

Case Report

Aesthetic management of a patient with different level of fluorosis: Clinical and technical report

Mohammed M Al Moaleem¹, Hassan A Madkhali², Musab H Judayba², Abdulrahman A Mobaraky², Abdulaziz H Mobarki²

¹Department of Prosthodontics, College of Dentistry, Jazan University, Jazan 45142, Kingdom of Saudi Arabia

²Interne Department, College of Dentistry, Jazan University, Jazan 45142, Kingdom of Saudi Arabia

***Corresponding Author:**

Dr. Mohammed M. AlMoaleem

Email: drmoaleem2014@gmail.com

Abstract: Satisfying patients' high expectations for dental esthetics is one of the challenges in contemporary dental therapy for both clinicians and dental technicians. The prevalence of dental fluorosis appears high in some area. Its severe form results in great psychological distress to the affected individual. The purpose of this report is to demonstrate the use of restorative materials used for treatment of different levels of fluorosis for a young patient. Maxillary individual crowns were constructed and cemented for a 30 years old teacher male patient presenting with severe fluorosis along with missing maxillary right canine tooth. The lower teeth were treated with in-office bleaching. These types of treatment by all ceramic crowns and in-office bleaching boosted the self-esteem of the patient with better social interaction especially as a teacher by profession.

Keywords: Fluoresced teeth, aesthetic, all ceramic crowns, bleaching.

INTRODUCTION

Dental fluorosis is a condition of enamel hypomineralization due to effects of excessive fluoride on ameloblasts during enamel formation, results in impaired or incomplete crystal growth, producing hypomineralised and porous enamel. Severely fluorosed teeth are compromised aesthetic and may undergo post eruptive white spots, striations or opacities at lower severity, to dark brown to black discoloration with increasing severity of fluorosis [1-2].

Treatment options for fluorosis varies and depending upon severity. The option varies from micro/macro abrasion, bleaching, composite veneers and full veneers crowns [3].

Satisfying patients' high expectations for dental esthetics is one of the challenges in contemporary dental therapy for clinicians and technicians. As part of treatment planning, clinicians should be able to choose the appropriate restorative materials to achieve excellence esthetics as well as proper biomechanics and durability [4]. Although porcelain fused to metal crowns have been used for many years with a high level of clinical success, the challenge of achieving ideal esthetics may be facilitated with the use of all-ceramic restorations. The all ceramic crowns had high translucent teeth, matching the shade and other optical properties to adjacent teeth. These

restorations may pose a challenge to the dental ceramist and restorative dentist. Therefore, the prospect of using all-ceramic materials to match in different segments of the mouth, which may require different mechanical properties, may prove advantageous [4].

As dental materials continue to evolve, new all-ceramic materials with superior mechanical properties, like high flexural strength and high fracture toughness, are continuously being introduced to the market, such as the zirconia-based computer-aided design and computer-aided manufacturing (CAD/CAM) systems, which have been introduced recently [5]. These systems are gaining popularity in both the anterior and posterior segments for multiple indications. Zirconia is the strongest and toughest ceramic material available so far. Clinical reports and anecdotal evidence demonstrated that zirconia-based restorations could be used for both anterior and posterior complete crown and fixed partial denture [5].

In-office bleaching is a conservative method for restoring the color of intrinsic discoloration of teeth [6]. In which different concentrations of hydrogen peroxide (15-38%) formulation directly on the tooth surface were used [7]. Torres *et al.*, indicate the use of LED devices (light activated power to enhance the bleaching action) due to their greater security in promoting selective heating over longer periods without

the risk of pulpal damage [8, 9]. The McInnes bleaching agent gives instant results, not dependent on patient's compliance as other office based procedures, no dehydration of the tooth occurs without any damage to the pulp. The dentist is in complete control of the process throughout the treatment, results in an evident even after a single visit. Bleaching with this solution is aesthetically pleasing and minimally invasive option for young patients [10].

The purpose of this article is to demonstrate the combination of zirconia based crowns and bleaching to achieve a successful aesthetic restoration for treatment of different level of fluorosis in a young teacher patient.

