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Esthetic Correction A Fluorosis Stained Teeth Using Full Mouth Rehabilitation: A Case Report

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Case Report

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ABSTRACT

Dental fluorosis is characterized by the reduced mineralization of enamel due to the excessive intake of fluoride (over 1 ppm) during the formation of teeth. Advanced dental fluorosis results in the enamel showing signs of pitting or mottling, which heightens the risk of pollution, fractures, wear, and premature loss of teeth. This can negatively impact the stability of the bite and the overall function of chewing. Apart from impacting oral health, severe dental fluorosis can lead to psychological consequences resulting from the visible disfigurement and staining of affected teeth, along with compromised functionality. In numerous instances of severe dental fluorosis, complete mouth rehabilitation is not just a treatment but a crucial pre-emptive measure, aiming to restore functionality and prevent further deterioration.

This case study outlines the complete mouth rehabilitation of a 20-year-old female patient who presented with discoloured teeth and chipping of the upper layer along with multiple carious lesions. The rehabilitation procedure employed the Panky Mann Schyuler (PMS) technique.

Keywords: Esthetic, Fluorosis, Rehabilitation, Teeth.

Introduction

Dental fluorosis is a prevalent issue impacting both milk and adult teeth, but its impact on adult teeth is considered more significant because the effects are permanent.[1]

In humans, dental fluorosis arises when there is an excessive intake of fluoride-contaminated drinking water during the developmental stage of teeth, typically occurring in the early years of life. This condition, also known as hypoplasia or hypomineralization of dental enamel, is directly associated with the abundant incorporation of fluoride into these dental structures.[2]

During the stage when teeth are developing, known as the calcification stage, they are particularly vulnerable to fluorosis, especially within the first seven years of life.[3]

The overconsumption of fluoride from drinking water leads to the displacement of hydroxide ions (OH-) from hydroxyapatite, leading to the creation of fluorapatite. This marks the onset of dental fluorosis, which, when prolonged, can lead to the

teeth becoming hard and brittle. Additionally, enamel may exhibit mottling, discoloration ranging from yellow-brown or black, and the development of pits. Discoloration may manifest as spots or horizontal streaks. Ultimately, the discoloration becomes an integral part of the tooth structure, diminishing the shine and luster of the teeth.[4]

The available treatments for addressing dental fluorosis vary from basic restorative methods such as bleaching and composite fillings to more intricate procedures like veneers and crowns, which may involve complete mouth rehabilitation.[5]

Case Report

A 20-year-old female of moderate build, in good overall health with no systemic illness, visited the Department of Prosthodontics and Crown & Bridge at Dr. Ziauddin Ahmad Dental College, Aligarh Muslim University, Aligarh. She presented with concerns about tooth discoloration and noted instances of "chipping" across all her teeth along with multiple carious lesions. The patient reported living in a village near Aligarh since birth, where the groundwater fluoride concentrations exceed the World Health Organization's guideline for drinking water (1.5 mg/L) established in 2005. She reported that her younger sister was experiencing the same condition. Intraoral examination revealed dental fluorosis which was affecting all the permanent dentition with severe mottling of enamel and dark brown staining (Dean's Fluorosis Index: severe). Occlusal caries were present in the first and second molar in the fourth quadrant. Canine-guided occlusion is present on the right side and group function on the left side with attrition of canine tips on both sides. The incisal edge of the left maxillary central incisor and the right lateral incisor are not intact. In this case, full mouth rehabilitation was seen as the best option as there was structure loss in multiple teeth. The patient was explained the treatment plan and she gave consent for full mouth rehabilitation. Occlusal caries were restored using amalgam restoration (DPI Alloy Non-Gamma 2 Zinc Free Amalgam) in 46,47. Pre-operative photographs were taken and diagnostic impressions were made using irreversible hydrocolloid (Prime Dental Prime Chrome Dental Alginate) Fig.1.The maxillary cast was positioned on the articulator axis with the help of a facebow record (Spring facebow, Whip mix, U.S.A). The lower jaw was positioned into a centric relation using Dawson's Bimanual manipulation technique, and an interocclusal record was made using aluwax. Subsequently, the lower jaw cast was mounted on a semi-adjustable articulator (Hanau Wide Vue, Whip mix, U.S.A). First, wax-up procedures were carried out on the front teeth of the upper jaw, followed by those of the lower jaw (Fig.2). Anterior guidance was then established. Maxillary and mandibular incisors were prepared for laminates (incisal wrap design) whereas canines were prepared for complete coverage in both arches (Fig.3). Final impressions were made and temporisation was done. The temporary restoration was cemented using non-eugenol temporary cement (Avue T Cem Ne Non-eugenol temporary luting cement). Definitive crowns and veneers were tried and checked for aesthetics, fit, and margins followed by cementation using resin cement(Prevest Fusion Ultra D/C- Intro Pack Dual Cure Resin Based Luting Cement). Canine-guided occlusion was given on both sides. Patient comfort was assessed during function i.e. during protrusion and lateral excursion. Following the rehabilitation of the anterior teeth, the occlusal plane was assessed using a Broadrick plane analyser (Fig.4). The caliper was set at a 4-inch radius from the needle point to the pencil point. The pointed end of the caliper was placed on a specific spot on the canine, and a curved line was traced on the analysis plane, creating the front survey line. Then, the caliper's pointed tip was positioned against the condylar ball of the articulator, and then one more curve was made in the flag, marking the posterior survey line. A line was drawn from the intersecting point between these arcs to the molar and canine. This process established an approved plane of occlusion for lower posterior teeth. A putty index was utilized to transfer this occlusal plane to the patient's mouth. Following that, the mandibular

