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Veneers: Use of CAD CAM, Digital Photography & Conventional Impressions to Facilitate Esthetic dental treatment- A Case Report

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Abstract

The Porcelain Laminates Veneers (PLVs) is one amongst the most esthetic restorations. These are conservative and sturdy restorations provided the correct techniques and indications are followed. This clinical report describes the use of CAD/CAM technology combined with digital photography and a conventional impression technique to treat a case of generalized anterior spacing, hypoplastic spots and malformations using lithium disilicate ceramic veneers.

Keywords: CAD, CAM, Veneers.

Introduction

Preservation of tooth structure along with a long lasting solution for restoring the function, esthetic and bio-mechanics of teeth using minimally invasive techniques are the main goal of dentistry. The development of no-preparation or minimal-preparation concept along with improved enamel bonding procedure has made it possible to achieve these goals[1].

Rehabilitation of patients with diastemas, rotations and malformations can be done by direct composite veneers or by indirect lithium disilicate veneers. Direct restoration with composite resin has advantages such as minimally invasive, low cost compared with indirect techniques and other prosthetic approaches, reversibility, and a relatively simple technique, easy to repair (cracks or fractures), easy Intraoral polishing[2,3] and no need for an additional

adhesive cementing system are some advantages of this technique[4,5.]

Composite materials have increased conservative treatments of compromised anterior teeth[6,7.] The main indications for direct laminate veneer restorations are tooth discolorations, rotated teeth, coronal fractures, congenital or acquired malformations, diastemas, discolored restorations, palatally positioned teeth, absence of lateral incisors, abrasions and erosions[8,9] however, for extensive tooth reconstruction, composites have a high failure rate,[10] averaging 2.9% annually. This can be due to secondary caries, loss of restoration, pigment impregnation, fracture, marginal defects[11] or a highdegree of color instability.[12] The mechanisms behind the development of secondary caries are much less clear and are most probably multifactorial (microgaps and microleakage). Rehabilitation should include not only the esthetic aspect but also the reestablishment of occlusion, such as anterior and lateral guidance. Excellent soft tissue health and correct tooth contours and emergence profiles are just as important as the actual color of the new restoration/adjacent teeth.[13,14]

E-max crowns/veneers are prepared from lithium disilicate, which is a glass ceramic and possesses excellent strength. Emax crown imitate natural beauty of tooth structure, and it is all ceramic, looks lifelike, offer durability and high strength regardless of the indication. They offer outstanding performance which is because of combination of excellent flexural strength and high fracture toughness. The clinical success of the material attests to its quality. This is the material of choice since tooth conserving and conventional cementation are possible. Anterior restoration require esthetic excellency which is possible by lifelike transition of color and translucency with the benefit of stability of a monolithic structure. Reduced restoration thickness enables tooth preserving preparation and Bio-compatibility.[15]

Based on the above considerations, the objective of this report is to demonstrate a clinical case where the anterior teeth were rehabilitated using lithium disilicate ceramic veneers.

Case Report

A 24-year-old female patient was presented with a complain of white spots on her teeth, spacing and desire to have a cosmetic treatment for the same.

- On intraoral examination, it was observed that teeth had stains most likely caused by fluorosis and upper lateral incisors were not in proportion with centrals. Spacing between the 11 and 12, 12 and 13, 21 and 22, 22 and 23 was also present.
- On smile analysis, it was observed that incisal third of upper anterior teeth was visible on rest (Fig.1) and thin gingival biotype was present. On smiling, incisal edges of upper anterior teeth were not in harmony with vermillion border of lower lip. (Fig.1)
- Phonetic evaluation was done by asking patient to produce ‘s’ sound to check closest speaking space and ‘f’ sound to determine the labiolingual position and length of the maxillary teeth.
- The patient was informed about her smile defect and possible treatment options like orthodontic treatment and veneers were discussed. But due to time limitation, decision was made to treat the case with minimally invasive techniques and planned for veneers.
- The treatment objectives were to manage the discoloration and modify the contours of the teeth in most conservative method possible. Preoperative photographs were taken and a diagnostic wax up was made according to esthetic and phonetic evaluation. (Fig.2)

- Conservative intraorally mockup transfer with flowable composite (TPH Spectra ST flow, Dentsply Sirona) using biostar clear vaccum pressed hard template on unprepared teeth was done to evaluate esthetics and phonetics. (Fig.3) Photographs and patient approval was taken. Necessary changes done intraorally on composite mockup and a alginate impression was taken of approved mock up to communicate with laboratory. (Fig.4)

Tooth preparation

- A well adapted, horizontally sectioned silicon matrix was made from the diagnostic cast which was later used as a reference for teeth reduction to get controlled and appropriate tooth preparation. (The preparation depth of the order of 0.4mm close to the gingival margin, rising to 0.7mm for the bulk was achieved by using depth cutting burs.
- To mimic the natural curvature of the tooth and to provide even thickness of porcelain two plane facial reduction was done.
- Equigingival Chamfer finish line of 0.4mm of maximum depth was made. All the internal line angles were rounded to reduce stresses in the margins of the veneers. (Fig.5)

Impression record and Temporization

- After completion of the tooth preparation before taking impression stump shade was noted (A2 shade using vita shade guide) (Fig.6) and retraction cord (number-000) placed in facial gingival sulcus for tissue management.
- Fine details were recorded with the one stage putty/wash technique using silicone impression material (coltene affinis addition silicone) Temporaries were fabricated from composite material and cemented with the spot-etch technique. (Fig.7,8)
- Mockup cast and final impression was sent to lab for fabrication of E-max Veneers. Both the casts were scanned using cam scanner (ceramill map 400) and 3D planning and designing were done in Exocad software, intraoral composite mockup was overlapped on final prep images to get exact replicas of approved mockup. Wax patterns were milled using CAD/CAM. Pressed lithium disilicate veneers fabricated.

