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2 **Aesthetic Conservative Management of Fluorosis affected Teeth with**

3 **Resin Infiltration- Case Report**

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9 **ABSTRACT**

Aims: The scientific case report aims to show recent technique of minimally invasive procedure for aesthetic resolution in moderate to severe fluorosis affected teeth

Presentation of case: A clinical case of severe fluorosis was treated with microabrasion followed by resin infiltration. A commercial resin was applied on the facial surfaces of the anterior teeth resulting in masking of spots and re-establishing color uniformity.

Discussion: The procedure proved to be a good option to mask spots associated with moderate to severe fluorosis. Moreover, it is a relatively quick, inexpensive and minimally invasive treatment

Conclusion: This case report demonstrates that the microabrasion and resin infiltration technique is an effective conservative aesthetic treatment. It minimizes an individual's tooth discoloration when diagnosed with moderate to severe levels of dental fluorosis and has shown a good outcome even after twelve months.

11 *Keywords: Fluorosis, microabrasion, resin infiltration, conservative treatment*

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15 **1. INTRODUCTION**

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17 "Dental fluorosis is caused by excessive fluoride ingestion during tooth development".^[1] "The main consequence of dental

18 fluorosis is compromised aesthetics. Veneers and crowns as treatment in these cases can remove greater amounts of

19 healthy dental tissues, are more expensive, and can be time-consuming".^[2] "The non-invasive such as bleaching,

20 microabrasion, and the use of infiltrants, contribute to aesthetics without compromising tooth structure and are

21 conservative approaches that aim to remineralize the initial caries lesions".^[3] "The resin infiltration is a low-viscosity resin

22 applied on the tooth surface that consequently infiltrates the enamel micropores. This filling of pores changes the optical

23 properties of the tooth, masking the enamel stains with no tooth removal".^[4]

24 This scientific case report aims to show a sequential treatment of fluorosis affected teeth using a minimally invasive
25 procedure for aesthetic resolution in such teeth. A clinical case of severe fluorosis was treated with microabrasion and
26 infiltration of low-viscosity resin.

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29 **2. PRESENTATION OF CASE:**

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31 A 20-year-old woman reported to the Department of conservative dentistry and endodontics with a chief complaint of
32 yellow to brown discoloration in upper and lower teeth along with a pitted appearance for treatment of the anterior-tooth
33 discoloration [Figure 1]. After taking the patient's medical history and completing an intra- and extraoral examination, the
34 yellow and brown discolorations were diagnosed as moderate to severe form of dental fluorosis. This corresponds to
35 scores 3 and 4 of Dean's Fluorosis Index, as more than 50% of each tooth was affected and pitting was evident on the
36 fluorosis portions of the teeth.



37
38 Fig. 1. Discolored teeth

39 **Clinical Microabrasion Technique**

40 Under rubber dam isolation, a thin layer of paste of 18% HCl and pumice paste was applied for 10 seconds over the facial
41 surface and rubbed lightly using a contra-angle handpiece in slow rotation with a synthetic rubber rotary application tip for
42 30 seconds followed by rinsing with copious water for 5 seconds. Four applications were performed in a single visit. Two
43 appointments were scheduled for the microabrasion procedure. The teeth were examined wet to allow for the assessment
44 of treatment progress [Figure 2]. In the last session, resin infiltrant (Icon, DMG) was applied according to the
45 manufacturer's instructions.

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Fig.2(a)

Fig.2(b)

Resin Infiltration

The micro-invasive resin infiltration technique (Icon, DMG; Hamburg, Germany) was used after microabrasion. The 15% hydrochloric acid (Icon-etch) was applied for 2 minutes over the affected teeth' surface, thus wearing the superficial layer of the tooth enamel. After acid etching, the area was washed for 30 seconds with abundant water and immediately dried. After the third etching procedure, an agent composed of 99% ethanol (Icon-dry) was applied to remove the water retained in the microporosities of the enamel, letting it rest for 30 seconds. After applying this compound, no white spots were observed in such proportions as before, which ensured that acid cauterization would no longer be required.

