CASE REPORT

'Pitted' to 'Pleasing' in 20 min

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SUMMARY

In recent times, as a result of extensive drinking water fluoridation, the number of patients affected by fluorosis has increased considerably. The purpose of this clinical report is to describe the use of enamel microabrasion for a patient with severe fluorosis using 37% phosphoric acid and pumice mixture. The results were pleasing, and hence 37% phosphoric acid can be recommended as a safe and easily available alternative in microabrasion procedures.

BACKGROUND

Recent advances in public health practices have provided unrestricted access to fluoride supplies through the fluoridation of drinking water in many communities. However, while greater access to fluoridated water leads to a reduction in caries prevalence indexes, it also results in the increased prevalence of enamel fluorosis.^{1 2}

Fluorosis-affected enamel has been characterised as an altered structure prone to fracture and wear. Clinically, it appears as shades varying from white to brownish. Histologically, the tissue presents a hypomineralised subsurface confined to a few micrometres from the external mineralised surface, with an increase in porosity.³

The various treatment regimens proposed for the treatment of fluorosis are:

1. Microabrasion
2. Non-vital bleaching
3. Vital bleaching (a) chairside (b) nightguard
4. Composite resin restorations
5. Porcelain veneers

However, each of the techniques mentioned have its own limitations; for example, porcelain veneers are recommended only in the age group of 16 years and above. Composite resin restorations are not a conservative approach. Many patients report post-operative sensitivity following vital tooth bleaching.

'Icon' is a recently available minimally invasive technique for treating white spot lesions by caries infiltration. The low-viscosity light-curing resins can rapidly penetrate the porous enamel and prevent further progression of initial enamel caries lesions by occluding the microporosities within the lesion by infiltration. However, this new technique is contraindicated in other causes of white spot lesion such as fluorosis, hypoplasia, hypocalcification, erosion, tetracycline staining and trauma.⁴

Microabrasion, being a minimally invasive technique, was thus opted for the treatment of dental fluorosis as it is efficient in achieving acceptable results in removal of enamel stains.⁵

CASE PRESENTATION

A 10-year-old girl reported to the department, with stained, rough teeth. The anamnesis, followed by clinical examination led to the diagnosis of severe enamel fluorosis as we could see there was pitting present on the entire surface of the tooth. This is in accordance with Dean's fluorosis index (figure 1). Owing to the presence of large pulp chambers (considering the patient's age), a more conservative and relatively non-invasive technique such as microabrasion was selected.

TREATMENT

After discussion with the parents, it was agreed to use the microabrasion treatment technique on the maxillary and mandibular incisors and canines. A full mouth supragingival scaling was performed for the patient using ultrasonic scaling tips. The teeth were isolated using a rubber dam. A slow rotating rubber cup in a contra-angled micromotor head-piece was used to apply 37% phosphoric acid and pumice mixture on each tooth for 30 s followed by 20 s rinsing with copious water spray. A total of six applications were performed in one visit.⁶ After every application, a careful evaluation of the surface topography was carried out to make sure that no concavities were produced. The patient was also asked to report any sensitivity felt during the entire procedure. A high-volume saliva ejector was placed under the teeth at all times to prevent the escape of the mixture. An appreciable amount of stain reduction was evident at the end of the procedure. However, the surface enamel seemed chalky white in appearance. Following the microabrasion procedure, a CPP-ACP (casein phosphopeptide-amorphous calcium phosphate) combination was applied once on the treated tooth surface for 15 min (figure 2). The patient was instructed not to eat or drink for 30 min and to avoid coloured beverages for a week. The patient was also asked to

Figure 1 Preoperative photograph showing pitted enamel.

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Figure 2 Postoperative photograph showing teeth after six applications of 37% phosphoric acid and pumice mixture.

apply the CPP-ACP combination on the treated teeth once daily during the follow-up period.

OUTCOME AND FOLLOW-UP

The recall visit was after 1 month. On the follow-up visit, it was observed that there was a miraculous improvement in terms of stain reduction as well as in the texture and translucency of the surface enamel (figure 3).

DISCUSSION

The main consequence of dental fluorosis is compromised aesthetics, from white spots, striations or opacities in mild fluorosis, to postoperative dark brown to black staining, in moderate and severe fluorosis.³

Dr Walter Kane in 1916 experimented with various acid solutions to improve the tooth colour of people suffering with 'Colorado Brown Stain'. It was not until 1984 that microabrasion came in a big way when Dr Robert J Closkey described his own modification of Dr Kane's work in which he used a cotton pellet soaked in 18% hydrochloric acid wrapped around an amalgam condenser. In 1986, Croll and Cavanaugh advocated a regimen to remove fluorosis that consisted of up to 15 separate 5 s applications of a thick paste made up of 18% hydrochloric acid mixed with fine pumice powder, followed by 10 s rinsing with water. In the late 1980s, the Premier Dental Products Company researched an ideal enamel microabrasion using hydrochloric acid, silicon carbide, abrasive and silica gel.^{7 8}

Although 18% hydrochloric acid is considered as a gold standard in the microabrasion technique, hydrochloric acid is a very strong acid that demands a careful technique for its use to avoid damage of the soft tissues.⁹ On the other hand, phosphoric acid could be considered a safe and efficient alternative; further, it is an easily found substance in the dental office.¹⁰

Figure 3 After 1 month of follow-up.

It was seen in the present case that there was a significant reduction of white spot opacities, intensity of yellow, brown and black stains and the total area affected by them. All the three parameters seemed to improve over the 1 month period. This can be attributed to the fact that enamel microabrasion abrades the enamel surface which compacts calcium and phosphate ions into the interprismatic spaces. At the crystal surface level, crystal growth occurs when two or more 'kink' sites (defined as 2 or more adjacent surfaces) are available.¹¹ This polished surface reflects light differently (abrosion effect) and appears whiter than normal enamel. The microabraded surface reflects and refracts light from the tooth surface in such a way that mild imperfections in the underlying enamel are camouflaged.¹² The acid may also penetrate and bleach the organic compounds within the enamel. The enamel also becomes more resistant to demineralisation after microabrasion.⁸

How much enamel can be safely removed without the subsequent need for restoring a tooth? The rinsed tooth surface should be closely inspected after each application to see whether the site of the lesion has become concave. If this has occurred and considerable decalcification is still present, a bonded resin restoration would be indicated. Otherwise, the treatment can be considered complete once the wet tooth surface shows no signs of white spot decalcification. Microabrasion should be used cautiously in areas where the enamel is very thin, since it can result in postoperative sensitivity. Other treatment modalities should be tried if the clinical appearance does not improve after 10 applications.¹³

Patient satisfaction is very high with the technique of microabrasion. There is no report of any gingival ulceration, postoperative sensitivity or loss of tooth vitality. Hence, it can be said that the microabrasion technique is an easy and effective alternative in dental practice.

Learning points

- ▶ Microabrasion is an effective and efficient technique for the treatment of fluorosis.
- ▶ Microabrasion is a safe and easy alternative for the treatment of intrinsic staining in mixed dentition where porcelain crowns and veneers are contraindicated.
- ▶ Thirty-seven per cent phosphoric acid is an excellent alternative for 18% hydrochloric acid for microabrasion procedures.

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Competing interests None declared.

Patient consent Parental consent obtained.

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