REVIEW ARTICLE

Veneer in Restorative Dentistry

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ABSTRACT

Aim: To discuss the development of veneering system from initial porcelain to composite resin and ultimately to cad -cam system.

Summary**:** The demand for the tooth color restorations and a more attractive smile has now passed the boundaries of exclusive practitioners, specialist and the esthetic centers to all over the world. As esthetically pleasing restorations of young fractured malformed or discolored teeth has been a perplexing problem for dentist, in past few years a conservative approach to improve the esthetic appearance has led to widespread use of the veneering system. Typically, veneers are made of chair side composite, processed composite, porcelain, or cast ceramic materials. This review article discusses the indications, contraindications and development of veneering system over the years.

Keywords: Porcelain veneers, laminate, CAD/CAM.

INTRODUCTION

The demand for the tooth color restorations and a more attractive smile has now passed the boundaries of exclusive practitioners, specialist and the esthetic centers to all over the world. As esthetically pleasing restorations of young fractured malformed or discolored teeth has been a perplexing problem for dentist, in past few years a conservative approach to improve the esthetic appearance has led widespread use of the veneering system. Typically, veneers are made of chair side composite, processed composite, porcelain, or cast ceramic materials.

Perfect smile improves the self-confidence, personality, social life and have psychological effect on improving self-image with enhanced self-esteem of the patient. Improvement of smile makes us gratifying and opens door in the new dimension of dental treatment using veneers. As we are in the new era of resin bonded porcelain (ceramic and esthetic dentistry), this review article enlights and emphasize upon newer information regarding materials, methods and techniques regarding veneers.

HISTORY

Porcelain veneers were introduced by Dr Charles Pincus in Hollywood in 1930s, to enhance an actor's appearance for close-ups in movie industry. Dr Pincus attached these thin veneers temporarily with a denture adhesive powder.[1]

In 1955, Buonocore's research into the acid-etch technique provided a simple method of increasing the adhesion to enamel surface for acrylic filling materials[2]. His discovery was quickly followed by Bowen's work with filled resin. Only in 1970s, however, with introduction of visible-light cured composites, did the dentist have the necessary working time to properly shape direct composite laminate veneers. In the 1970s, Faunce described a one-piece acrylic resin prefabricated veneer as an improved alternative to direct composite resin bonding.[3,4] These veneers were primed with ethyl acetate or methylene chloride liquid and luted to the etched tooth with a composite resin.

The concept of laminate veneers although existing long back, got surface in 1975 by Rochette who introduced the use of silane coupling agent with porcelain laminate veneers of repairing fractured incisors.[5] Then the popularity of porcelain laminate skyrocketed in 1980s partly because of its conservative nature and the dental researches in the etched technique and new bonding methods.

In the 1983- Porcelain as a material for veneering was first reported by Horn, using commercially available porcelain.[6]

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In the 1983, Horn advocated the use of a light-curing resin luting agent for efficacy and convenience.

In the 1983, Simonsen and Calamia demonstrated that etching of the internal surface of the porcelain veneer allowed the veneer to be retained on etched tooth enamel better than composite resins or acrylic resin.[7,8]

In the 1984, study done by Calamia revealed the enhancement of the etched porcelain/luting resin bond by chemical means through pretreatment with silane.[9]

1986- Nicholls J.I. showed that tensile forces are primarily responsible for dislodgement of esthetic veneers that are cemented with microfilled resins.[10]

1987- Heymann HO demonstrated a clinical technique of indirect composite resin veneers[11]

1988 - Reid J.S. did a study on tooth color modification and porcelain veneers and found a method whereby the appearance of a discolored tooth could be improved not only by masking the discoloration but also by producing a more natural result.[12]

1989- Graber A. David compared direct composite veneer versus etched porcelain laminate veneers. He concluded that the etched porcelain restoration, in future would replace direct bonding composite restoration in most clinical situation.

