

A Smile Enhancement with Ceramic Veneers - A Case Report

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Abstract: Porcelain veneers are steadily increasing in popularity among today's dental practitioners for conservative restoration of unaesthetic anterior teeth. The adhesive porcelain veneer complex has been proven to be a very strong complex in vitro and in vivo. An optimal bonded restoration was achieved especially if the preparation was located completely in enamel, if correct adhesive treatment procedures were carried out and if a suitable luting composite was selected. The maintenance of aesthetics of porcelain veneers in the medium to long term was excellent, patient satisfaction was high and porcelain veneers had no adverse effects on gingival health inpatients with an optimal oral hygiene. Major shortcomings of the porcelain veneer system were described as a relatively large marginal discrepancy, and an insufficient wear resistance of the luting composite. Although these shortcomings had no direct impact on the clinical success of porcelain veneers.

Keywords - Ceramic, Esthetics, fluorosis, Etching, bonding

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I. INTRODUCTION

During the past 20 years, dentists have applied veneers to teeth using various techniques to correct esthetic problems. Veneers can be divided into 3 categories: free-hand-placed direct composite resins, preformed acrylic laminates and laboratory-fabricated acrylic resins, composite resins, porcelains and glass ceramic veneer. Porcelain and other all-ceramic veneers are rated as the best veneer restorations. The use of porcelain and other all-ceramic veneers to restore discolored or malformed anterior teeth has become a significant component of esthetic dentistry in the past decade.¹

Improvements in adhesive systems and the development of new-generation porcelain technology have supported the growing demand for treating unaesthetic teeth with porcelain laminate veneers. Studies have shown a 7% failure rate of porcelain laminate veneers, but failure had no direct impact on the clinical success in terms of longevity or durability. These restorations are highly esthetic, biocompatible, and resistant to staining and wear. Porcelain laminate veneer preparation can be stressful for dentists with insufficient clinical skills or experience. Lack of good procedural knowledge frequently results in failed restorations.²

II. Case Report

A 22-year old female patient reported with the chief complaint of poor esthetics due to fractured maxillary anterior teeth with dental fluorosis staining. (Figure-1) Extra-orally the only abnormality was the unaesthetic smile of the patient with broad arch form. Intra-orally the right incisor was restored with unaesthetic composite restoration with apparent shade difference to the adjacent teeth. Also mild to moderate fluorosis staining was present on the facial surfaces of maxillary anterior teeth.

The patient gave a history of restoration with upper anterior 6 months back. There was absence of tenderness on percussion, sinus tract was absent with no signs of bleeding on probing

and periodontal pockets.

2.1 Investigation:

An intraoral periapical radiograph was taken which demonstrated no abnormality with upper anteriors. Electric pulp testing showed a normal response and was responsive on cold test. Based on clinical and radiographic findings, the diagnosis of chipped unaesthetic restoration and fluorosis staining was confirmed.

2.2 Treatment:

Before the commencement of the treatment, oral prophylaxis was done in the patient. Various treatment options were discussed which included ceramic veneers and composite veneering. Owing to its minimally invasive nature and excellent aesthetic qualities it was decided to enhance her appearance using all ceramic laminate fabricated with E-Max from upper 5-5 teeth. Maxillary and mandibular diagnostic casts were made (Figure-2).

The colour of ceramic veneers was selected and incisal guidance was checked. Depth orientation grooves were placed on the facial surface of the tooth with 0.3mm and 0.5mm three-wheel diamond grooves on the gingival half and incisal half respectively. The structure remaining between the depth orientation grooves were removed with a round end tapered diamond bur. Doing so, the aprismatic top surface of mature unprepared enamel, which is known to offer only a minor retention capacity, was removed. A chamfer finish line was placed lightly subgingivally in the maxillary anterior teeth. Distally the tooth preparation was extended into the contact area but terminated facial to the contact area.

An overlapped incisal edge preparation was chosen because incisal overlap provides a vertical stop that aids in the proper seating of the veneer. The veneer extended onto the lingual surface will enhance mechanical retention and increase the surface area for bonding. All sharp angles of the preparation were rounded off (Figure-3). After gingival retraction (Figure-4), impression was made with polyvinylsiloxane by putty-wash technique (Figure-5). Temporary restoration was done with light cured composite resin.

2.3 Veneer Cementation:

The temporary veneers were removed; the teeth were cleaned using pumice and were dried. The Porcelain veneer made up of IPS-emax (Figure-6) was tried on to the tooth with selected shade of try in paste to verify its color and fit (Figure-7). The esthetics and fit were acceptable; the veneers were removed from the tooth, rinsed thoroughly and dried. The inner side of porcelain veneer was etched with 5% hydrofluoric acid (IPS Ceramic etching gel) for 20 seconds, washed under running water and dried. A layer of silane coupling agent (Monobond-S, Ivoclar Vivadent) was applied on the inner surface of veneer and gently air dried after one minute (Figure-8). The silane coupling agent forms a chemical bond between the porcelain and resin, besides it also reduces the marginal leakage and discoloration.

The silanized surface was then coated with a thin layer of bonding agent thinned with air from the air syringe. The resin layer was polymerized with light. The prepared teeth were etched with 37% phosphoric acid for 30 seconds, rinsed thoroughly and dried. A layer of bonding agent (Adper single bond 3M ESPE USA) was applied on to the tooth surface. Light cure resin cement (Variolink II, Ivoclar Vivadent, Liechtenstein) was used for bonding the veneer to the tooth. The selected shade of base paste and catalyst paste were mixed in proportion to get the shade that was obtained during the try in stage, and a layer of cement was applied on the inner surface of veneers. The veneers were then positioned on the teeth correctly with slight pressure and the excess cement was removed with a brush.

