International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Brightening Smiles in-office Vital Bleaching for Discolored Teeth: A Case Report

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Abstract:
In today's image-conscious society, aesthetics significantly influence personal grooming and self-confidence. Increasingly, individuals across diverse communities are recognizing the value of a confident smile. In regions where groundwater is a primary drinking source, enamel discoloration and surface irregularities associated with excess mineral exposure are frequently observed. Affected teeth may display a range of visual changes, including white spots, brown stains, and textural defects.
A variety of aesthetic treatment options exist for improving the appearance of such enamel conditions, including veneers, bleaching, crowns, and abrasion techniques. However, many advanced procedures can be cost-prohibitive or require specialized equipment and laboratory resources. Alternatively, enamel macroabrasion and microabrasion provide conservative and effective solutions for treating superficial enamel imperfections. Though these methods have been in clinical use for over a century, they are sometimes overshadowed by more invasive restorative approaches.
This clinical case report presents a conservative and cost-effective aesthetic solution through the combined use of enamel microabrasion, macroabrasion, and vital tooth bleaching to enhance smile appearance in a patient with enamel discoloration.

INTRODUCTION

Recently, there has been a noticeable increase in patient concerns regarding tooth discoloration, making it a prevalent cosmetic issue. A growing number of individuals are seeking professional dental treatments to whiten their teeth, motivated by the desire to enhance their appearance. The pursuit of a brighter smile is often associated with perceptions of health and beauty [1].
The natural color of permanent teeth typically ranges from grayish-yellow to grayish-white or yellowish-white. Deviations from this spectrum may occur due to physiological or pathological factors [1].
Dental fluorosis is characterized by white opaque spots or discoloration, which can range from yellow to dark brown, often accompanied by surface porosities in the enamel [2].
Optimal fluoride consumption provides an anti-cariogenic benefit to teeth. The World Health Organization (WHO) recommends a fluoride concentration of 1.5 ppm in drinking water to promote oral health.

However, intake exceeding this threshold may result in systemic effects and dental fluorosis [3].

Tooth discoloration-whether or not accompanied by structural anomalies-can significantly impact an individual's appearance, social confidence, and overall quality of life. Consequently, the treatment of stained teeth has become a central focus in cosmetic dentistry. Tooth whitening, or bleaching, is a non-invasive method used to enhance the color of teeth. For vital teeth, whitening options include over-the-counter products, in-office professional treatments, dentist-supervised at-home bleaching, and self-administered bleaching methods.

In-office bleaching involves the direct application of hydrogen peroxide (HP), typically in concentrations ranging from 15% to 38%, to the tooth surface. To enhance the bleaching process, various light sources-such as lasers, quartz halogen lamps, ultraviolet (UV) units, plasma arc systems, or light-emitting diodes (leds)-may be used for activation. This technique is commonly referred to as "power bleaching" [3].

Professional in-office whitening is a highly preferred option for patients seeking quick and visibly noticeable results without undergoing prolonged treatment sessions [4].

In the past, dental fluorosis was mainly observed in areas with naturally elevated fluoride levels in the water supply. However, due to the widespread integration of fluoride in preventive dental care, the condition has become more common, even in regions where public water supplies contain little to no fluoride [5].

Dental fluorosis is a developmental condition caused by enamel hypomineralization, which results from fluoride-induced disruption in the removal of enamel proteins-particularly amelogenins-during tooth formation. This interference affects enamel maturation, producing both surface and subsurface porosities. Clinically, it manifests as white streaks or patches on the enamel, with more severe cases exhibiting brown discoloration. These aesthetic issues, especially when involving the maxillary anterior teeth, can have a significant psychological impact [6].

Enamel hypomaturation defects may result from various underlying factors that disrupt enamel structure at the microscopic level. These include hereditary conditions such as the hypomaturation type of amelogenesis imperfecta, systemic influences like dental fluorosis, and localized developmental disturbances [7].

Enamel microabrasion is a conservative, non-restorative procedure used to eliminate or improve the appearance of superficial intrinsic stains caused by enamel mineralization defects. Within a few months following treatment, the enamel surface typically appears smooth and glass-like. Furthermore, research has shown that microabraded enamel surfaces tend to accumulate less dental plaque compared to adjacent untreated areas [8].