1991 - Herbert Victor Exner investigated the predictability of colour (hue value and chroma) on cervical surfaces, body surfaces and incisal surfaces of ceramic veneers and the extent to which laminates may be shade adapted by use of tints and opaquers on the fitting surfaces.[13]

1991 - Rada E. Robert and Betty Jean Jankowski described porcelain laminate veneer provisionalization using visible light cure acrylic resin.[14]

1997- Rouse S. Jeffrey discussed the interproximal extension of full veneer and traditional veneer preparations.[15]

2000-Dumfahrt Herbert and Herbert Schaffer did a retrospective evaluation after one to ten years of service of porcelain laminate veneers (PLVs). This study covered a period from 14 months to 127 months and evaluated 191 PLV restorations with a mean wearing time of 55.6 months. They concluded that:

1. The survival probability of PLVs was 97% at 5 years and 91% at 10 ½ years.
2. The failure rate increased when the finish line was within an existing filling and/or when the veneer was partially bonded to dentin.
3. Occlusion played a major role in most failures.
4. Marginal integrity and discoloration were worse when the restoration margin was within dentin.
5. The weak link in bonding PLVs was the dentin resin cement bond.
6. The wearing time had a significant influence on the porcelain surface, marginal integrity, and marginal discoloration.
7. Papillary bleeding on probing and recession increased when the preparation margins were located equigingivally or subgingivally. [16]

Overall the esthetic results over an extended period remain excellent, as did patient's acceptance.

2000- Peumans m et al stated that an optimal bond was obtained if the preparation was located completely in enamel, if correct surface treatment procedures were carried out and if a suitable composite luting agent was selected. They also concluded that the major shortcoming of porcelain veneers was the relatively wide marginal discrepancy. [17]

2001- Hager Bertil, Agneta Oden, Bernt Anderson et al DESCRIBED the use of Procera All ceram laminates for patients with discolored teeth.[18]

2004- Magne pascal demonstrated novel porcelain laminates preparation approach driven by a diagnostic mock-up. [19]

2005-George P. Cherukara, Graham R. Davis, Kevin G. Seymour, Lifong Zou, Dayananda Y.D. Samarawickrama did a study to assess the effectiveness of 3 clinical techniques, namely, dimple, depth groove, and freehand, in producing an intraenamel preparation. Within the limitations of this pilot study, the 3 different techniques tested did not differ significantly in conserving enamel.[20]

2006- Zarone, Ettore Epifania, Giuliana Leone, Roberto Sorrentino, Marco Ferrari, demonstrated that chamfer preparation is recommended for central incisors, whereas the window preparation showed better results for canines.[21]

2006-Barghi et al did a study on effects of porcelain leucite content, types of etchants, and etching time on porcelain-composite bond strength and they concluded that

1. Gel hydrofluoric acid etchant provided higher porcelain-composite bond strength than did the liquid etchant.
2. Proper etching of porcelain for boning depends on the leucite content of the porcelain as well as the type of etchant used.
3. Presence of additional leucite crystals may affect the time required for proper etching of porcelain.[22]

2007- Sailer I et al compared color stability of three veneering ceramics for zirconia frameworks. Three veneering ceramic compared were Initial (GC), Triceram (Esprident) and Cercon Ceram S (DeguDent).They concluded that all 3 ceramics met the esthetic demands only to a limited extent. Triceram allowed to be the most predictable result in terms of color stability. [23]

Porcelain has long history in the dental field. It is one of the most esthetically suitable and biocompatible material available. Porcelain abrasion and stain resistance are excellent and well tolerated by gingival tissues. Thus it makes porcelain laminate veneers superior to other veneering systems.

A veneer is a layer of tooth colored material that is applied to a tooth for esthetically restoring localized or generalized defects or intrinsic discolorations.[24]

Constructing a veneer (without regard to the material) and bonding it to etched tooth structure is referred to as "laminating" (Faunce FR). [3]

The laminate veneer is a conservative alternative to full coverage for improving the appearance of an anterior tooth (Horn HR).[25]

A porcelain laminate veneer is an extremely thin shell of porcelain applied directly to tooth structure (McLaughlin G). [26]

There is little difference between a laminate and veneer. In general terms, a laminate is done to maintain the color, where as a veneer is made to change the color. In esthetic dentistry, laminates are used to restore the original color of the tooth, whereas veneers are used to change the original color of the tooth to make it look more natural.[27]

Types of Veneers [24]

