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Esthetic smile designing with porcelain laminates – A case report



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ABSTRACT

Porcelain laminate restorations are one of the most successful treatment modalities for cosmetic improvement of unsightly anterior teeth. Porcelain veneers within reason allow for the alteration of tooth position, shape, size and color. They require a minimal amount of tooth preparation. This case report describes the management of a case of dental fluorosis and unaesthetic gingival contours by gingival reshaping and final esthetic rehabilitation with porcelain laminates.

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1. Introduction

Teeth contribute an important part to one's appearance. A person's appearance and more importantly self perception of his own appearance have a vast influence on his confidence.[1]

Porcelain laminates are one of the most successful treatment modalities for cosmetic improvement of unsightly anterior teeth. Conventionally, laminates were indicated to correct problems such as unacceptable or peculiar tooth contours, interdental spacing, gingival recession, malpositioned teeth, and discolored teeth or to address minor tooth alignment issues.[2]

This case report describes the management of a case of dental fluorosis and unaesthetic gingival contours by gingival reshaping and final esthetic rehabilitation with porcelain laminates.

2. Case report

A 22 year old girl reported to Department of Prosthodontics with the chief complaint of discolored teeth and unattractive smile thereof. On clinical examination, the patient had generalized enamel fluorosis affecting all the permanent teeth [Fig. 1]. Confluent pitting was present on most of the surfaces of the upper and lower teeth with wide spread yellow-brown stains. She had an Angles Class-I occlusal relationship. Oral hygiene was satisfactory but gingival zenith was squarish giving an unaesthetic appearance. A discrepancy in plane of orientation of the maxillary teeth was also noted on the left side. Radiographic examination showed no caries or alveolar bone loss. Oral prophylaxis was carried out followed by bleaching (Pola Office+, SDI, Australia) but no reduction in the intensity of stains was achieved. After explaining all the

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Fig. 1 – Intraoral picture showing generalized enamel fluorosis.



Fig. 2 – Diagnostic wax up.

existing treatment modalities to the patient, it was decided to reshape the maxillary gingival zenith with soft tissue laser and restore maxillary anterior teeth upto first premolars and mandibular anterior teeth with porcelain laminates.

3. Procedure

Maxillary and mandibular diagnostic impressions were made with irreversible hydrocolloid material (Plastalgin, Septodont, France). Diagnostic casts were prepared and mounted on Hanau H2 articulator using a facebow transfer and a diagnostic mock wax up was done [Fig. 2]. A soft tissue diode laser was used for gingival reshaping of maxillary anterior teeth [Fig. 3]. Patient was recalled after a healing period of 2 weeks. An orientation depth groove of 0.5–0.8 mm was made labially with a three tier diamond cutter for maxillary and mandibular anteriors and maxillary first premolars. The remainder of the tooth surface was prepared using round end tapered diamond bur. Care was taken to restrict the tooth preparation in enamel only. This is because bonding to enamel is most reliable and ensures long lasting and strong bonds. Proximally, the preparation was extended till the mesiodistal contact areas without involving the contact points. The incisal edges of the teeth were reduced approximately 1 mm to allow for adequate bulk of restorative material and were extended lingually to form an incisal wrap with a chamfer finish line. It was ensured that finish line was relieved from opposing centric contacts [Fig. 4]. The final finishing of the tooth preparation was done using extra-fine diamond bur. Gingival retraction was done using single cord (Siltrax, 000, USA) technique and final impressions were made using putty-wash (Aquaqsil, Dentsply) double mix technique [Fig. 5]. Chairside provisionalization was done with tooth colored resin (Protemp, 3M ESPE) [Fig. 6]. Occlusion was checked in centric, lateral, and protrusive movements.

Dies were fabricated from type IV dental stone (Kalstone, Kalabhai, India) using Dilok trays. The cervico-incisal dimensions of the maxillary left anterior teeth were accordingly increased during the wax up stage to rectify the discrepancy in the plane of orientation [Fig. 7]. The laminates were fabricated from IPS Empress (Cergo, Degudent, Germany) using the lost wax technique. The restorations were adjusted to the master die and then tried on the patient to check for marginal fit, contours and aesthetics. After patient's approval, internal surface of the laminates was microetched with 8% hydrofluoric acid and silane coupling agent was applied and air dried. The teeth were cleaned using pumice slurry. They were acid etched with 37% phosphoric acid for 15 s and rinsed thoroughly. All the teeth surfaces were then coated with bonding agent and light polymerized for 15 s. Dual cure composite luting agent (Variolink-II, Ivoclar) of appropriate shade was selected and coated on the internal surface of the laminates. These were then placed over the teeth and initial polymerization was carried out for 5 s. Excess luting agent was removed with floss and explorer followed by curing for 60 s on each tooth. The laminates were cemented contralaterally one after the other. Laminate margins were refined with extra-fine diamond burs and polished after 24 h [Fig. 8] with a ceramic polishing kit.