CASE REPORT

A 30 year old Yemeni teacher male patient attended to the clinic. He complained from bade aesthetic due to discolored maxillary anterior teeth and improper arrangement of right maxillary teeth. Clinical examination showed mild gingivitis with normal pocket depth. The maxillary teeth showed deep fluorosis and missing maxillary right canine with edge to edge relationship of anterior teeth. The canine was extracted since long time ago due to ectopic eruption. There was a good contact between maxillary right lateral incisor and first premolar with slight shifting of midline. Mild crowding of maxillary teeth was obvious (Figure -1 a - e). The mandibular teeth showed mild fluorosis in the cervical third (Figure- 1 b).

At the first appointment, scaling and root planning and polishing of all teeth were done. Maxillary and mandibular impressions with dust free alginate impression were taken. After pouring of those impressions, diagnostic castes were obtained. Diagnostic wax-up of all maxillary teeth including anterior and premolars teeth (Figure -2 a & b) was done.

At the subsequent appointment different treatments options were introduced to the patient. The treatments options for maxillary teeth were orthodontic treatment, labial veneers and full crowns with all ceramic materials for maxillary teeth. While the treatment option of the mandibular teeth was conservative bleaching. The gingiva was healed and healthy with reduction of pocket depth was seen. A rubber base index was prepared from the diagnostic wax-up (Figure -2c).

Also at this appointment, local anesthesia was given to the patient, and preparations of the maxillary teeth were done extending from 2nd premolar on the right side to the 2nd premolar on the left side. After preparation of teeth no need for elective root canal treatment were noticed. Maxillary final impression with additional silicon (Virtual, Ivoclar Vivadent, Lichtenstein) using double mixing technique was taken (Figure, 3 a). The provisional crowns were constructed

from Success SD (PROMEDICA NEUMUNSTER, Germany) and cemented with temporary cementation (Temp-BondNT, Italy) (Figure, 4 b & c).

After pouring the final impression with CAD/CAM special improved stone (BEGO/ Germany), die preparation, die ditching and finish line exposure were done (Figure, 4 a). The maxillary and mandibular master casts were mounted manually using Di-Lok tray (Di-Equi Dental Products, Wappingers Falls N.Y). The maxillary master cast was mounted on the laser scanner (CYNOPROD/CANADA) for scanning and capturing the preparation (Figure, 4 B). A scanner is connected to computer screen by software program I. 3 EVOLUTION (CYNOPROD/CANADA) for milling the zirconia core build-up was with Vita In-Ceram YZ Disc (VitaZahnfabric/ Germany). All the zirconia cores were prepared (Figure -4 c - e).

Cores try-in were done in the patient's mouth (Figure- 5 a), then shade guide selection using the digital shade guide VITA System 3D-Master (Vita Easyshade^(R) Compact, Vita, Germany) (Figure - 5b). The selected shade was (2R1.5- 3D master) (Figure - 5c). Porcelain build -up were done with porcelain VITA VM^(R)9 (VitaZahnfabric/Germany). All the laboratory steps were done according to the manufacturer's instruction. The final contours of the porcelain build-up over the zirconia cores were near to the shape of diagnostic wax-up.

The try-in of the individual crowns, occlusal adjustment, and lateral movement as well as protrusive movements was checked before glazing of the crowns. Cementations of the glazed crowns with Rely X, TM, Unicem AppliCap Resin Cement (3M ESPE, Germany) were done.

For the mandibular teeth, shade was evaluated with Vita shade guide alone and in relation to maxillary all ceramic crown. Then mandibular teeth were polished with pumice and rubber cup, isolation of teeth was done to protect the adjacent teeth with lubricant and rubber dam. In-office bleaching was done with McInnes solution [10] (5parts 30% H₂O₂, 5parts 36% Hcl and 1 part anaesthetic ether/alcohol) and activated with power bleaching system-LED module (Bluedent 12bl bleaching system, 430-490 nm, 1.5 amp, 50-60 hz, 24v) placed perpendicular to the tooth surface, at a period of 3min for 3 to 4 times. Teeth were washed with water and abraded with fine grit sand paper disc each time after bleaching. Polishing was done with pumice and rubber cup. Patients were instructed to use dentifrice containing potassium nitrate for two weeks (figure, 6 a)