Veneers can be divided into two categories based tooth preparation

1. Partial veneers
2. Full veneers

Indications [24]

Partial veneers and Full veneers

Partial veneers are indicated for the restoration of localized defects or areas of intrinsic discoloration. Full veneers are indicated for the restoration of generalized defect or areas of intrinsic staining involving the majority of the facial surface of the tooth. However, several important factors including patient age, occlusion tissue health, position and alignment of the teeth and oral hygiene must be evaluated prior to pursuing full veneers as a treatment option. Furthermore, if full veneers are done, care must be taken to provide proper physiological contours, particularly in the gingival area, to favor good gingival health. One veneer has been lost and severe gingival irritation exists around the remaining overcontoured veneers.

Partial veneer

Full veneers can be accomplished by a direct or an indirect technique. When a small number of teeth are involved or when the entire facial surface is not faulty (partial veneers), directly applied composite veneers can be completed for the patient in one appointment with chair side composite. Placing direct composite full veneers is very time consuming and labor intensive. However, for cases involving young children, a single discolored tooth or when economics or patient time are limited precluding a laboratory fabricated veneer the direct technique is a viable option.

Veneers also can be divided into two categories based method of fabrication

1. Directly fabricated composite resin veneers (i.e. free hand placed), and
2. Indirectly fabricated veneers, such as preformed laminates or laboratory-fabricated acrylic resin, microfilled resin, or porcelain veneers.

Direct Veneers:[24]

Buonocore's research of the acid etch technique in 1955, combined with Bowen's later use of filled resins, provided the technology enabling mechanical bonding between etched tooth and filled resins (direct bonding). Although these were major breakthroughs in dental research by the early 1960s, little esthetic use was made of this bonding technology of nearly a decade. This was partially due to the limitations of the available self-curing resins, which did not allow sufficient working time for the dentist to recreate a labial surface before the composite resin chemically cured itself.

The introduction of light cured composite resins in the early to mid 1970s allowed the dentist greater flexibility. The advantages of visible light cured composite resins, such as greater working time and improved chemistry, versus the self-cured composite resins, marked the entrée into the next generation of esthetic materials. Visible light cured composite resins were replacing self-cured composite resins by the late 1970s and were preferred for esthetic anterior restorations.

Direct acid etched bonding proved to be advantageous, yet a susceptibility to stain, poor wear resistance and lack of natural fluorescence spurred the continued search for improved materials.

Indirect Veneers:

The idea of restoring teeth for esthetic purposes became more widely accepted by the dental community as new esthetic restorative techniques and material became available. Faunce described a one-piece acrylic resin prefabricated veneer as an improved alternative to direct acid etched bonding. By using, a chemical primer applied to the veneer and a composite to lute the veneer onto an etched tooth, both a chemical and mechanical bond contributed to the attachment. It was more stain resistant than composite resin veneers, but numerous preformed acrylic resin laminates suffered from delamination at the laminate/composite interface, usually due to the weak chemical bond. Like composite resins, they also exhibited poor resistance to abrasion.

The inherent advantage to laboratory-fabricated veneers is the anatomical accuracy. Laboratory formed acrylic resin veneers and laboratory formed microfill resin veneers offer a smooth surface, good masking ability, and very little finishing, if they are completed properly. However, porcelain laminates can surpass their esthetics, strength, and longevity.

Advantages of Indirect Veneers Over Direct Veneers

Indirect veneers require two appointments but typically offer numerous advantages over directly placed full veneers. First, indirectly fabricated veneers are much less technique sensitive to operator ability. Considerable artistic expertise and attention to detail are required to consistently achieve esthetic and physiologically sound direct veneers. Indirect veneers are made by a laboratory technician and are typically more esthetic. Second, if multiple teeth are to be veneered indirect veneers usually can be placed much more expeditiously. Third, indirect veneers typically will last much longer than a direct veneer, especially if made of porcelain or pressed ceramic.

Contraindications for Veneer placement

- Teeth with defective enamel formation
- Teeth having insufficient crown material
- Young permanent teeth
- Teeth exhibiting severe occlusal wear patterns, due to Para-functional habits
- Severe periodontal involvement and severe crowding
- Poor oral hygiene

Veneering Materials

Composite Resins

It is a tooth colored restorative system developed in late 1950's & early 1960's It is basically a resin, which has been strengthened by adding silica particles.

