



Treatment of Dental Fluorosis with Air Abrasive Technology and Resin Infiltration: A Case Report

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Abstract

Dental Fluorosis (DF) manifests by too much ingestion of fluoride resulting in disturbances in enamel mineralization. The result is intrinsic discolorations in the maxillary and mandibular teeth with a poor esthetic appearance. This aesthetic damage has a significant impact on the quality of life of the patients concerned, particularly with regard to their socio-cultural integration, which requires appropriate care. In challenging cases, an esthetic result may be achieved only by a combination of techniques. This case report describes a combined minimally invasive treatment of a teenager's maxillary teeth affected by fluorosis. Air abrasion, and resin infiltration were performed. The satisfactory clinical result has made it possible to avoid more invasive and expensive treatments.

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Introduction

Dental fluorosis is defined as a specific perturbation of the enamel formation, caused by excessive exposure to high concentrations of fluoride. This results in a reduction of the mineral content of the enamel, and eventually an increase in enamel porosity. The gamut of clinical presentation ranges from small white opaque areas of enamel to more severe discoloration, including black and brown stains. The enamel may also be pitted and rough in appearance. More severe fluorosis is less prevalent than the milder forms [7,11].

The Thylstrup and Fejerskov Index (TFI) classifies the severity of the condition based on the biological aspects and clinical appearance of the fluorosis [4].

The severity of the condition is related to when the overexposure occurred and for how long. For the aesthetically important maxillary permanent incisors, the risk of fluorosis is greatest if the child is exposed to excessive levels of fluoride between the ages of 20–30 months old [8].

Although fluorosis may affect the primary dentition, the majority of cases are seen in the permanent dentition. Once eruption has occurred, the tooth is no longer at risk of developing fluorosis as a result of excessive fluoride exposure.

The diagnosis of fluorosis is dependent on taking a thorough history and undertaking a detailed clinical examination. It is important to ascertain the region in which the patient grew up and



to determine whether the drinking water was fluoridated. Tooth brushing habits should also be explored, to determine whether the patient used a child or adult toothpaste when younger.

The treatment options for the affected teeth are micro abrasion, whitening, resin infiltration, composite restoration, composite resin or porcelain veneers. The least invasive approach should be selected to meet the aesthetic demands of younger individuals in particular. Micro abrasion and resin infiltration techniques, which can be applied to the tooth without any loss of enamel, have emerged as attractive treatment options in recent years [1].

The aim of this article was to present a case of management of dental fluorosis using Air abrasion, and resin infiltration.

Case report

A 12 year old girl was referred to the Department of Pediatric and Preventive Dentistry, Monastir Dental Faculty, Tunisia, with an aesthetic chief complaint.

The patient general condition was good but she showed a very low self-esteem because of her poor teeth appearance.

While investigating the history of the patient, we found out that she grew up in a region where the drinking water was highly fluoridated (1.8 ppm to 2 ppm).

Intraoral examination revealed a satisfied hygiene, absence of dental caries, a horizontal opaque white yellow brown striation that occur bilaterally and are diffuse.

The discoloration appeared on the enamel surface away from the gums and were seen as lines or spots horizontally aligned. With the use of magnifying lens, tiny pits and perforations due to demineralization of the tooth matrix were observed (Figure 1).

A diagnosis of moderate fluorosis was made (Thylstrup and Fejerskov Index = 4).

A treatment plan was developed which the main objective was to improve aesthetic.

A combined technique of both air abrasion and resin infiltration was suggested to mask the discolored area completely.

In fact, the affected enamel was removed by a high speed stream of purified aluminum oxide (alpha alumina) particles propelled by air pressure (Figure 2) and then fluid composite resin placed within the defect (Figure 3).



Figure 1: Intraoral view before treatment showing moderate dental fluorosis.



Figure 2: Air abrasive machine.



Figure 3: Intraoral view after treatment.

Discussion

Dental fluorosis is a specific disturbance of tooth formation due to excessive fluoride ingestion.

The disturbance affects enamel during its late secretory and maturation phase.

Water and secretory proteins, such as amelogenins are retained, resulting in enamel sub-surface porosity. In other words, when the children are exposed from intrauterine life of 5–6 months, when tooth germ erupts and exposed to F–through placental transfer of F–from mother to fetus and if so, DF discoloration will be seen in the tip of the tooth. If the exposure to F–is during later years, the level of discoloration on the enamel surface would be at a higher level and not at the tip of the teeth [5,9].