Post-operative view shows the relation of soft and hard tissue during smile position (Figure, 6 a & b). The patient was schedule for continuous and regular followed-up and recalled appointments. During this visits the gingival condition and contour was

excellent in relation to crowns. The patient showed self-stem.
excellent physical and mental health with noticeable



Fig-1: Pre-operative view

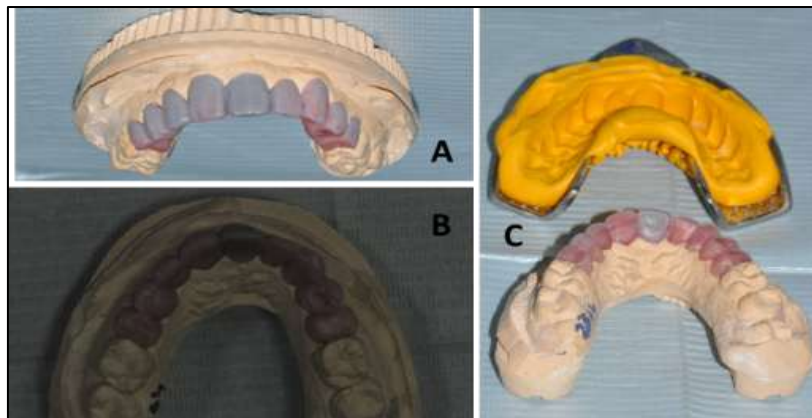


Fig-2: Diagnostic wax-up and index for maxillary teeth



Fig-3: Maxillary final impression and provisional crowns

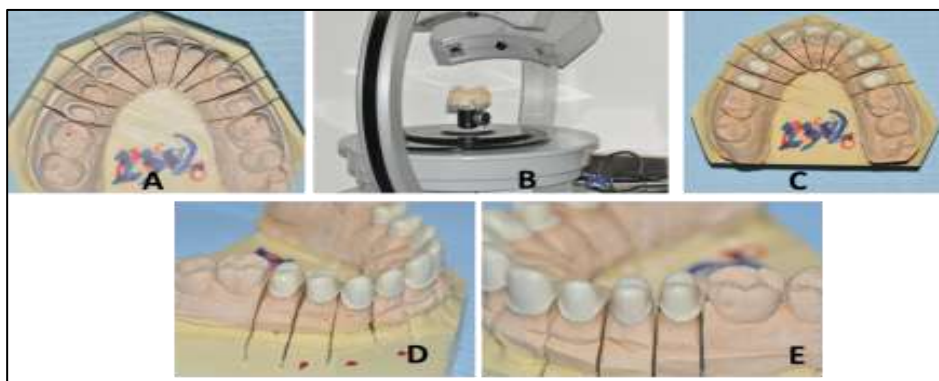


Fig-4: Ditched and scanned master cast, zirconia cores on master cast

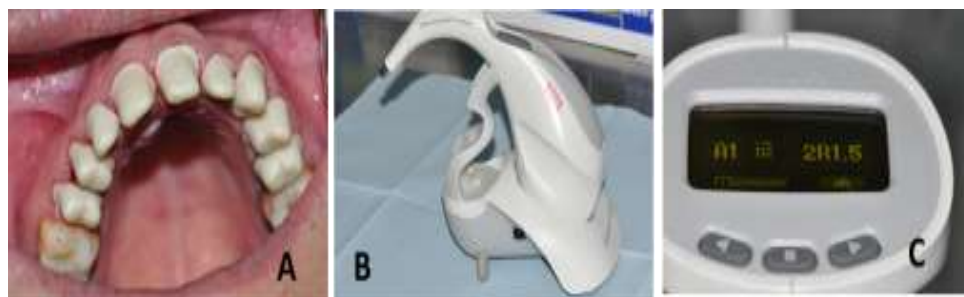


Fig-5: Cores try-in and digital shade selection

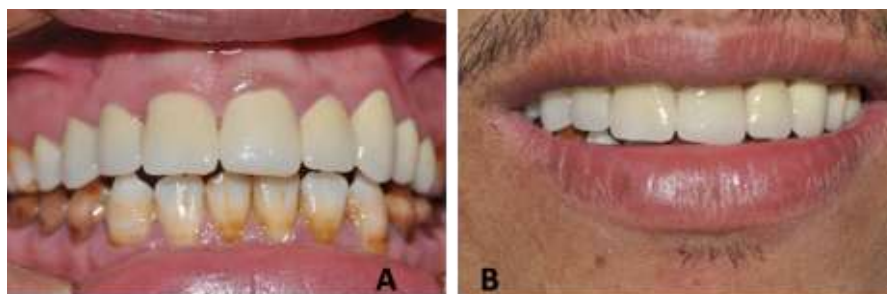


Fig-6: Post-operative view

DISCUSSION

Dental fluorosis' often leads to unaesthetic white chalky patches on teeth as well as brownish discoloration of enamel referred to as mottled enamel. If supplemented with a high caries rate many teeth can be involved as mottled enamel is quite porous in nature and has compromised structural integrity [2].

The treatment plan for a patient with dental fluorosis depends on how severely teeth are affected by it. If the stain extends up to a few millimeter of enamel it can be treated with simple procedures like micro abrasion or bleaching but complicated fluorosis stains may require veneers or crowns [2]. In this case severe brownish stains and pitting with lateral incisor and premolars was present. Also due to missing canine an edge to edge anterior bite had resulted.

The treatment constituted of individuals crowns using the CAD/CAM system. The core build-up was with Vita In-Ceram YZ Disc. Zirconia based restoration was selected from a variety of different all-ceramic core materials because of its unique properties. Zirconia presents with high biocompatibility, facilitating gingival response, less framework distortion during firing cycles, and adequate marginal fit [11]. Moreover, most zirconia-based systems allow for shaded copings and frameworks as related to the prospective color of the restoration, while allowing some level of light transmission similar to alumina-based ceramic systems [12]. With its superior mechanical properties in terms of flexural strength and fracture toughness as compared to other all-ceramic materials, zirconia-based restorations may serve as a

