

# Minimally Invasive Management of Dental Fluorosis with a Combination Technique: A Case Report

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(Submitted: 15 May 2019 – Revised version received: 22 June 2019 – Accepted: 8 July 2019 – Published online: Spring 2019)

**Objectives** Dental fluorosis is a condition characterized by hypomineralization of tooth structure. It manifests as bilateral white opaque discolorations. Patients with these kinds of staining and discoloration often present to dental offices in young ages, seeking esthetic solutions. Color, shape and structural alterations in the anterior teeth could lead to significant esthetic complications for young patients. There are many cosmetic options to correct the unpleasant appearance of the anterior teeth. Dental bleaching is a conservative treatment for stained or dark-colored teeth. Micro-abrasion and removal of the outer layer of the tooth is another effective and successful method to treat fluorosis. Resin infiltration can also significantly change the esthetic appearance of such teeth.

**Case** Micro-abrasion followed by tooth bleaching and application of resin infiltrate was used in this study as a minimally invasive and inexpensive approach to treat discolored teeth due to dental fluorosis.

**Conclusion** To treat discolored teeth affected by dental fluorosis, a minimally invasive and inexpensive approach would be micro-abrasion followed by tooth bleaching and resin infiltration. This approach obviates the need for more invasive techniques such as veneers and crowns while it meets the esthetic demands of patients.

**Keywords** Fluorosis, Dental; Tooth Bleaching; Enamel Microabrasion

## Introduction

Fluoride is an element that can be found in water. Fluoridation of community water supplies is a common method to reduce dental caries. However, dental fluorosis may occur if the total level of ingested fluoride is more than the optimal limits.<sup>1</sup>

Concentration of fluoride in water is widely variable in different parts of Iran because the ecological situation of the country is uneven. The average concentration of fluoride in drinking water of Iran is lower than the optimal standards in the world.<sup>2</sup> Fluorosis is common in Iran in spite of low fluoride concentrations. The reason for this issue is related to the halo effect that means fluoride uptake from other supplies except water.<sup>2</sup>

The outer surface of fluorosed teeth is well mineralized. On the other hand, the subsurface layer is hypo-mineralized and has porosities. Clinically, fluorosis can cause esthetic problems depending on its severity.<sup>3</sup>

Ameloblasts are sensitive to fluoride during tooth development. Bilateral, thin and horizontal white to brown striations and stained regions are seen in mild to moderate fluorosis. In severe conditions, the enamel may have a discolored or pitted appearance.<sup>4</sup>

Patients with these kinds of staining and discolorations often refer to dental offices in young ages, seeking esthetic treatments. Color, shape, and structural alterations in the anterior teeth could lead to significant esthetic complications in young patients. In patients with fluorosis, combination of bleaching techniques and micro-abrasion may improve esthetics. These approaches have acceptable

outcomes. Also, they can result in optimal patient satisfaction with regard to their appearance.<sup>5</sup> These techniques preserve the dental structure and prevent damages that may occur during the veneering procedures.<sup>6</sup> Also, when we apply direct composite veneers in patients with fluorosis, a great challenge is the process of bonding to fluorosed enamel.<sup>6</sup>

Dental bleaching is a conservative treatment approach in stained or dark-colored teeth.<sup>7</sup> Hydrogen peroxide and carbamide peroxide are the commonly used bleaching agents.<sup>8</sup> Concentration and kinetic release of hydrogen peroxide are the key factors that dictate the application time of bleaching agents.<sup>9</sup> Resin infiltration treatment reportedly yields the best esthetic outcomes and improves the tooth appearance via a conservative approach.<sup>10</sup>

The aim of this study was to present a step-by-step minimally-invasive esthetic treatment comprising of bleaching, microabrasion and subsequent resin infiltration for a case of dental fluorosis.

## Case

A 27-year-old male was referred to the Esthetics and Restorative Department of Kashan Dental School (Kashan University of Medical Sciences), to seek an esthetic option for his discolored anterior teeth. He did not declare any systemic disease. His teeth had a brownish discoloration for as long as he recalled (Figure 1) and despite the suggestions by previous dental clinicians, he had not consented to treatments such as laminate veneers or crowns.

After comprehensive clinical and radiographic

examinations and evaluating the patient history, dental fluorosis was diagnosed. A minimally invasive and esthetically satisfactory treatment plan was suggested to the patient. Then, the consent of the patient was achieved.



