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Esthetic rehabilitation of a patient with dental fluorosis: A case report

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Abstract

Dental fluorosis is a common dental condition presenting with esthetic and structural changes which can significantly impact an individual's self-esteem. It can clinically manifest from mild to severe form, and its management depends on the extent of the condition. This case report highlights multidisciplinary approach for conservative management of moderate dental fluorosis using in-office bleaching in combination with lithium disilicate veneers for optimum results.

Keywords: Fluorosis, veneers, in-office bleaching

Introduction

Prosthetic rehabilitation plays a crucial role in restoring the esthetics and function of teeth affected by various dental conditions. One such condition is dental fluorosis, which is caused by excessive fluoride intake during tooth development. Dental fluorosis is a prevalent dental problem, particularly in areas with high levels of fluoride in the water supply or in regions where fluoride is ingested through other sources.¹ Fluoride content in drinking water exceeding a concentration of 0.5-1.5 mg/l, can result in metabolic alteration in ameloblasts; which can result in a defective matrix and improper calcification of teeth^[1, 2]. The extent and severity of fluorosis is dependent on amount of fluoride intake and duration of exposure during tooth development.

It can be graded from very mild to severe. Very mild and mild forms cause chalky white opaque areas on enamel surface. Moderate form is characterized by noticeable enamel staining, ranging from white flecks to brown discoloration, along with mild enamel pitting. Severe fluorosis involves extensive brownish staining, pitting and worn-out teeth. Various treatment modalities can be applied depending on the severity of fluorosis^[3]. In mild cases with no esthetic concern for patient no treatment might be required. However, in patients with esthetic concern and mild to moderate fluorosis cosmetic procedures like bleaching, microabrasion, macroabrasion, resin infiltration, composite veneers, lithium disilicate veneers can be done. Full coverage crowns and full mouth rehabilitation is often required for severe fluorosis.

The esthetic implications of dental fluorosis can detrimentally impact oral health-related quality of life and have result in psychosocial effects on affected individuals. Clinical manifestation of moderate to severe fluorosis has been demonstrated to be perceived as esthetically displeasing in both adolescent and adult populations. This case report highlights a conservative approach for esthetic rehabilitation of patient with moderate dental fluorosis using in-office bleaching and lithium disilicate veneers^[4, 5].

Case Report

A 24-year-old female patient reported to the Department of Prosthodontics with the chief complaint of unesthetic appearance due to discoloration of teeth. Extraoral examination showed no gross extra-oral facial asymmetry and normal TMJ (Fig1). Intraoral examination showed white opaque areas with brown staining on all teeth suggestive of generalized dental fluorosis (Fig 2, 3, 4). Root canal treated 36 and 46 were present.

Various treatment options available from minimally invasive to extensive procedures were bleaching, composite veneers, lithium disilicate veneers, full coverage porcelain fused to metal crowns and all ceramic crowns. Considering the extent of fluorosis, in-office bleaching using 35% hydrogen peroxide was planned to lighten the brownish stains followed by porcelain laminate veneers for maxillary and mandibular anterior teeth and the first premolars.

Procedure

Diagnostic impressions of maxillary and mandibular arches were made using alginate impression material (Dentsply vignette chromatic alginate). Diagnostic casts were poured (Fig 5).

In-Office Bleaching

Informed consent was taken from the patient. Pre operative tooth shade was determined using VITA Toothguide 3D-MASTER, and pretreatment clinical photographs were taken. Teeth were cleaned using pumice slurry. Isolation was done and gingival barrier was applied on maxillary teeth to be treated. It was light cured for 20 seconds. In office bleaching was done using 35% percent of hydrogen peroxide gel (Pola Office, SDI Limited, Australia) to the maxillary teeth for 8 minutes (Fig 6). It was suctioned off and the procedure was repeated for two more times. Gingival barrier was removed and post operative shade was determined. Pre operative shades of Cervical third was 2M2, Middle third was 5M3, Incisal third was 2R1.5 which changed to 2L1, 4M3 and 1M1 respectively (Fig 7).

