Case Study

MANAGEMENT OF ENAMEL STAINS USING A COMBINATION TECHNIQUE OF MICROABRASION AND REMINERALIZING AGENT

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ABSTRACT

The most common cause of an unaesthetic smile is Dental fluorosis which leads to discoloration of the teeth due to staining. The staining of the incisor and cuspids gives a disagreeable and unaesthetic smile which ranges from mild-to-moderate fluorosis stains and tobacco stains. To overcome these problems, a minimally invasive approach, Enamel Microabrasion can be considered which not only enhances esthetics but also leads to minimal enamel loss. Due to the abrasive effect of the material, there are chances of postoperative sensitivity. To overcome these effects topical application of remineralizing agents after microabrasion is considered beneficial. The present case reports of 28 and 33-year-old male patients emphasize the management of fluorosis and tobacco stains respectively with microabrasion followed by a remineralizing agent which can be topically applied, and the outcome shows the efficacy of the blending technique of microabrasion and remineralization. Clinical significance is providing the minimally invasive non-restorative technique that provides excellent long-term esthetic outcomes.

Key words: Combination technique, Microabrasion, Macro-reduction, Remineralization.

Introduction

An unaesthetic smile can psychologically impact young patients thereby leading to lowered self-esteem[1].The unacceptable discoloration or pitting of teeth can be due to several factors including fluoride stains amelogenesis imperfecta, and enamel hypoplasia which are developmental disturbances due to some extrinsic factors like intake of tobacco, coffee, tea, and red wine, and some intrinsic etiology [2]. Dental Fluorosis is characterized by matte patches present on the enamel, that can be opaque and whitish in appearance, and striations that can be streaky or blemished. The mottled areas usually become stained on the enamel which gives a disagreeable appearance. This becomes challenging for the dentist to meet the requirement of desired aesthetics of patients. For enhancing aesthetics, the preferred and favorable treatment which gives a desirable outcome in cases of mild to moderate degree of fluorosis and extrinsic stains such as tobacco stains is Enamel microabrasion. Microabrasion causes a minimum reduction in tooth surface as well as minimum discomfort to the patient that leaves behind an even and glossy surface with a long-lasting result. Besides improving esthetics, the need for a restorative approach is reduced, which is a prime concern in young patients [3].Microabrasion is a process in which only a small and minute layer of enamel is gnawed and abraded simultaneously with a unique material that leaves behind an undamaged enamel surface. In 1916, hydrochloric acid (HCl) was introduced by Dr. D Kane for the cases of fluorosis to refine the improved desirability of teeth[4].After this revolutionization, more research was carried out for the technique of Microabrasion to examine the efficacy of different concentrations of HCl ranging from 6.6% to 18% and different concentration of phosphoric acid (H3 PO4) in the range of 30% to 40% in association with abrasives [5].Enamel Microabrasion has shown to have a promising outcome for stains or defects of enamel that are superficially present and is considered an esthetic and conservative treatment[6].Postoperative sensitivity after microabrasion is reduced by applying remineralizing agent like Remin Pro[7].Remin Pro® contains fluoride, hydroxyapatite, and xylitol to fortify remineralization and re-strengthen the enamel sub-surface[8].

Case history

Case 1

A 33-year-old male patient reported at Department of Conservative Dentistry and Endodontics,Inderprastha dental college and Hospital,Sahibabad , giving chief complaint of the staining of his upper and lower anterior teeth.The patient gave a history of discoloration for 5-6 years and a history of tobacco consumption in the last 9-10 years.No relevant systemic disorder was recorded. The family history given by the patient was not relevant.During clinical examination, generalized brown stains were noted. Vitality test- electric pulp testing and the cold test was done wrt to the upper and lower anterior. The teeth were vital. Various treatment plans were suggested to the patient and the patient opted for a conservative approach. The treatment plan was explained in detail to the patient and the patient's consent was obtained. The treatment proceeded

