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Clinical Technique

Accomplishing Esthetics Using Enamel Microabrasion and Bleaching—A Case Report

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Clinical Relevance

This article discusses indications and limitations of enamel microabrasion treatment and indicates that this technique may be a promising alternative to restoring severe stains.

SUMMARY

This case report describes the sequential steps that were used to treat unesthetic, white, hard-texture enamel stains of unknown etiology. A tapered fine diamond bur was used to remove superficial enamel followed by the use of an enamel microabrasion compound Opalustre (Ultradent Products Inc). This technique removed the stains and was followed by polishing with a fluoride paste to restore the enamel to a smooth finish. The teeth were subsequently bleached with carbamide peroxide (Opalescence 10%, Ultradent Products), which achieved the patient's desired esthetic results.

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INTRODUCTION

Since the study by Croll and Cavanaugh in 1986,[1] the application of enamel microabrasion to remove hard, superficial enamel stains has routinely been used with considerable success.[1-4] Extensive studies have been performed to develop enamel microabrasive products that ensure adequate safety for oral tissues while allowing for ease of use.[5,6] Enamel microabrasive materials are currently composed of low concentration hydrochloric acid and silica carbide microparticles, which offer a good margin of safety during application to the operator and the patient.[3,5]

Several publications have reported on techniques to reduce the time needed for enamel microabrasion.[3,7,8] It has been suggested that clinicians begin the treatment by performing enamel macroreduction

Figure 1. *A 28-year-old man with intrinsic white stains that have a hard texture, located on the buccal and lingual enamel surface of all maxillary incisors, canines, and premolars.*

using a tapered fine diamond bur to lightly abrade the affected area. This is followed by application of an enamel microabrasive paste to complete the removal of remaining stains and to smooth the enamel surface that was ground by the diamond bur.[3,4]

The enamel microabrasion technique causes a negligible loss of enamel[5,9]; however, teeth may acquire a darker and yellower hue in areas where the enamel has been reduced to remove the stains, thus revealing the underlying dentin. In these cases, a color correction may be accomplished using carbamide peroxide or hydrogen peroxide.[3] The case reported here presents a protocol for an enamel microabrasion technique that removes stains from the buccal enamel surface and is followed by bleaching with carbamide peroxide to acquire the desired esthetic results.

CLINICAL CASE

A 28-year-old patient presented at Araçatuba Dental School—UNESP, Araçatuba, Brazil, complaining about white enamel stains and some eroded areas on his upper and lower teeth (Figure 1). A clinical examination determined the white stains to be intrinsic and of a hard texture (Figure 2). The patient was offered the option of an enamel microabrasion treatment on the buccal surfaces of incisors, canines, and premolars of the maxillary and mandibular teeth, followed by bleaching. The steps involved in this proposed treatment were explained. After consenting to the treatment, and in preparation for the bleaching phase, alginate impressions were made, poured in stone, and used to fabricate custom bleaching trays.

After a dental prophylaxis with pumice and water, a high-speed tapered fine diamond bur (No. 3195 FF, KG Sorensen Indústria e Comércio Ltda, Barueri, São Paulo, Brazil) was used under copious irrigation, and the superficial layer of the stained enamel was removed (macroreduction) (Figure 3). A layer of petroleum jelly was applied to the gingival tissues, followed by the placement of a rubber dam, to protect the gingiva from the microabrasion compound (Figure 4). The patient, assistants, and operator all wore eye protection during the procedures.

Figure 2. *Intrinsic white stains with a hard texture located on the buccal enamel surface of all maxillary incisors, canines, and premolars.*

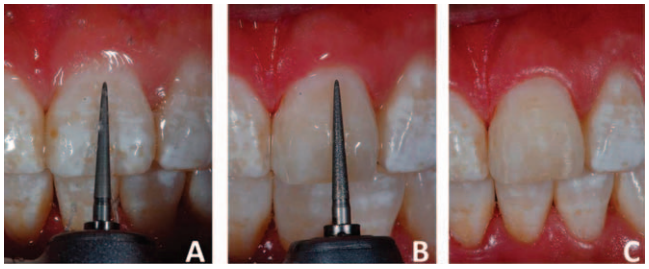

Figure 3. *The use of a tapered fine diamond bur No. 3195 FF on the buccal surfaces of the maxillary incisors, canines, and premolars.*

An enamel microabrasive product containing a mild concentration of hydrochloric acid (6%) and a fine-grit silicon carbide abrasive in a water-soluble gel (Opalustre, Ultradent Products Inc, South Jordan, Utah, USA) was subsequently used to remove the remaining stains (Figure 5). This compound was applied using a specially designed rubber cup for a low speed hand piece under firm pressure. The

Figure 4. *Total isolation with a rubber dam.*

Figure 5. *Application of Opalustre (Ultradent Products) for 1 minute.*

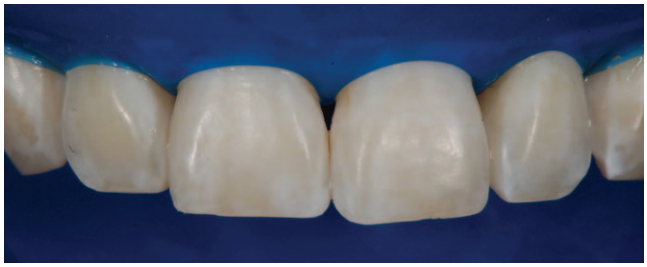

Figure 6. *Appearance immediately after performing enamel microabrasion.*

abrasive compound was applied in 3 applications of 1 minute each, with irrigation between each application (Figure 6).

