

Brown Teeth - Diagnosis and Management: A Case Report

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Abstract

Dental fluorosis is a developmental disturbance of dental enamel, caused by successive exposures to high concentrations of fluoride during tooth development, leading to enamel with lower mineral content and increased porosity. It is still endemic in many parts of the world including Africa, China, India, Middle East and South America. Dental fluorosis occurs in the permanent teeth in children after 8 years of age. Increase in enamel porosity along the Striae of Retzius is the earliest manifestation of dental fluorosis. The later in life the mineralization of a tooth, the severe the effect of dental fluorosis. More the thickness of enamel, more severe the condition. In this case report, we will be discussing about the fluorosis and its various treatment options.

Keywords: Dental Fluorosis; Enamel; Treatment

Introduction

Dental fluorosis is a developmental disturbance of dental enamel, caused by successive exposures to high concentrations of fluoride during tooth development, leading to enamel with lower mineral content and increased porosity [1]. In 1888, it was described as a condition that appeared to be endemic dental fluorosis in certain areas of Mexico [2]. It was not until 1931 that Churchill discovered the correlation between fluoride from drinking water and dental fluorosis, a condition that is still endemic in many parts of the world including Africa, China, India, Middle East and South America [2]. The severity of dental fluorosis depends on when and for how long the overexposure to fluoride occurs, the individual response, weight, degree of physical activity, nutritional factors and bone growth, suggesting that similar dose of fluoride may lead to different levels of dental fluorosis [1]. Other factors that may include are altitude, malnutrition and renal insufficiency. The critical period to fluoride overexposure is between 1 and 4 years old, and the child would not be at risk around 8 years old. The safe level for daily fluoride intake is 0.05 to 0.07 mg F/Kg/day. Above this level, the risk of developing fluorosis due to chronic fluoride consumption will be evident [1].

Case Report

A medically fit 19 years old female patient hailing from Davangere comes with the chief complaint of generalized discoloration of the teeth. She gave the history of discoloration since her childhood and same history of discoloration in her neighborhood. Patient also gives the history of Trauma 9 years ago. On intra oral examination, there is generalized white flecks seen in all the surfaces of the teeth along with blackish discoloration with cavitation seen on the lingual aspect of upper left central incisor (Figure 1 and 2). It was non-tender on percussion and vestibular palpation. Upper right central incisor was root canal treated and was nonvital. Intraoral periapical radiography of upper left central incisor revealed ill-defined radiolucency involving enamel, dentin, linear radiolucency involving the root canal and shortened root apex giving the final diagnosis of external and internal resorption. Also the final diagnosis of Grade IV generalized fluorosis was given. Patient was advised for the extraction of upper left central incisor and tooth colored restoration for the anterior teeth.



Figure 1: Mottling of teeth seen on occlusal aspect of maxillary teeth with decay in relation to upper left central incisor.



Figure 2: White chalky appearance seen on the maxillary and mandibular teeth.

Discussion

Fluorosis has been reported way back in 1901 [3]. It is well documented that fluoride can have both beneficial and detrimental effects on the dentition ever since Mc Kay and GV Black in 1916 published the effect of fluoride on dentition. The beneficial effects of fluoride on dental caries are primarily due to the topical effect of fluoride after the teeth have erupted in the oral cavity [3]. In contrast, detrimental

effects are due to the systemic absorption during tooth development causing dental fluorosis [3]. Dean and WHO determined 1 ppm to be the optimal level of fluoridation for caries reduction [4].

In India, definite dental fluorosis has been reported at fluoride level of 0.4 ppm [3]. It was first identified in 1937 in Nellore of Andhra Pradesh by Shortt, *et al* [3]. In this case report, the patient is hailing from Davangere which has fluoride levels in the range of 0.22 - 3.41 ppm and it is the major dental public health problem among children in Davangere district [5]. Water is the most common source of fluoride ingestion [2]. The other risk factors include altitude of residence, climate, dietary habits, tea consumption, nutritional status of the child, duration of breast feeding, infant formulae and use of fluoridated toothpaste. It has also been reported that inadequate dietary intake of calcium, usually due to inadequate milk consumption has been associated with increased fluoride-related bone changes. Similarly calcium deficiency during the formation and mineralization of teeth will lead to hypocalcification [4].

Fluorosis occurs in three forms. They are dental fluorosis, skeletal fluorosis and non-skeletal fluorosis. Dental fluorosis occurs in the permanent teeth in children after 8 years of age [6]. Skeletal fluorosis affects the bones and major joints of the body [6]. Non-skeletal fluorosis affects invariably all the soft tissues, organs, and systems of the body [6]. Dental fluorosis is a good indicator of exposure to excessive amounts of fluoride [6]. Our case report presents with Dental Fluorosis.

