

Microabrasion - A Conservative Approach for Mild to Moderate Fluorosis – A Case Report

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INTRODUCTION

The undesirable discoloration or pitting of teeth due to fluorosis or developmental defects like amelogenesis imperfecta or enamel hypoplasia pose a challenge to the clinician to cater to the aesthetic requirements of patients. Fluorosis had been reported way back in 1901. There are treatment options depending upon individual cases as follows: microabrasion / macroabrasion, bleaching, composite restoration, veneers or full crowns. For the aesthetic enhancement of stains associated with mild to moderate fluorosis enamel microabrasion is the preferred treatment. This technique involves removal of entrapped stains by rubbing of slurry containing HCl acid and an abrasive agent on the stained enamel surface. But if the depth of the defect is more than microabrasion can be done in conjunction with bleaching or bonded restorations can be done to achieve optimal aesthetics. Casein phosphopeptide - Amorphous calcium phosphate (CPP - ACP) can be topically applied after microabrasion which enhances remineralisation and prevents post-operative sensitivity. The present paper illustrates the management of mild to moderate dental fluorosis by microabrasion to remove stains on the enamel surface followed by remineralisation using CPP - ACP paste.

An unaesthetic smile has psychological impact especially on young patients and lowers their confidence.¹ Discoloration of the young permanent anterior teeth is mostly seen due to varying developmental defects. This could be due to extrinsic aetiology such as those caused by coffee, tea, red wine and tobacco or due to intrinsic aetiology. The intrinsic stains may be due to pre-eruptive or post-eruptive causes.² Pre-eruptive causes of intrinsic stains include dentinogenesis imperfecta and fluorosis, whereas post-eruptive causes of intrinsic stains include tetracycline dentine staining or due to injuries.³ The excessive and chronic ingestion of fluoride during amelogenesis leads to fluorosis which can be skeletal or dental depending upon the intake.^{4,5} Dental fluorosis is characterized by white opaque flecks on teeth or yellow to brown discolorations with pitting on the enamel surface.^{6,7}

The enamel microabrasion is an effective and non-invasive procedure for removing the stains limited to outer enamel layer.^{7,8} It uses a rubber cup along with abrasive materials and chemical solutions.^{9,10} Currently, many products are commercially available for enamel microabrasion such as Prema Compound (Premier Dental Products, Norristown, PA, USA) containing 15 % HCl and Opalustre (Ultradent, South Jordan, UT, USA) containing 6.6 % HCl and silicon carbide.⁷ (Table 1)

Since these products are expensive, the prototype paste containing 18 % HCl and pumice, as described by Croll in 1986 is most commonly used in clinical practice.⁸

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Use of a remineralising agent after microabrasion helps reduce the chances of postoperative sensitivity. Casein Phosphopeptide - Amorphous Calcium Phosphate (CPP - ACP) is one such agent which stabilizes high content of calcium and phosphate ions to maintain a super saturated mineral ambience.^{11,12}

The favourable outcome of enamel microabrasion depends on proper case selection and proper implementation of the procedure. This case report illustrates the management of mild to moderate dental fluorosis by microabrasion using the prototype paste followed by the application of CPP - ACP.

PRESENTATION OF CASE

An 18 yr. old patient presented at Department of Conservative Dentistry and Endodontics complaining of unaesthetic yellow brown discoloration of teeth. On history taking it was found out that he lived in Faridabad, Haryana, a fluoride endemic region. His self-esteem was low and was reluctant to smile due to unpleasant appearance of his teeth. No history of any systemic disease or allergy was reported. On clinical examination, the stains were identified as mild fluorosis according to Dean's fluorosis Index (Figure 1).



The slurry was then washed off thoroughly with water. The result was evaluated, and the procedure was repeated three times on the same appointment, or it could also be done at different sittings. The number of sittings can vary depending upon the severity of the stains. The rubber dam was removed and the patient was advised to rinse the mouth with water. This was followed by the application of CPP - ACP cream (GC Tooth Mousse) on labial surface of the teeth for 4 mins. Patient was advised to use CPP - ACP cream thrice daily for 2 weeks, which aids in remineralisation of enamel and prevention of sensitivity. The patient was instructed to avoid smoking or to eat or drink anything that may stain the teeth for next two to three days. He was also asked to avoid too cold or too hot food / beverages for few days to prevent sensitivity. The patient was pleased with the aesthetics achieved (Figure 4).