with enamel microabrasion preceded by the application of Remin Pro, remineralizing agent **(Figure 1d)**.The first step of treatment involved taking pre-operative photographs after oral prophylaxis followed by rubber dam (Coltene Hygiene) application in the upper arch.After stabilizing the rubber dam the rubber dam was slightly reflected and a gingival shield (Aarc Dental) **(Figure 1b)** was applied and light cured.**(Figure 2a)**Protective eye gear was provided to the patient.**(Figure2b)**Opalustre (Ultradent Products) **(Figure 1a)** was chosen to carry out Microabrasion for improving the aesthetics with minimal surface loss of the teeth. A thick layer of Opalustre (Ultradent Products) of about 1mm was applied on the six upper anterior teeth (central, lateral incisor, canines) all over their labial surfaces, and scrapping was done by small rubber cups **(Figure 1c)** via contra-angle. **(Figure 2d)** A slight pressure was applied for about 60 s/toothon the and were micro abraded. The teeth were rinsed with water and observed. The procedure was repeated with a second application of Opalusture. All the above steps were repeated for the lower anterior teeth.Then, Remin Pro cream (Voco) application was done for 4 min to the treated teeth surface. The patient was then advised three time daily home applications for 2 weeks.**(Figure 2e)**

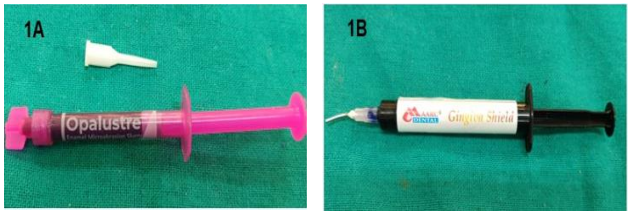
The pre and post treatment pictures of case 1 - **Figures 3a and 3b**

Case 2

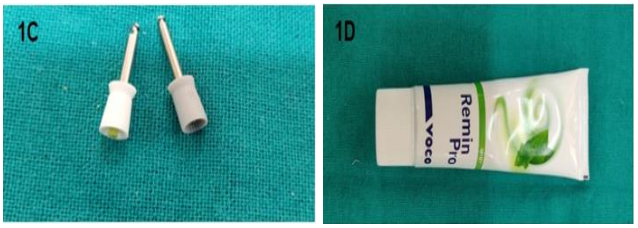
A 28-year-old male reported at Department of Conservative Dentistry and Endodontics,Inderprastha dental college and Hospital,Sahibabad, with the complaint of the staining of his upper and lower anterior teeth. The patient gave a history of discoloration for 10-12 years.No relevant systemic disorder was recorded. The personal history given by the patient disclosed that he resided in an excess fluoride-prone area. Therefore, due to the unesthetic appearance of his teeth, he was hesitant in talking or smiling. According to Dean's fluorosis index, a diagnosis of moderate fluorosis was made[4].

All the above steps in Case 1 were repeated with the difference in Enamel Macro-reduction **(Figure 2c)**, a process of trimming the surface of enamel with a fine diamond bur which was done before the application of Opalustre (Ultradent Products).

The pre and post treatment pictures of case 2- **Figures 3c and 3d**

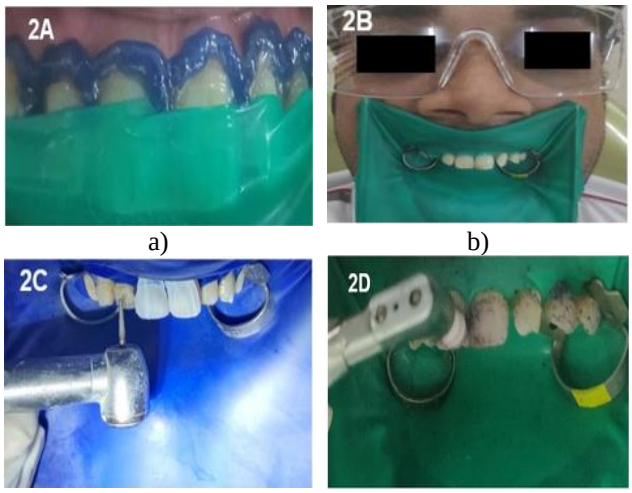


a) b)



c) d)

Figure 1.armamentarium used: a) opalustre (Ultradent products); b) gingival shield; c) rubber cups; d) Remin pro (voco, Germany)

