

# Conservative Aesthetic Enhancement of Discolored Teeth – A Case Report

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## Abstract:

The art of aesthetic dentistry has always been on the quest to achieve a beautiful smile. Discoloured teeth are considered as major impairment in aesthetics. Alterations in the colour may be physiologic or pathologic and endogenous or exogenous in nature. An array of treatment alternatives like ceramics or composite veneering, bleaching, full coverage crowns, macroabrasion and microabrasion are available to manage intrinsic tooth discolouration. Most of these treatment modalities are expensive, need exclusive materials and the need of specialized laboratories. Microabrasion, macroabrasion and bleaching are some of the most conservative and cost-effective treatment options that can be easily provided to all patients. Macroabrasion along with microabrasion has been in practice since early 19th century. It's a combined chemomechanical approach for aesthetic management of superficial enamel defects. In some cases, even after these procedures are completed, the underlying natural tooth colour may appear too yellow or dark for the patient's and dentist's liking. In such situations they can be followed by Vital tooth bleaching for complete tooth colour correction.

**Key Word:** Aesthetic dentistry; Macroabrasion; Microabrasion; Conservative; Vital tooth bleaching

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## I. Introduction

One of the main goals in dentistry is to achieve an aesthetic smile and discolouration of teeth can be considered as a major obstacle for the same. Teeth can become stained or discoloured for many different reasons, including our lifestyle, poor dental hygiene, and disease. Tooth discolouration falls into three different categories: extrinsic, intrinsic, and age-related. One of the primary causes of intrinsic staining is dental fluorosis. It is a developmental disturbance of enamel caused by successive systemic exposure to high concentrations of fluoride during tooth development, leading to enamel with lower mineral content and increased porosity [1]. How dental fluorosis presents clinically depends upon the severity, which ranges from narrow white lines following the parenchyma to discrete white opaque areas or to an entirely chalky white tooth surface [2].

Treatment options vary depending on the thickness of the layer of enamel involved and include microabrasion, macroabrasion, bleaching, composite resin restorations, veneers, or crowns [3]. Since most patients seeking treatment for dental fluorosis are young, and prosthetic treatment options result in excessive removal of tooth structure at an early age and are more time-consuming and expensive [4], a more conservative approach should be considered.

Enamel macroabrasion is a controlled method for removing enamel to improve discolorations limited to the outer enamel layer, while the technique of enamel microabrasion involves application of hydrochloric acid and pumice in a paste form to the affected tooth surfaces to remove up to 100 m of surface enamel by use of a combination of erosion and abrasion [5]. This combined chemomechanical approach can be used in the aesthetic management of superficial enamel defects.

However, in some cases patients might require further teeth whitening procedures for satisfactory results. This may be achieved conveniently by the matrix (night guard), home-bleaching technique or in-office vital bleaching [6]. Professional in-office whitening is a chair-side technique that has gained popularity due to its immediate whitening without the need for tray use at home. These procedures are significantly less invasive

and more economical than the prosthetic and restorative treatment options available, providing highly aesthetic and quick results to patients.

The purpose of this case report was to illustrate the improvement of dental aesthetics in a patient with dental fluorosis through conservative treatment with enamel microabrasion and macroabrasion, followed by tooth whitening using in-office vital bleaching technique.

## **II. Case Report**

A 19-year-old male patient reported to Dept. of Conservative Dentistry and Endodontics, Govt. Dental College & Hospital Aurangabad, with the chief complaint of discolored upper front teeth. The patient gave a history of discoloration since the eruption of the teeth. Clinical examination revealed brown and chalky white discoloration of maxillary central incisors, i.e. 11 and 21 (Figure 1). Diagnosis of dental fluorosis leading to intrinsic discoloration of teeth was established.



**Figure-1** Pre-operative photograph

As the patient wanted a conservative, economic and quick solution, macroabrasion and microabrasion of the affected teeth followed by in-office bleaching, if required, was decided as the treatment plan. Oral prophylaxis of the patient was done 1 week before the initiation of the treatment procedures.

Isolation of the field was done using cotton rolls and Vaseline was applied. Gingival barrier was then placed and cured for 20 seconds with respect to the maxillary incisors (Figure 2).



**Figure-2** Isolation using cotton rolls and gingival barrier

Macroabrasion of the affected teeth was done using a 12-fluted carbide, moving it along the anatomy of the tooth to maintain the natural contour, with a reduction of 0.5 mm. For the microabrasion procedure, 12% HCl was mixed with pumice into a slurry and a small amount was applied to the labial surface with a slowly rotating rubber cup. The slurry was rubbed over the surface for 5 seconds and then washed for 5 seconds directly into the aspirator. This process was repeated ten times per tooth until the stain was reduced (Figure 3).



