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Aesthetic management of fluorosis: A case report

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Abstract--With increasing awareness and aesthetic concerns, the number of people seeking professional dental help for improvement in the appearance of their dentitions and for smile makeovers are on rise. Dental fluorosis, tetracycline staining, localised and chronological hypoplasia, and both amelogenesis and dentinogenesis imperfecta can all produce a cosmetically unsatisfactory dentition. The aetiology of intrinsic discolouration of enamel may sometimes be deduced from the patient's history, and one factor long associated with the problem has been a high level of fluoride intake. Optimal use of topical fluorides leads to a decrease in the caries prevalence but may show an increase in the prevalence of fluorosis staining because of metabolic alterations in the ameloblasts, causing a defective matrix formation and improper calcification. A 28 yr female patient was screened at the Department of Conservative Dentistry and Endodontics at Desh Bhagat Dental College, Mandi Gobindgarh, Punjab. She wanted us to remove and/or minimise the noticeable brown/yellow staining of her teeth. She requested the least invasive and most cost-effective treatment to change her smile. Various treatment modalities are present for the treatment of fluorosis stains. This report discusses the microabrasion technique in the patient having dental fluorosis.

Keywords--dental fluorosis, microabrasion, professional dental.

Introduction

In today's aesthetic driven modern society, anterior teeth discolorations becomes a major source of concern in some individuals. Several factors have been linked with teeth discolorations which lead to unsightly smiles in such patients.¹ Most of them are caused by extrinsic stains present in some foods and beverages while others result from intrinsic discolorations caused due to devitalisation of pulp, excessive fluoride intake during childhood, maternal use of tetracycline during pregnancy, use of tetracycline antibiotics in children under 8 yrs of age and trauma to the tooth bud during development. While in most cases, extrinsic stains can be removed with professional scaling, some require the use of bleaching agents. Still others, where stains do not respond to bleaching agents, the dentists may recommend covering the discoloured areas with veneers¹ Fluorosis had been reported way back in 1901. There are treatment options depending upon individual cases as follows: microabrasion / macroabrasion, bleaching, composite restoration, veneers or full crowns. For the aesthetic enhancement of stains associated with mild to moderate fluorosis enamel microabrasion is the preferred treatment.²

Case Report

Case Study

A 28 yr old female patient presented at Department of Conservative Dentistry and Endodontics at Desh Bhagat Dental College, Mandi Gobindgarh, Punjab complaining of unaesthetic yellow brown discoloration of teeth. On history taking it was found out that he lived in Bathinda, punjab a fluoride endemic region. Her self-esteem was low and was reluctant to smile due to unpleasant appearance of her teeth. No history of any systemic disease or allergy was reported. On clinical examination, the stains were identified as mild fluorosis according to Dean's fluorosis Index

Window preparation of direct composite veneer was done in this case. Then, 37% phosphoric acid was applied on the enamel surfaces for 15 seconds, rinsed with water spray for 20 seconds and dried slightly. One-bottle bonding agent was applied in two layers on the prepared tooth surfaces by using a bonding brush and polymerized with a light-curing unit for 20 seconds. In order to prevent any dark color reflection on the prepared surfaces. Later, the cavities were filled with A3 shade of composite resin incrementally and polymerized each time for 40seconds.

For finishing and polishing procedures, first a yellow-banded knife-edge bur (Acurata, Germany) was used in a high-speed handpiece (NSK Pana Air, Japan). For advanced polishing, discs (Ultra Gloss Composite Polishing System, Axis, USA) in different dimensions were used from coarse to fine grits.



pre operative picture



window preparation using direct composite veneering



Post operative picture

Outcome and Follow Up

The patient were satisfied with the final aesthetic result. The patient was reviewed after 1 month for sensitivity testing.