Successful aesthetic outcomes in the treatment of tooth discoloration depend on careful patient selection, focusing on individuals most likely to respond well to bleaching. The efficacy of bleaching procedures is influenced by several factors, including the concentration and application time of the bleaching agent, the type of discoloration, the initial tooth shade, and the patient's age. Due to the limited availability of regional data on this treatment approach, it is important to highlight the effectiveness of in-office bleaching for managing fluorosis-related staining.

This case report describes the successful aesthetic rehabilitation of dental fluorosis using a combination of enamel microabrasion, macroabrasion, and vital teeth bleaching.

Case Presentation

A 20-year-old male patient presented to the Department of Conservative Dentistry and Endodontics with

a chief complaint of discoloration affecting his upper front teeth. During the clinical examination, emphasis was placed on evaluating periodontal health, checking for gingival recession, and assessing the presence or absence of carious lesions. Notably, there were no signs of active decay, and the periodontium appeared healthy. The patient did not experience any pain or sensitivity associated with the discolored teeth, suggesting the condition was largely aesthetic in nature (Figure 1).

Figure 1: Intraoral preoperative photograph (Original image, taken with patient consent)

Upon further inquiry, the patient disclosed that similar discoloration had been observed in his younger sister as well as several residents from his native village. He denied any history of tobacco use, areca nut chewing, or consumption of substances commonly associated with extrinsic staining. Given the patient's background and the symmetrical, diffuse nature of the discoloration, a diagnosis of dental fluorosis was established.

To address the discoloration, an in-office bleaching procedure was selected as the treatment modality. Prior to initiating treatment, the vitality of the maxillary and mandibular anterior teeth was assessed using an electronic pulp vitality tester. All tested teeth were confirmed to be vital. A thorough oral prophylaxis was performed using an ultrasonic scaler to remove plaque and surface stains, followed by drying of the teeth. Pre-operative intraoral photographs were taken to document the baseline condition (Figure 1).

The bleaching system chosen for this case was Pola Office, which contains 35% hydrogen peroxide. This product is known for its effective whitening capabilities within a relatively short time frame, typically under an hour. Additionally, the presence of potassium nitrate in the formulation helps to minimize both intraoperative and postoperative sensitivity, making it a preferred choice for patients undergoing in-office bleaching. Following prophylaxis, the teeth were polished with a pumice slurry to prepare the enamel surface for optimal whitening results (Figure 2).

Figure 2: The teeth were polished using a pumice slurry (Original image, taken with patient consent)

The teeth were then dried, and a light-cured gingival barrier was carefully applied using a fanning motion to protect the soft tissues during the bleaching process (Figure 3). The patient was also provided with protective eyewear to ensure safety throughout the procedure. The bleaching gel was prepared by mixing the powder and liquid components in a 1:1 ratio using the manufacturer-supplied dispenser. To prevent any undue pressure buildup, the plunger of the hydrogen peroxide syringe was gently retracted. The mixture was stirred with a brush-tip applicator until a uniform gel consistency was obtained.

Figure 3: After application of gingival barrier, bleaching agent applied onto the facial surfaces. (Original image, taken with patient consent)

A thick layer of the gel was then evenly applied to the stained teeth. The gel remained in contact with the teeth for eight minutes, and photoactivation was performed using a light-curing unit for the same duration

to enhance the whitening effect (Figure 4). At the end of the application period, the bleaching agent was thoroughly removed with an air-water syringe and suction. Final polishing was completed to restore a smooth enamel surface. The patient was scheduled for a follow-up visit one week later.

