

COMPREHENSIVE MANAGEMENT OF AN ADULT PATIENT WITH DENTAL FLUOROSIS

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**ABSTRACT:** Dental fluorosis is a condition of enamel hypo-mineralization due to the effects of excessive fluoride on ameloblasts during enamel formation. Bonding brackets to fluorosed teeth remains a notable clinical challenge because of frequent bracket failure at the compromised enamel interface. This case report presents comprehensive management of an adult patient with Angle's class II div 1 malocclusion with crowding and severe dental fluorosis. **Diagnosis:** A diagnosis of severe dental fluorosis was established based on Deans's index for fluorosis (score-3) with a skeletal Class I pattern and Angle's Class II Division I dental malocclusion with upper anterior crowding . **Treatment plan:** Orthodontic treatment with extraction of upper first premolars to correct the dental malocclusion followed by restorative procedure. **Treatment results:** Competent lips achieved after orthodontic treatment. A class-II molar relation was maintained .Excellent dental esthetics was seen after direct composite restoration.

**KEYWORDS:** Dental fluorosis, Bonding to fluorosed teeth, Direct Composite Restoration.

INTRODUCTION

Dental fluorosis is a condition of enamel hypo-mineralization due to the effects of excessive fluoride on ameloblasts during enamel formation. Restoration of these defects is important not only because of esthetic and functional concerns, but also because there may be a positive psychological impact for the patient<sup>1</sup>. Bonding brackets to fluorosed teeth remains a notable clinical challenge because of frequent bracket failure at the compromised enamel interface. The fluorosed enamel surface challenges orthodontists even more than bonding brackets to gold, amalgam, and porcelain <sup>2</sup>.Fluorosed enamel demonstrates an outer hyper-mineralized and acid-resistant layer, where it is difficult to attach brackets because a reliable etched enamel surface cannot be produced<sup>1</sup>.

This case report presents comprehensive management of an adult patient with Angle's class II div 1 malocclusion with crowding and severe dental fluorosis.

Case Report

**Chief complain and History:** A 19 year old male patient presented with a chief complaint of crowded and discoloured anterior teeth. A detailed dental, medical, and social history was obtained from the patient. Past medical history was unremarkable for any systemic, metabolic, or endocrine condition that may have caused these enamel defects. Clinical examination

**Extra oral examination-** The patient had a mesoprosopic facial form, adequate incisal display, a mildly convex profile and incompetent lips (**Fig.1a-1c**).

**Intra-oral examination-**Intra oral examination revealed generalized fluorosed form of enamel on all teeth. The mottled enamel was appeared to be of normal thickness, and in many locations, the enamel had chipped away at the incisal edge leaving behind exposed dentin (**Fig.2a-**