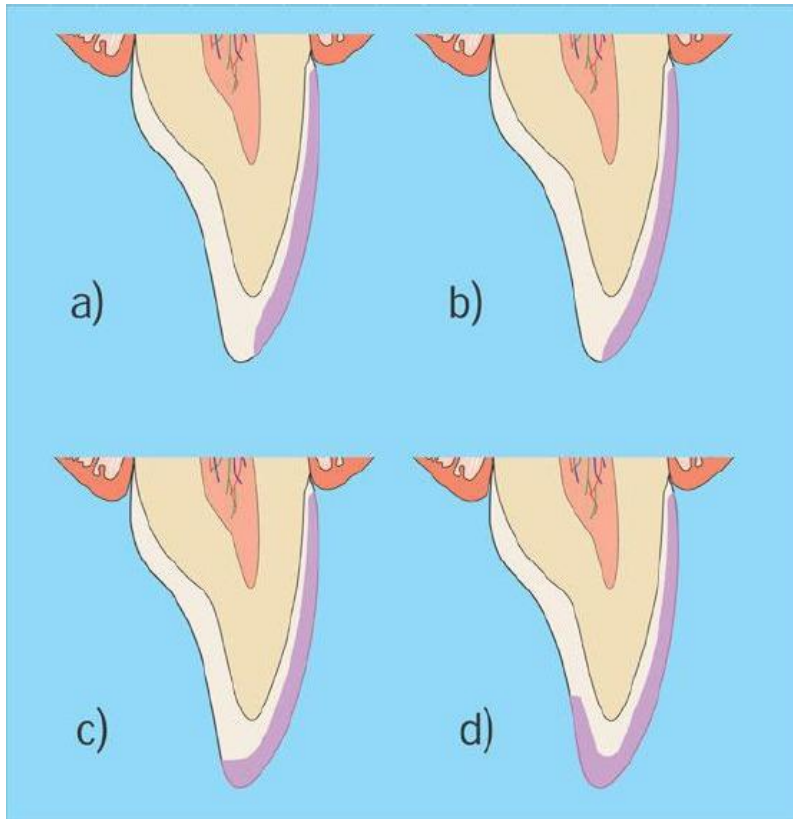
Discussion

Fluorosis, also called dental fluorosis, is a condition that changes the appearance of tooth enamel in young children as a result of being exposed to too much fluoride. Children are only at risk for fluorosis while their permanent teeth are still forming⁴. Adults and children older than 8 do not get fluorosis.⁵ A child can develop fluorosis any time during the years when teeth are beginning to form (birth to 8 years) if they are exposed to high levels of fluoride. Excess fluoride may be consumed through toothpaste, drinking water, and fortified foods. Low levels of fluoride have been shown to help prevent cavities and are often recommended as a preventative measure for dental health in children and adults⁵. Excess fluoride can alter the appearance of tooth enamel in children whose permanent teeth haven't come in yet.

Fluorosis is a painless cosmetic condition. If a child has developed fluorosis, the appearance of the tooth enamel will change, usually becoming stained with white "splotches" or "streaking."⁶ The majority of cases are mild and do not permanently damage teeth, and severe cases of fluorosis are not common. However, signs of severe fluorosis include:⁶

- Brown spots on tooth enamel
- Pitting of the enamel
- Permanent damage to the tooth enamel

The desire for more durable aesthetic outcomes did not confine to improve the material type only; new preparation designs were introduced to the field of dental veneers.⁷ There are four different main designs of teeth preparation commonly mentioned in the literature:⁸ 1) window preparation: in which the incisal edge of the tooth is preserved 2) feather preparation: in which the incisal edge of the tooth is prepared Bucco-palatable⁹, but the incisal length is not reduced 3) bevel preparation: in which the incisal edge of the tooth is prepared Bucco-palatable, and the length of the incisal edge is reduced slightly (0.5-1 mm) 4) incisal overlap preparation: in which the incisal edge of the tooth is prepared Bucco-palatable, and the length is reduced (about 2 mm), so the veneer is extended to the palatal aspect of the tooth¹⁰



Resin-based composites are restorative materials that have mainly the following three compositions: 1) resin matrix 2) inorganic filler 3) coupling agent. The most commonly used monomer in the resin is Bis-GMA which has a higher molecular weight than methyl methacrylate resins. Therefore, the polymerisation shrinkage of Bis-GMA (7.5%) is significantly less than that of methyl methacrylate resins (22%). Wide range of fillers such as quartz have been added to composites through the years, the addition of fillers offers many advantages like: 1) reduction of the polymerisation shrinkage 2) reduction of coefficient thermal expansion of the monomer 3) improve mechanical characteristics 4) some metallic fillers such as barium provide better radiopacity. The bonding between the resin and the filler is achieved by the use of coupling agents¹¹ i.e. silanes, the most commonly one that is used in resin composite is γ -MPTS.

Dental composites can be categorised according to the particle size of the filler traditional composites have a mean particle size of 10-20 μm , on the other hand, micro filled composites have a mean particle size of 0.02 μm . new generations of composites are introduced by the dental company through the years, aiming for better aesthetic and physical properties (Bonsor & Pearson 2012, Van Noort 2013)¹²

It was thought once that composites in the anterior area would be replaced with porcelain veneers due to their success (Garber 1989) .¹³ However, the aesthetic and physical properties of resin composite have improved remarkably lately.

Thus, it has been used extensively in clinical practice (Wolff *et al.* 2010)¹⁴. The main advantage of composite veneer is that it can be used directly, resulting in less chair time with good initial aesthetic. Nonetheless, composite veneers are more prone to discolouration and wear (Wakiaga *et al.* 2004)¹⁵. Additionally, the clinician skill in placing, finishing and polishing the composite plays a major factor in the aesthetic outcome.¹⁶

Composite veneers do not require heavy preparations. Therefore enamel can be preserved for good adhesion. It is documented that the bonding strength between etching porcelain and enamel is greater than resin composite and enamel (Lacy *et al.*, 1988, Nicholls 1988, Lu *et al.*, 1992) . Correspondingly,¹⁷ it has been reported that composite veneers do not significantly restore the stiffness of the prepared tooth (Reeh & Ross 1994) . Although composite veneers can be made indirectly in dental laboratories, the used composite is essentially the same one that is applied directly. Thus, it shares the same physical properties and limitations of direct composite restorations such as polymerisation shrinkage (Van Noort 2013)¹⁸

Conclusion

Composites in the anterior area would be replaced with porcelain veneers due to their success (Garber 1989) However, the aesthetic and physical properties of resin composite have improved remarkably lately. Thus, it has been used extensively in clinical practice (Wolff *et al.*2010). The main advantage of composite veneer is that it can be used directly, resulting in less chair time with good initial aesthetic. Composite veneers provide good aesthetic outcome and patient's satisfaction

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