

# Conservative Approach for Esthetic Treatment of Enamel Hypoplasia

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## Purpose

**This article describes a minimally invasive technique for removal of intrinsic enamel stains and discoloration. The technique is based on enamel microabrasion with application of an acid-abrasive gel. Treatment may be complemented with composite resin to compensate for the effects of acid or to finish the masking effect.**

## INTRODUCTION

Microabrasion for stain removal has been described in different ways in the literature over the years.<sup>1-8</sup>

In 1960, McInnes<sup>2</sup> used a mixture of five parts of 36% hydrochloric acid or HCl, five parts of 30% hydrogen peroxide, and one part of ether as a topical treatment. In the 1970s, this technique was slightly modified by Chandra and Chawla,<sup>3</sup> who applied a

solution with chemical agents and sandpaper discs in a rotary instrument. They observed a noticeable loss of distal curvature in some teeth after the procedure.

In 1980, Myers and Lyon<sup>4</sup> reported favorable results using a 37% phosphoric acid gel and etching the teeth for 2–3 minutes, followed by pumice abrasion and rotary instrumentation of the surface. The two steps of the technique were repeated, followed by a four-minute application of a mixture of 2% sodium fluoride. A 40% amorphous calcium phosphate (ACP) gel was then applied and was left on the tooth surface for 30 minutes. If no significant improvement was observed after four weeks, the treatment was repeated.

Murrin and Barkmeier<sup>5</sup> applied 36% hydrochloric acid mixed with pumice to the enamel surface with a slowly rotating rubber cup for up to five minutes to remove enamel stains. The teeth were bleached with 30% hydrogen peroxide and heat, followed by topical fluoride application and dental polishing.

In 1986, Croll and Cavanaugh<sup>6</sup> developed a technique for removing fluorosis stains from teeth, which consisted of five 15-second applications of a thick paste composed of 18% hydrochloric acid mixed with finely powdered pumice, followed by a 10-second water wash. This paste should be thick to prevent the spread of acid over the teeth and gingiva, in addition to serving as a vehicle for pressure applied during abrasion of the teeth. The stained teeth were isolated with a rubber dam, which was sealed in the cervical region of the teeth with cavity varnish. A paste of sodium bicarbonate was applied around the isolated area to neutralize any acid exposure. An acid-pumice mixture was applied to the buccal surface of each affected tooth by

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gently rubbing with a wooden spatula for five seconds. The teeth then were washed with water for 10–15 seconds and air dried to remove the product. This procedure was repeated until stains were completely or partially removed.

### DESCRIPTION OF TECHNIQUE

A 12-year-old male patient attended the School of Dentistry Undergraduate Clinic accompanied by his father, who reported psychological discomfort from the presence of stains in the upper and lower incisors. After clinical examination and medical history, the stains were diagnosed as enamel hypoplasia (Figure 1).

Treatment decision making considered the importance of the smile during adolescence and implications for self-esteem and personal relationship processes. Treatment planning was based on minimal intervention, avoiding treatments with more predictable results that would require greater tooth structure reduction, such as ceramic veneers. Thus, the enamel microabrasion technique with abrasive gel composed of 6% hydrochloric acid and silicon carbide (Whiteness RM, FGM, Joinville, SC, Brazil) was selected.

Because of the extent of stains on some teeth, the parent was alerted to the possible need for veneering with composite resin (Filtek Z350, 3M ESPE, St Paul, MN, USA).

Prophylaxis was performed initially using a Robinson toothbrush and prophylaxis paste, and subsequently rubber dam isolation and protection with a gingival barrier (Top Dam, FGM, Joinville, SC, Brazil). The microabrasive paste was rubbed on the tooth structure with a wooden toothpick<sup>5</sup> (Figure 2).



Figure 1. Hypoplastic stains concentrated in the upper central incisors.



Figure 2. Application of acid-abrasive gel with a wooden toothpick.

A total of six 10-second applications were performed on each tooth. Between applications, the teeth were washed with water and air dried. At the end of the procedure, the teeth were polished with Sof-Lex finishing discs (3M ESPE), and 5% fluoride varnish (Fluorniz, SS White, Rio de Janeiro, RJ, Brazil) was applied for four minutes to assist in enamel remineralization. The number of applications per session was estimated according to protocols previously described.<sup>5</sup> In a second session, six new applications were performed, with repetition of the protocol used at the first appointment.

After the second appointment, the patient was discharged, returning after seven days. The initial stains were reduced in intensity (Figure 3) but remained visible. Therefore, composite resin was applied to veneer the buccal surface. Cavity preparation was not performed, only phosphoric acid etching (3M ESPE) and adhesive system application (Adper Single Bond 2, 3M ESPE), followed by incremental placement of the composite resin.

The patient and his father were informed that there could be a feeling of a thick tooth during the first weeks. However, it was explained that the decision not to prepare the structure was made to preserve tooth structure, and that this feeling would disappear with time. In the future, if the patient wishes, a more invasive treatment can be performed (Figure 4).

### LIST OF MATERIALS USED

Whiteness RM, FGM, Joinville, SC, Brazil  
 Filtek Z350, 3M ESPE, St Paul, MN, USA  
 Top Dam, FGM, Joinville, SC, Brazil  
 Sof-Lex, 3M ESPE, St Paul, MN, USA  
 Fluorniz, SS White, Rio de Janeiro, RJ, Brazil



Figure 3. Reduction in stain intensity.

Adper Single Bond 2, 3M ESPE, St Paul, MN, USA

### POTENTIAL PROBLEMS

Microabrasion should be considered a minimally invasive method. Caution should be exercised in its clinical application to avoid excessive removal of tooth substrate. In most cases studied, improvement in tooth color was reported to occur in the sixth application at one appointment. If no change is observed after 12–15 applications, the technique should be interrupted to avoid excessive loss of enamel structure.<sup>5</sup>

Polishing after application is of critical importance to maintain ideal esthetics and prevent surface changes.<sup>5</sup>

It is vital that the enamel microabrasion procedure be performed under rubber dam isolation with the use of safety goggles by the professional, patients, and assistants, and surgical masks and procedure gloves by the professional and assistants. The product has strongly acidic characteristics because of the presence of hydrochloric acid in the formulation.<sup>9</sup>

### SUMMARY OF ADVANTAGES AND DISADVANTAGES

Enamel microabrasion is an approach that can be safely and effectively performed in a single session, yielding good esthetic results. It does not cause tooth sensitivity and may lead to complete and final removal of stains, with no recurrence depending on the extent and depth of the stained area. In deeper stains, the technique may be associated with tooth whitening and/or veneering with composite resin



Figure 4. Final aspect of restorative treatment. Notice the natural look obtained.

restorations. The method employs abrasive material, resulting in controlled loss of tooth structure. The procedures are simple but require knowledge of the cause of staining and mastery of the technique, thus minimizing excessive tooth preparation.

### CONCLUSIONS

Correct application of the microabrasion technique, complemented by the use of composite resin, allowed significant improvement in the appearance and color uniformity of teeth, restoring the patient's self-esteem.

Correct diagnosis concerning lesion depth and prognosis of the technique was a crucial factor in the treatment decision-making process and in the success of the case.

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