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Tooth in a day: Digital smile makeover of a patient with fluorosis using cad-cam veneers

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Abstract
In the ever-changing field of cosmetic dentistry, prosthodontists strive to enhance aesthetics while minimizing damage to the teeth in the shortest time possible. Advancements in material sciences and adhesive systems have allowed for the use of computer-aided designing and machining to improve the appearance of patients' smiles. CAD/CAM restorations can now be created in a single visit, offering better fit and adaptation. Porcelain veneers are often preferred over other invasive treatments, particularly for managing fluoride stains. Veneers not only enhance appearance but also boost self-confidence, improve personal relationships, and even contribute to the patient's career success.
The case study highlights the cosmetic restoration of a patient with dental fluorosis, utilizing the "Tooth in a day concept" with CAD-CAM veneers at a tertiary dental care center.

Keywords: Smile designing, ceramic veneers, CAD CAM, dental fluorosis

Introduction
The concept of "esthetics" originates from the Greek term "aesthesia," which means sensation or sensibility, and is associated with the appreciation of beauty. Dental esthetics, as defined by Pilkingtonin in 1936, involves harmonizing work with nature to create art that seamlessly blends in. The term "cosmetic" is derived from the Greek word "Kosmos," which translates to adornment. Ceramic veneers are a minimally invasive solution for patients seeking to enhance the shape, color, or position of their front teeth. Dr. Charles Pincus first described the technique in 1940, but advancements in composite resin technology and enamel etching were necessary for its widespread adoption. Porcelain laminates have significantly transformed the field of esthetic rehabilitation in recent years, offering new possibilities for enhancing smiles.

Case Report
A 23-year-old male patient presented with discolored upper front teeth, with a family history of similar discoloration in his elder sister, possibly due to borewell water consumption during childhood in Maharashtra, known for high fluoride levels [2]. Intra-oral examination revealed Enamel hypoplasia secondary to moderate dental fluorosis (Deans Code - 3) (Figure 1), with Angle's Class I dental malocclusion. A treatment plan was devised to address the patient's concerns, involving the use of ceramic veneers fabricated with CAD/CAM material and a 2D smile design makeover to be completed in a single working day [3].
Photographs (frontal, smiling and posed smile) of the patient were taken and analysis of the proportion of the teeth was done in (DTS pro 2D smile design) software. After confirming the selected tooth template from the library in the software a diagnostic mockup over diagnostic models was carried out and shown to the patient to give a tentative idea of the outcome of the treatment and consent was obtained.
Before initialization of the treatment, a digital shade of the teeth was recorded using VITA easyshade V and VITA SUPRINITY blocks of the corresponding A1 shade were selected.
The maxillary teeth 11, 12, 13, 21, 22, and 23 were prepared for a porcelain veneer restoration at approximately 0900hrs on the day of treatment. A veneer preparation kit was used, following the prescribed protocol for teeth preparation [4, 5].

To ensure proper reduction of the tooth surface, depth orientation grooves were marked for labial reduction of 0.5mm at the body of the tooth and 0.3 mm at the cervical region. A chamfer margin of 0.3 mm was maintained uniformly in the cervical region. The incisal edge was included in the preparation to create a butt joint palatally, improving esthetics, stress distribution, and veneer seating. The gingival retraction was performed by 1100hrs using a "000" non-impregnated retraction cord (Figure 2), and impressions of the maxillary and mandibular arch were taken using Polyvinylsiloxane material and the putty wash technique.

At 1130 hrs, temporary bis acrylic material was used to provisionally restore the teeth after creating a putty index over the diagnostic mockup (Figure 3). The patient was then scheduled for a recall after four hours on the same day. Casts were made using type 3 dental stone and scanned using an extra-oral scanner (Amann Girrbach AG). CAD/CAM technology was used to design (Figure 4) and mill the veneer restorations, using 'VITA Suprinity' blocks. Try-in was performed at 1500hr using flowable light cure composite resin try-in paste. After polishing and cleaning the teeth, final adjustments were made to the veneers, followed by finishing and polishing. The veneers were etched with 5% hydrofluoric acid for 10 sec and a silane coupling agent was applied and air dried for a minute after washing the etchant with water. The tooth surface was also etched with 37% phosphoric acid for 20 seconds and a bonding agent was applied over the tooth for a minute and airdried after washing the etchant with water. Luting was done using self-cure resin cement (3M ESPE RelyX Veneer Adhesive Resin Cement). Excess cement was removed after spot curing for 3 sec and then curing of the cement was done for 20 seconds on each side. The above-mentioned procedure was completed by 1700hr on the very same day (Figure 5). The entire procedure was completed by 1700 hours. After cementation, the patient was given oral hygiene maintenance instructions and scheduled for regular follow-ups. The patient has been satisfied with the result and has had no complaints during the one-year follow-up period (Figure 6).

Discussions

Porcelain veneers have become increasingly popular in modern aesthetic dentistry due to the growing demand for aesthetic improvements by patients and advancements in adhesive systems and veneering methods. They are considered a conservative restoration option for unaesthetic anterior teeth. However, it is important to note that the placement of porcelain veneers is an irreversible procedure as it requires tooth preparation. Therefore, it is crucial to carefully evaluate the criteria for porcelain veneers to ensure long-term success. Esthetic rehabilitation techniques may involve the use of preoperative and postoperative clinical photographs, diagnostic models with wax-ups, composite resin mock-ups, and computer simulations. Veneers are thin layers of tooth-colored material that are used to address localized or generalized defects and intrinsic discoloration. They can be made from chair-side composite, processed composite, porcelain, or compressed ceramic materials [6].

Several clinical trials have demonstrated the biocompatibility, durability, aesthetics, and performance of porcelain laminate veneers made with VITA SUPRINITY. The material used in this case provides adequate opacity to conceal discoloration and acceptable translucency to improve aesthetics. Utilizing CAD/CAM technology for laminate fabrication simplifies laboratory processes, leading to improved internal adaptation and marginal fit accuracy, ultimately enhancing the restoration's durability and longevity.

Fig 1: Dental Fluorosis

Fig 2: Prepared teeth

Fig 3: Temporization

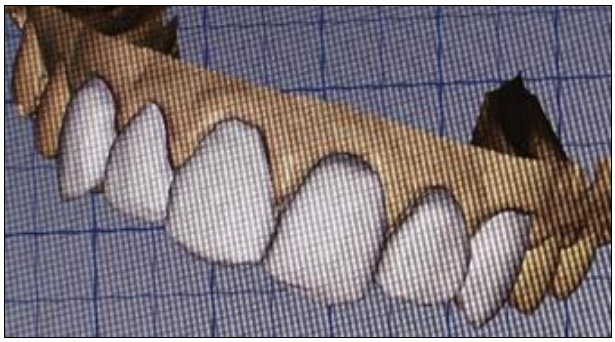

Fig 4: Veneer Designing

Fig 5: Veneers in-situ

Fig 6: Patients Profile

Conclusion

Porcelain veneers offer an aesthetically pleasing and conservative treatment choice for various dental issues, with success hinging on fabrication techniques and proper case selection. By utilizing glass ceramic and CAD-CAM technology, we were able to achieve superior aesthetic outcomes without the necessity for extensive tooth preparation, making ceramic veneers a minimally invasive and highly esthetic solution for anterior teeth rehabilitation.

Acknowledgments

None

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