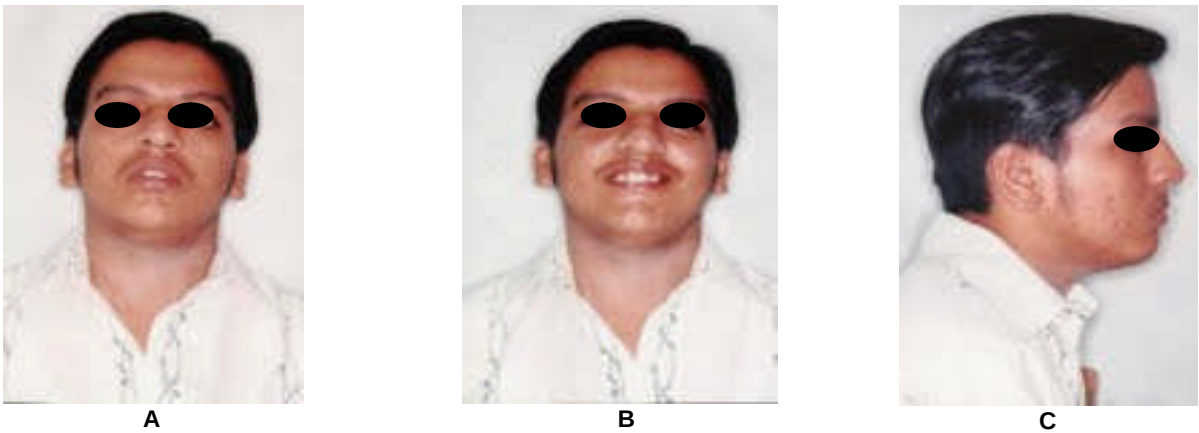


Fig.1a-1c Pre treatment extra oral photograph



Fig.2 Pre treatment intra oral photograph

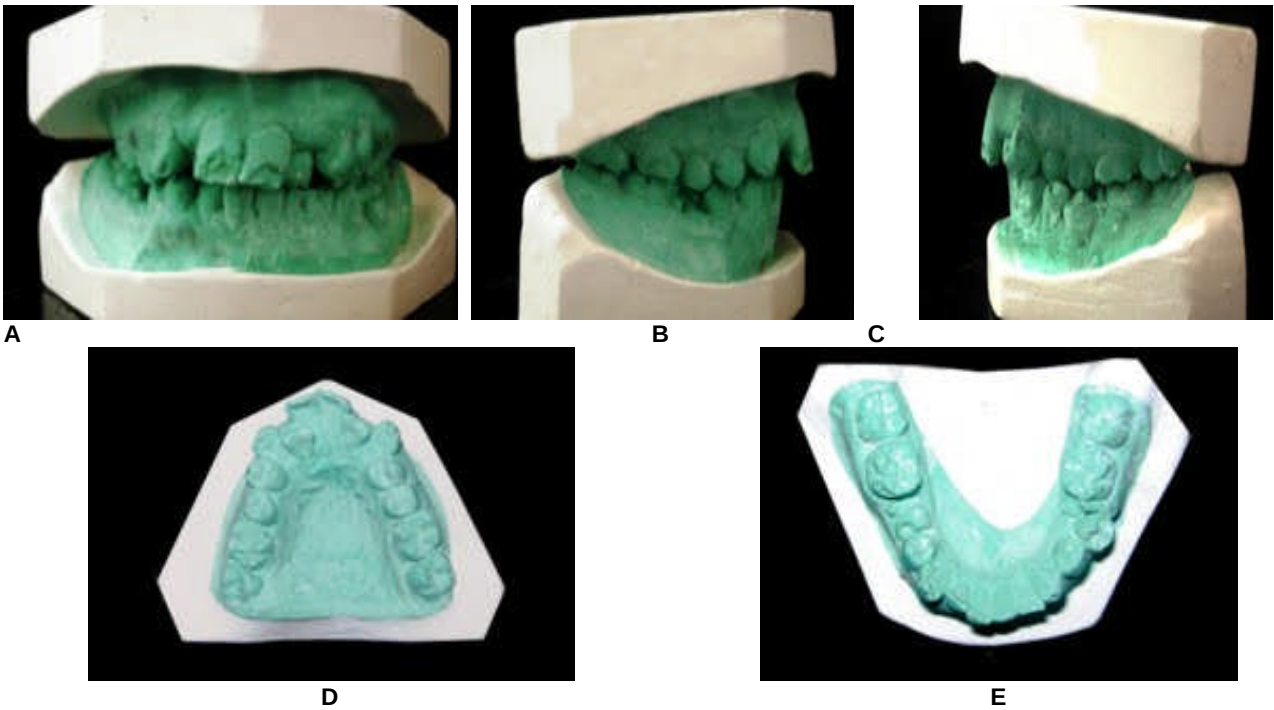


Fig.3a-3e Pre treatment study models

2c). The patient was not currently experiencing any signs or symptoms of sensitivity.

The maxillary arch showed crowding of the anteriors with in standing laterals and a crossbite in relation to maxillary left premolars. In the mandibular arch lower right and left deciduous molar root stumps were remaining which left the lower right second premolar unerupted. Class II molar relation was present bilaterally. (Fig.3a-3e)

### Diagnosis

A diagnosis of severe dental fluorosis was established based on Deans's index for fluorosis (score-3) with a skeletal Class I pattern and Angle's Class II Division I dental malocclusion with upper anterior crowding .

### Treatment plan

In the treatment plan two options were given-

- Orthodontic treatment with extraction of upper first premolars to correct the dental malocclusion followed by restorative procedure.
- Restorative treatment as first stage and then orthodontic treatment.

There was difficulty in restoration of in-standing laterals and high chances of discolouration of restoration during long orthodontic treatment duration which may require re-treatment hence patient chose the former mode of treatment.

### Treatment objectives

In the maxillary arch objective were to maintain the transverse relation and bring about change in the antero-posterior and vertical dimensions by extraction and retraction mechanics. This would ultimately reduce the overjet and increase overbite. Objectives in the mandibular arch included maintaining the transverse dimension, removal of deciduous root stumps to allow eruption and alignment of second premolars.

Over all objectives were to maintain the Class II molar relation and obtain ideal overjet and overbite.

### Treatment progress

Pre adjusted edgewise .018" x .025" Roth-prescription brackets were bonded in both the arches. The patient underwent extraction of the retained primary root stumps and maxillary first premolar teeth based on space requirements. Orthodontic appliances were placed two week after extraction. Teeth were etched for little longer than usual due to acid resistant outer enamel layer( 30 seconds) with 37% phosphoric acid and washed with air-water spray for ten seconds. The surface was thoroughly dried and the Transbond XT sealant was applied to the

etched surface and cured with halogen light for ten seconds. Transbond XT paste (3M Unitek, Monrovia, California, USA) was applied to the bracket base and cured for 20 seconds with halogen light. After bonding light, continuous arch wires were placed. Since maxillary laterals were in-standing they were excluded during initial bonding .

