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The etch-bleach-seal technique for conservative aesthetic management of fluorosis stains in young permanent incisors: a case report

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Abstract

Hypomineralized enamel lesions are frequently associated with appearances ranging from white mottling or opaque to discrete or generalized yellow-brown discolorations. Dental flluorosis staining is commonly considered an aesthetic problem because of the psychological impact of unaesthetic maxillary anterior teeth. Numerous treatment approaches have been proposed ranging from bleaching to enamel reduction to restorative techniques. The present case report describes etch-bleach-seal technique for treatment of fluorotic lesions using 5% sodium hypochlorite with good clinical success. It is simple, low cost, non invasive, relatively rapid and safe, requires no special materials, and can be used safely on young permanent teeth.

Keywords: bleaching, sodium hypochlorite, dental fluorosis.

Introduction

The teeth are an integrated part of facial aesthetics and are involved in a complex social, cultural and psychological interaction. The appearance of the dentition is of concern to a large number of people seeking dental treatment especially in young age groups, and the colour of the teeth is of particular cosmetic importance.[1]

Discoloration of the tooth is one of the most frequent reasons why a patient seeks dental care. Aesthetically distressing discolorations of permanent incisors have multiple etiologies that comprise both the genetic and environmental factors.[2,3] Dental fluorosis is a condition of enamel hypomineralization precipitated by the effects of excessive fluoride on the ameloblasts during enamel

formation resulting in optical and physical changes. Clinically, it leads to aesthetic deviations characterized by opaque white areas or discolorations ranging from light yellow to dark brown, together with porosities on the enamel surface.[4] Dental fluorosis is distributed symmetrically, affecting mainly anterior teeth, and the severity varies among the different types of teeth. Teeth that develop and mineralize later in life have a higher prevalence of dental fluorosis.[5]

The unaesthetic discoloration of facial surfaces of permanent anterior teeth due to dental fluorosis is the most prominent feature, frequently causing psychological problems,[6] especially among children and adolescents. A variety of treatment approaches have been proposed for masking dental fluorosis stains in young patients, including bleaching, microabrasion,[7-10] and direct and indirect restorations.[11] However, bleaching for young children may induce hypersensitivity, mucosal irritation and enamel surface alterations (Joiner 2006),[12] whereas microabrasion may result in loss of enamel structure (Sapir and Shapira 2007).[13] Therefore, suitable conservative treatment options are needed for young permanent teeth that are partially erupted and have large pulp chambers and incomplete root formation. A recent etch-bleach-seal technique using sodium hypochlorite as a bleaching agent has been suggested by Wright (2002) as a conservative alternative treatment option for aesthetic improvement of fluorosis stains and it has shown good clinical success.[14]

The present case report describes the aesthetic management of mild to moderate fluorosis stains using etch-bleach-seal technique.

Case report

Two 11-year old siblings accompanied by their parents reported to the Department of Paediatrics & Preventive Dentistry with the chief complaint of yellowish-brown stains on their upper front teeth. After taking patients' medical history and performing clinical examination the stains were diagnosed as fluorosis. Taking into consideration patients' age, a conservative treatment plan was advised to both of them. The treatment plan was explained to their parents along with its advantages and shortcomings and an informed written consent was obtained. Both the maxillary central incisors were cleaned with flour pumice using rubber cup to remove plaque and any extrinsic surface discolorations. The teeth were then isolated with rubber dam and ligated to protect the soft tissues from bleaching agent. Then the enamel surface was etched with 37% phosphoric acid for 60 seconds to allow better penetration of bleaching agent. Sodium hypochlorite (5%) was applied to the entire tooth surface using a cotton applicator. The bleach was continuously reapplied to the tooth surface as it evaporates. The teeth were then re-etched for 60 seconds after 10 minutes of bleaching agent application. Bleaching agent was reapplied after rinsing. The teeth were bleached in a single appointment for 25–30 minutes. After bleaching, the previously stained lesions achieved a white mottled appearance. To prevent organic material from re-entering the porous enamel, the teeth were sealed after achieving the optimal aesthetic result. Sealing was accomplished by rinsing and drying the teeth followed by etching the teeth with 37% phosphoric acid for 30 seconds. The teeth were then rinsed with water and a highly penetrating clear resin like composite bonding agent was applied so as to create the resin tags that occlude the porosities and prevent re-staining of the hypomineralized enamel lesion. Aesthetically acceptable clinical results were obtained for both the patients with adequate stability up to six months follow-up period.

