made up on a pre-operative plaster cast of the patient's mouth, then fill the labial aspect of the vacuform with a light cured composite resin and manipulate it on the prepared teeth, then set the composite with the appropriate light-curing unit.

Peel the vacuform away from the teeth, leaving the composite in place, trim and shape it.

III) Direct Acrylic Veneer

Methyl methacrylate self-curing acrylic resin is used in this technique with the help of vacuform matrix.

Cementation is done by using a laminate composite resin luting system.

IV) Indirect Composite Resin/Acrylic Resin Veneer:

These temporary veneers are fabricated in the laboratory on a cast of the prepared teeth, manipulated the matrix and material into position on the cast of the prepared teeth and cure it, then trim the matrix and polish it, lute in place with any composite resin system.

5. Laboratory Techniques-

Porcelain as a material for veneering was first reported by Horn in 1983,<sup>(25)</sup> using commercially available porcelain built upon a platinum foil matrix adapted to a model of the prepared tooth. In later, Calamia<sup>(25)</sup> described a modified investment laboratory technique using high temperature investments similar to those used in the past for porcelain inlays.

Platinum foil technique is better because you have more control of the porcelain thickness and the space of the composite.

Sorensen et al (1989)<sup>(31)</sup> compared marginal openings between veneers made on platinum foil and those made on refractory casts and found that those made on foil were significantly smaller. Also Dr. J. Gregory Wall (1992)<sup>(16)</sup>, stated that "Marginal cement film thickness of veneers made on platinum foil is less than that reported for veneers made on a refractory investment.

## 6. Veneer placement

The porcelain veneer is made in the laboratory. It is highly glazed on the labial surface and etched by hydrofluoric acid on the inner surface to create micro-porosities for bonding.<sup>(13)</sup>

### a) Try in-

The extremely friable veneers must be handled very carefully, care must again be taken not to contaminate the veneers etched surface. So handled should be at their edges and on unetched labial surface.

After ensuring that all veneers fit the cast model, they can be tried in the patient's mouth.

The prepared teeth are cleaned with pumice and water, the teeth are thoroughly washed, dried and isolated with cotton rolls and a saliva ejector. The inner side of the veneer is moistened with water and the veneer is placed on the teeth. The water keeps the veneer in place during the try in and gives it some translucency.

With the patient supine position, the veneers are tried in single and together. The margins are carefully checked to ensure maximum adaptation.

### b) Color evaluation:-

After ensuring that the veneers fit well and are properly contoured we have to make color evaluation. At this stage the inner aspect of veneers cleaned with 37% phosphoric acid for 1 min. to remove any salivary contamination. A fresh silane coupling agent such as scotchprime, porcelite silane primer, fusion, is then applied on the

etched surface and allowed to dry for at least 1 min. The use of silane pretreatment has been shown to increase the retentive bond strength. A very thin layer of light cured bonding agent is placed over the silane. The porcelain laminate veneers are monochromatic due to their limited thickness. The dentist should have the artistic skills to tint the veneers. So their color will exactly match the color of the adjacent teeth.

A color match of luting composite resin is selected and applied to the incisal half of the veneer and tried on the mouth. The shade of the porcelain veneer on the prepared unetched tooth is evaluated. If the shade is unsatisfactory, it has to be changed.

c) **Cementation (Bonding):-**

Once the correct stain and shade has been determined by trial and error. Clean the teeth with a slurry of pumice and water and isolate the teeth.

The appropriate tooth is isolated on both sides by mylar strips then etched with a 30% to 37% phosphoric acid solution for 15 - 2 sec., the etching material is washed off.

Many veneers include both dentin as enamel, and gingival margins are frequently on dentin. Recommendation is to use dentin bonding material that does not require curing before resin cement (such as All bond 2, Gluma (3- step), Mirage bond plus ... etc.) in order to avoid film thickness that prevents complete seating. With veneers, dentin bonding reduces leakage that potentially causes margin discoloration and tooth sensitivity. If strong bond to dentin is required, placement of numerous 1/4 round bur holes in dentin prior to application of dentin bonding material is suggested.

The composite resin is applied in an even layer over the inner surface of the veneer.

- Seat one laminate at a time by rotating the veneer onto the buccal surfaces of the tooth and then gently manipulate it until contact is made in the region of the gingival finish line, then check the fir

between the margin and the preparation line, with an explorer, then begin the polymerization process with the light.

- Curing was done from gingival, labial, incisal and lingual directions allowing for light penetration through the porcelain.
- Chip any excess composite resin with a carbide interproximal carver or gold foil knife.
- A polishing diamond is used next to refine this interface of tooth/resin/porcelain.
- The polishing of the veneer is done with ceramic polishing points and then diamond dust-impregnated paste with a non-webbed rubber cup.
- The last step is to verify occlusion and ensure that the veneers do not make excessive contact with the opposing arch in any excursive movements of the mandible.

