

# Enamel Microabrasion

M.M. ELKHAZINDAR AND R.R. WELBURY

**Abstract:** A significant number of patients complain of discoloured teeth. The enamel microabrasion technique described in this article is a simple conservative method for improving the appearance of discoloured enamel.

**Dent Update 2000; 27: 194-196**

**Clinical Relevance:** It may be possible to treat some types of enamel discoloration using this technique.

**E**namel microabrasion is a conservative, non-restorative method of removing (or improving the appearance of) intrinsic superficial discoloured dysmineralization defects.<sup>1</sup> Abnormal dysmineralization has been defined as 'a disturbance in the formation of the inorganic component of enamel during amelogenesis' and can result in brown spots, white enamel opacities or multicoloured tooth surface defects.<sup>2</sup> Hydrochloric acid has been used most extensively in enamel microabrasion, but recently the use of phosphoric acid, in association with enamel removal by finishing burs has been reported.<sup>3</sup>

An ideal correction of enamel discoloration<sup>4</sup> would:

- cause insignificant loss of tooth structure;
- not damage the pulp or the periodontal tissues;
- be easy for the patient to tolerate and for the dentist to perform in a reasonable time; and

- give a permanent result.

Enamel microabrasion should not be confused with tooth bleaching, a process performed by using concentrated oxygenating agents such as 35% hydrogen peroxide.<sup>2</sup>

Mechanical removal of superficial enamel defects using burs, abrasive stones or discs does not give the same result as microabrasion, no matter how much care is taken, as it often leaves visible and identifiable marks in the enamel surface.<sup>2</sup>

## INDICATIONS

Microabrasion may be used for the treatment of the following defects:

- white and brown spots and streaks caused by fluorosis;
- decalcification defects, commonly seen after orthodontic brackets or cemented bands are removed;<sup>5</sup>
- surface hypoplasia secondary to trauma of a primary predecessor.

Microabrasion is successful in treating superficial enamel staining only.

## CONTRAINDICATIONS

The microabrasion technique is

contraindicated in uncooperative patients with a history of sensitivity to heat, cold and acidic fluids.<sup>3</sup> It is not recommended for deep hypoplastic lesions of the enamel, such as amelogenesis imperfecta, or for tetracycline staining, and should not be attempted in patients with tooth discoloration caused by dentinogenesis imperfecta.

## ADVANTAGES OF ACID MICROABRASION

In teeth with enamel stains of uncertain depth, there is nothing to lose by first attempting 'enamel microabrasion' for colour correction, but if the stain proves too deep for elimination by this method, a bonded composite resin restoration should be considered.<sup>2</sup>

The acid abrasion technique is safe, practical and not time-consuming, and is a less destructive alternative to the mechanical removal of discoloured enamel and its subsequent replacement with restorative material.

The microabraded enamel develops a shiny, glass-like surface texture within a few months of treatment. It has also been observed that microabraded enamel surfaces do not seem to accumulate dental plaque as readily as untreated adjacent teeth.<sup>2</sup> Some authors have even considered using microabrasion to reduce plaque adhesion.<sup>6</sup> The microabraded surface has also been found to inhibit colonization by *Streptococcus mutans*.<sup>7</sup>

Local analgesia is not required and no significant postoperative sensitivity or recurrence of stains have been reported. Patients are generally satisfied with the results.

**M.M. Elkhazindar**, BDS, FDS RCS, Senior House Officer, and **R.R. Welbury**, MB BS, BDS, PhD, FDS RCS, Consultant, Department of Child Dental Health, Dental Hospital, Newcastle upon Tyne.



**Figure 1.** Surface decalcification on 3211/23 following fixed appliance therapy.



**Figure 2.** Isolation with rubber dam of the teeth to be treated aided by latex dam stabilizing cord interdentally (Wedjets, The Hygienic Corporation, Akron, Ohio).

## DISADVANTAGES OF ACID MICROABRASION

The main problem with this technique is the danger inherent in using a powerful acid in the mouth: soft tissue injury can be severe if it remains in contact with the tissues for too long. However, in tests, exposure to the microabrasion compound of up to 15 seconds resulted in no observable soft tissue damage.<sup>8</sup>

## TECHNIQUE

The precise amount of enamel removed by enamel microabrasion is dependent on the approximate force applied to the tooth and the duration of treatment. The technique described removes up to 100 microns.<sup>9</sup>

1. Perform preoperative vitality tests, take radiographs and photographs (see Figure 1).
2. Clean the teeth with pumice and water, wash and dry.
3. Isolate the teeth to be treated with rubber dam and paint Copalite varnish around necks of dam or

Vaseline under the dam (Figure 2). Safety of the patient is of prime concern – even though new compounds – even though new compounds have a low acid content, mild concentrations of hydrochloric acid can still cause injury, especially to the eyes. Use of rubber dam and protective eyewear for the patient are essential. It is also essential to use the 10:1 gear reduction handpiece to ensure that splattering of the compound from the rotary mandrel does not occur.<sup>6</sup>