posterior teeth were prepared to receive all-ceramic zirconia crowns in accordance with the established occlusal plane. Impressions were taken using polyvinyl silicones, and temporary restorations were placed. The vertical dimension was not altered since the determined occlusal plane aligned with the existing one, resulting in a temporary restoration period of just one week. Permanent crowns were bonded using resin cement (Prevest Fusion Ultra D/C- Intro Pack Dual Cure Resin Based Luting Cement). Subsequently, the maxillary posterior teeth were prepared, impressions were made, and temporary restorations were placed for one week (Fig.4). Final evaluation was conducted in centric and all excursive movements, revealing no interferences in excursions or protrusion. After one week, permanent restorations were cemented using resin cement (Fig.5). The patient was then advised to adhere to a proper dental hygiene routine and regular dental visits.

Fig 1.Pre-operative photographs.(a.Extraoral picture; b.Intraoral maximum intercuspation; c.OPG; d.Maxillary occlusal view; e.Mandibular occlusal view; f.Protrusion; g.Right lateral excursion; h.Left lateral excursion.

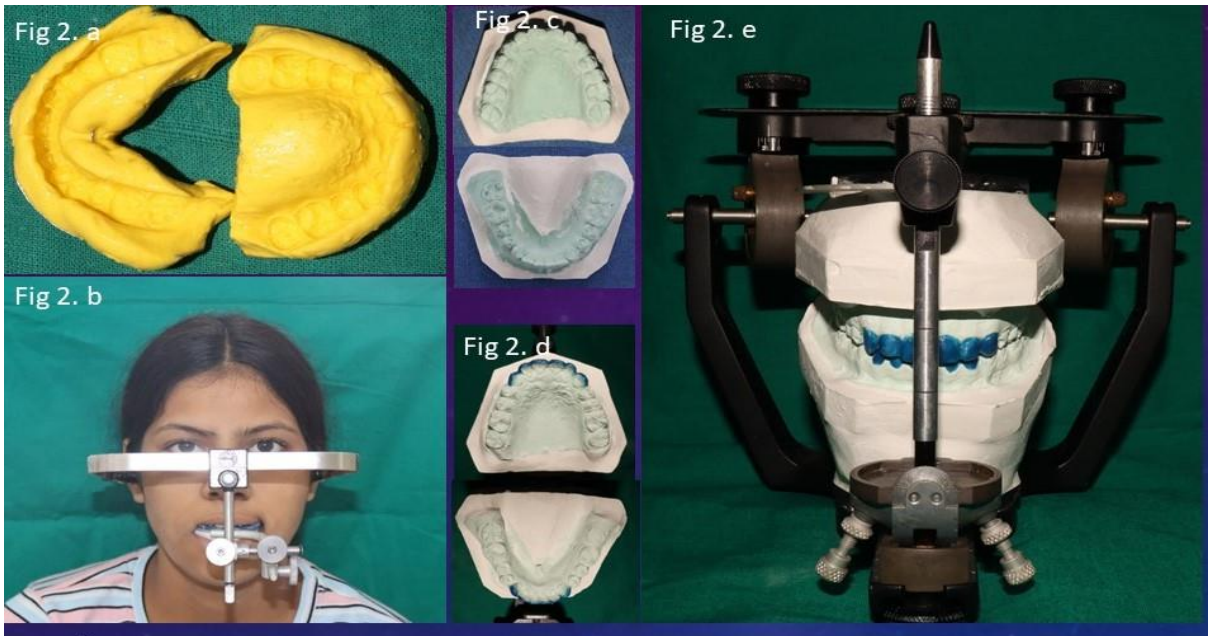

Fig.2 (a. Diagnostic impressions; b. Facebow recording; c. Diagnostic cast; d. Wax up of anterior teeth occlusal view; e. Wax up of anterior teeth frontal view.

