

CLINICAL STUDY

MANAGEMENT OF DISCOLORED TEETH WITH ENAMEL MICROABRASION

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ABSTRACT

This case reports describes the esthetic dental treatment of a patient with dental fluorosis where microabrasion was used to treat the problem. The patient's teeth had white and light yellow spots which were treated with the mixture of acid and pumice i.e. microabrasion. The esthetic results were satisfactory. These case reports showed that microabrasion helped to improve the dental esthetics.

Key Words – Microabrasion, Dental Fluorosis, Esthetics

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INTRODUCTION

Microabrasion is a conservative esthetic treatment used for the selective removal of localized areas of intrinsically stained superficial enamel, usually caused by mild fluorosis and/or enamel hypoplasia (white spots). Such enamel discoloration has been termed dysmineralization. In the most popular microabrasion method, a mild concentration of hydrochloric acid is mixed with an abrasive powder to form a paste; this is safely applied to the affected area of the tooth either with a hand instrument or with a slow-speed dental handpiece. The application can be repeated until the stain is totally removed or the esthetic result is acceptable. Enamel microabrasion on teeth is analogous to dermabrasion on skin surfaces.³ Microabrasion works best to remove unpleasant stains that are localized in the outermost part of the dental enamel. It also can be combined with tooth whitening to achieve an even more esthetic result.

Microabrasion is not recommended for deeper, internal tooth stains such as those caused by tetracycline, severe mottling from fluorosis, or generalized yellowing of the teeth. In this case reports describe tooth color improvement achieved in patients using enamel microabrasion. Long-term results are presented.

CASE REPORT 1

An 18-year-old boy presented with brown and white enamel

dysmineralization of his maxillary anteriors. A clinical examination identified the presence of whitish and light yellow stains on the labial surfaces of his teeth. From his past dental history, the hypoplastic stains were suggestive of moderate dental fluorosis, with spots staining labial surface of the maxillary anterior teeth. Enamel microabrasion was used for tooth-color correction as follows: The teeth to be treated were cleaned with pumice and water, washed and dried. To protect the gingival tissues, Rubber Dam was placed according to the

manufacturer's instructions. 18% hydrochloric acid was mixed with pumice into slurry and applied a small amount to the labial surface with a slowly rotating rubber cup over the surface for 5 seconds. Then the teeth were washed for 5 seconds directly into the aspirator. The procedure was repeated until the stain was reduced, up to a maximum of 10 x 5 second applications per tooth. After superficial stains had been removed, the teeth were saturated with 1.1 % neutral sodium fluoride gels. The rubber dam isolation barrier was removed using a cotton forceps. The teeth were polished with fluoridated toothpaste for one minute.



Figure 1 – Preoperative Photograph



Figure 2 – After Rubber dam application



Figure 3 – Immediately after treatment



Figure 4 – After 2 weeks

CASE REPORT 2

A 15-year-old girl presented with brownish enamel dysmineralization affecting the maxillary permanent lateral incisors and, to a lesser degree, the central incisors. The chief complaint of both the child and her mother was about her "tooth spots" and "splotchy teeth." Enamel

microabrasion was used for tooth-color correction as follows: The gingival tissues were protected with Vaseline while the affected teeth were isolated with a rubber dam to avoid contact between the acidic material and other teeth as well as the soft tissues of the mouth. The patient was fitted with protective glasses to protect her eyes from the microabrasive paste. The patient was cooperative during the procedure. The microabrasive paste was prepared with 37% phosphoric acid in gel form mixed together with pumice in equal volume, to make a stable consistent paste. The paste was applied with a rubber cup in as low-speed handpiece for 15 seconds. After using the paste, the teeth were liberally washed with a water spray to remove the paste. This procedure was repeated more than ten times. Circular movements were made on the enamel stains with the rubber cup for 5

seconds, and then repeated. In a single session, the teeth were washed between paste applications. The treatment was followed by removing the rubber dam and applying neutral sodium fluoride gel to the enamel surfaces for 1 minute. The final result was evaluated.

