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# Recreating Smiles for Dental Fluorosis – A Minimally Invasive Technique Using Opalustre – A Case Report

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## Abstract

**Introduction:** Esthetics plays an important role in contemporary dentistry, especially because the media emphasizes beauty and health. Dental fluorosis leads to staining of the teeth which ranges from mild to moderate to severe grade. Dental fluorosis stains present over the anterior teeth gives an unaesthetic and unpleasant smile. In such conditions, enamel microabrasion could be a conservative approach which helps in rehabilitation of the esthetics with minimal enamel loss.

**Keywords:** Microabrasion, Minimal Invasive, Fluorosis, Opalustre.

## Introduction

There is an increased reporting of discolored teeth in child population [1]. White tooth discoloration can result from a number of factors and are usually a concern of esthetics for patients**.** These young attractive smiles are getting affected due to discolorations or stains. These discolorations are often seen as an isolated or generalized condition which needs to be dealt with, based on the extent of lesion.

Dental fluorosis is a disorder caused by chronic excessive fluoride in amounts that exceed the optimal daily dose of 1 ppm intake during the period of the development of the teeth [2]. Depending on the amount of fluoride intake, the tooth may show different degrees of changes in its

enamel.It has been proven that exposure to 1 ppm fluoride in drinking water reduces the caries increment by 50-60 [3, 4]. When the fluoride in potable water exceeds 1.5 ppm, aesthetic problems usually appear on tooth surfaces [5].Water is the most common source for fluoride intake. In addition, fluoride can also be found in drinks, toothpaste and infant formulas. Specifically, the exposure of young children (for example, 0-3 years old) to fluoride through toothpaste, has been associated with a high prevalence of dental fluorosis.

The enamel affected by fluorosis may generally show an altered structure resulting in more susceptibility towards fracture and wear [6]. Clinically, their shades may alter from white to brownish. Histologically, it is consisting of hypomineralized sub-surface areas limited to few micrometers from the external mineralized surface and it can have increased level of porosity.

The ultrastructural studies about the affected structure have reported the appearence of highly uniform, flattened, hexagonal crystals in the outer regions and irregular crystals in the inner regions, more closely resembling those explained for normal enamel [7,8].

The discoloured and porous enamel of fluorosed teeth can be aesthetically unsatisfactory, impacting on patient's psychological state of mind. The modes of treatment for such cases may range from invasive ceramic veneer bonding restorations to minimally invasive approaches including bleaching, micro-abrasion and composite resin restorations which are cheaper and less time-consuming treatments. Enamel microabrasion being a conservative technique, modifies the superficial enamel to improve discolorations as it is limited to outer enamel layer only. According to an in-vitro study by Sundfeld, et al. (2007) [9], it results around 25-200 µm loss of enamel depending on the number of applications and acids concentration. Commercially available microabrasion kit Opalustre (Ultradent Products, Inc) **(Figure 1- Opalustre Kit)** is a chemical and mechanical abrasion slurry containing 6.6% HCl and silicon carbide microparticles in water-soluble paste.

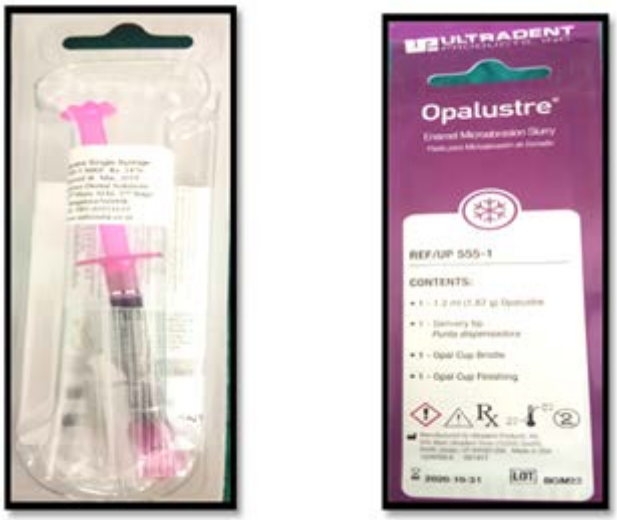


Figure 1: Opalustre Kit

The article describes a clinical case of a 11-year old boy, who was diagnosed with mild-to-moderate dental fluorosis, and the treatment procedure which was performed for the esthetic rehabilitation using microabrasion with opalustre.