Next, the infiltrant (Icon) was applied carefully and specifically over the lesion with the proper applicator [Figure 3], letting it rest for 3 minutes for penetration more efficiently. The excess resin was removed before light curing the area for 40 s. A second application of the infiltrant was carried out for 1 min to ensure that the resin penetrated any remaining open microporosities. After two applications, the infiltrant was polymerized for 40 seconds to be retained in the microporosities.



Figure 3(a) Resin infiltrant applied on maxillary teeth

Figure 3(b) mandibular teeth

The patient was satisfied with the results of the resin infiltration technique, as there was an aesthetic improvement of the brown discolorations of all anterior teeth [Figure 4]. The outcome of the treatment was effective and long-term stability was seen even after twelve months [Figure 6]



Fig. 4(a) Post treatment

Fig. 4(b) Post-operative photograph



Fig.5 Follow up after 12 months

3. DISCUSSION

Treatments that whiten discolored teeth have become popular in recent years. The described product was chosen as it has shown promising results in the treatment of such defects in recent times and also it is inexpensive and conservative method to improve the color in contrast to veneers and crowns. Thus non-invasive or minimally invasive procedures have become the first choice of technique.^[5]

Other treatments were excluded due to cost and the possibility of intensive wear on the tooth structure. Depending on the level of involvement and the severity of the fluorosis, Enamel microabrasion followed by resin infiltration technique was preferred. Microabrasion dissolves minerals and removes a thin layer of enamel.^[6,7] The extent of removal depends on the type and concentration of acid used, the abrasive particles, and the duration and number of applications. "White spots are more visible when the teeth are dry because the refractive indices of enamel, water, and air are different".^[8] "The reason for its better visual effect on the opacities of enamel through resin infiltration is due to the change in the refractive light index. Enamel with hypomineralization has a refractive light index of 1.33; however, a normal light index for enamel is 1.62. When the porosity of the damaged structure is filled with infiltrate, the refractive index rises to 1.52".^[9,10] "Thus infiltration resin fills the pores, rendering white spots negligible because the refractive index becomes very similar to that of healthy enamel"^[11].

"The commercial infiltration product used was based on triethylene glycol dimethacrylate (TEGDMA), a monomer with hydrophilic characteristics, low viscosity, and a high penetration coefficient, which facilitate penetration into the pores of the enamel. The benefits of using this treatment method include partially or completely esthetic masking the enamel opacities alongside high maintenance of the tooth structure".^[12] Park et al noticed that "cariogenic activity had significantly slower in the infiltrated enamel compared to non-infiltrated lesions".^[13] "Ethanol at a 99% concentration is used to remove water from the pores, facilitating the resin's penetration. The resin must be applied twice because the first application causes contraction of the material as the monomers convert to polymers, resulting in the generation of spaces. The second application must fill these spaces. In polishing, it is necessary to remove the excess resin, and this removal can also prevent future staining. Resin infiltration showed higher masking effect than natural remineralization or regular application of fluoride varnishes in the recent systemic review and seems to be a viable option to esthetically mask

107 enamel white spot lesions and mild to medium fluorosis".^[14] Thus microabrasion followed by resin infiltration proved to be
108 a good option to mask spots associated with fluorosis. Moreover, it is a relatively quick, inexpensive and minimally
109 invasive treatment.

110 **4. CONCLUSION**

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112 This case report demonstrates that the microabrasion and resin infiltration technique is an effective conservative aesthetic
113 treatment. It minimizes an individual's tooth discoloration when diagnosed with moderate to severe levels of dental
114 fluorosis and has shown a good outcome even after twelve months. Clinical success is related directly to spot depth,
115 diagnosis, and the most relevant treatment choice.
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117 **COMPETING INTERESTS**

118 Authors have declared that no competing interests exist.

119 **AUTHORS' CONTRIBUTIONS**

120 This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.
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122 **CONSENT**

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124 As per international standard or university standard, patient(s) written consent has been collected and preserved
125 by the author(s).
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129 **ETHICAL APPROVAL**

130 As per international standard or university standard written ethical approval has been collected and preserved
131 by the author(s).
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