A composite is a system composed of a mixture of two or more macromolecules, which are essentially insoluble in each other and differ in from. Examples of natural composite material are tooth enamel & dentin matrix is made collagen with hydroxyapatite crystals acting as fillers.

Composition

- Resin matrix/binder- BIS-GMA or urethane dimethacrylate
- Filter Quartz colloidal silica or heavy metal glasses
- Coupling agents – Organoslianes
- Hydroquinone inhibitor to prevent immature polymerization
- UV absorbs to improve color stability
- Opacities e.g. Titanium dioxide & aluminum oxide
- Color pigments to match tooth color

Types

Based on curing Mechanisms

1. Chemically activated

   Alfa camp (VOCO)

- Two paste system; base and catalyst paste supplied in small jars or syringes.
- Powder liquid systems; powder(inorganic phase)supplied in jars and liquid (BIS-GMA) diluted with monomers in bottles.

2. Light Activates

- Hercentile (kerr)
- Heliomolar (Vivadent)

3. Dual Cured

- Auto polymerizing + photo cured

Based upon size of filler particles

Conventional	8-12mm
Small particle	1-5mm
Microfilled	0.04-0.4mm
Hybrid	1-0mm

CEROMERS

The term ceromer stands for ceramic optimized polymer and was introduced to describe composite Tetric ceram.This consists of barium glass (<1mm)Spheroidal mixed oxide,Ytterbium trifluoride & silicone in dimethacrylate

monomers (BIS-GMA) & urethane dimethacrylate by a polymerization of C=C of the methacrylate.Ceromers combine the advantages of ceramics & composites.

Properties similar to ceramics

i) Durable esthetics with enamel like translucency and fluorescence

ii) Abrasion resistance & enamel like hardness.

Properties similar to composites:

i) Ease of final adjustment.

ii) Excellent polish ability.

iii) Effective bond with luting composite.

iv) Low degree of brittleness.

v) Possibility of repairing restorations in the mouth.

Commercial name – Tergis.

Indirect veneers are made of:

i) Processed composite

ii) Porcelain

Indirect veneers are attached to the enamel by acid etching and bonding with either a self-cured, light cured or dual cured resin bonding material.

1) PROCESSED COMPOSITE VENEERS:

Composite veneers can be processed in a laboratory to achieve superior properties. Using intense light, heat, vacuum, pressure, or a combination of these, cured composites can be produced that possess improved physical and mechanical properties compared to traditional chairside composites. Indirectly fabricated composite veneers offer superior shading and characterizing potentials well as better control of facial contours.

MATERIALS:

MICROFILL COMPOSITES

Most processed composites presently are microfill composites. Although significant advantages exist over direct composite veneers, indirect veneers made of processed microfill composites possesses limited bond strength because of the reduced potential to form a chemical bond with the bonding medium because laboratory processing results in a greater degree of polymerization resulting in fewer bond sites.Consequently, they should not be used in areas of high occlusal stress.

HYBRID TYPE:

Newly developed processed composite colloidal silica, offers a significant improvement in bond strength. This type of composite contains particles of barium glass, which is soft radio-opaque filler; it can be sandblasted and etched in the lab. With a mild concentration of (9%-10%) of hydrofluoric acid to produce numerous areas of microscopic undercuts, similar to those formed with etched enamel.By producing a surface capable of micromechanical bonding, "etched composite" veneers can be strongly bonded to enamel.They can be replaced or repaired easily with chairside composite.

Indications:

For placement in children and adolescents as interim restorations until the teeth have fully erupted and achieved their complete clinical crown length.

For placement in patients who exhibits significant wear of their anterior teeth due to occlusal stress.

II) Porcelain Veneer[28]

Feldspathic porcelains contain a variety of oxide components, including SiO_2 (52-62 wt%), $A1_2O_3$ (11-16 wt%), K_2O (9-11 wt%), Na_2O (5-7 wt%), and certain additives, including Li_2O and ZrO_2. These ceramics are called porcelains because they contain a glass matrix and one or more crystal phases. They cannot be classified as glass-ceramics because crystal formation does not occur through controlled nucleation and crystal formation and growth.