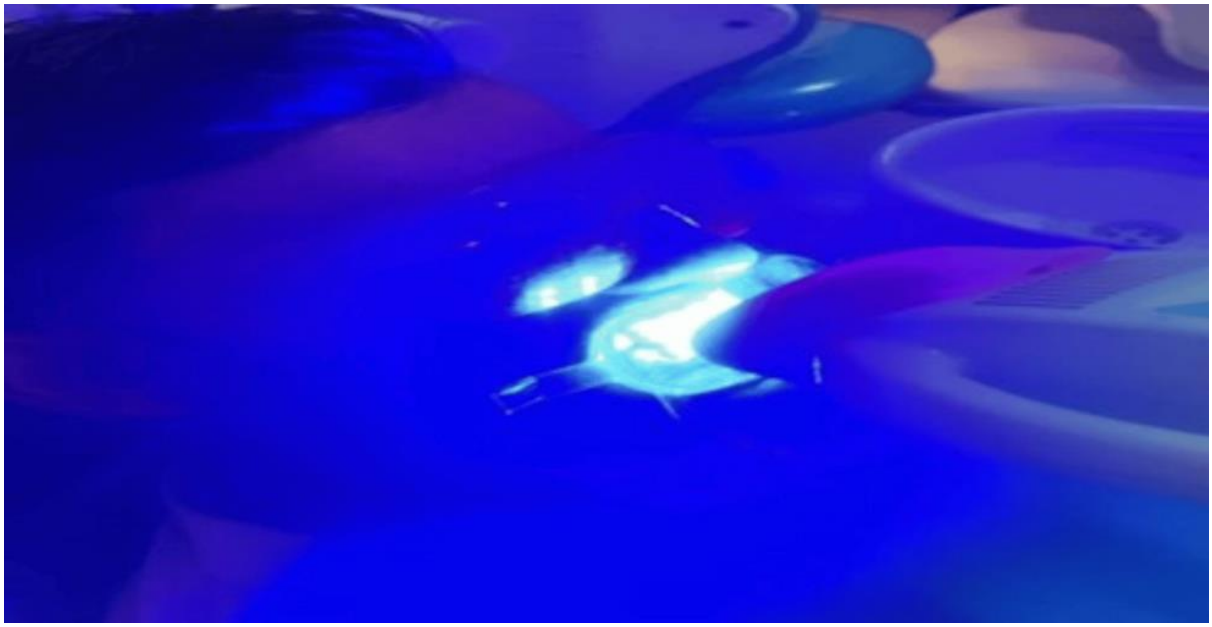

Figure 4: Light activation of the bleaching agent (Original image, taken with patient consent)

During the follow-up appointment, the patient reported a noticeable improvement in the color of his teeth and expressed high satisfaction with the results of the procedure (Figure 5). The outcome confirmed the effectiveness of the chosen treatment approach in managing esthetic concerns related to dental fluorosis.

Figure 5: Postoperative photograph following application of bleaching agent showing lightening of discolored teeth. (Original image, taken with patient consent)

Discussion

Dental fluorosis often contributes to a negative self-image and dissatisfaction, with the level of concern increasing alongside the severity of the condition. Tooth discoloration is a common reason patients seek aesthetic treatment, and several correction methods are available, including resin infiltration, bleaching,

microabrasion, full crowns, and veneers. Conservative approaches such as resin infiltration, bleaching, and microabrasion help preserve the tooth's physical integrity. In contrast, more invasive options like macroabrasion, veneers, or crown preparations result in significant tooth structure loss [1].

Conservative treatments, including enamel microabrasion and tooth bleaching, can significantly improve the appearance of discolored teeth by removing white opaque areas, brown stains, and superficial enamel defects. These minimally invasive techniques often yield highly satisfactory results, reducing the need for more extensive restorative procedures [2].

The primary goal of the bleaching process is to restore the natural color of teeth by breaking down stains through the application of a potent oxidizing agent. This treatment is generally suitable for most types of tooth discoloration. However, it is contraindicated in certain cases, including use in pregnant women, infants, and children under the age of 10. It is also not advised for individuals with exposed dentinal tubules, those unable to abstain from smoking during treatment, or patients experiencing severe tooth sensitivity [3].

In-office bleaching procedures offer numerous advantages, such as professional supervision, soft tissue protection, prevention of accidental ingestion of materials, shorter treatment time, and the potential for immediate results. This method also circumvents issues related to patient compliance and dexterity, making it ideal for those with a strong gag reflex or laryngeal spasm. The effectiveness of bleaching depends on several variables, including the patient's age, initial tooth shade, concentration of the bleaching agent, and application duration [4].

Patients undergoing bleaching for fluorosis-related discoloration may experience mild to moderate post-treatment sensitivity. In this case, only minimal sensitivity was reported during the in-office whitening session. A desensitizing gel was applied immediately after the procedure to reduce discomfort. No sensitivity was noted during the follow-up visit.

Conclusions

Tooth discoloration is a common aesthetic concern resulting from a variety of factors, with the severity and appropriate treatment differing from one patient to another. In-office bleaching is a non-invasive and highly effective method for enhancing the appearance of teeth affected by severe fluorosis and discoloration. When performed with the correct concentration of bleaching agents, it is a safe and dependable option for dental professionals. Overall, in-office bleaching provides a convenient and efficient approach to restoring a brighter, more confident smile.

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