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Treatment of severe fluorosis by a combined use of: at-home bleaching and at-office resin infiltration. A case report

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Abstract. *Introduction:* severe Enamel Fluorosis is frequently found in young adolescents with aesthetic concerns. Colourimetric alterations could vary from diffuse opacities to demarcated brown and white areas.

Material and methods: one young patient with a severe fluorosis was treated by a combined use of at-home bleaching and at-office resin infiltration.

Results: in all the affected teeth, the existing aesthetic enamel alterations were successfully treated by the combined use of bleaching and Icon® resin application. Given the minimal substance loss due to the erosion-infiltration procedure, the patient was extremely satisfied with the results.

Conclusions: our case report show the capability of treating severe fluorosis with bleaching and subsequent Icon® resin infiltration. Longer observation periods in studies with larger patients population are needed to validate the clinical significance found in this case report.

Keywords: fluorosis, bleaching, resin infiltration, discolouration, aesthetic outcome, Icon

Introduction

Enamel fluorosis (EF) is a hypo-mineralization of enamel characterized by greater surface and subsurface porosity than in sound enamel, as a result of fluoride intake excess during the period of enamel formation (1). It has also been defined as 'a dose response effect caused by fluoride

ingestion during the pre-eruptive development of teeth' and it is currently classified as a Developmental Defect of Enamel (DDE).

The clinical aspect of the defects depends on the stage of development during which the insult occurs, as well as the extent and duration of the insult. The enamel aesthetic defects correlated with EF are alteration in quality and quantity of the enamel, caused by disruption and/or damage to the enamel organ during the amelogenesis process (2). The enamel defects can be correlated both with enamel hypoplasia and hypomineralization. Enamel hypoplasia (HE) is a quantitative defect and presents a scarce enamel thickness, while enamel hypomineralization (EO) is a qualitative enamel deficiency presenting alterations in enamel translucency and opacity which may be diffuse (DIO) or demarcated (DEO) with white, yellow, or brown colour (3) (4). The changes in enamel appearance range from fine white lines to staining and pitting of enamel.

Enamel fluorosis is daily encountered in clinical practice and it can have a significant impact on oral health, aesthetics of the smile, tooth sensitivity and altered occlusal functions. Epidemiologic data show a high prevalence of EF both in primary and permanent dentition, reflecting the current increasing trend of this condition, which should be considered as a public health problem.

Several clinical indices have been developed to categorize enamel defects based on appearance, microscopic features or cause. Direct comparisons of the findings of population surveys of enamel defects (including fluorosis) are impossible due to different classifications and indices. The latter can be divided into: a) specific fluorosis indices, which identify and categorize only dental fluorosis; and b) descriptive indices, which make no etiological assumption. The Dean, Thylstrup and Fejerskov, and Tooth Surface Index of Fluorosis (TSIF) indices are the most commonly used fluorosis indices and they require a diagnosis of fluorosis at the clinical examination. Of the descriptive indices, with no etiological assumption, the Al-Alousi and the Developmental Defects of Enamel (DDE) indices are the most commonly used for record the enamel defects (5) (6).

A recent clinical study reported an incidence of 31% of fluorosis among a group of 9 years old children. Although classification methods could evidence different epidemiological data, fluorosis is nowadays a frequent clinical finding and a condition that require aesthetic solution (7).

In a previous study we described the successful effect of resin infiltration on white spot post orthodontic lesions, DDEs and mild cases of fluorosis (8). Enamel hypomineralizations are successfully treated by resin infiltration by Icon, which has been initially used for the interproximal enamel non cavitated caries in the posterior segment and then it started to be used for vestibular hypomineralization (9) (10) (11). On the other hand, lesions with deeper configuration in the enamel layer such as Molar Incisal Hypomineralization (MIH), hypomineralization of traumatic origin and severe cases of fluorosis did not seem to have the same response to this treatment. In the past these lesions have been treated with more invasive approaches, such as direct resin restorations and ceramic veneers. These treatments are not always affordable by patients, especially young and in the hospital setting.

Here we present a clinical case where a severe form of fluorosis in a young adolescent with relevant aesthetic enamel alteration, has been treated by a combined use of: two weeks at-home bleaching and at-office resin infiltration.

Case report

The patient (CM), a 14 years old male, who was found with a severe fluorosis on both the upper and lower dental arches (**Figure 1-3**).



Figure 1. Pre-operative extra-oral frontal view



Figure 2. Pre-operative intra-oral left view



Figure 3. Pre-operative intra-oral right view

Upper incisors presented with brown demarcated defects on central and incisal tooth sections and whitish diffuse discolouration on the gingival tooth area (**Figure 4**).

Enamel hypoplasia was observed also on the incisal part, causing incisal chipping (**Figure 5**) and all the upper teeth presented both hypomineralization and hypoplasia (**Figure 6**).



Figure 4. Intra-oral pre-operative frontal view



Figure 5. The extent of the fluorosis



Figure 6. The discolouration extent on all the clinical crown area, with frank alteration of the enamel translucency

Custom fitted trays were done in our Lab and a two weeks at-home bleaching treatment with 16% carbamide peroxide take-home whitening gel was performed (3 hours per day). Before and after two weeks' photographic images documented the bleaching outcome (**Figure 7-9**). The brown discolouration amount was diminished but still unpleasant and visible to the patients who was concerned about his teeth appearance.



Figure 7. Intra-oral view after 2 weeks of home bleaching with 16% peroxide-carbamide



Figure 8. Lateral upper right incisors after bleaching



Figure 9. Upper left incisors after bleaching

After a wash-out period of two weeks, Icon infiltration clinical procedure was performed according to manufacturer instructions (**Figure 10-13**). The enamel surface appearance after rinsing and ethanol drying was chalky white and the brown discolorations were no more present. After resin infiltration the vestibular surface appeared smooth and both the discoloration and pitted hypoplasia have been corrected.

The Icon etching by 16% HCl application was performed three times (**Figure 14 - 15**).



Figure 10. Etching



Figure 11. After rinsing and ethanol drying.



Figure 12. Clinical view after resin infiltration on the four upper incisors



Figure 13. Clinical view of upper right incisors



Figure 14. Post-operative extra-oral view



Figure 15. Resin infiltration has been performed on both upper canines

Results

The photographic images show the aesthetic outcome of the treated lesions. The treatments proved to be effective both on brown and white lesions of a severe form of fluorosis.

Conclusion

The combined use of at-home 16% peroxide carbamide bleaching and subsequent at-office Icon clinical procedure proved to be effective on severe fluorosis. This therapeutic protocol with a minimal invasive approach showed to be an effective clinical option, instead of more invasive treatments, such as direct resin restorations or ceramic veneers. More clinical studies on a larger cohort of patients are needed to document definitively on the efficacy of this new procedure.

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