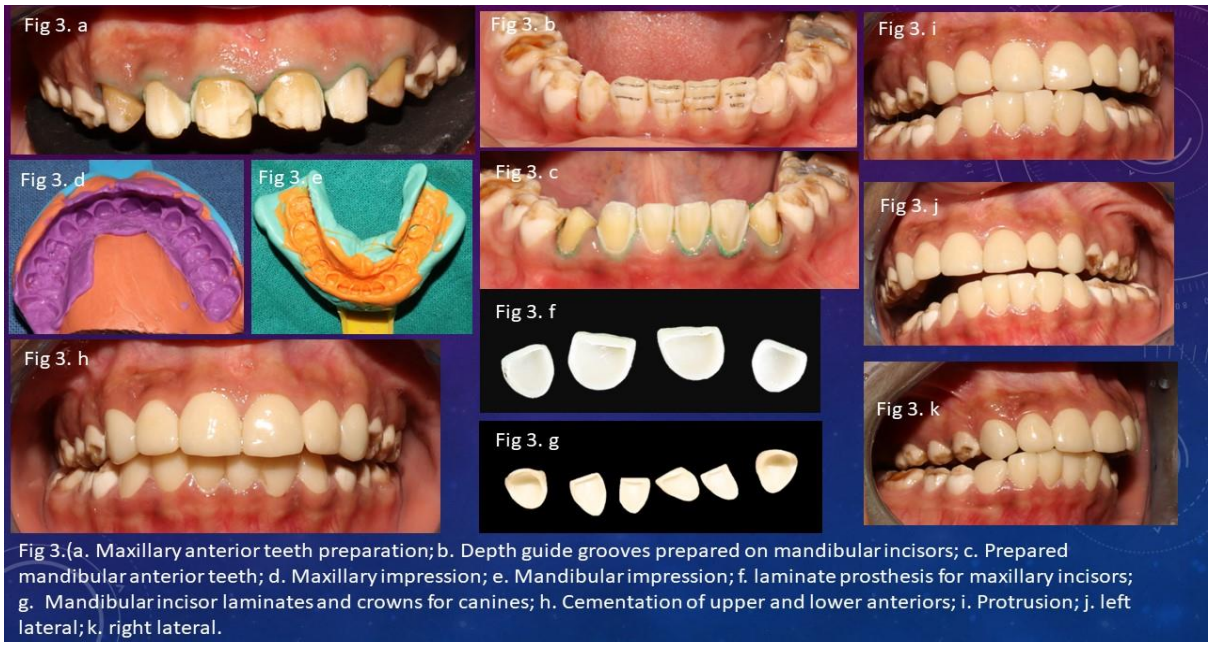

Fig 3.(a. Maxillary anterior teeth preparation; b. Depth guide grooves prepared on mandibular incisors; c. Prepared mandibular anterior teeth; d. Maxillary impression; e. Mandibular impression; f. laminate prosthesis for maxillary incisors; g. Mandibular incisor laminates and crowns for canines; h. Cementation of upper and lower anteriors; i. Protrusion; j. left lateral; k. right lateral.