## 7. Posttreatment consideration:-

### a) Short term consideration:-

The short term period consist of the first 30 days after the placement appointment. The patient must be especially cautious during the first 72 hours post bonding, because polymerization of the composite resin bonding occurs during this period. Therefore, the patient must be instructed to:

- 1) Avoid stress of chewing hards foods.
- 2) Extremes in temperature (either hot or cold should be avoided).
- 3) Avoid mouth washes with a high alcoholic content, because ethanol has been shown to have a softening effect on BIS-GMA based polymers.

b) **Long term maintenance:-**

A long term maintenance protocol need to be developed so the patients new laminate will remain highly esthetic and will function for many years. A 3-6 months recall schedule is appropriate, depending on the patients diet and oral hygiene.<sup>(12)</sup>

At the prophylaxis appointments, ultrasonic scalers and air abrasion unit should be avoided, both can disrupt marginal integrity and scratch the porcelain. It is best to polish these restoration with either a diamond paste or aluminum oxide polishing paste.

Finally, the use of acidulated phosphate fluoride gel is contraindicated these will remove the porcelain glaze and create porosity in the composite margin, instead a neutral sodium fluoride gel should used.

# Failure of Porcelain Laminate Veneer

The incidence of complication involving proper placement is low. Four problem categories have been described:

## 1. Intraporcelain fracture:-

Intraporcelain fracture usually occurs before or during cementation. Excessive seating pressure or high viscosity luting cement may cause the veneer to fracture. Therefore, the veneer should be closely examined for craze lines or microcracks before try-in and bonding.

## 2. Debonding:

Failure that involves debonding the entire veneer or a chip of porcelain rarely occurs, because the bond is extremely strong. A contaminated field, faulty porcelain etch, or unrecognized dentin bonding are all factors that can weaken the bond and create a potential source of partial veneer bonding.

## 3. Marginal failures:-

Marginal failures are caused primarily by microleakage and can result in staining, discoloration, and recurrent decay. Resin deficiencies or incomplete resin polymerization may increase the potential for marginal failures. This can be avoided by ascertaining that the veneers have excellent marginal adaptation and cementation.

The opened margins have to be sealed with the resin luting cement. Though the bulk of composite resin when used as a luting agent is greatly reduced, yet there is still polymerization volumetric shrinkage in the amount of 2.6% - 5.7%. This curing shrinkage, compounded with the difference in the coefficient of thermal expansion of tooth tissue and dental restorations would contribute to marginal leakage, playing a part in either debonding or marginal staining. In one study, marginal discoloration at 2 years was

recorded in 15% of the patient. Most discoloration were located at the proximal cavosurface margins and were attributed to the difficulty of finishing and polishing these relatively inaccessible margins.

In Dec. 1991, Zaimglu and Kahaagaclioglu<sup>(24)</sup> concluded that "microleakage beneath laminate veneers could be considered to be inevitable, but the amount is affected by the type of dentine enamel bonding agent and by resin sealing of the veneer following finishing."

#### 4. Color failure:-

Color failure, which compromise esthetics, become a long term problem and may necessitate veneer replacement.

Porcelain may appear to exhibit a shade darkening years after placement because of reactions between the silane primer, composite resin, and phosphorated bonding agent used for luting.

Inadequate composite curing, voids, or improper dentin bonding can allow oral fluid to seep beneath the veneer and create localized color change.

## Longevity

Longevity of any dental restoration cannot be predicted merely by testing its mechanical properties in vitro, and only clinical data may provide the answer. The porcelain laminate veneer when placed properly and maintained by the patient with good oral hygiene and proper maintenance appointments, there is every reason to believe that they will last for many years.

## The Future of Porcelain Laminate Veneers

The introduction of new dental technology combined with changing patient attitudes, was slowly altering dentistry's approach to esthetic problems.

The patients acceptance of the porcelain laminate veneer technique now a days seems to be high. A study conducted by Goldstein and Lancaster<sup>(32)</sup> showed that patients would readily accept shorter restoration life expectancy (five to eight years) if enamel could be saved by not reducing the tooth for a full crown.

The technique is expected in the near future to be drastically simplified. Clinical researches to date has shown excellent retention rates. The introduction of high strength dentin bonding agents and reliable resin cements will accelerate the progression towards bonded porcelain used in clinical practice.<sup>(11)</sup>

On the other hand long-term study of porcelain veneers is required in order to study their marginal integrity, marginal staining and their effect on gingival tissues.

Finally, we believe that the advantages of this technique as a treatment modality make it worthy of serious consideration in view of the distribution and prevalence of certain dental problems confronting the general practitioner.