**Figure-3** After Macroabrasion and Microabrasion

Since the shade obtained after macro-microabrasion was not satisfactory, in-office power bleaching using SDI Pola Office kit was decided. The material contains 35% hydrogen peroxide as the bleaching agent and potassium nitrate as a desensitizer and is available in a powder and liquid formula. Equal parts of bleaching powder and liquid were taken and mixed until a thick homogeneous mixture was obtained. This gel-like mixture was then applied over 11 and 21 using an applicator tip (Figure 4).



**Figure-4** After application of bleaching agent

Light activation was done using a curing unit for 8 minutes, after which the gel was suctioned off (Figure 5).



**Figure-5** Exposure to bleaching light

This process was repeated for 2 more cycles. After the final cycle, all the gel was suctioned off, the teeth were washed using an air-water syringe and suctioned, and final polishing was done using a pumice slurry and rubber cup. The patient was highly satisfied with the final aesthetic result (Figure 6).



**Figure-6** Post-operative photograph

The patient was recalled after 1 week for evaluation and reported marked improvement in the color of the affected teeth with no signs of sensitivity.

### **III. Discussion**

In this day and age where aesthetics is of utmost importance, discolored teeth serve as a major setback in achieving the perfect smile. Patients with stained teeth have lowered self-esteem and confidence levels, with the possibility of having a direct effect on their social lives.

The color of the affected tooth is influenced by a combination of its intrinsic discoloration and the presence of any extrinsic stains. Dental fluorosis is the hypoplasia or hypermineralization of tooth enamel or dentin preceded by the chronic ingestion of excessive amounts of fluoride during the period of teeth development causing intrinsic discoloration of the affected teeth. The proposed treatment options, depending on fluorosis severity, include expensive ceramic veneers, free-hand bonding restorations, abrasive chemical treatments and bleaching.

For this young patient, who sought a conservative treatment plan with rapid and effective results, macroabrasion, microabrasion and subsequent bleaching proved to be an appropriate and satisfactory treatment plan for the aesthetic improvement of teeth with coloration caused by dental fluorosis.

According to Sturdevant, a technique for removing localized white spots, not subject to remineralizing therapy, is called macroabrasion [7]. It is a controlled method for removing enamel to improve discolorations limited to the outer enamel layer [8]. Macroabrasion simply uses a finishing diamond tip or multilaminated drill on a high turbine to remove the defect [9] with light and intermittent pressure to avoid the formation of a cavity [7].

The technique of enamel microabrasion involves application of hydrochloric acid and pumice in a paste form to the affected tooth surfaces to remove up to 100 μm of surface enamel by use of a combination of erosion and abrasion [5]. Because microabrasion improves tooth appearance by microreduction of the enamel surface, it is logical to perform this procedure before bleaching [10]. By the phenomenon of the “abrasion effect”, as named by Croll, subsurface stains may be camouflaged by the optical properties of the newly microabraded surface [8]. The “abrasion effect,” which results in a smooth, prism-free layer of enamel and a lustrous surface sheen that increases over time, is apparently not influenced by bleaching [10].

Since the patient was not completely satisfied by the results obtained after macro-microabrasion, in-office bleaching was decided to be proceeded with. The mechanism of action of bleaching agents is based on the release of active forms of oxygen, as a function of the interaction of hydrogen peroxide with tooth structure. Hydrogen peroxide is an oxidizing agent capable of producing free radicals, releasing oxygen (O<sub>2</sub>), reducing the complex carbonic chain of the pigment (which absorbs the blue spectrum of light), into smaller molecules with free hydroxyls (which do not absorb blue light) and thus reflect the blue light along with the green and red spectra; the colour mixture gives the H<sub>2</sub>O<sub>2</sub> whitening effect [11]. The bleaching kit used in this case was SDI Pola Office. Along with 35% hydrogen peroxide, which acts as the bleaching agent, Pola office also contains potassium nitrate as a desensitizer, thereby reducing the patient’s post-bleaching sensitivity. Bleaching light was used to accelerate the process.

Resin infiltration can be considered as a minimally invasive restorative option in an attempt to remove white spot remnants after bleaching. However, recent studies have shown that teeth treated by resin infiltration may lack color stability and be susceptible to staining [12]. After being informed of these risks, the patient stated that he was pleased with his results and declined any further treatment.

#### **IV. Conclusion**

The aesthetic rehabilitation of discolored teeth can be successfully treated with conservative treatment options such as microabrasion, macroabrasion and bleaching. These treatment modalities have proved to be safe without any deleterious effect on tooth structure when proper instructions are followed, providing satisfactory results to patients at a more economical price range.

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