

Esthetic Rehabilitation of a Patient with Dental Fluorosis using Porcelain Laminate Veneers - A Case Report

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ABSTRACT

Introduction: Dental fluorosis is hypo-mineralization of tooth enamel caused by intake of excessive fluoride during the formative stage of enamel formation. It causes intrinsic enamel staining ranging from mild to severe. Mild forms can be treated with conservative approach like bleaching, while moderate and severe forms need esthetic restorative procedures.

Case report: This case report describes rehabilitation of a moderate form of dental fluorosis using a conservative treatment approach with porcelain laminate veneers (PLVs). Porcelain laminate veneers provide better esthetics along with optimum functional strength.

Conclusion: Minimally invasive restorations are beneficial because they reduce the risk of endodontic complications in the abutment teeth, preserve tooth structure, and offer the potential for highly esthetic results. This treatment approach offers interesting possibilities but also involves a high degree of technique sensitivity regarding the preparation (mainly in the enamel), adhesive bonding, and final fine-tuning of the static and dynamic occlusion. Adherence to the defined guidelines during the various clinical and technical treatment phases is a key factor for achieving long-term clinical success.

Keywords: Dental Fluorosis; Porcelain Laminate Veneers; Esthetics

INTRODUCTION

In the current scenario conservative dental treatment modalities have become widely popular. Porcelain laminate veneers is one of the conservative treatment modalities, which have opened a new era in the field of dentistry known as “Esthetic dentistry”. With the introduction of etching and bonding techniques, porcelain laminate veneers have become more popular in the field of aesthetic dentistry. While composite veneers have improved a lot since their introduction into dentistry, they still have a few drawbacks such as wear, marginal and incisal edge fractures, and discoloration. Porcelain veneers are more stable, exhibit better wear resistance, better esthetics and shown less plaque retention. With advancements in adhesive and bonding techniques, the long-term survival rate of laminate veneers has improved dramatically.¹

CASE REPORT

A 21 years old female patient reported to the Department of Prosthodontics with the chief complaint of un-esthetic appearance due to discolored upper front teeth (Fig 2) and

spacing between upper lateral incisor and canine on both sides. Patient had no gross extra-oral facial deformity, muscle tenderness, TMJ pain and no deviation while opening and closing. Intraoral examination revealed moderate form of dental fluorosis with respect to upper and lower arch with fair oral hygiene. There was no interference in protrusive and lateral excursive movements. There was 2mm of over jet and over bite in maximum inter-cuspation position. Based on clinical and radiographic investigations, the case was diagnosed as moderate form of dental fluorosis (Fig 1) and taken up for rehabilitation with incisal lingual wrap type Porcelain laminate veneers for maxillary anterior teeth. (13,12,11, 21, 22, 23)

Clinical Procedure: After complete examination, diagnostic impressions were made with irreversible hydrocolloid (Dentsply Zelgan) and diagnostic casts were obtained (Fig 3a). Silicon putty (Dentsply Aquasil soft putty) index guide was made over the diagnostic cast for uniform reduction while tooth preparation. Index was cut horizontally from right to left into three sections at the level of Incisal (Fig 3b); middle third (Fig 3c) and cervical (Fig 3d). Shade selection (VITA Classical shade guide) was done under natural daylight.

To maintain proper depth, preparation was started with horizontal depth grooves given by a diamond depth cutting bur on the labial surface of upper anterior teeth. Depth grooves were extended from mesial to distal without damaging the adjacent soft tissues and teeth that were not being prepared. Bur was angled in relation to the contour of the labial surface to achieve the appropriate depth for these guide cuts. To achieve optimum bond strength, depth grooves were kept in enamel only and not extended into dentin.^{2,3} Even though dentin adhesives have improved dramatically,

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Classification	Criteria
Normal (0)	The enamel represents the usual translucent semivitriform-type of structure. The surface is smooth, glossy, and usually of pale, creamy white color.
Questionable (0.5)	The enamel discloses slight aberrations from the translucency of normal enamel, ranging from a few flecks to occasional white spots.
Very mild (1)	Small, opaque, paper white areas scattered irregularly over the tooth, but not involving as much as approximately 25% of tooth surface.
Mild (2)	The white opaque areas in the enamel of teeth are more extensive, but do not involve as much as 50% of tooth.
Moderate (3)	All enamel surfaces of the teeth are affected and surfaces subject to attrition show wear. Brown stain is frequently a disfiguring feature.
Severe (4)	All enamel surfaces of the tooth are affected and hypoplasia is so marked that the general form of the tooth may be affected. There is discrete pitting of the affected tooth. Brown stains are widespread and teeth often present a corroded-like appearance.