**Case Presentation**

A 11 year old male patient visited to the Department of Pediatric and Preventive Dentistry, National Dental College and Hospital, Derabassi with noticeable brown-yellow stains on his upper anterior teeth which resulted in unaesthetic appearance **(Figure 2 – Dental fluorosis stains in maxillary anterior teeth)**. He was hesitant in talking due to the presence of brown-yellow stains on his teeth. Considering the age of the child, opting for veneers or laminates would have resulted in the more removal of tooth structure. Therefore, the minimal invasive procedure resulting in better structural stability was planned and proposed to the parents.

Figure 2: Dental fluorosis stains in maxillary anterior teeth

According to Dean's fluorosis index, it was categorized as mild to moderately severe grade of dental fluorosis. During the microabrasion treatment, the patient's, clinician's and assistant's eyes were protected with protective glasses. After dental prophylaxis with pumice and water, a fine-tapered diamond bur was used with water cooling to remove the superficial layer of the stained enamel in order to reduce the time needed for the microabrasion as well as the amount of microabrasive material used. This procedure is generally referred as "Microreduction". Which was followed by placement of a rubber dam with application of a layer of solid petroleum jelly between the rubber dam and gingival tissue to protect the tissue from the microabrasion product.

Then 1 mm thick layer of Opalustre (6.6% HCl & Silicon carbide microparticles) was applied on the affected teeth **(Figure 3- Opalustre applied to the effected teeth).** A rubber cuff was attached to contra angled handpiece & tooth surface was microabraded with slight pressure for 60-120 seconds. According to the manufacturer's instructions three applications of opalustre are required. After three applications of Opalustre, done in a single session, it is possible to visualize the removal of stains.

Figure 3: Opalustre applied to the effected teeth

Abundant rinsing must be done after each application for an optical evaluation, before proceeding to the next application. After polishing the region with felt disc and polishing paste at slow speed, a neutral 2% sodium fluoride gel was applied for one minute in order to enhance remineralization **(Figure 4 – postoperative after polishing).** The patient was instructed not to rinse for one hour.

Figure 4: Postoperative after polishing

**Discussion**

According to Welbury and Shaw [9] aesthetic problems may psychologically affect patients, especially teenagers, and may interfere with their social life. In this case though the patient was only 11 years old, he was concerned about the aesthetic appearance of his teeth that led him to visit the dental hospital.

Enamel microabrasion has become accepted as a conservative, non-restorative method to improve the appearance of teeth with superficial demineralization 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 because it is a procedure that is less invasive and more conservative.

The indications of microabrasion usually include cases of fluorosis, post-orthodontic demineralization, localized hypoplasia due to infection or trauma, and idiopathic hypoplasia where the discoloration is limited to the outer enamel layer. Post-managemet, the analysis of the effectiveness of microabrasion should be delayed for approximately one month, as the teeth appearances will continue to improve in this duration [10].

It removes only a small amount of structure without causing any postoperative pain or sensitivity and in majority of cases can be done in a single session causing minimum discomfort to the patient. 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, and does not cause injuries either to the pulp or to the periodontal tissue [11].

It has been proved that microabrasion technique using acidic/abrasive materials gives immediate and permanent aesthetic outcomes with insignificant enamel destruction [12]. 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 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 [13]. 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. This vitreous characteristic was observed in the clinical case presented and is known as the ‘abrasion effect’ [14] or ‘enamel glaze’ [15]. 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.

**Conclusion**

Microabrasion provides a minimally invasive technique to treat the teeth with enamel fluorosis and allows recovery of natural tooth appearance. It has an advantage of being safe, extremely conservative with reduced wear of tooth surface, minimum discomfort to the patient and finally, the enhancement of the patient’s smile and aesthetic.

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