

## CASE REPORT

## Enamel microabrasion for aesthetic management of dental fluorosis

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**SUMMARY**

Fluorosis has increased in recent times due to fluoridation of drinking water and addition of fluoride to various edible items, which leads to unaesthetic appearance of teeth visible at close quarters. The enamel microabrasion technique is a conservative method that improves the appearance of the teeth by restoring bright and superficial smoothness, without causing significant structural loss. The aim of this article is to describe an easy technique for managing mild to moderate dental fluorosis using Opalustre (Ultradent Products) microabrasion slurry. This conservative approach may be considered an interesting alternative to more invasive prosthetic techniques like composite resin restorations, ceramic veneers or crown fabrications.

**BACKGROUND**

Dental fluorosis is a specific disturbance of tooth formation caused by excessive fluoride intake.<sup>1</sup> Ingestion of water with a fluoride concentration two or three times greater than the recommended amount causes mild fluorosis while its concentration four times the recommended amount causes moderate to severe forms of fluorosis.<sup>1</sup> It is characterised by lustreless opaque white patches on the enamel, which may become mottled striated and/or pitted. The mottled areas may become stained yellow or brown.<sup>1</sup> In recent decades, fluorosis has increased, due to fluoridation of drinking water and addition of fluoride to milk and salt. This kind of pathology leads to a discoloured, opaque, brownish and an unpleasant appearance of the enamel which is often visible at speaking distance.<sup>2</sup> The first report of hydrochloric acid (HCl) application to improve aesthetics of teeth with fluorosis was of Dr D Kane in 1916.<sup>3</sup> Since the results obtained were favourable, researches were carried out in order to verify the effectiveness of the microabrasion technique using HCl in different concentrations ranging from 6.6% to 18% and phosphoric acid (H<sub>3</sub> PO<sub>4</sub>) from 30% to 40% concentrations in association with abrasives. Microabrasion causes reduced wear of tooth surface and minimum discomfort to the patient,<sup>3-5</sup> and hence is an effective and safe method to improve the dental aesthetics of children, adolescents and adults. The aim of this article is to describe an easy technique for managing mild (grade 2) to moderate (grade 3) dental fluorosis (grading as per Dean's classification of dental fluorosis).<sup>1</sup>

**CASE PRESENTATION**

A 15-year-old female patient visited the Department of Pedodontics & Preventive Dentistry, Government Dental College & Hospital, Raipur and presented with the staining of her upper anterior teeth. No relevant systemic disorder was recorded in anamnesis. During clinical examination, brown stains were noted over the cervical thirds of maxillary central incisors and over the middle and incisal thirds of maxillary lateral incisors (figure 1). The patient did not have any other significant finding in the oral cavity. Medical and family history was not relevant.

**INVESTIGATIONS**

Tooth vitality tests were performed which showed the teeth vital.

**DIFFERENTIAL DIAGNOSIS**

Based on the clinical examination differential diagnosis of tetracycline staining was made, which was ruled out through case history of the patient.

**TREATMENT**

The first step of treatment involved slight trimming with diamond bur to the stained enamel region for 5–10 s to reframe the morphology of the sound tooth and to decrease overall treatment time. After accomplishing this first step, the microabrasion technique using Opalustre (Ultradent Products) was chosen for aesthetic improvement of the teeth that presented pigmentation. This material contains 6.6% HCl and SiC microparticles. It is purple in colour and supplied in syringes.



**Figure 1** Initial clinical aspect of the upper incisors after isolation with rubber dam. Note the brown stains on the teeth.

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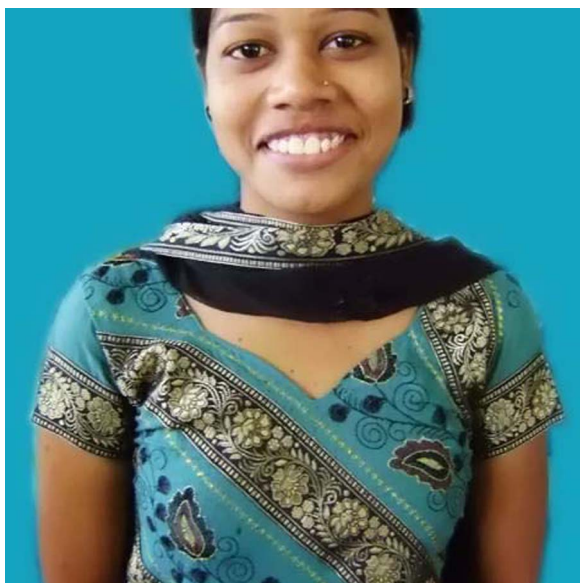