DISCUSSION

Today, esthetics in dental care has a significant role. Any deviation from what is considered the esthetic can affect the psychological development of an individual. Analogous to dermabrasion on skin surfaces, enamel micro-abrasion is a method of reducing the tooth surface in such a way as to remove superficial dysmineralization discoloration defects. Using rotary application of a prepared abrasive-acid compound, a microscopic amount of enamel is eliminated, exposing the unstained subsurface layer. Enamel loss is insignificant and clinically unrecognizable¹. Enamel microabrasion using acid and pumice removes superficial dysmineralization defects, and the treated tooth surface becomes smooth and lustrous as time passes^{9, 8, 12}. Formation of this type of surface has been called the "enamel glaze effect"^{9, 8, 10, 13}. Dentists not yet experienced with the enamel microabrasion technique often inquire as to how one can tell the depth of an enamel lesion, and when to abandon microabrasion for a restorative alternative. Using the dental handmirror during the microabrasion procedure, the dentist can periodically view the crown from the incisal aspect. If the tooth surface begins to flatten or even become concave, the discoloration lesion is too deep for complete removal using microabrasion. Once one gains experience with the technique, it becomes easier to predict which types of enamel discoloration defects can be eliminated. In successful microabrasion cases, there is generally less than 150 microns of enamel loss¹⁶ and rotary application usually takes about 3 to 5 minutes per tooth. The amount of enamel loss



Figure 1- Preoperative Photograph (Front view)



Figure 2- Preoperati (Right lateral view)



Figure 3- Preoperative Photograph (Left lateral view)



Figure 4 – Immediately after treatment



Figure 5 – After 1 month

depended on the number of applications, application duration, pressure applied, and acid concentration. Variations in the technique also revealed no difference in the quantity of enamel removed; whether applied manually with a wooden stick, or mechanically utilizing a slow-speed handpiece, no alteration occurred in the amount of structural enamel that was worn away. To achieve a satisfactory esthetic result, an analysis of the etiology and depth of the stains should precede microabrasion. Extrinsic discolorations can be easily removed, but deep intrinsic discolorations, such as tetracycline stains, are not removed when exposed to abrasion^{6,13}. The technique can be used on stains up to a depth of 0.2 mm². It is not clear how microabrasion eliminate such discolorations and improves the appearance of demineralized enamel. Donly et al.¹² stated that the enamel microabrasion reflected and refracted light from the tooth surface in such a way that mild imperfections in the underlying enamel were camouflaged and that tooth hydration by saliva increased these optical properties of the newly formed enamel abrasion surface. For Ashkenazi and Sarnat⁴, this could be due to the acid component, which dissolves organic material, including pigmentation, and eliminates mineralized tissue. After dissolution, fluoride and saliva minerals provide a remineralization of the enamel⁴. A scanning electron microscopic analysis revealed that the peripheral region of the enamel prism appeared eroded, with decreased mineral content due to the acid mixture. These areas were compacted around the central prisms. This newly formed surface layer of enamel, highly polished and densely compacted, had become an intrinsic part of the external enamel layer¹¹.

The materials used—phosphoric acid and pumice—are routinely used in dentistry, thus no specific product is required for the technique. There are, however, a variety of readily applicable materials. Silva et al.¹¹ reported that using phosphoric acid in the preparation of the paste reduced the number of applications by half compared to a commercial kit. In relation to acidic variation, 18% hydrochloric had a similar effect to 37% phosphoric^{5,15}, but phosphoric acid was easier to handle and was faster.

1.1 % neutral sodium fluoride gel after the enamel microabrasion is preferred over the acidulated fluoride gel simply because the treated surfaces have just been treated with concentrated acid application¹⁶.

The esthetic effects of microabrasion can be observed after just one session, which makes the treatment less tiring for patient. It is relatively safe technique that does not cause damage to the dental pulp or the periodontal tissue, nor does it cause dental sensitivity^{4,15}. Clinical monitoring of our patient coincided with data provided by Silva et al¹¹, showing that over a period of 24 months, the patient had neither recurrence of the stains nor any damage to the periodontium or the teeth. The esthetic result has been satisfactory since the first microabrasion appointment.

CONCLUSION

Enamel microabrasion is a conservative procedure that can be used to eliminate localized superficial enamel stains. The procedure is used in children and adults and does not require an injection of anesthetic. Multiple teeth can be treated at the same time, although more than one application might be necessary to completely remove the affected enamel. Microabrasion can be combined with tooth bleaching in some cases, for an exceptional improvement of tooth appearance.

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