There are four types of veneering ceramics. These include (1) low-fusing ceramics (feldspar-based porcelain and nepheline syenite-based porcelain); (2) ultra low-fusing ceramics (porcelains and glasses); (3) stains; and (4) glazes (self-glaze and add-on glaze). The particle type and size of crystal particles, if present, will greatly influence the potential abrasiveness of the ceramic prosthesis.

Classification of All Ceramic Systems used as Veneering Materials [29]

1. Conventional powder slurry ceramic
   i) Optec HSP – Leucite reinforced porcelain.
   ii) Duceram LFC – Hydrothermal low fusing ceramic.
2. Pressable Ceramic
   i) IPS Empress
   ii) Optec Pressable Ceramic
3. Castable Ceramic
   i) Dicor
   ii) Cerapearl

4. Machinable Ceramic
   i) Cerec Vitablocs Mark I & II
   ii) Celay blocks
   iii) Dicro MGC
5. Infiltrated Ceramic
   i) In-Ceram

1) Conventional Powder Slurry Ceramic

I. OPTEC HSP: Leucite Reinforced Porcelain

Lencite porcelain is commercially available as optec HSP.These porcelains contain dispersed leucite (potassium aluminium silicate) crystals in a glassy mix.They have a high tensile strength rendering porcelain to be stronger compared to conventional feldspathic porcelains. The leucite and glassy components are fused together during the baking process at 1020^0C. The build up, condensation and curing is done using the powder slurry technique on a special semipermeable die material.

Advantages:

i) Lack of metal or opaque substructure, good translucency.

ii) Moderate flexural strength, higher than conventional feldspathic porcelain.

iii) Ability to be used without special lab. Equip.

Disadvantages:

i) Margin inaccuracy caused by porcelain sintering shrinkage.

ii) Potential to fracture at increased loads.

iii) Increased leucite content may cause high in vitro wear of opposing teeth.

II. Duceram LFC – Hydrothermal Low Fusing Ceramic

It is composed of an amorphous glass containing hydroxyl ions. The restoration from Duceram LFC is made in two layers. The base layer is Duceram metal ceramic (a Lucite containing porcelain), which is placed in a refractory die and baked at 930^0C. The second layer Duceram LFC is applied over the base layer & baked at 660^0C.

Advantages:

a) Greater density, high flexural strength, greater fracture resistance than feldspathic porcelain.

b) No special lab equip or techniques are required for fabrication process.

Disadvantages:

These are no clinical studies that the material is less abrasive than feldspathic porcelain.

2) Pressable Ceramic – IPS Empress Injection Moulded Glass / Leucity Reinforced Hot Pressed Glass Ceramic

Wohlwend et al first described this System in 1989.This is precerammed glass reinforced with leucite that prevents glass propagation without diminishing its translucency.It is available in the form of ingots, which are heated and injected under pressure and temperature into a mold created by a lost wax technique. It is less susceptible to fatigue failure.

Flexural strength is higher than Dicor and conventional porcelain.

Advantages:

a) Potential to fracture under high stress.

b) Need for special equipment (pressing oven and die material).

3) Castable Glass Ceramic:

i) DICOR:

A glass ceramic is a material that is formed into the desired shape as a glass and subsequently heat treated to induce partial devitrification or crystallization.This conversion process, which involves crystal nucleation and growth is referred to as ceramming and is accompanied by a small and controlled volume change.The crystalline particles, needles or plates formed during the ceramming process constitutes a ceramming network which increases strength of material by interrupting crack prepagation.

COMPOSITION:

The glass ceramic material is composed of SiO_2, K_2O, MgO, Mg F_2, Al_2O_3 The fluoride acts as a nucleating agent and improves the fluidity of molten glass.

After ceramining, the material is approximately 55% crystalline and contains tetrasilicic fluoride crystals ($K_2Mg_sSi_8$ $O_{2o}F$) which closelyresemble mica.Addition of 2.5% lithimm fluoride to the embedment material may promote crystallization of mica and increase toughness of glass ceramic.

