

## Evaluation of Esthetic Rehabilitation of Teeth with Severe Fluorosis Using Direct and Indirect Laminate Veneer: A Case Report

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### Abstract

Laminate veneers is a conservative method of restoring the appearance of discolored, pitted teeth, and teeth with diastemas that provide extremely good esthetic results. A 21-year-old male patient with staining in maxillary and mandibular anterior teeth had reported for esthetic rehabilitation. This article presents the stages of esthetic rehabilitation of a patient with severe fluorosis including direct Laminte (composite) veneering for mandibular anterior teeth and indirect Laminate (ceramic) veneering for maxillary anterior teeth. The patient was satisfied with the enhanced esthetic appearance. One year follow up have displayed acceptable outcomes and esthetic appearance.

**Keywords:** Esthetics; Fluorosis; Pitted teeth; Porcelain veneer; Direct laminate; Indirect laminates

### Introduction

Dental fluorosis is caused by an excessive fluoride intake during tooth formation. Fluoride-containing dental products and drinking water are two main potential sources for this developmental tooth disorder. Fluoride related alterations in enamel lead to surface hypermineralization and subsurface hypomineralization which are characterized by white opaque appearance with secondary brown stain. The successful treatment of fluorosed teeth depends on the severity of the fluorosis [1]. In the mild cases of dental fluorosis, clinical appearance is characterized by opaque white areas presenting as horizontal lines and cloudy patches on the enamel surface. Bleaching and microabrasion have been recommended for these forms of fluorosis. In the moderate-to-severe level of fluorosis, all tooth surfaces are affected by white opacities. Brown stains and some pits may be observed on the surfaces as a result of damage to the poorly mineralized enamel. Treatments include microabrasion, direct composite restorations, esthetic veneers or crowns or combination of the above mentioned techniques [2]. Laminate veneer restorations are two different types: direct and indirect laminate veneers. Direct laminates are applied on prepared tooth surfaces with a composite resin material directly in the dental clinic. Absence of necessity for tooth preparation, low cost for patients compared with indirect techniques and other prosthetic approaches, reversibility of treatment and no need for an additional adhesive cementing system are some advantages of this technique. Intraoral polishing of direct laminate veneers is easy and any cracks or fractures on the restoration may be repaired intraorally and marginal adaptation is better than that of indirect laminate veneer restorations. However, the main disadvantages of direct laminate veneers are low resistance to wear, discoloration and fractures. Indirect laminate veneers with high resistance against attrition and fractures and discolorations, however, long chair time, higher cost and use of an adhesive cementing system are the main disadvantages of indirect laminate veneer restorations [3]. This article presents the stages of esthetic rehabilitation of a patient with severe fluorosis including Direct Laminte (composite) veneering for

mandibular anterior teeth and Indirect Laminate (ceramic) veneering for maxillary anterior teeth and its success in one year follow-ups is discussed.

### Case Presentation

A 25-year-old boy had reported to private clinic with the chief complaint of discolored teeth. The patient was not satisfied with his smile appearance because of the discolored teeth. The clinical examination and history revealed that the present discoloration was due to Generalized fluorosis representing as opaque patches, subsurface brown staining and small pits in enamel representing severe fluorosis (Figure 1). The diagnosis was made based on the Dean's fluorosis index. Due to young age, patient was insisting for esthetic correction of anterior teeth only. Radiographic and clinical examination did not reveal any periapical pathological condition (Figure 2). Therefore esthetic correction with more conservative procedure and indirect porcelain veneers for maxillary anterior teeth and direct composite for mandibular anterior teeth were planned. Diagnostic impressions were made and diagnostic wax-up was carried out. The teeth were esthetically contoured and then prepared for porcelain veneers.

### Indirect laminate technique for maxillary anterior teeth

The maxillary anterior teeth were prepared for ceramic veneer thickness starting with the labial surface using depth cutting burs from mesioproximal line angle to distoproximal line angle. A definitive chamfer margin was prepared. The preparations were terminated at linguoincisor line angle (Figure 3). Once the preparation was completed, impressions were made using polyvinyl siloxane impression material (Examix; GC America Inc., Aliso Viejo, California, USA) by putty-wash technique and cast is poured in vacuum-mixed Type IV Gypsum Product (Ultrarock; Kalbhai Karson Pvt. Ltd., Mumbai, India) according to the manufacturer's recommendations. The veneers were waxed-up to dies and they were fabricated from lithium disilicate-reinforced glass ceramic material (IPSEmpress 2). Each porcelain veneer was individually tried starting from distal tooth. The intimate adaptation, margin and shade of each porcelain veneer were checked. The inner surface of porcelain veneers was treated