**Figure 2** Appearance of teeth after polishing with felt discs and paste at slow speed.

The sequence of the enamel microabrasion technique with Opalustre (Ultradent Products) used in this clinical case was: topical anaesthesia, isolation with rubber dam of upper anterior region (canine to canine), application of 1 mm thick layer of Opalustre (Ultradent Products) applied over labial surfaces of upper four anterior teeth, and abrasion performed using a rubber cup attached to a gear reduction contra-angle. The surfaces were microabraded with pressure at slow speed for 60 s/time. The teeth were observed after abundant rinsing with water. After three applications of Opalustre (Ultradent Products) done in a single session, the removal of stains and aesthetic improvement were visualised on the wet surfaces. The polishing was performed using Z pro prophylaxis paste (International Corporation Limited, Kent, UK) containing phosphate fluoride (figure 2). Then, the teeth were treated with topical fluoride gel. Finally the rubber dam was removed (figure 3).

### OUTCOME AND FOLLOW-UP

The patient was recalled after 3 months for follow-up examination. After 3 months, it was observed that the shiny aspects and the surface smoothness were maintained and there was no pain



**Figure 3** Smiling face of the patient after accomplishing microabrasion technique.

or sensitivity to cold and hot stimuli on the teeth that had been treated with microabrasion.

### DISCUSSION

The aesthetic appearance of the teeth, which is key to a beautiful smile, is appreciated by all age groups and both genders. According to Welbury and Shaw<sup>6</sup> aesthetic problems may psychologically affect patients, especially teenagers, and may interfere with their social life. In this case though the patient was only 15 years old, she was concerned about the aesthetic appearance of her teeth that led her to visit the dental hospital.

Enamel microabrasion has become accepted as a conservative, non-restorative method to improve the appearance of teeth with superficial demineralisation and decalcification effects. Literature shows that enamel microabrasion should be considered as the first treatment option when trying to improve aesthetics of teeth that present intrinsic stains (fluorosis) or extrinsic superficial enamel stains<sup>4 5 7</sup> because it is a procedure that is less invasive and more conservative. It only requires a small amount of structure removal, does not cause postoperative pain or sensitivity and in majority of cases can be done in a single session causing minimum discomfort to the patient.<sup>3 5 7 8</sup> Other advantages of this technique include immediate, permanent and lasting results due to the fact that microabrasion involves the removal of the stain instead of just covering up the stain or altering the enamel<sup>5 9</sup>; shorter time required for the procedure which is easy to carry out;<sup>9</sup> avoiding dental cavity preparation for restorative materials<sup>8 10</sup>; and does not cause injuries either to the pulp or to the periodontal tissue.<sup>5 8</sup>

Owing to the presence of acid in the material used, rubber dam isolation is mandatory during the procedure for not only does it protect soft tissues but also stops material debris from falling into the mouth and reduces contact with saliva.<sup>9</sup> In the clinical case reported, after placement of the rubber dam three applications of Opalustre (Ultradent Products) were required in one session in order to remove the brown pigmentation. After

### Learning points

- ▶ The microabrasion technique, which is a minimal invasive approach, allows good aesthetic results and a possible cost reduction in terms of money for patients, without causing significant enamel structural loss required for ceramic veneers and without need for cavity preparations.
- ▶ The combination of Opalustre (Ultradent Products) and mechanical techniques discards the need for composite resin restoration even in surfaces that presented small cavities.
- ▶ The aesthetic treatment should be considered as early as possible irrespective of the age because aesthetic problems may psychologically affect patients, especially teenagers, and may interfere with their social life.
- ▶ The microabrasion technique using Opalustre (Ultradent Products) is effective in the removal of inactive carious white spot lesions that have been pigmented after remineralisation to produce a regular surface.
- ▶ Microabrasion may be performed in a single session and is safe to use even in young children. In order to obtain a favourable and lasting aesthetic result, it is important to make an adequate diagnosis of the alterations found and the patients must be included in a preventive programme to reduce caries risk and activity.

using the microabrasion technique, the colouration was improved and a shiny surface was obtained because during the procedure, the demineralised layer was almost completely removed by the method.<sup>10</sup> Mild surface abrasion of enamel demineralises with simultaneous acid erosion, which replaces the outer layer of prism rich enamel with a densely compacted prism-free region. The optical properties of this newly microabraded surface camouflage the remaining subsurface stains when light is reflected off this surface and refracted through it.<sup>4</sup> This vitreous characteristic was observed in the clinical case presented and is known as the 'abrasion effect'<sup>11</sup> or 'enamel glaze'.<sup>12</sup> The combination of Opalustre (Ultradent Products) and the mechanical technique used resulted in a surface without roughness and discarded the need for restoration with composite resin restorations, ceramic veneers or crown fabrications.

**Competing interests** None.

**Patient consent** Obtained.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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