Advantages:

i) Excellent marginal fit.

ii) High strength.

iii) Surface hardness and occlusal wear similar to enamel.

iv) Can produce wax patterns precisely by using lost wax technique.

ii) Cera Pearl

Composition:

Cera Pearl is composed of CaO, P_2O_5, MgO, and SiO_2

CaO (45%) and P_2O_5 (15%) are the main constituents in glass formation and hydroxyapatite crystals.

MgO (5%) helps in formation of hydroxyapatite crystals.

SiO_2 (34%) with P_2O_5 forms the matrix and regulates thermal properties.

Advantages:

i) Biocompatible

ii) Young's modulus, tensile strength and compressive strength are higher than conventional porcelains.

4) Machinable Ceramic:

These products are supplied in the form of ceramic ingots in various shades and with the help of a machine are fabricated.The fabrication process involves exposing a ceramic ingot to a machining apparatus, which produces desired contours. This is followed by occlusal adjustment, polishing, etching and bonding to the tooth.

Various types of ingots used are:

a) Cerec Vitablocs Mark I

b) Cerec Vitablocs Mark II

c) Dicor MGC

d) Celay.

5) Computer Assisted Restorations

Currently, the CEREC system (Sieman's corporations, charolette, NC) is a computer assisted design comuter assisted manufacture (CAD/CAM) ceramic reconstruction with a laser imaging camera that reconstructs the tooth preparation in three dimensions. The operator can program the design and the computer directs the milling machine in the appropriate fabrication of the restoration.

Advantages

Computer assisted system eliminate the problems that arise for the indirect fabrication technique employed.

Disadvantages

High cost and inability to build layers of color and translucency.

Examples – lava (3M USA), Procera (Sweeden)

6) ART GLASS

Polymer glass material.

It offers the esthetics and longevity of porcelain but is tougher and more flexible.It can be easily adjusted or repaired intraorally with any hybrid composite. It is color stable, plaque repellent and offers perfect esthetics and margins.

Current materials for ceramic laminate veneer restorations: [30]

Fracture Toughness and Relative Optical Properties

Material	Flexural Strength (MPa)	Opacity/ Translucency
Slip-Cast Alumina Ceramics (In-Ceram, Vita Zahnfabrik, Germany)	630	high/low
High-Alumina Reinforced (Sintered) Ceramics (Procera-Sandvik, Stockholm, Sweden)	600	high/low
Leucite-Reinforced Ceramics		
(Empress 1, Ivoclar-Vivadent, Lichtenstein)	180	moderate/moderate
(Cerpress SL, Leach and Dillon, Cranston, RI)	180	variable (high/low)
Feldspathic Ceramics	90	low/high
(Creation, Jensen Industries, New Haven, CT)		
Synthetic Low-Fusing Quartz Glass Ceramics (HeraCeram, Heraeus-Kulzer-Jelenko, Arrnonk, NY)	120	very low/very high

REPAIR OF VENEERS[24]

Failures of esthetic veneers occur because of breakage, discoloration, or wear. Consideration should be given to conservative repairs of veneers if examination reveals that the remaining tooth and restoration are sound. It is not always necessary to remove all of the old restoration. The material most commonly used for making repairs is light cued composite.

Veneers on tooth structure

Small-chipped areas on veneers can often be corrected by recontouring and polishing. When a sizable area is broken, it can usually be repaired if the remaining portion is sound.

Direct composite veneers

For direct composite veneers, repairs ideally should be made with the same material that was used originally. After cleaning the area and selecting the shade, the operator should roughen the damaged surface of the veneer and/or tooth with a coarse, rounded end diamond instrument to form a chamfered cavosurface margin. For more positive retention, mechanical locks may be placed in the remaining composite material with a small round bur. An etching solution is applied to clean the prepared area, which is then rinsed and dried. Next, a resin-bonding agent is applied to the preparation (existing composite and enamel) and polymerized. Chair side composite material is then added, cured, and finished in the usual manner.

Indirect processed composite veneers

Indirect processed composite veneers are repaired in a similar manner.