Figure-1: Types of Dental fluorosis



Figure-2: Pre-treatment intra oral pictures

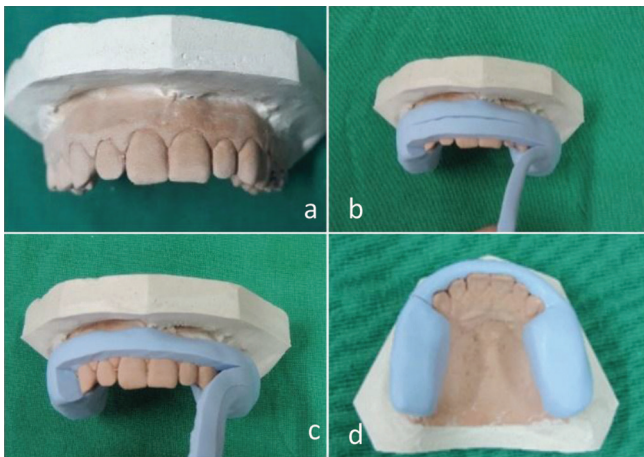


Figure-3: Study model and Silicon putty index guide

porcelain bonding to enamel is better than porcelain bonding to dentin.⁴ Depth of grooves was marked with lead pencil (Fig 4a), which helps as a reminder to avoid over reduction. The finish line of the preparation was kept at the gingival level, approximately 0.5 mm incisal to cemento-enamel junction (CEJ).

Labial Reduction (Fig 4b) was done using a tapered diamond bur. Silicone reduction guide (Dentsply Aquasil soft putty) was used in order to check the amount of reduction required. The reduction guide was designed to evaluate the amount of



Figure-4: Bio-mechanical tooth preparation and temporization (Essex appliance)



Figure-5: Lab procedures



Figure-6: Post-treatment pictures



Figure-7: Pre and Post-treatment pictures

reduction at the incisal, middle third and cervical third of the tooth. A chamfer finish line was prepared 0.5 mm incisal to the CEJ at gingival level. Interproximal tooth reduction was extended till contact area without breaking the contact point to prevent tooth movement during temporization.

Incisal reduction (Fig 4c) was done with a 0.5 mm depth cuts on incisal surface of tooth. For Incisal Lingual Wrap Preparation the mesio incisal and the disto incisal corners were reduced an additional 0.5 mm. Then using a diamond bur, incisal chamfer was extended to the palatal surface. All incisal edges was kept rounded. The palatal chamfer line was kept above the centric lingual contacts to avoid occlusal contact on the interface between porcelain and tooth structure. Contact should be either completely on porcelain or on tooth structure.

Once the preparation was done, tapered finishing bur was used to finish the preparation without further reduction. Gingival retraction (Ultrapak USA) was done by placing a # 0 cord to reveal the margin, which was left in place while making the impressions using putty-wash impression technique. Polyvinyl siloxane (Dentsply Aquasil USA) impression materials were used according to manufacturer's instruction and impressions were poured twice with Die stone (Kalabhai Ultrarock) one to obtain master cast and second to obtain a cast for fabrication of temporary template. An Essex appliance was fabricated using a thermoplastic material over the pre-treatment diagnostic cast. Precision of the template was checked on second cast obtained after tooth preparation, separating media applied on cast, template filled with composite resin was placed over it and light cured (Fig 4d). Finishing and polishing of appliance was done, checked in mouth and seated.