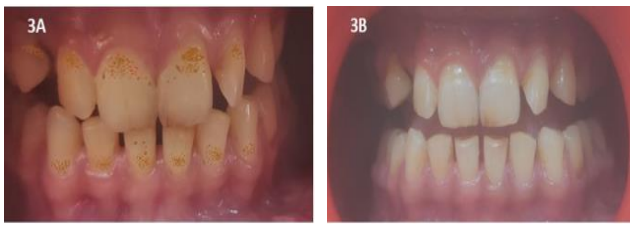


a) b)

c) d)

e)

Figure 2. a) application of gingival shield; b) rubber dam application; c)enamel macro reduction; d) application of opalustre; e) application of Remin-pro



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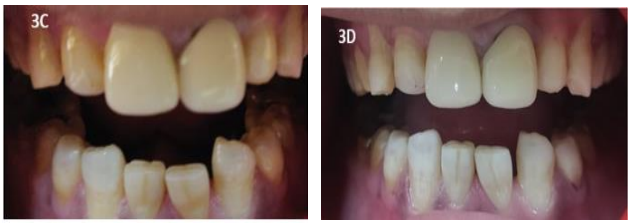

c) d)

Figure 3. a) case 1 pre-operative; b) case 1 post-operative; c) case 2 pre-operative; d) case 2 post-operative

Results and Discussion

Aesthetic problems psychologically affect patients of all age groups, especially young adults, which intrude on their social life, and emotional well-being. For the recovery of teeth that represents superficial defects and are demineralized and decalcified, Enamel microabrasion has been adopted as a minimally invasive, non-restorative method in recent times[9, 10].The advantages include only a minute removal of tooth-stained tooth structure, so the chances of post-operative pain or sensitivity are less, and also account for only a slight discomfort to the patients as in most of the cases a single session is only. Prolonged effects with immediate results are some others added benefits. This is attributed to the fact that the enamel characteristics change after the micro-abrasion, resulting in a special optical effect that refracts light in a way that masks the spot instead of just covering or altering the enamel stain[11].As reported by Sundfeld*et al*., application of 5 to 10 times of micro abrasive paste-like Opalustre and pumice added to 30%-40% concentration of phosphoric acid results in enamel reduction that is about 25 to 200 μm, which is allowable clinically[12,13].The micro abrasive paste leads to the accumulation of the tissue that is mineralized in nature inside the enamel that consists of the organic part due to the simultaneous action of abrasion and acid erosion leading to an increase in surface roughness and a decrease in micro reduction[14].However, both these effects can be reversed by saliva exposure[14-16].In the clinical case reported, post microabrasion, the coloration of the teeth was recovered which was followed by applying remineralizing agent, Remin- Pro. The chances of postoperative sensitivity post application of remineralizing agent are reduced and at the same time stabilized by maintaining a mineral ambiance through improvement in the crystalline structure of enamel. Remin Pro® manufactured by Voco, Cuxhaven, Germany is a remineralizing material containing fluoride, hydroxyapatite, and xylitol which the manufacturers claim prevention and recovery of the dental tissues that are demineralized and eroded as a result of microabrasion by facilitating the neutralization of acids. Remineralization and strengthening of the enamel subsurface are reinforced by fluoride and hydroxyapatite[8].There are some considerations regarding enamel microabrasion summarized as follows: Since the procedure of Enamel Microabrasion is simple, minimally invasive, and conserves the tooth structure therefore age is not a consideration[17].The number of applications is determined by the severity of the stains[18].The treatment of stained teeth can be achieved by the "MAb-Re" (Microabrasion-remineralization) method in a very efficient manner[17].Microabrasion is contraindicated in patients with incomplete lip closure as it can lead to the failure of the procedure due to the continuous dehydration of enamel[13].Better aesthetic results are achieved when Enamel Microabrasion is combined with bleaching[18].

Conclusion

The patient's self-confidence along with esthetics and even distribution of the teeth color can be achieved by Microabrasion. In terms of removing enamel stains and defects that are superficially present the reliability of the procedure is attributed to the fact that it provides safety, is conservative, doesn't cause any trauma to the teeth, and hence is beneficial. Therefore, for patients who seek a minimally invasive method enamel microabrasion is the best and first option. Remineralization post Microabrasion is an excellent treatment approach for various types of enamel stains because the remineralizing agents reduce any chance of sensitivity post-microabrasion.

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Conflict of interest: None

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Ethics statement: The case was performed with the consent and approval of the patient.

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