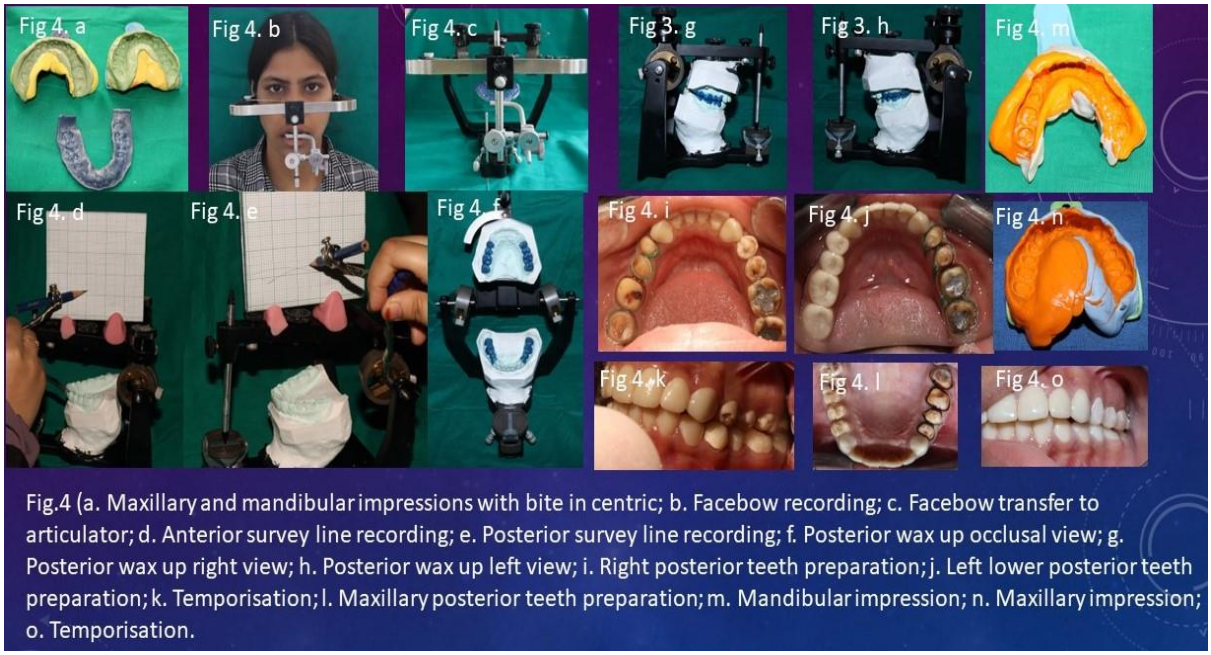

Fig.4 (a. Maxillary and mandibular impressions with bite in centric; b. Facebow recording; c. Facebow transfer to articulator; d. Anterior survey line recording; e. Posterior survey line recording; f. Posterior wax up occlusal view; g. Posterior wax up right view; h. Posterior wax up left view; i. Right posterior teeth preparation; j. Left lower posterior teeth preparation; k. Temporisation; l. Maxillary posterior teeth preparation; m. Mandibular impression; n. Maxillary impression; o. Temporisation.

Fig.5 Post operative photographs(a. In centric occlusion; b. Maxillary occlusal view; c. Mandibular occlusal view; d. In protrusion;e. Right lateral excursion; f. Left lateral excursion; g. Frontal extraoral view; h. Full smile.

Discussion

The discoloration of teeth due to fluorosis can undermine an individual's confidence in social interactions.

Worldwide, the significant issue of naturally occurring fluoride in groundwater is a major challenge. Approximately 200 million people in 25 developing nations are significantly impacted by the adverse effects of fluorosis. In India, around 66 million individuals, including six million children under 14 years old are at risk of experiencing teeth discoloration, bone abnormalities, and neurological harm due to regular consumption of fluoride through drinking water with fluoride levels more than 1.5 mg/L.[6]

A pleasant smile significantly contributes to a person's overall psychosocial well-being and can enhance their performance. Treatment options for this condition differ depending on its severity and the aesthetic preferences of the patient.[5]

Fixed prosthodontics can be categorized as either Conformative or Re-organized. The former is typically utilized when minimal restorative treatment is needed. The Reorganized approach becomes necessary when the existing Inter Cuspal Position (ICP) is deemed unsatisfactory and requires alteration, "or in cases where significant restorations are needed to improve the alignment of the patient's bite".[7]

When undertaking full mouth rehabilitation, it's crucial to determine the sequence of tooth preparation and restoration, as well as the preferred occlusal scheme. Options include Segmental/Quadrant, Simultaneous full arch, or Sequential simultaneous techniques, as well as the choice between Group function or Canine guided occlusal schemes. The choice depends on what is best suited for the patient, taking into account their clinical status and desires, alongside the practitioner's expertise and understanding.[7]

Canine-guided occlusion is commonly favoured in the majority of full-mouth rehabilitations due to its relatively straightforward fabrication process, and numerous studies endorse its application. In cases where the canines are missing or impacted by developmental problems like short roots, misalignment, significant differences in jaw size, or periodontal disease, the Group function method provides a more stable and self-sustaining way for the teeth to come together.[7]

In this case, a segmental/quadrant-wise approach was employed along with a canine-guided occlusion. Initially, the anterior maxillary segment was restored, followed by the rehabilitation of the mandibular anterior teeth, aligning with the established anterior guidance. Next, the occlusal plane was determined using Broadrick's plane analyzer. The mandibular and maxillary segments were then rehabilitated sequentially.

The interim period can be adjusted based on the patient's clinical condition and capacity for adaptation.[8]

Conclusion

An appealing smile is pivotal in enhancing an individual's psychological and social welfare. It instills confidence and enhances one's overall performance. For many patients, the discoloration of teeth caused by fluorosis is a significant cosmetic issue. The treatment of choice is determined by the extent of the condition and aesthetic preferences of patient. Various restorative options are available. For mild to moderate fluorosis, bleaching with or without micro/macro abrasion is the least invasive approach. Severe cases may require veneers or full coverage crowns for aesthetic needs.

The primary objective of all rehabilitation procedures should be to prioritize optimal oral health, aiming to restore the mouth to a state of health and functionality while effectively addressing the aesthetic needs of the patients.

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