DISCUSSION OF MANAGEMENT

The patient wanted a least invasive cost-effective treatment option to enhance the aesthetics. So, it was decided to do enamel microabrasion of maxillary anterior teeth.



Oral prophylaxis was done followed by isolation of teeth using rubber dam to protect the gingiva from acid contact. Patient and the clinician wore eye protection during the procedure. 1mm thick pumice acid slurry paste was applied on the maxillary anterior teeth using agate spatula (Figure 3). The pumice slurry was rubbed using a rubber cup attached to a right angled latch type slow speed hand piece for 30s to 40s.

DISCUSSION

Discoloration due to excessive endemic fluorosis leads to aesthetic concerns. Various invasive and expensive treatment options available include full crowns, veneers, composite restorations, and bleaching, but patients' decision regarding the aesthetic treatment is also influenced by the financial aspect.^{13,14}

Enamel microabrasion is a conservative approach for the reestablishment of the aesthetics with the minimal chair side time and minimal loss of enamel. It is also not associated with post-operative sensitivity or pulpal trauma. In microabrasion the HCl shatters the silica particles and abrades the stains on the surface and the underneath porosities. A thin layer of enamel ranging from 25 - 200 µm gets removed depending on the concentration of HCl acid and the period of application of the slurry. It eliminates superficial discoloration and also forms a smoother surface by removing the micropores.^{15,16} This provides prism free outer enamel surface which is rich in mineral and takes a longer time for acquired pellicle and also the *Streptococci mutans* to colonise the smooth surface. The microabrasion process compacts calcium and phosphate into interprismatic space while abrading the enamel surface.¹⁷ The enamel surface becomes brighter and more reflective.^{15,16}

Since the procedure is simple, conservative, and non-invasive few points to be taken into consideration with respect to microabrasion for fluorosed teeth are -

1. Age is not a limiting factor.¹ 2. Extent of lesion decides the number of applications as severe stains require more number of applications.¹⁸ 3. To prevent postoperative sensitivity as observed in some cases, application of remineralising agent is preferred.¹² 4. Contraindicated in patients with lip incompetence because of the desiccation of enamel which seems as failure of microabrasion.⁹ 5. For significant outcomes, bleaching can follow the microabrasion.¹⁹

CPP - ACP molecules bind calcium & phosphorus ions and stabilize amorphous calcium phosphate in metastable solution.²⁰ CPP - ACP bind to biofilms, plaque, bacteria, hydroxyapatite, and soft tissues in the oral cavity and localize the bioavailability of calcium and phosphorus. This maintains a super-saturated state with respect to tooth enamel, reducing demineralization and enhancing remineralisation. This helps in improving the crystalline structure of enamel resulting in reduced chances of postoperative sensitivity and stabilized results.²¹ Also, saliva enhances the effectiveness of CPP - ACP.^{22,23,24}

Enamel microabrasion with acidic / abrasive products provides immediate and long-lasting aesthetic results, with insignificant and unrecognizable enamel loss.^{25,9} In cases of severe stains, microabrasion can be followed by bleaching or bonded aesthetic restorations to achieve better outcomes. Microabraded teeth attains darker shade or yellowish coloration since remaining enamel is thin and translucent, so the yellowish dentin is more evident. After the microabrasion is done, bleaching should be delayed for few weeks, this delay will provide time for complete enamel surface remineralisation.⁹

When assessing discoloured teeth for microabrasion, bleaching or composite restoration, it should be remembered that thickness of enamel is not the same in different crown portions. In the incisal third the translucency of enamel is more and it becomes opaque moving towards the cervical margin. These points should be kept in mind and the clinician should evaluate the thickness of residual enamel after microabrasion and what shade matching implications will be there if the teeth need to be restored with bonded composites.²⁶

CONCLUSIONS

With enamel microabrasion the stained enamel is removed and not masked or altered, thus leading to long lasting results.¹ Enamel microabrasion alone or in conjunction with bleaching seems to be safe, effective and conservative approach for aesthetic enhancement of patients' smile.

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