4. Discussion

The primary objectives of cosmetic dentistry are to attain the best possible esthetic results and at the same time preserve



Fig. 3 – Gingival zenith reshaping with diode laser.



Fig. 4 – Maxillary and mandibular tooth preparations for laminate.

the hard and soft tissues. Porcelain laminates are among the best esthetic modality to achieve a more pleasing and beautiful smile and are a good conservative alternative to full crowns for treatment of discolored teeth. The tooth preparation for a full coverage crown may alter the existing incisal guidance, proximal contacts, overall tooth morphology, food-flow pattern, and phonetics of the patient.[3]

Various workers have different schools of thought regarding veneer preparations. Gilmour and Stone[4] classified veneer preparation into four types, 1) Window or intraenamel preparation labially with intact incisal enamel, which may result in an inferior appearance. 2) Feathered incisal preparation labially, where the porcelain is liable to fracture. 3) Incisal edge preparation, with minimum of 0.5–1 mm incisal tooth reduction to form a butt joint. 4) Incisal wrapping which is the most versatile design. Freedman and Mclaughlin[1] described six basic preparation types as 1) Minimal preparation 2) Incisal preparation 3) Over the incisal edge 4) Over the incisal edge with lingual ledge 5) Maximal preparation 6) Double preparation.

Literature shows a variety of opinions as to whether the incisal edge should be included in the preparation or not. The advantages of incisal wrapping are to hide the tooth–porcelain interface, aid in proper placement of laminates and to minimize the effects of shear forces on the restoration. Garber et al[5] stated that placement of a palatal chamfer provides increased veneer strength. Highton et al[6] claimed that an incisal reduction provides suitable stress distribution and increases the longevity of laminate veneers. Conversely Gilde, Hui and Hahn et al[7–9] reported that porcelain veneers without overlap demonstrated more resistance to load. While, Meijering and Stappert et al[10,11] found no correlation between the survival rate and different incisal preparation designs.

The choice of veneer material and technique depends on the physical properties of the materials, the bond strength, degree of enamel discoloration, expertise of the operator and the number of teeth involved.[12] In our case, pressable IPS Empress ingots were used for the fabrication of laminates because the translucency of pressable ceramics is similar to that of enamel, this allows the material to blend with natural tooth structure and depicts a "chameleon effect". Other materials suggested for laminates are; resins and composites processed at elevated pressures and/or temperatures, castable hydroxyapatite and infiltrated ceramics. The indirect resins have better physical properties than direct light cured composites, but reduced bond strengths.[13] The castable ceramics have the advantage of a wax up stage, excellent translucency and possibly reduced plaque adherence, but are more technique sensitive. Single visit laminates can also be fabricated with CAD/CAM which allows the clinician to control color and contour and save time for both the patient and the clinician.[14] Now a days lumineers that are cerinate porcelain can also be used which are not only ultrathin and durable but removable and reusable if flexible resin is used for bonding.

Porcelain laminates are biocompatible, wear and solvent resistant, color stable and have a coefficient of thermal expansion similar to enamel. A life like vital appearance and subtle surface texture effect can be produced. At the same time, tooth preparation, fabrication and handling of the



Fig. 5 – Maxillary and mandibular definitive impressions.



Fig. 6 – Provisional restorations.



Fig. 7 – Final wax up of laminates.



Fig. 8 – Laminates insitu.

veneers during cementation is a highly technique sensitive procedure. This is because of minimal amount of tooth reduction involved and their fragility prior to cementation.

5. Conclusion

Ceramic laminates remains a popular prosthetic modality that best complies with the principles of present day esthetic dentistry. Due to its excellent esthetic qualities and conservative nature it may well be called "bonded artificial enamel". This clinical report depicts porcelain laminates as a treatment of choice for a combination of multiple esthetic problems. If properly fabricated and carefully inserted, porcelain laminates can last as long as any other esthetic dental restoration.

Conflicts of interest

All authors have none to declare.

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