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Case Report

Microabrasion of teeth with fluorosis: A minimally invasive solution to unaesthetic smile

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ABSTRACT

Dental hypomineralization like dental fluorosis leads to a less aesthetic appearance of the teeth visible in the vicinity. Dental fluorosis results from excessive fluoride intake during enamel formation, which may lead to color abnormalities or defects in the tooth surface. Microabrasion is the preferred treatment for aesthetic improvement of stains in mild to moderate cases. In this procedure, trapped stains are removed with the help of the abrasive agent and HCL acid which is directly applied to the stained enamel surface. Casein phosphopeptide - Amorphous calcium phosphate (CPP-ACP) applied topically after microabrasion, improving remineralization and preventing post-operative sensitivity. This case report illustrates the microabrasion technique for the management of mild to moderate dental fluorosis in maxillary incisors to eliminate stains from the enamel surface in a single session, followed by remineralization with CPP - ACP paste and a further one-year follow-up was done to check the long-term effect of the treatment.

1. Introduction

Young patients with discoloration in their anterior teeth lead to a psychological impact on them and this lowers their confidence. The causes of tooth discoloration mainly include extrinsic etiology such as tea, coffee, and pan, or intrinsic etiology that can be pre-eruptive or post-eruptive. Pre-eruptive causes are dental fluorosis and dentinogenesis imperfecta whereas post-eruptive causes include injuries or staining of tooth by tetracycline drug consumption.[1] Among all these dental fluorosis is one of the common causes of tooth discoloration which when consumed in high doses leads to hypomineralization of enamel.[2] Using Dean's Index, dental fluorosis according to severity is classified into three main types: mild-chalky appearance, moderate-pigmented appearance, and severe defect.[3] More severe dental fluorosis produces more serious aesthetic concerns related to the color of the tooth.[4]

There is no conclusive evidence for reversible changes in hard tissues by fluorosis and that's why therapeutic management in most of the cases for cosmetic problems is required which has to be minimally invasive if possible.[5] Considering the minimally invasive technique one such method available is enamel microabrasion which may significantly influence the outcome of the smile.[6] In this technique, minimum chair time is required and there is minimal enamel loss during the procedure thus there is no post-operative sensitivity or any pulpal trauma.[4] Current micro abrasive materials have silicon carbide particles and HCL acid which have shown to be a safe option.[7]

According to Croll and Cavanaugh, the technique of microabrasion helps in removing intrinsic and superficial enamel discoloration with the help of acidic and abrasive agents, these agents create a smooth surface enamel because of which the colonization of Streptococcus

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mutans, and demineralization is also resisted when enamel microabrasion is done.[8] This case presents the minimally invasive treatment of fluorosis in maxillary incisors with opalustre microabrasive gel followed by polishing and application of CPP- ACP remineralizing paste.

2. Case Report

A twenty-one-year-old female patient came to the dental OPD with a chief complaint of noticeable yellowish-brown stains on her upper anterior teeth [Figure 1a]. On history taking, the patient was a resident of Kishangarh town in Rajasthan which is a fluoride-rich belt. The patient's medical history was non-contributory. From the appearance of her teeth, a diagnosis of mild to moderate fluorosis staining was determined by using Dean's Fluorosis Index with the most significant staining occurring on the maxillary anterior teeth, with light brown streaks at the junction of a middle and incisal third of the facial surfaces. In consideration of her age, the patient was not interested in treatment options that involved significant removal of tooth structure, such as porcelain or composite resin veneers. So, the conservative treatment option taken into consideration was microabrasion with 6.6% hydrochloric acid slurry and microparticles of silicon carbide in a water-soluble paste.

During her treatment visit, informed consent was obtained, and dental prophylaxis was done. Rubber dam (OptraDam plus; Ivoclar vivadent,) isolation was achieved, including floss ligatures on all upper anterior teeth to ensure proper inversion of the rubber dam sheet [Figure 1b]. A pre-mixed version of 6.6% hydrochloric acid slurry and silicon carbide microparticles (Opalustre; Ultradent, South Jordan, UT, USA) was applied on the facial surface of anterior teeth followed by rubbing with special polishing cups having central bristles (Opalcups; Ultradent, South Jordan, UT, USA) coupled with the micromotor slow-speed contra-angle handpiece [Figure 2a]. These polishing cups were used for a 1-minute duration at a low rotational speed with gentle pressure to distribute the mixture evenly. The teeth were rinsed with water and the result was assessed clinically. For the remaining stains, the same procedure was repeated further for two more times in the same visit. Thereafter, teeth were polished with polishing paste using superfine polishing cups [Figure 2b]. A CPP-ACP-containing paste (GC tooth mousse) was applied for about 4 minutes. After the accomplishment of the procedure, immediate enamel aspects were satisfactory with a major improvement in the aesthetic appearance of the patient compared with the pre-procedure smile [Figure 3a].