restorative alternative for both the anterior and posterior segments [11, 13].

A digital shade guide selection was preferred over the traditional others shade guide systems as it greatly elevates the likelihood of a clinically acceptable shade match through accurate shade analysis [14].

Full crown preparation was selected over labial veneers because of their clinical longevity and survival rate, this is in agreement with Shillenburg *et al.*, 1997, and those concluded that full crown restoration is the most type of preparation with long services calculated by years [15].

In our case, since the patient had mild grade of fluorosis, so in-office vital bleaching procedure with McInnes solution was advocated. This solution has been successfully used for treating mild fluorosis. This procedure is relatively non-invasive compared to other restorative procedures and it could be finished with minimum chair side time. While the disadvantage of this procedure is the postoperative sensitivity it produces and that it cannot be employed in patients with more severe grade of fluorosis [16]. That's why we applied it in the mandibular teeth. Also vital bleaching is more successful for fluorosis in younger patients presenting with opaque to orange colorstain rather than older patients with darker type of brown stains [17]. This was the guide to use such solution for mandibular teeth in our case.

A logical sequence of treatment plan was followed in the treatment of this case, which consists of identifying the patient's chief complain, followed by

diagnostic wax-up, restorations fabrication, cementation of the definitive fixed prosthesis and correction of the occlusion with group function.

The clinical significance of the treatment of this case is masking of the deep fluorosis stain, creating a good relationship of anterior and posteriors teeth regarding (over jet and overbite) with durable and biocompatible restorations in harmony with existing occlusion.

CONCLUSIONS

Dental fluorosis is an ailment affecting aesthetics and functional demands of the patient. A successfully accomplished treatments with all ceramic crowns and bleaching, provides better esthetics to a teacher patient with full competence in function. The patient feels psychologically and mentally motivated with good physical health to move around in full confidence during follow-up appointments.

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