

INDIRECT LAMINATE VENEERS PREPARATION DESIGNS AND MATERIAL SELECTION

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ABSTRACT

One of the most frequent reasons that patient seeks dental care is discolored anterior teeth. Ceramic laminate veneers, also known as “contact lens,” are capable of providing an extremely faithful reproduction of the natural teeth with great color stability and periodontal biocompatibility. This review article will be discussing different preparation designs and material options of indirect veneer.

Key words: Indirect Laminate Veneers, ceramic, tooth preparation

INTRODUCTION

Aesthetics is a branch of philosophy which deals with beauty and the beautiful (Merriam Webster dictionary).¹The goal of esthetic dentistry should be "bright, beautiful, but believable."² Charles Reade rightly said that beauty is power; a smile is its sword. Hence a confident smile is one of the most important aspects of one's personality.³Various treatment modalities for esthetic rehabilitation exist like micro abrasion, direct composite resin restorations or combination of both, indirect composites, crowns, esthetic veneers, and so forth. Restorative aesthetic dentistry should be practiced as conservatively as possible.⁴ With the introduction of adhesive systems more conservative treatment options have emerged. One of the most minimally invasive techniques is the application of laminate veneers made of either ceramics or particulate filler composites.^{5,6} A veneer is a thin covering over another surface.⁷ A dental veneer is a thin layer of tooth colored material that is applied to a tooth to restore localized or generalized defects and intrinsic discolorations.⁸ Between the late 1920's and mid 1930's a Californian dentist called Charles Pincus created the first veneer. The Laminate veneer refers to the combination of tooth, bonding interface and veneer complex. Veneers can be fabricated as indirect restorations using porcelain or composite resin or as a direct restoration using composite resin.

The choice between direct and indirect techniques should be based on tooth vitality preservation, minimum loss of sound tissue, a minimally invasive approach toward the gingival complex, esthetic demands, patient age, financial cost, and total treatment time, the number and extent of involved teeth, type of function, antagonist teeth situation, feasibility of functional and anatomical recovery, and biomechanical resistance of the restored tooth.⁹ Direct techniques provide the maximum preservation of residual sound tissue but with this method, the restorative material must be placed and completed in one appointment and it needs a long chair side time.¹⁰ But Indirect technique provide remarkable advantages like maximum

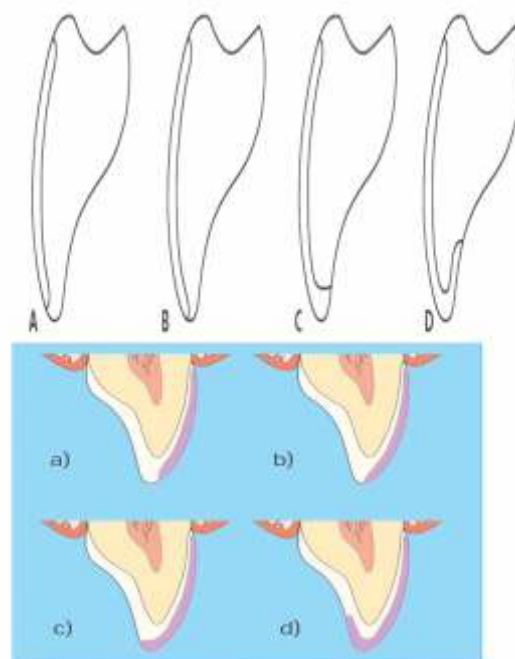
aesthetics optimal control of tooth dimensions, try-in and esthetic evaluation on the hydrated tooth prior to the start of cementation procedures.

INDIRECT VENEER

Veneer shades and contours can be better controlled when made outside the mouth on the cast. Indirect veneers are attached to enamel by acid etching and bonding with a light cured resin cement.

Preparation designs :

- Window preparation
- Feathered-edge
- Butt joint
- Incisal overlap preparation¹¹



- a) Window preparation:-Incisal edge of the tooth is preserved. In this we get ceramic thickness of 0.4 to 0.7 mm near the incisal edge. So can decrease the incidence of ceramic fracture and wear of opposing teeth. But it is difficult to mask the ceramic finish line and there is risk of chipping of

the unsupported enamel on the incisal edge.