Ceramic Veneers

The diagnostic casts were mounted on a semi-adjustable articulator using facebow transfer in maximum intercuspation utilising an intraoral record bite (Fig 8a, b). Diagnostic wax mock-up was done (Fig 9). Preparation guide (silicone putty index) was made on wax mock-up. In the next appointment, mock-up was transferred on teeth using Bis-acrylic composite resin using silicone putty index to make Aesthetic Pre-evaluative temporaries (APT). The aesthetics and occlusion were properly evaluated. Patients' speech and phonetics was assessed. After thorough evaluation and patients' approval, shade selection was done and preparation was initiated.

Tooth preparation was done through APT (Fig 10). It was commenced using 0.3mm depth cutting diamond point bur. Labial tooth reduction was done in three planes with rounded tapered diamond point bur for uniform reduction and improved esthetics. Interproximal tooth reduction was extended slightly beyond contact area without breaking the contact point. Incisal overlap type of tooth preparation was done. Chamfer finish line was given labially. All line angles were rounded and polished.

Gingival retraction was done using 3-0 retraction cord (Ultrapak Cord #000, Ultradent Products Inc., South Jordan, UT, USA) (Fig 11). A two-step final impression was made using polyvinyl siloxane impression material using putty and light body. Temporary restorations was placed by spot etching on the facial surface of each prepared tooth using 37% phosphoric acid (Total Etch, Ivoclar Vivadent, Schaan, Liechtenstein) and using bisacrylate temporary material (Accutemp).

The impressions were poured using die stone and master cast was made. Exocad designing of the veneers was done (Fig 12). Ceramic veneers were fabricated with a lithium disilicate-reinforced glass ceramic material (IPS e.max Press,

Ivoclar Vivadent, Schaan, Liechtenstein). The bisque trial was performed to evaluate the marginal fit and accuracy and patient's approval was taken. Occlusal adjustment was performed to achieve a mutually protected occlusion. Veneers were then glazed and esthetic trial was done.

Cementation Protocol (Fig 13)

Intaglio surface of veneers was treated with 9% Hydrofluoric acid for 90s. Veneers were rinsed thoroughly and dried. A frosted appearance was appreciated. 37% phosphoric acid was applied for 5 seconds, rinsed and dried. Silane coupling agent was applied with an applicator tip for 60 seconds and dried. Veneers were covered in lightproof box until bonded.

Rinsed and polish the prepared teeth with slurry of pumice and water. Teeth were etched with 37% phosphoric acid, rinsed and dried. Bonding agent was applied. Light cure resin cement (RelyX Veneer 3M ESPE light-cured resin cement St. Paul, MN, USA) was used for bonding. Tack cure was done for 5 seconds and excess cement was removed using explorer. All surfaces of veneers were cured for 20 seconds each. Excess cement was removed using explorer and floss. Finishing was done using rubber polishing cups. Occlusion was assessed in protrusive and lateral movements and no interferences were found. Post operative instructions were given and patient was asked to follow meticulous oral hygiene procedures (Fig 14, 15). Follow up was taken after 1 week (Fig 16). Patient was informed about follow up after 1 month, 3 months, 6 months and 1 year followed by once every year. After completion of the treatment, there was a noticeable enhancement in the patient's esthetic appearance. Patient was completely satisfied by the outcome of the treatment.



Fig 1: Extraoral frontal smiling view



Fig 2: Pre operative frontal view



Fig 3: Maxillary Occlusal view



Fig 4: Mandibular Occlusal view



Fig 5: Diagnostic cast



Fig 6: Application of bleaching agent



Fig 7: Post operative view after bleaching

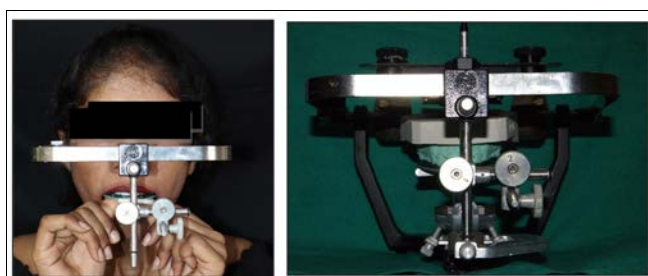


Fig 8: a) Facebow record b) Transfer on semi-adjustable articulator



Fig 9: a) wax mockup on articulator b) Transfer of mockup intraorally



Fig 10: Preparation through APT



Fig 11: a) Maxillary tooth preparation and gingival retraction b) Mandibular tooth preparation and gingival retraction