Light curing of the luting composite was done through the Liquid strip for 10 seconds and the veneers were tacked to the teeth. After the initial set the remaining excess cement was removed. The polymerization was continued for 60 seconds by directing the light initially from lingual side, so that the resin cement shrinks towards tooth providing more retention. Then each segment of veneer was light cured for 40 seconds. Occlusion was checked to ensure that no contact existed on tooth-porcelain interfaces. The patient was satisfied with her new smile (Figure-9).

III. Discussion

The porcelain veneer technique includes the bonding of a thin porcelain laminate to the tooth

surface using adhesive techniques and a luting composite in order to change the colour, form and/or position of anterior teeth. The success of the porcelain veneer is greatly determined by the strength and durability of the formed bond between the three different components of the bonded veneer complex, as there are the tooth surfaces, the luting composite and the porcelain veneer.

Enamel reduction is required to improve the bond strength of the resin composite to the tooth surface. Doing so, the aprismatic top surface of mature unprepared enamel, which is known to offer only a minor retention capacity, is removed. In addition, care must be taken to maintain the preparation completely in enamel to realise an optimal bond with the porcelain veneer.³

Veneers are mainly fabricated from conventional low fusing feldspathic porcelain. Two methods for fabrication of these porcelain veneers have been described: the platinum foil technique and the refractory die technique.⁴ At present, the refractory die technique is preferred to the platinum foil technique in most laboratories. By etching the inner side of the porcelain veneer with hydrofluoric acid and subsequently silanizing the etched surface, the bond strength of a luting composite to the etched porcelain surface has been measured to be higher than the bond strength of a luting composite to etched enamel and even exceeding the cohesive strength of the porcelain itself.

For cementation of porcelain veneers a light-curing luting composite is preferred⁵. A major advantage of lightcuring is that it allows for a longer working time compared with dual cure or chemically curing materials. This makes it easier for the dentist to remove excess composite prior to curing, and greatly shorten the finishing time required for these restorations. In addition, their colour stability is superior compared with that of dual-cured or chemical-cured systems.⁶

Unlike these procedures, the use of ceramic veneers offers an excellent combination of hardness, resistance, and resilience. According with Magne and Belser, a tooth restored with a ceramic veneer that is subjected to posterior-anterior force recovers 89 to 96% of its coronary stiffness when compared with a healthy tooth.⁷

IV. FIGURES



Figure 1-Preoperative intra-oral photograph



Figure 2-Mock-up done on cast



Figure 3-Finished and polished tooth preparation



Figure 4-Retraction cord placed

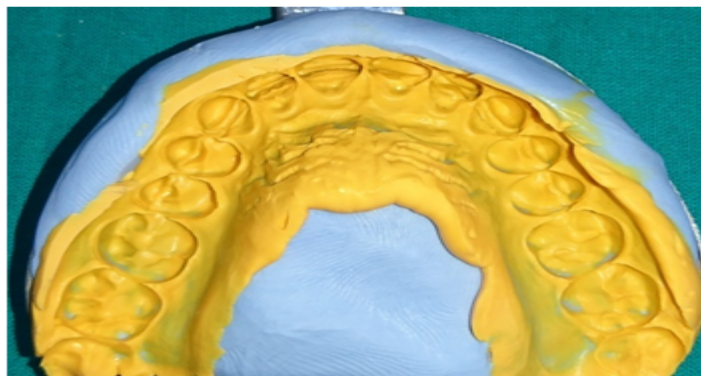


Figure 5-Details of the elastomeric impression



Figure 6-Finished and polished ceramic veneers



Figure 7- Evaluation of the shade and fit using try-in paste

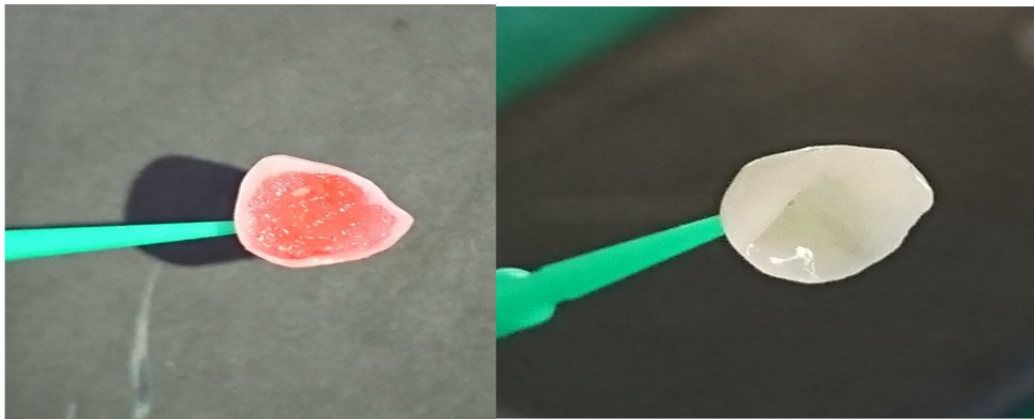


Figure 8-Etching (HF) and application of silane of the bonding surface of veneer



Figure 9-Post-operative intra-oral photograph

V. CONCLUSION

Etched porcelain veneer technology has demonstrated long-term clinical success. It has proved to be one of the most successful modalities of treatment that modern dentistry has to offer. The minimally invasive, conservative porcelain laminate veneer technique here described is an extremely versatile clinical procedure, with excellent esthetic results when performed according to a well-designed treatment plan and a strict protocol during the clinical and laboratory stages. Ceramic veneers can be a better choice as compared to composites as it is more esthetic and more conservative than full veneer crown.

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