Seven months into the treatment leveling and aligning was achieved. Space for in-standing laterals was created and then were bonded , wire was stepped down to initial light force arch wires. Further six months into the treatment lateral incisors were brought out and leveling and aligning was achieved with .016"x .022"stainless steel continuous arch wires in both upper and lower arches. Remaining space was closed with retraction of incisors by using sliding mechanics in six months and upper arch wire was sectioned to wear finishing elastics for four weeks. Orthodontic treatment of the patient lasted for 20 months. Upper arch was debonded first (Fig.4). and referred for esthetic restoration but minor space had opened up in between central incisors which was later closed by Hawley's appliance.

Different conservative treatment options including the use of in-office and take-home tooth whitening systems, enamel microabrasion, composite veneers and direct composite restoration to treat the fluorosis was presented to the patient. Due to socioeconomic status and time required for treatment patient chose restoration of the mottled enamel with direct composite restorations. The occlusal contacts were determined in intercuspal position before cavity preparation .Afterward, a rubber dam was placed to prevent contamination of the adhesive surface with saliva or blood. The cavity preparation was performed only to encompass caries and dark areas of dentin that may interfere with the final esthetic result. Teeth were conditioned and primed with a self-etching adhesive (Clearfil SE Bond, Primer; Kuraray Medical, Tokyo, Japan) for 20 seconds. Enamel margins were then covered with a bonding agent (Clearfil SE Bond; Kuraray Medical Inc) and polymerized for 10 seconds with a polymerizing unit (Bluephase C5, Ivoclar, Vivadent). The restorations were formed using a hybrid resin composite (Ecusit System, DMG, Hamburg, Germany), which was placed using an incremental technique. The resin composite restorations were polymerized for at least 2 minutes with the polymerization unit (Bluephase C5, Ivoclar Vivadent).

After this a Hawleys retainer was fabricated for retention of orthodontic treatment. The patient was recalled at 3-month intervals.

### Treatment results

Competent lips achieved after orthodontic treatment(Fig5a-5c). Class-II molar relations was maintained and class I canine relation was achieved. Both the lateral incisors were brought labially. Ideal overjet and



Fig.4 Before direct composite restoration



A



B



C

Fig.5a-5c Post treatment extra oral photograph



Fig.6 Post treatment intra oral photograph



A



B



C



C



D

Fig.7a-7e Post treatment study models

overbite is achieved (**Fig6,7a-7e**). Excellent dental esthetics was seen after direct composite restoration.

## Discussion

Treatment planning for patients with fluorosis is related to many factors including the age and socioeconomic status of the patient, the type and severity of the disorder and the intraoral situation at the time the treatment is planned. An interdisciplinary approach is necessary to evaluate, diagnose, and resolve aesthetic and functional problems using a combination of orthodontic, prosthodontic and restorative treatments<sup>3</sup>.

Bonding brackets to fluorosed teeth remains a notable clinical challenge because of frequent bracket failure at the compromised enamel interface. Scanning electron microscope studies have confirmed that the difficulty in bonding is likely attributable to the inability of fluorosed enamel to be effectively etched with 37% phosphoric acid<sup>4,5</sup> which results in a decreased amount of enamel irregularity, preventing effective bonding. These studies demonstrate that it is difficult to predict how a fluorosed tooth will be etched.

Clinicians have therefore frequently relied on micromechanical etching of fluorosed teeth to attain a roughened surface. It has been suggested that microabrasion of fluorosed enamel concomitantly with acid etching improves bond strength<sup>5,6</sup>. However, drawbacks to microabrasion include damage to enamel, the need to use a rubber dam, poor powder control, patient ingestion of the powder particles, the potential for the powder aerosol to cause facial trauma, increased chair time and costs, and potential allergy to the aluminium oxide or silicone carbide powder<sup>2,4</sup>. Since in present case severity was maximum towards incisal third we chose to bond the brackets more gingivally which also helped in closure of bite.

Treatment options for fluorosis vary with severity<sup>7</sup>. Depending upon severity different treatment option are- Micro/Macro abrasion, Bleaching, Composite restorations, Veneers and Full crowns<sup>7</sup>. Direct composite resin restorations may an alternative treatment. But, bonding composite resin to enamel of teeth affected by fluorosis is often problematic, especially in cases with poorly mineralized, friable enamel<sup>8</sup>. Because of tremendous advances in the field of esthetic dentistry, especially in bonding to dentin, it is today possible to restore function and esthetics to an acceptable level. This adhesive restorative procedure preserves tooth structure and is not very time consuming or costly to the patient<sup>3</sup>.

In this report, direct composite resin restorations were chosen because fluorosis was mainly present on incisal third which did not require extensive tooth preparation. Cost factor was also an issue. Direct

composite restoration in present case resulted in good esthetics and functional rehabilitation.

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