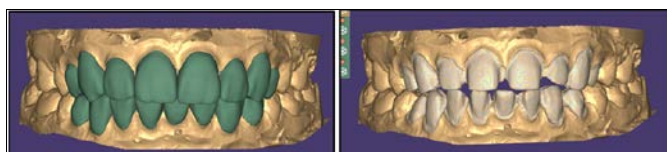


Fig 12: Exocad designing of veneers

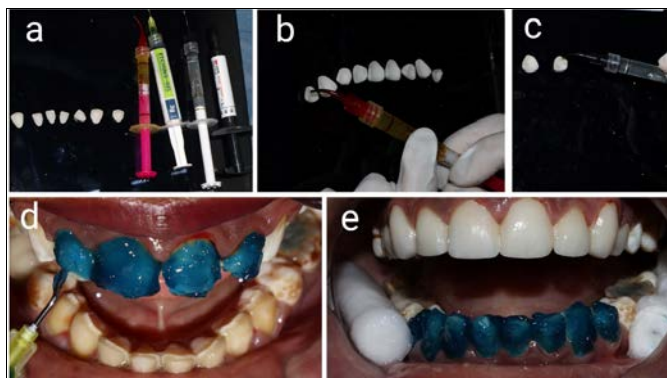


Fig 13: Cementation Protocol a) Armamentarium b) Application of porcelain etchant b) Application of silane coupling agent on intaglio surface of veneers. d & e) Application of etchant on maxillary and mandibular teeth



Fig 14: Post operative frontal view. a) Retracted maxillary frontal view b) Retracted mandibular frontal view



Fig 15: Post operative a) Maxillary occlusal view b) Mandibular occlusal view c) Maxillary 12 O'clock view



Fig 16: Post operative extraoral frontal view

Discussion

Ceramic veneers can be used for esthetic correction of discoloured teeth. In this case, patient was young with discoloured teeth. Minimally invasive approach is conservative as well as best option for such patients. In-office bleaching is an effective, simple, and non-invasive method for discoloured teeth [6]. It was done to reduce the extent of discoloration. By bleaching teeth, there was increase in l value and b value decreased (according to CIELAB colour system). Hence lightness increased and yellowness decreased. This helped to improve the esthetic outcome of veneers.

The treatment approaches employed in this particular case were directed towards enhancing the patient's smile and facilitating aesthetic restoration of the teeth. This objective was fulfilled by using ceramic veneers, which is recommended to mask tooth discoloration in cases with moderate fluorosis. According to Demirekin and Turkaslan, ceramic veneers have been documented to offer long-lasting and successful restoration, demonstrating an estimated survival rate of 93.5% over ten years in individuals with fluorosis. Veneers have added benefit of maintaining biocompatibility, abrasion resistance, good translucency, and ensuring color and contour stability [7, 8]. Furthermore, the potential risk of gingival irritation may be diminished as there is lower plaque deposition around ceramic veneers as compared to natural teeth [9-11]. Aesthetic pre-evaluative temporaries were transferred intraorally as it helps to resemble the exact contours of the final outcome such as the incisal edge position and the facial volume (contours) of the teeth [12].

Proper bonding protocol is essential for the longevity of veneers. Choosing and applying the suitable surface treatment and cementation procedure will play a pivotal role in ensuring long-lasting restorations. It is recommended to increase the enamel etching time by twice (30 seconds) with phosphoric acid in order to obtain good bonding strength and to remove the outer layer of hyper-mineralization 50 to 80 um thick. [12] In cases with severe dental fluorosis with wear of dentition or loss of vertical dimension, full mouth rehabilitation should be planned with full coverage restorations.

Conclusion

Smile is an important asset of a person's life. In this modern era, major concern is for esthetics and minimally invasive techniques. Dental fluorosis can appear in various clinical forms. To make the right treatment choices, it is essential to conduct a comprehensive assessment of the affected teeth, considering both their specific conditions and the overall

functional and aesthetic requirements of the patient. By combining bleaching followed by veneers we could achieve esthetic outcome, thereby fulfilling patient expectations.

Conflict of Interest

None

Financial Support

None

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