Porcelain veneers

However, in order to repair porcelain veneers, a mild hydrofluoric acid preparation, suitable for intraoral use, must be used to etch the fractured porcelain. Hydrofluoric acid gels are available in approximately 20% buffered concentration, which are intended for intraoral porcelain repairs. Although caution still must be taken when using hydrofluoric acid gels intraorally, the lower acid, concentration allows for relatively safe intraoral use. Full strength hydrofluoric acid should never be used intraorally or etching porcelain isolation of the porcelain veneer to be repaired should be accomplished with rubber dam to protect the gingival tissues from the irritating effects of the hydrofluoric acid. The manufacturer's instructions must be followed regarding application time of the hydrofluoric acid gel to ensure optimal porcelain etching. A lightly frosted appearance similar to that of etched enamel should be seen if the porcelain has been properly etched. A silane-coupling agent may be applied to the etched porcelain surface prior to the application of the resin-bonding agent. Chairside composite material is then added, cured, and finished in the usual manner. Large fractures are best treated by replacing the entire porcelain veneer.

Faulty veneers in metal restorations[17]

Faulty acrylic resins veneers on gold crown after long years of service need replacing because of wear and discoloration. The teeth are cleaned with slurry of pumice and the shade selected before isolation by cotton rolls and retraction cords. With superficial wear or staining, part of the old restoration (silicate cement, acrylic or composite) can be left to achieve some masking of the underlying metal. All of the old resin material is removed with an appropriate instrument such as a No. 1558 carbide metal cutting bur. Both preparations are accomplished together. The outline of each preparation is extended gingivally by removing some of the gold. The operator should endeavor to create a chamfered finish line. Retention is placed with a No. 33 ½-carbide bur in selected areas in the metal along the line angles approximately 0.25 mm deep.

Although the preparations are done simultaneously, it is usually better to place the veneers one at a time. A light cured composite is recommended because of the extended working time. Polyester strips are placed between the proximal surfaces. The preparation is cleaned with acid etchant for 30 seconds, then rinsed and dried to remove debris and obtain a clean dry surface. The acid is used only to clean the surface, not to etch the metal. Wedges placed in the gingival embrasure may help to establish proper contour of the matrix. A masking material (opaquing resin) is artfully placed with a small brush over the metal areas of the preparation by applying and curing successive thin layers. Adhesive resin lines containing 4-META, capable of bonding to metal, also may be used to achieve additional retention and to achieve some masking. These materials should be placed directly over the prepared metal surface. Manufacturer's instruction should be followed closely to ensure optimal results with these materials, as they are quite sensitive to proper technique.

Next, a small amount of composite material (gingival shade) is placed at the cervical area with a hand instrument, adapted with the time of a No. 2 explorer, and cured with visible light. New material of the preselected lighter shade is added to restore the middle and incisal portions. A small brush is helpful in smoothing the surface and obtaining the final contour before curing. Finishing is delayed except for removing any excess contour at the mesiofacial embrasures.

Evaluation of the width of the teeth can be achieved with a Boley gauge or another appropriate caliper. The second preparation is cleaned and died before the opaque or adhesive liner is added. Composite material is inserted and cured as

described for the first veneer. The retraction cords are removed and both restorations are finished together to obtain symmetrical contours.

CONCLUSION

New emerging concepts in esthetic dentistry with regards to materials technology and public awareness have made veneers on demand. It has been less than a decade since the phenomenon of fusing porcelain directly to tooth was first described in 1980s since then the growth and development in this field has been nothing short of humungous. Yet, because the science is still in its infancy cautions is required. The average dentist has a tendency to think only in terms of articulation also and function with a little thought to esthetics. We should always keep in mind that we are dealing with organs, which can change an individual's entire visual personality. A captivating smile showing an even row of natural gleaming white teeth is a major factor in achieving that elusive dominant characteristic called personality. The objective of cosmetic dentistry must be to provide the maximum improvement in esthetic with the minimum trauma to the dentition. There are a number of procedure that begin in approximate the ideal parameter of cosmetic dentistry, most notably that of porcelain laminate veneers.

Porcelain veneers are a useful adjunct to the armamentarium of the dentist to help in the management of aesthetic problems in patients, both young and old. Care needs to be taken during tooth preparation and particularly during the luting phase to ensure maximal results are obtained for the patient.

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