Cementation

- Once received from the laboratory, the restorations were tried intraorally and assessed for quality of fit, gingival extension and color match. The intaglio surface of veneers were treated with 9% hydrofluoric acid gel (Ultradent Procelain Etch) for 90 seconds and then rinsed (Fig.9). They were then etched with 37% Phosphoric Acid (3M ESPE Scotchbond Etchant) for 30 seconds for residue removal. They were thoroughly rinsed after. A silane agent (Ultradent) was applied on veneers and air dried afterwards for its uniform spread and to prevent its accumulation (Fig.10). A bonding agent was then applied on the veneers and light cured.
- Simultaneously tooth surface was etched using 37% of phosphoric acid for 30 sec (Fig.11) and then bonding agent was applied on tooth surface and light cured (Fig.12). Veneers were cemented started with central incisor. Polytetrafluoroethylene film tape was used to separate two veneers while cementation and floss was used to remove excess cement.(Fig.13) Similarly upper lateral incisor and were cemented using resin cement Variolink II (Ivoclar Vivadent) in a transparent colour without catalyst and then light cured. (Fig.14)
- Homecare instructions were given and asked to follow, follow-up protocol 1 week, 3 month and 6 months for assessment of the oral hygiene measures.

Discussion

Patient selection is essential for success of PLVs, in the present case because of young age a conservative method of treatment of PLVs were selected. Presence of normal overjet and overbite with favorable smile line and absence of parafunction and presence of sufficient enamel made PLVs most acceptable treatment option. The advantages of using these restorations are they are biologically acceptable to the body owing to their increased chemical stability, lesser cytotoxicity and reduced risk of causing irritation or sensitivity. These restorations exhibit reduced plaque build-up and its easy removal due to their smoothly glazed surface.16 Owing to their ceramic thickness (0.3-0.5mm), the PLVs can be easily fractured even before they are bonded. However, once the PLVs are bonded to the etched enamel surface they integrate with the tooth structure and become extremely durable. The union of etched enamel and porcelain, combined with the bonding composite resin-luting agent with a silane coupling agent provides a long lasting restoration.17 PLVs should be avoided when enamel is insufficient, parafunction, tooth is pulpless, unsuitable anatomically and poor oral hygiene. The risk factors for veneer failure are bonding onto pre-existing composites restorations, placement by an inexperienced operator, using veneers to restore worn or fractured teeth where large areas of exposed dentin and insufficient tooth structure is left. Another risk factor, shown up by in-vitro work, is the tendency for thermal changes in combination with polymerization contraction stresses to cause cracking of the veneer when the porcelain is thin and the luting composite is thick.2 A thick composite lute may occur as a result of a poorly fitting veneer or the use of copious die spacer in an attempt to mask underlying tooth discolouration. Least cracking was seen with a ceramic and luting composite thickness ratio above17,18 It is possible to use composite restorations rather than porcelain laminate veneers to cover up tooth discolouration or unesthetic forms. However, the longevity of composites is questionable as they are susceptible to discolouration, marginal fractures and wear.[16]

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Legend Figures

(a.) (b.)

Figure 1: Pre- operative view

Figure 2: Diagnostic Waxup

Figure3. Wax up transfer using vacuum pressed hard template

Figure 4. Intraoral view of composite mockup

Figure 5(a.) Tooth preparation Frontal View

Figure 5(b.) Tooth Preparation Occlusal View

Figure 6: Shade Matching

Figure 7: Spot Etching done before temporization

Figure 8: Composite Temporaries cemented

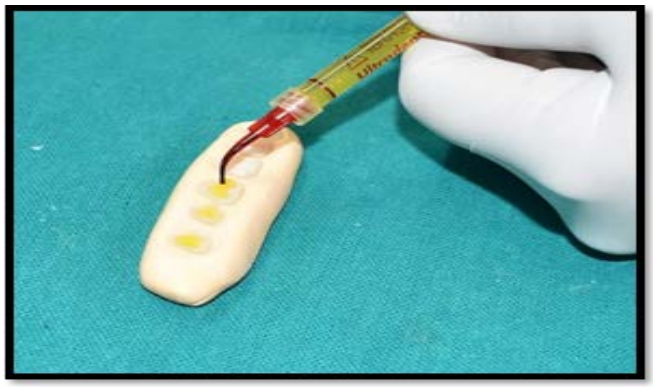

Figure 9: Intaglio surface treated with 9% Hydrofluoric acid

Figure 10: Application of Silane Coupling Agent

Figure 11: Etching using 37% phosphoric acid

Figure 12: Bonding agent light cured

Figure 13: Cementation

Figure 14: Post operative view