After the abrasion compound treatment, the surfaces were polished with a 1200-ppm fluoride paste (Herjos, Vigodent SA Indústria e Comércio, Rio de Janeiro, Brazil) (Figure 7). A 2% neutral-pH sodium fluoride gel was applied to the enamel surfaces for 4 minutes (Figure 8). After removal of the rubber dam, the patient was advised not to ingest solids or liquids for at least 30 minutes (Figure 9).

After completion of the enamel microabrasion, the patient was instructed in the use of the bleaching trays and supplied with 10% carbamide peroxide (Opalescence, Ultradent Products Inc, South Jordan, Utah, USA)[4] (Figure 10), in an application of a

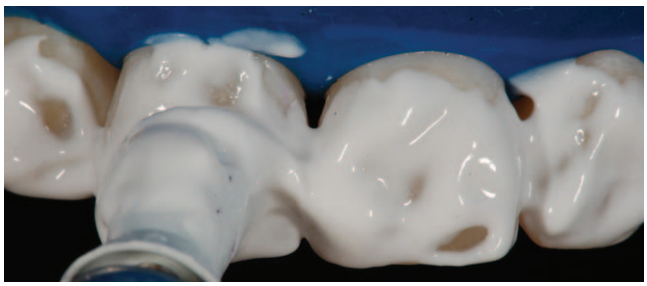

Figure 7. *Polishing with fluoride paste.*

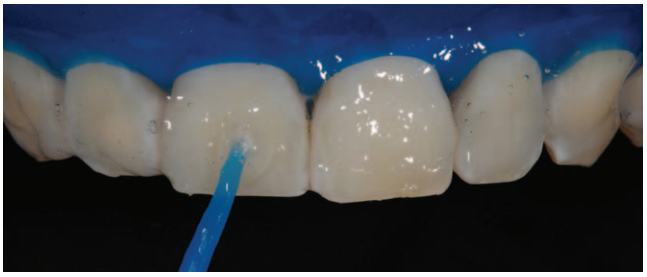

Figure 8. *Application of 2% neutral-pH sodium fluoride gel.*

Figure 9. *Appearance immediately after microabrasion, polishing, and application of topical fluoride paste.*

dentist-supervised home bleaching protocol following the manufacturer's instructions. The patient placed a small amount of bleaching gel in each tooth indentation, inserted the tray and wore it overnight. Initially, the patient wore the tray for 4 weeks; however, the patient was required to use the bleaching trays for 2 additional weeks to achieve the desired esthetic results. After reaching the esthetic end result (Figures 11 and 12), the patient received topical applications of 2% neutral-pH sodium fluoride gel for 4 minutes each day for 1 week at the office.[3]

DISCUSSION

Undesirable esthetics of enamel and dentin can be resolved with enamel microabrasion and bleaching techniques. This current clinical case addressed esthetic concerns and is in agreement with reports

Figure 10. *Dental bleaching with carbamide peroxide (Opalescence 10%, Ultradent Products).*

Figure 11. *Final esthetic results after completion of the treatment.*

from other authors.[2-4,10-13] The most likely diagnosis of the white enamel stains in the present case was dental fluorosis. This was based on the fact that the teeth showed opaque white spots on the enamel with hypoplastic areas and mild erosion. Dental fluorosis is caused by a change in enamel from excessive ingestion of fluoride during tooth development. Fluoride intake over and above what is present in fluoridated water, fluoride toothpastes, and fluoride supplements is considered a risk factor for dental fluorosis.[14] However, in this clinical case and based on the clinical history, excessive intake of fluoride at the time of tooth development was not considered a factor. Killian in 1993[10] and Croll in 1998[2] used the terms "fluorosis-type stains" and "fluorosis-like dysmineralization," respectively, to describe the chromatic alterations in the enamel surface resulting from a disturbance in the process of enamel mineralization. It has been reported[3,4] that the texture of the intrinsic white stain (ie, a stain of hard texture and of any color presenting on the buccal surface of the anterior and premolar teeth), and not its etiology, is the main indicator for the microabrasive procedure.

The microabrasion procedure to remove enamel stains causes minimal loss of enamel when related to the total amount of remaining enamel,[9] and clinically over time,[3] promotes the achievement of an enamel surface with considerable uniformity, smoothness, and luster, which is known as the "abrosion effect". This, according to Croll in 1991,[5] Donly and others in 1992,[15] and Segura in 1993,[16] is the result of the deposition of mineral substances from the abrasive and erosive action of the microabrasive compound.

Figure 12. *Final esthetic appearance.*

Based on years of experience in clinical practice,[3,4,7,17] it has also been observed that using a tapered, fine diamond bur as a first step results in less clinical time for the procedure. Using two or three applications of microabrasion, at intervals of 1 minute each, allows the microabrasive product to produce the desired esthetic appearance. Other than the advantages stated earlier, the stains in the presented case were removed and did not return.

In some cases, the patient will present with lip incompetence. This clinical condition greatly hinders the formation of moistened film on enamel surfaces[4] and routine follow-up with the dentist is important to ensure that the stains are not returning. However, it is recommended that patients who present with lip incompetence be referred to an orthodontist who can correct the labial positioning before beginning the microabrasion procedure.[3]

Bleaching with carbamide peroxide can result in considerable improvement of esthetics that becomes more apparent after the removal of enamel stains. Bleaching should be performed only under professional supervision and preferably on patients who do not present with exposed dentin, as this may cause dentin sensitivity during bleaching. Over time, the sensitivity disappears without the need for intervention.

CONCLUSION

Enamel microabrasion, followed by tooth bleaching, can result in a satisfactory improvement of the esthetics of a patient.

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Conflict of Interest

The authors of this manuscript certify that they have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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