IPS empress porcelain material was chosen because of its good esthetics and life like appearance. Lab procedures were carried out in form of wax pattern fabrication, spruing (Fig 5), investment and wax burn out. Porcelain furnace used for press able ceramics as per the guidelines. Provisional restorations were removed, tooth surfaces were cleaned and washed thoroughly without inducing gingival bleeding. The teeth were dried, isolated for try-in procedure. Veneers were

moistened with water and placed over the prepared teeth to check fit and shade.

For cementation, inner surfaces of veneers were etched with hydrofluoric acid (CEREC 5% Hydrofluoric Acid Gel, VITA North America) for 20 seconds and Silane coupling agent (Kerr silane primer) was applied to the etched porcelain surface for 60 second followed by air-drying. Tooth surface was cleaned using pumice, dried and isolated. Prepared tooth surface was etched with 37% phosphoric acid for 30 seconds, rinsed thoroughly and air dried followed by bonding agent (Adper single bond 3M ESPE USA) application according to the manufacturer's instructions and was light cured. Dual cure resin luting cement (PANAVIA F 2.0) was applied to the inner surface of veneers and placed gently onto the tooth in an inciso-gingival direction. Excess cement was removed and light-cure was done at gingival margins first for 10 seconds, followed by all other surfaces. Final cure for 60 seconds was done through the facial surface. Excess cement were removed using sharp hand instruments. A layer of glycerine gel (Liquid strip- IvoclarVivadent) was applied along the veneer margins. Fine and extra fine diamond finishing burs were used to remove excess resin cement. Polishing was done to regain a smooth porcelain surface. Occlusion was checked in protrusive and lateral excursive movements and no interferences were found (Fig 6,7)

DISCUSSION

Dental fluorosis is hypo-mineralization of tooth enamel caused by intake of excessive fluoride during the formative stage of enamel formation. It causes intrinsic enamel staining ranging from mild to severe. Depending upon severity of dental fluorosis, different treatment options available includes tooth bleaching, micro abrasions, direct composite veneers, indirect composite veneers, porcelain laminate veneers, all ceramic crowns and metal ceramic crowns. Composite resin and porcelain are the most frequently used veneering material for moderate to severe form of dental fluorosis. Composite resins have some advantages like easy to use, less time required, cost effectiveness but poor wear resistance and staining are some disadvantages, which makes them inferior to dental porcelain. Conservation of tooth structure has apparently become a major factor in determining the long term prognosis of any restorative procedure. Most important advantages of porcelain laminate veneers is that they are extremely conservative in terms of tooth reduction. In the present case report, only 0.3 to 0.5 mm reduction on the labial surface was done. This minimal reduction rarely leads to pulpal involvement which is a major advantage of porcelain laminate veneers. Another advantage of highly glazed porcelain laminate surface is less plaque accumulation, considered important to attain a healthy periodontal response. Excellent esthetics is achieved due to lifelike appearance of porcelain and scattering effect of the luting cement. However, porcelain laminates veneers have their own limitations too. They should not be used when remaining enamel is inadequate to provide adequate retention. The prognosis for veneers in bruxism is doubtful.⁵

Certainly, such patients should be instructed to use a night guard during sleep. Even, if the laminates fail in long term run, the conserved tooth can still be treated with all other treatment options like a full crown restoration. Porcelain laminate veneers offer a predictable and successful treatment modality that preserves maximum sound tooth structure. According to Dumfahrt and Schäffer et al⁶, the estimated survival probability of porcelain laminate veneers over a period of 10 years is 91%.

CONCLUSION

The reliable resin bonding between enamel and porcelain has brought in a paradigm shift towards more conservative preparation design methods relative to the preparation methods that were utilized a few decades ago. Minimally invasive restorations are beneficial because they reduce the risk of endodontic complications in the abutment teeth, preserve tooth structure, and offer the potential for highly pleasing esthetic results. This treatment approach offers interesting possibilities but also involves a high degree of technique sensitivity regarding the preparation (mainly in the enamel), adhesive bonding, and final fine-tuning of the static and dynamic occlusions. Adherence to the defined guidelines during the various clinical and technical treatment phases is a key factor for achieving long-term clinical success.

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