## Summary

Porcelain laminate veneers offer many wonderful advantages for carefully planned and properly selected cases. Although the market for cosmetic services has grown quickly, treatment is often complex. The input and expectations of patients must be considered and addressed as primary factors for success. Porcelain laminates are here to stay and added another existing dimension to dental practice.

## References

- 1) John R. Calamia: Etched porcelain facial veneers New York, J. of Dent. 53: 255-259 (1983).
- 2) Garber, D. A., Gold Stein R.E. Feinman, R.A.: Porcelain Laminate Veneers. Quintessence Publishing Co. 1988.
- 3) Garber, D.A. : Rational Tooth Preparation for porcelain laminate veneers. Compendium 1991 May 12: 316-320.
- 4) Garber, D.A. : Porcelain laminate veneers - to prepare or not to prepare? Compendium 1991 Mar 12: 178-180
- 5) Harvey P. : Bleaching and 1 or porcelain veneers: Case reports. J. of Esthetic-Dent, 1992 May-June: 67-70
- 6) Weinberg: Tooth preparation for porcelain laminates. N.Y. J of Dent 1989 May.
- 7) Ronk S.L. : Dental Laminate: Which teck.? J.A.D.A., 102: 186. 1981
- 8) Horn, H.R.: Porcelain Laminate veneers bonded to etched enamel. Dent. Clin. North Am., 27: 671, 1983
- 9) Simon, R.J. and Calamia, J.R.: Tensile bond strength of etched porcelain. J. Dent. Res. 62: 297. 1983
- 10) Calamia, J.R.: Etched porcelain veneers: The Current State of Art. Quintessenceirt. 16.5. 1985
- 11) Levin, R.P.: The Future of Porcelain Laminate Veneers. J. Esthet-Dent. 1989 Mar-Apr: 45-6
- 12) Rada, R.E.: Porcelain Laminate Veneers: Posttreatment Considerations. Compendium: 1992 Jun: 474-478

- 13) Ben - Amar: Porcelain Laminate Veneer - for improved anesthesia of anterior teeth. R.H. 1989 Jan: 17-23
- 14) Frank R.: Laminate Veneer Restoration of permanent incisors. J.A.D.A., Oct. 1976
- 15) Rucker, L.M.: Porcelain and resin veneers clinically evaluated 2 year results. J.A.M-Dent.-Asso. 1990 Nov.: 594-6
- 16) J.G. Wall : Cement luting thickness beneath porcelain veneers made on platinum foil. J. Prosthet-Dent. 1992 Sep.: 448-50
- 17) Sheets, Taniguchi.: Advantage and limitation in the use of porcelain veneer restorations, J. Prosthet-Dent. 1990 Oct.: 406-11
- 18) Robbins. J.W.: Color characterization of Porcelain veneers Quintessence-Int. 1991 Nov.: 853-6
- 19) Garber, D.: Direct composite veneers versus Etched Porcelain Laminate Veneers, Dent-Clin North Am. 1989 Apr.: 301-4
- 20) Elledge, D. Hart and Schorr: A provisional restoration technique for laminate veneer preparations J. Prosth. Dent. 1989.
- 21) Frank F. : Management of Discolored teeth. Dent. Clin North Am. Oct. 1983
- 22) Rouffignae, M. : Aesthetic All-Porcelain Anterior Restorations. PP & A v d 4 No. 8 Oct. 1992
- 23) Ronald A. : Mandibular laminate provisiolation. Quintessence Int. Vol. 20 No. 10 1989
- 24) Zaimoglu, A. and Karaagaclioglu: Microleakage in porcelain laminate veneers. J. Dent., 19: 369, 1991
- 25) Wei, S.H. and Tang, H.:- Laminate Veneers for the Aesthetics Restoration of anterior teeth. Ann-R. Australia Coll-Dent. Surg. 1989 Oct.

- 26) Miller, B.J.: Porcelain veneers. Dent. update 14:381, 1987
- 27) Clyde, J.S. : Porcelain Veneer: A preliminary review. Br. Dent. J. 164. 1988
- 28) Mc Lean, D.: Ceramics in clinical Dentistry. Br. Dent. J. 164: 1988
- 29) Parmeijer, C.H.: Porcelain Laminate Veneers. C.D.J. 19. 59, 1991
- 30) Hobo, S.: Porcelain Laminate Veneers with three dimensional shade reproduction. Int. Dent. J. 1992 Aug.: 42: 189: 98
- 31) Sorensen, J.A.: Porcelain Veneer Marginal Fidelity. Platinum Foil Vs. Refractory die technique. J. Dent. 1989
- 32) Goldstein, R. and Lancaster, J. Survey on patient attitudes toward current esthetics procedures. J. Prosth. Dent., 52: 775, 1984.