**Figure 1:** Intraoral view discoloured maxillary and mandibular anterior teeth



**Figure 4:** Cementation of porcelain veneer in maxillary anterior teeth- frontal view



**Figure 2:** Preoperative OPG



**Figure 5:** Composite veneer in mandibular anterior teeth-frontal view



**Figure 3:** Tooth preparation in maxillary anterior teeth- frontal view

with air-particle abrasion using 50  $\mu\text{m}$  AlO (Korox, Bego, Germany) with a chair side air-abrasion device (CoJet, 3M-ESPE, Germany) from a distance of 10 mm at a pressure of 250 kPa bar for 10 s. Then, each surface treatment was followed by acid etching with 9% hydrofluoric acid (Pulpdent Corporation, USA) prior to silanization. A silane coupling agent (Pulpdent Corporation, USA) was applied to the internal veneer surface for 60s and air-dried. Gingival retraction cord was placed on the prepared teeth to decrease the crevicular fluid flow. During cementation procedure, each tooth was etched for 15s using a 37% phosphoric acid etch-gel (Alpha-Etch 37, Dental Technologies, USA). Subsequently, the tooth surface was rinsed thoroughly and

air-dried gently. Dentin primer and adhesive were applied as the preparation reached dentin structure (Clearfil, Kuraray). Following the bonding application, a thin layer of light polymerizing resin luting cement was applied at the intaglio surface of the veneers, placed onto the prepared teeth and light-polymerized for 40s (Elipar Free Light, 3M ESPE) from palatal, labial, and incisal sides. Excess luting cement was removed and the marginal area was finished and polished with abrasive discs. Restorations were checked to avoid any occlusal interference (Figure 4).

#### Direct laminate technique for mandibular anterior teeth

The color was recorded using the Vita Classical shade guide, and the shade A2 and A3 was considered as the initial color the tooth preparation involved a minimal chamfer in the facial surfaces. The enamel surface was acid etched using 35% phosphoric acid gel (Ultra-Etch; Ultradent, South Jordan, UT, USA) for 15 s, rinsed for 10 s and dried. A self-etch two component adhesive system (Clearfil SE bond; Kuraray, Osaka, Japan) was applied on the prepared enamel and dentin surface and light-cured for 10 s with an intensity of 1100 mW/cm<sup>2</sup> (Demi Plus LED; Kerr, Middleton, USA). A stratified layering technique was used to fill the tooth with microhybrid resin composite (Vit-l-escence; Ultradent, South Jordan, UT, USA). The contouring and finishing was accomplished with finishing burs (Composite Finishing Bur Kit; Ultradent, South Jordan, UT, USA). The polishing was performed using polishing disk, polishing points and cups (Jiffy Polishers and Jiffy HiShine; Ultradent, South Jordan, UT, USA) and diamond polishing

paste (Diamond Polish Mint; Ultradent, South Jordan, UT, USA) (Figure 5). Patient was recalled in 2 days and encouraged for better dental flossing and also recalled every 6 months for periodical controls.

## Discussion

The aim of the treatment in this case was to restore the patient esthetics and self-esteem. Different treatment plans have been proposed for the treatment of discoloration in the fluorosed teeth depending on the severity of the fluorosis. A direct composite restoration was a conservative alternative which offered the ability to correct the shape and the contour of mandibular anterior teeth in addition to the removal of discoloration. Although using direct composite provides excellent esthetics; the fracture resistance, wear resistance and color stability of composite resin is lower than indirect porcelain restorations. Furthermore, bonding procedure to the fluorosed enamel and dentin can be challenging [4]. In these cases some modifications in the preparation etching time and selection of adhesive system had been done. It is recommended to grind the fluorosed enamel surface to remove the hypermineralized layer [5]. Etching with phosphoric acid for 15 s achieved the best results in the normal enamel. While the best etching result were obtained at 30 s for the moderate fluorosed enamel, increased etching time for severe fluorosis result in less retentive surface The bond strength of all the adhesive systems to enamel is adversely affected by fluorosis. In contrast to surface enamel, fluorosed dentin is more susceptible to acid, especially in the severely affected teeth Therefore, etch-and-rinse systems are not recommended for bonding the dentin in the affected teeth, It has been reported that reliable adhesion can be obtained using two-step self-etch adhesive system [6-9]. Ceramic Veneers is considered to be a more conservative treatment approach than full crowns because preparation of the teeth for veneers requires less tooth reduction than full crown preparations. Porcelain veneers provide precise color match and translucency to the natural tooth and fulfill the need for adequate retention. Porcelain veneers are very suitable for young adults who have large pulp chamber and pulp horns close to the teeth enamel surface [10]. Porcelain veneers have become the major modality of treatment when conservative aesthetic restoration of anterior teeth is needed. Minimally invasive preparation designs and modern ceramic materials make this treatment option increasingly conservative to the natural tooth structures, while providing both predictable and long-lasting aesthetics [11,12]. Porcelain veneers ensure color and translucency close to those of the natural tooth as well as fulfilling the need for adequate retention, while preserving maximum remaining tooth structure. Porcelain veneers involving the incisal edge, proximal areas, and parts of the palatal surface have been recognized as an alternative to full crowns in the anterior dentition. The versatility of veneers allows them to be used with a variety of preparation forms, from simple facial veneers to more complex restorations that involve the replacement of more tooth

structure [13,14]. The use of porcelain veneers to solve esthetic and/or functional problems in the anterior section has been shown to be a convincing option. Years of experience with both the technique and the materials employed offer satisfactory, predictable, and lasting results.

## Conclusion

Successful laminate veneers depend upon clinician ability to select the appropriate material to match intraoral conditions and esthetic demands. Advancement in the technique, ceramic materials, and luting cements made porcelain and composite veneering the most accepted treatment for esthetic correction of the anterior teeth over full coverage restorations.

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