4. Place a mixture of sodium bicarbonate and water on the dam behind the teeth to protect the patient from any spillages.
5. Mix 18% hydrochloric acid with pumice into a slurry and apply a small amount, for 5 seconds only, on either a slowly rotating rubber cup or a wooden stick rubbed over the surface, before washing for 5 seconds directly into an aspirator tip.
6. Repeat until the staining has reduced, up to a maximum of ten 5-second applications per tooth. Any improvement that is going to occur will have done so by this time (Figures 3–5).
7. Apply fluoride drops to the teeth for 3 minutes (Figure 6).
8. Remove the rubber dam.
9. Polish the teeth with the finest Soflex discs (Figure 7).
10. Polish the teeth with fluoridated toothpaste for 1 minute (Figure 8).
11. Review aesthetics in one month and perform vitality tests (Figure 9).
12. Review every six months, checking pulpal status.

Prema compound (Premier Dental Products) is an acid/abrasive compound that comprises abrasive particles and mild hydrochloric acid in a water-soluble gel paste. It is applied by a special hard rubber mandrel on a 10:1 gear reduction handpiece. The acid content is less than 18% and, because of its paste-like consistency, its flow may be controlled which makes it safer to use.



**Figure 3.** Application of hydrochloric acid–pumice slurry with a rubber cup at slow speed for 5 seconds. Sodium bicarbonate paste is applied to the rubber dam behind the tooth to neutralize any acid spills.



**Figure 4.** The acid–pumice slurry is washed off with water for 30 seconds after each 5-second application, directly into the aspirator tip.



**Figure 5.** Application of the acid-pumice slurry may be repeated up to a maximum of ten times for each tooth.

## THE EFFECT OF MICROABRASION ON ENAMEL

Microabrasion treatment appears to affect the optical properties of enamel, as tooth appearance often improves with time. The development of a smooth and lustrous surface sheen that improves with time has been termed the ‘abrasion effect’,<sup>10</sup> and is caused by mild surface abrasion of enamel prisms with simultaneous acid erosion, compacting the mineralized tissue within the organic area. This replaces the outer layer of prism-rich enamel with a densely



**Figure 6.** Non-acidulated fluoride drops are applied for 3 minutes.



**Figure 7.** Surface lustre is restored with finest grade Soflex discs.

compacted prism-free region. Light reflected off and refracted through this new surface acts differently than it would with an untreated enamel surface. Any remaining sub-surface stains are camouflaged by the optical properties of the newly microabraded surfaces.

The exact amount of enamel removed is irrelevant, as long as enough remains on the tooth for normal function and appearance.<sup>6</sup>

## CONCLUSION

The hydrochloric acid–pumice

microabrasion technique, if used with care, is a quick, safe, and economically viable technique for treating superficial enamel dysmineralization. Although it may not always completely eliminate the staining, it often produces a result that is pleasing to the patient.

Alternatively, the reduction in the degree of discoloration may make the task of masking residual defects or discoloration with veneers considerably easier.

In cases of fluorosis it is extremely important to make sure that the patient understands that the 'extra white bits' are abnormal, and that it is those that you are going to remove to produce a surface of an even colour.

## ACKNOWLEDGEMENT

The photographs in Figures 1–9 have all been reproduced from the *British Journal of Orthodontics*, by courtesy of the Editor.

## REFERENCES

1. Croll TP. Enamel microabrasion: Observation after 10 years. *J Am Dent Assoc* 1997; **128**: 47–50.
2. Croll TP. Enamel microabrasion for removal of superficial dysmineralization and decalcification defects. *J Am Dent Assoc* 1990; **120**: 411–415.
3. Pourghadiri M, Longhurst P, Watson TF. A new technique for the controlled removal of mottled enamel: measurement of enamel loss. *Br Dent J* 1998; **184**: 239–241.
4. Croll TP and Cavanaugh RR. Enamel colour modification by controlled hydrochloric acid–pumice abrasion I. Technique and examples. *Quint Int* 1986; **17**: 81–87.
5. Welbury RR and Carter NE. The hydrochloric



**Figure 8.** The teeth are polished with fluoride toothpaste for 1 minute.



**Figure 9.** The treated teeth one month following completion of the procedure.

acid–pumice microabrasion technique in the treatment of post-orthodontic decalcification. *Br J Orthodont* 1993; **20**: 181–185.

6. Croll TP. Enamel microabrasion: The technique. *Quint Int* 1989; **20**: 395–400.
7. Segura A, Donly K, Wefel J, Drake D. Effect of enamel microabrasion on bacterial colonization. *Am J Dent* 1997; **10**: 272–274.
8. Croll TP, Killian CM, Miller AS. Effect of enamel microabrasion compound on human gingiva: report of a case. *Quint Int* 1990; **21**: 959–963.
9. Welbury RR and Shaw L. A simple technique for removal of mottling, opacities and pigmentation from enamel. *Dent Update* 1990; **14**: 161–163.
10. Donly KJ, O'Neill M and Croll TP. Enamel microabrasion: a microscopic evaluation of the 'abrosion effect'. *Quint Int* 1992; **23**: 175–179.