One of the major sources of fluoride ingestion by man is from drinking water. Other sources include beverages, toothpaste's infant formula and fluoride supplements. Certain foods also contain considerable amounts of fluorides.

In areas of the world where drinking water is obtained directly from deep wells, dental fluorosis is often endemic; in many cases, the deeper the wells, the higher the fluoride concentration of the drinking water [12].

Most of the studies have shown that higher levels of severity of the disease promoted a higher social and psychological discomfort. The clinical characteristics of fluorosis lead to shy, sad, and quiet children who cover their faces with their hands to express happiness, smile with closed lips, do not participate in school social activities, and avoid talking with their classmates and smiling due to the shame of their dental appearance. When

patients perceive differences in their oral condition and when this causes changes to their social life, it is expected that they will visit a dentist to resolve the problem [6].

Classification of the severity of DF by the Thylstrup and Fejerskov Index (TFI) 5 is most suitable for determining the type of treatment because it is based on the biological changes in fluorosed enamel. For convenience, fluorosed teeth may be classified into mild (TFI=1-3), moderate (TFI=4-5) and severe (TFI=6+) categories.

Teeth with TFI=1 have faint white lines due to accentuation of enamel perikymata or rod ends.

At TFI=2, the white lines are more distinct and some of them may be coalesced, while at TFI=3, discrete opaque areas are seen on the enamel surface, there being white lines between the opaque areas. At TFI=4, the entire enamel surface is chalky white, while teeth with TFI=5 have pitted enamel surfaces, the pits being less than 2mm in diameter. In teeth allocated to the severe category of dental fluorosis, the pits coalesce to form a band less than 2mm in vertical height at TFI=6, while less than 50 per cent of surface enamel has been lost at TFI=7. At TFI=8 more than 50 per cent of enamel surface has been lost and only a rim of cervical opaque enamel may be left at TFI=9 [4,12].

Therapeutic management of DF depends on the severity of the condition.

Prevention is the best approach, but when severely fluorosed teeth are aesthetically objectionable, restorative management may be indicated.

In milder cases with discoloration, air-abrasion technology may be beneficial.

This technique, introduced in the 1950s, uses a high-speed stream of purified aluminum oxide (alpha alumina) particles propelled by air pressure. (Alpha alumina is a non-toxic substance often used in medicine and foods, including some whitening toothpastes.) Two alpha alumina particle sizes, driven by a choice of three air pressures, can be selected depending on the procedure.

Air-abrasive technology can prepare enamel and dentin for bonding, similar to etching by acidic gels and solutions [2,3].

Air-abrasive technology provides a method of conservatively eliminating the darkened areas caused by the DF. In fact, the tooth can be restored with either an unfilled or filled resin material, or a combination of both [2,3].

Air-abrasive surface treatment may provide a faster and improved method of preparing the existing composite surface for bonding but several limitations should be considered when using air-abrasive equipment: The nozzle of the air-abrasive instrument does not come into actual contact with the tooth, providing no tactile guidance. In fact, Air-abrasive equipment depends more on the clinician's ability to envision the parameters of the preparation before cutting. Also, when the aluminum oxide powder used in the air-abrasive system strikes the glass surface of an intraoral mirror, the mirror becomes frosted. A number of approaches have been suggested to avoid destroying mirrors. Perhaps the simplest solution is to use disposable mirrors [2,3].

It now appears that air-abrasive methods are suited to restorations with current bonded resin materials and fit well into a philosophy of enamel conservation.

Laurell observed bond strengths to air-abrasive treated enamel surfaces similar to the values obtained with acid etching and found higher dentin bond strengths [10].

Air-abrasive technology also reportedly minimizes heat, vibration and bone-conducted noise, providing a reduced need for anesthesia, which is very important for children. The surface of enamel and dentin after preparation may permit the effective placement of composite restorations without chemical etching. Its precision may facilitate a conservative new approach to treat mild and moderate DF [3].

Conclusion

Fluoride is a safe and effective method of reducing dental caries when used appropriately. The risks associated with excessive ingestion of fluoride need to be monitored.

Dental Fluorosis poses predominantly an aesthetic issue. Once a definitive diagnosis has been established, treatment options will vary as patient expectations and aesthetic concerns differ.

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