Increase in the enamel porosity along the Striae of Retzius is the earliest manifestation of dental fluorosis [3]. Clinically, the porosity in the subsurface of enamel reflects as opacity of the enamel. There will be increased porosity of enamel along the entire tooth surface with an increased exposure to fluoride during tooth formation [3]. Very severely hypo mineralized enamel will become fragile and undergo surface damage as a result of mastication, attrition and abrasion once they erupt into the oral cavity [3]. Also they may attract extrinsic stains resulting in tooth discoloration [2]. Fluoride can induce dental fluorosis by affecting the enamel maturation.

The later in life the mineralization of a tooth, the severe the effect of dental fluorosis [2]. Hence more severe in premolars and second permanent molars and least in permanent mandibular incisors and first permanent molars [2]. More the enamel thickness, more the effect of dental fluorosis; hence, the snowcapped appearance of cusp tips and incisal edges of fluorosed teeth [2]. This may also explain the greater severity of dental fluorosis in maxillary than mandibular teeth [2].

Several indices have been used to describe the clinical appearance of dental fluorosis. But the Dean's fluorosis index is considered to be the 'gold standard', though other indices have been developed including the widely used Thylstrup and Fejerskov Fluorosis Index (TFI), which has an expanded range for the more severe forms of dental fluorosis [8]. We have used Dean's index to grade the fluorosis in this case (Table 1). Other indices such as Tooth surface fluorosis index, Thylstrup and Fejerskov index and Fluorosis risk index can also be used.

More recently, the Fluorosis Risk Index (FRI) has been in use [2]. One of the most crucial part in diagnosis of dental fluorosis is differentiating this entity from amelogenesis imperfecta and molar-Incisor hypo mineralization (MIH) and most important data for differentiating dental fluorosis from other pathologies will be familial history, place of residence, chronology of discoloration appearance [3]. They appear symmetrical and asymmetrical and/or discrete patterns of opaque defects [1]. These criteria imply that all symmetrically distributed and non-discrete opaque conditions of enamel are fluorosis and, also the patient gives the history of similar complaints of discoloration in her neighborhood [3]. Discolored and pitted enamel of fluorosed teeth may be esthetically objectionable and can be a cause of psychological ill health [2].

1	Questionable	Occasional white flecking and spotting of enamel
2	Mild	White opaque areas involving more of the tooth surface
3	Moderate	Pitting and brownish staining of tooth surface
4	Severe	Corroded appearance of tooth

Table 1: Dean's index.

Although it has been suggested that soft tissue changes due to excessive fluoride ingestion may be reversed in children by withdrawal of fluoride intake as well as dietary supplementation with calcium, vitamin D 3, ascorbic acid and antioxidants, there is no evidence that fluorotic changes in hard dental tissues are reversible. Hence, therapeutic intervention is often needed to correct cosmetic defects due to dental fluorosis [2]. Treatment options for fluorosis varies with severity. Depending upon severity, treatment option varies which includes Microabrasion, Bleaching, Laminate Veneers, composites and prosthetic crowns [3]. Other treatment options available are laser assisted bleaching, abrasion employing abrasive pastes [3].

Microabrasion: Microabrasion is the controlled removal of superficial stain from enamel. The technique is used for removing stains due to mild-to-moderate fluorosis. Microabrasion is often combined with bleaching to effectively remove fluorosis stains [2]. Generally, microabrasion is recommended when the enamel discoloration is not more than 0.2 - 0.3 mm deep [2]. It is conservative and if unsuccessful, more invasive treatment options can still be followed [2].

Bleaching: Discolored, mildly fluorosed teeth can be treated by in-office or at-home bleaching or a combination of both. Hydrogen peroxide (35%) and carbamide peroxide (10%) are the commonly used bleaching agents. High concentrations (e.g. 35% hydrogen peroxide) of the bleaching gel are used for in-office bleaching. Action of the gel can be accelerated by halogen or light-emitting diode (LED) curing light. Conditioning with 37% phosphoric acid is done to facilitate penetration of the bleaching agent to the subsurface porosities of the fluorosed tooth. The in-office bleaching may be followed by at-home bleaching until the desired shade is attained [2].

Laminate veneers: Laminate veneers can be used to manage severe dental fluorosis, especially where there is surface enamel loss. The veneer may be made of porcelain or resin composite [2].

Conclusion

It is evident from this case report that fluorosis is seen in certain places in India. Thus it has to be identified and given appropriate treatment to avoid psychological ill health. Emerging newer treatment options should be combined with the available various treatment modalities.

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