Before the patient was relieved, the following instructions were given: CPP - ACP cream should be used thrice daily for 2 weeks for remineralization, avoid smoking or eating, or drinking anything that may stain the teeth for the next two to three days, and was advised that bitterly cold or hot food/beverages should be avoided for few days to prevent sensitivity. After the one-year follow up there were no clinical findings of any discoloration in the anterior teeth and the effect was gratified [Figure 3b].

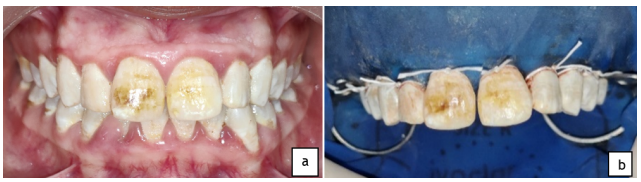

Figure 1: a: Pre-operative clinical photograph showing fluorosis; **b:** Application of rubber dam and floss tie.

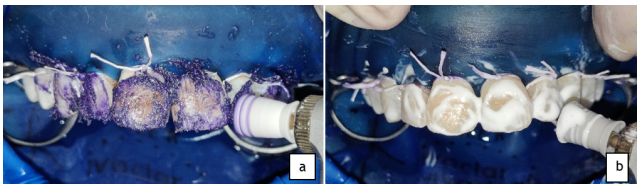

Figure 2: a: Application of opalustre microabrasion gel; **b:** Polishing with rubber polishing cup.

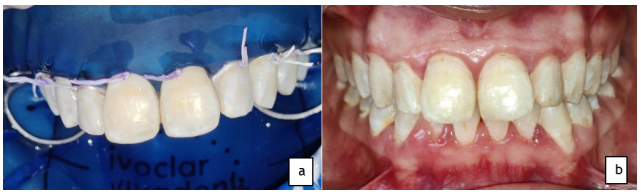

Figure 3: a: Immediate post-operative image with a satisfactory aesthetic outcome; **b:** Clinical image after one-year follow-up.

3. Discussion

Intrinsic color alterations may involve the enamel or dentin, or both.[9] Developmental disturbances like enamel hypoplasia are the most frequent one that includes discoloration of the enamel.[10,11] Various procedures are used to improve the esthetic appearance of the affected teeth, which include: bleaching of the teeth, enamel microabrasion, corrections using tooth-colored restorative material, or a combination of the procedures in some cases.[12]

The length of duration and the timing of exposure mainly influence the severity of fluorosis. Aesthetic improvements in mild to moderate cases of fluorosis, or defects limited only to enamel surface can be improved with the help of enamel microabrasion.[13] During this procedure the enamel

is not masked or altered, only the stained enamel is removed thus it gives better long-lasting results and does not cause any damage to the pulp or periodontal tissues.[14] As it is inexpensive, it becomes a feasible treatment option in dental practices. Microabrasion is technique sensitive as how much amount of the enamel will be removed is directly related to the technique, no. of cycles, and type of acid used.[15] Croll and Cavanaugh suggested that by applying 18% hydrochloric acid enamel stains can be removed. Many other combinations are developed and marketed for acid and abrasive particles such as 'Opalustre' which is a pre-mixed version of 6.6% hydrochloric acid slurry and silicon carbide microparticles. It may be more easily applied due to the single agent used, rather than using other alternative techniques that include mixing the phosphoric acid and pumice before application.

The tooth undergoing the procedure should be isolated with a well-sealed rubber dam because of the caustic and toxic effects of hydrochloric acid on the adjacent soft tissues. It should be ensured that the tooth should be dry to get the optimum results. Intermittent water rinses and inspections are necessary to determine whether additional applications are required or not. After a few weeks, microabrasion can be repeated depending on the degree of discoloration remaining after the first cycle.[10] It can be verified in the literature that the enamel loss in teeth after microabrasion ranges from 20 to 200 μm after each application of the paste depending on the concentration of the acid and the duration of the application. However there lack of consensus regarding the maximum number of microabrasion cycles that can be done without causing the excessive removal of tooth enamel.[16] The application of CPP-ACP-containing toothpaste is also recommended, as it recourses in the remineralization of enamel and prevents sensitivity.

The depth of altered enamel influences the success of the enamel microabrasion procedure. The final success of any dental treatment, whether functional or aesthetic, depends on the patient who should be well informed to maintain oral health and be motivated for the same. The periodic control by the dentist and the dentist's contribution is essential for the long-term success of such dental treatments.[6]

4. Conclusion

Enamel microabrasion is a conservative and safe alternative method to treat enamel discoloration caused by dental fluorosis. Thus, it helps in providing satisfactory aesthetic results to the patient's smile which helps the patient to regain self-esteem. The highest priority for clinicians should be the wishes of the patient when formulating a dental treatment plan.

5. Conflict of Interest

None.

6. Source of Funding

None.

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