Case 1

Figure 1: Pre-operative view.

Figure 2: Post-operative view.

Figure 3: Six months follow-up view.

Case 2

Figure 4: Pre-operative view.

Figure 5: Post-operative view.

Figure 6: Six months follow-up view.

Discussion

Dental fluorosis causes staining of teeth and is known to affect the facial esthetics. Moreover, it has been reported to have a psychological impact on the individuals especially adolescents. Various treatment approaches have been recommended for the treatment of dental fluorosis stains. However, minimally invasive interventions for these defects are of great importance especially in the young age groups to prevent extensive tooth destruction caused by the invasive procedures and for reducing treatment duration and cost. In young permanent teeth that are partially erupted and have large pulp chambers, bleaching with 5% sodium hypochlorite is an excellent conservative alternative for the treatment of fluorosis stains. The etch-bleach-seal technique has several advantages for the specific application of removing stains from localized hypomineralized lesions in young teeth. First, the bleaching agent proposed is sodium hypochlorite, which has been and continues to be used extensively to remove organic material from teeth (pulp canal irrigation during endodontic therapy) and as a sterilizing agent. It is known to be highly effective at removing organic material by oxidizing it and allowing the smaller degraded molecules to be washed away. Application of sodium hypochlorite to bleach discolored, hypomineralized enamel lesions can degrade and remove the chromogenic organic material that is located in the enamel.[15] The second critical step in this bleaching approach lies in the resin perfusion of the hypomineralized lesion to prevent future chromogens from entering the porous enamel causing a re-staining of the lesion.[14] Various authors have reported use of different acids for etching the teeth prior to bleaching. Belkhir et al in his case study presented a similar technique for removal of dental fluorosis stains in which 12% hydrochloric acid was used followed by bleaching with sodium hypochlorite.[15] The use of 16% hydrochloric acid alone or followed by hydrogen peroxide bleaching can successfully remove intrinsic yellow-brown stains as stated by Wong M in his clinical study.[16] In the present case report, the etchant used in the technique was 37% phosphoric acid. The use of phosphoric acid is preferred for two reasons. Firstly, it is readily available in most dental offices. Second, and more important, 37% phosphoric acid removes less enamel compared with 16% hydrochloric acid. It has long been known that 37% phosphoric acid (most commonly supplied for resin bonding) is highly effective at etching the enamel crystallites and increasing enamel porosity.[14] Furthermore, it has been shown that pre-treatment of the enamel with sodium hypochlorite to remove the enamel proteins can enhance the ability of acid to etch the surface, thereby improving the likelihood that resins can bond successfully to the surface.[17] Therefore, the etch-bleach-seal technique presented in this paper uses materials that are readily available in the dental office and that have been shown to be clinically safe and effective on young permanent teeth. Permanent incisor teeth that are only partially erupted can be treated, allowing older children and very young adolescents to benefit from this approach.[18] The present technique provides a conservative alternative treatment for yellow-brown hypomineralized enamel lesions that shows good clinical success and long-term stability. The application of conservative treatment approaches should be considered prior to applying techniques that require substantial enamel removal for the treatment of enamel discolorations.

Conclusion

Conclusively, etch-bleach-seal technique is a simple, non-invasive, cost-effective, relatively rapid and safe technique for masking mild to moderate fluorosis stains in young permanent teeth with good clinical success and adequate stability.

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