- b) Feathered-edge preparation: - The incisal edge of the tooth is prepared buccopalatally, but the incisal length is not reduced. Indicated only in patients with normal overbite. This may be associated with weak veneer, increased risk of ceramic chipping, and difficulty in veneer placement. Poor marginal adaptation has also been reported.
- c) Butt joint or bevel preparation: - The incisal edge of the tooth is prepared labiopalatally, and the length of the incisal edge is reduced (0.5-1mm). Indicated when the incisal edges are thin buccolingually or to increase the incisal length. This design can increase the surface area and avoids sharp angles. But there is high risk of developing ceramic fractures.
- d) Incisal overlap preparations:- The incisal edge of the tooth is prepared Buccopalatally, and the length is reduced (about 2 mm), so the veneer is extended to the palatal aspect of the tooth. Indicated in cases with anterior cross bite or deep overbite. Translucency of incisal edges and a more natural appearance can be given. Palatally the finish line should be above or below the centric lingual contact.¹²

MATERIAL SELECTION

Commonly used materials include processed composites, pressed ceramics and feldspathic porcelain. Ceramic laminate veneer restorations have proven to be durable and aesthetic restorative procedure for treatment of anterior teeth. It maintains the biomechanics of an original tooth. It has got a success rate of approximately 93% over 15 years of clinical use. Several types of ceramic materials are being used now. These materials can be classified according to sinterization temperature, composition and manufacturing technique¹³.

According to composition:-

- 1) Glass based ceramics: Feldspathic

porcelain, IPS Empress, IPS Empress II, and e-max Press.

- 2) Alumina based ceramics: In-ceram Alumina, In-ceram Spinell, In-ceram Zirconia, Procera All Ceram.
- 3) Zirconia Based Ceramics.

Glass Based Ceramics:- Feldspars are mainly comprised of silica dioxide (60% - 64%) and aluminum oxide (20% - 23%) and are modified in different techniques to create glass that can be used in dental restorations.¹⁴ The ideal conditions for the bond between the feldspathic veneer and the substrate are the presence of 50% or more of the bonded substrate being enamel.¹⁵ Traditionally fabricated using layering technique so that can give a naturally looking restoration. But it takes time. With CAD/CAM technology, under precise condition can give fine crystals without pores.¹⁶ Glass ceramics are fabricated through lost wax and heat pressed techniques, or using machinable technique. They can be opaque or translucent.¹⁷ It depends on its composition. Incorporation of fillers like leucite and lithium disilicate crystals, due to their low refractive index can impart translucency.¹⁸

Leucite reinforced glass ceramics (IPS Empress-Ivoclar Vivadent)

Lithium disilicate reinforced ceramics (IPS Empress II—Ivoclar Vivadent)

IPS e-max press- Lithium disilicate reinforced - More translucent.

Alumina Based Ceramics:- Includes In-ceram porcelains and Procera All Ceram

In-Ceram Porcelains: These are infused ceramics processed with slip-casting technique. According to the composition In-ceram porcelain is classified into: In-ceram alumina, In-ceram spinell, and In-ceram zirconia.¹⁹

In-ceram Alumina is composed of 85% aluminum oxide particles measuring 2 - 5 µm in diameter. They have low translucency than glass ceramics. In-Ceram Spinell contains a mixture of magnesia and alumina (MgAl₂O₄) in the framework to increase translucency. In-Ceram Zirconia composed of 67% aluminum oxide and 33% partially stabilized zirconium

oxide. In-ceram zirconia has an opaque core that lacks translucency, its opacity is comparable to metal alloy.

Porcera All-Ceram:-This material is fabricated from copings that contain 99.9% high purity aluminum oxide, these copings are coated with conventional aluminum ceramic. Fabricated using dry – pressing technique. High strength and higher level of translucency than In-ceram alumina and zirconia²⁰. These ceramics are not sensitive to hydrofluoric acid etching, so an effective method to roughen the alumina based ceramics is pretreatment by airborne particle abrasion

Zirconia Based Ceramics: - Zirconia based ceramic is polycrystalline material that contain no glass. In this type of ceramic all the atoms are packed into regular crystalline arrays through which it is very difficult to drive a crack. Has three forms – cubic, tetragonal and monoclinic form. Yttrium oxide partially stabilized zirconia (Y-TZP) has got mechanical properties like chemical and dimensional stability, high mechanical strength and fracture toughness. A very high fracture toughness of zirconia even with a very thin thickness accompanied with highly glazed esthetic appearance are main advantages.²¹

CONCLUSION

The minimum-thickness anterior ceramic laminate veneers may be a conservative and esthetic alternative to reestablish the form, shape, and color of anterior teeth. Even though it is one of the most conservative of treatment options, some rules have to be followed. The case has to be carefully selected and treatment planned. Tooth reduction for any restorative technique should be as conservative as possible.

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