**Figure 1- Patient presenting Dental Fluorosis**

The treatment was started with an initial impression to fabricate custom-made home-bleaching trays. On the next appointment, the teeth were isolated by rubber dam for microabrasion and the abrasive paste (Opalustre, Ultradent Products, South Jordan, UT, USA), comprising of silicon carbamide microparticulate paste and 6.6% hydrochloric acid, was applied on the six upper incisors. Abrasion was carried out for the two central incisors using a rubber cup (Oralcups, Ultradent Products, USA) for 40 s on all teeth, with an additional 120 s, while checking enamel thickness from the incisal view every 40 s (Figures 2 and 3).



**Figure 2- Microabrasion (Opalustre, Ultradent)**



**Figure 3- Immediately after microabrasion**

In the same session, 38% hydrogen peroxide (Opalescence Boost, Ultradent Products, Iran) in-office bleaching agent was applied on all teeth except the molars, to further improve the results. The teeth were exposed to 2% sodium

fluoride (Denti-care, Medicom, USA) using the custom trays for 4 min, in order to prevent sensitization.

Next, 20% carbamide peroxide (Whiter Image, USA) and custom trays were handed out to the patient with precise instructions according to the manufacturer, to further scale down the discoloration. After using four syringes of carbamide peroxide, the patient returned for the follow-up session (Figure 4).



**Figure 4- Facial view after 4 syringes of 20% carbamide peroxide (Whiter image, USA)**

The patient was satisfied with the results and only complained about the white spots that would appear on the abraded teeth immediately after tooth brushing, and would gradually disappear within an hour. A final resin infiltration step was performed to overcome this problem, while the inherently hypomineralized structure caused by dental fluorosis would be improved at the same time. Therefore, 2 weeks after the home-bleaching treatment, resin infiltration therapy (Icon, DMG Products, Hamburg, Germany) was performed as instructed by the manufacturer (Figure 5).



**Figure 5- Acide etching for resin infiltration (Icon, DMG)**

A rubber dam was applied to preserve the soft tissues and prevent possible traumatization. A gel comprised of 15% HCl, water, silica, and other additives was applied for 2 min. Then, the acid gel was rinsed with water spray for 40 s. An ethanol drier was used for 40 s to eliminate water from the white spot regions and reveal the microporosities more clearly. At the end of the process, resin infiltrate with low viscosity was applied for 3 min. A light curing unit (Woodpecker, China) was used for polymerization for 30 s (Figures 6 and 7).

The patient was totally satisfied with his smile and dental appearance.



Figure 6- Immediately after resin infiltration (Icon, DMG)



Figure 7- facial view one week after resin infiltration

## Discussion

Porcelain laminate veneers can be used as an esthetic restorative approach to treat enamel defects and discolored teeth.<sup>11</sup> But Goldstein et al.<sup>12</sup> recommended to use other conservative techniques that cost less and minimize the chair time. It has been proven that bleaching is an efficacious procedure in esthetic management of dental fluorosis and other external or internal stains.<sup>13</sup>

Penumatsa and Sharanasha<sup>13</sup> declared that bleaching with 5% sodium hypochlorite for hypomineralized enamel defects is useful and has favorable results. It is easy to handle and costs less. Also bleaching is relatively fast and safe. It can be safely performed for young permanent teeth

as well.<sup>13</sup>

According to Croll,<sup>5</sup> microabrasion and removal of the outer layer of tooth is an effective and successful method to treat fluorosed teeth. Combination of enamel microabrasion and dental bleaching was effective for re-establishment of dental esthetics of patients with severe dental fluorosis. A case report by Sundfeld et al.<sup>14</sup> illustrated the steps of enamel microabrasion in combination with dental bleaching to improve esthetics in a case of severely-pitted fluorosis. A case series by Gugnani et al.<sup>15</sup> reported the application of resin infiltration technique to correct the appearance of teeth with fluorosis stains and white spots. This study declared that resin infiltration can greatly improve the esthetic appearance of these cases.

Di Giovanni et al.<sup>16</sup> in a systematic review confirmed that resin infiltration is more effective to manage the esthetic demands of mild to moderate fluorosis cases than bleaching and microabrasion.

## Conclusion

To treat discolored teeth affected by dental fluorosis, a minimally invasive and inexpensive approach would be microabrasion followed by tooth whitening and resin infiltration technique. With this approach, it is possible to avoid applying invasive techniques such as veneers and crowns and meet the esthetic goals of patients.

## Acknowledgements

Special thanks to the head of Esthetics and Restorative Department of Kashan Dental School (Kashan University of Medical Sciences), for supplying the materials and support.

## Conflict of Interest

Non Declared ■

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**How to cite:**

Ghazaleh Daryakenari, Khashayar Sanjari, Hosna Ebrahimzadeh. Minimally Invasive Management of Dental Fluorosis with a Combination Technique: A Case Report. *J Dent Sch* 2019;37(2): 73-76.