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Microabrasion and Resin Infiltration in Esthetic Management of Dental Flurosis -A Case Report

H.C Baranwal[1], Silviya Samad[2], Aiyman Ayubi[3], Harshithaa Aggarwal[4], Shubham Kharat[5]

[1-5](Dept. of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, Institute of Medical Sciences, BHU, India)

Abstract: *In dentistry, enamel discoloration is a prevalent concern, particularly in younger patients. Numerous factors, including fluorosis, caries, and pulpal alterations, may be the reason for this. The Minimal Invasive Dental (MID) approach has been the subject of a recent dental evidence base for the treatment of such lesions. The treatment of fluorosis with microabrasion and resin infiltration has been described in this case report*

Key Word*: :fluorosis,microabrasion,resin infiltration*

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I. Introduction

Fluoride has been shown to have both positive and negative effects on dentition. Mc Kay and G.V. Black's in 1916 published effect of fluoride on dentition [1]. The topical action of fluoride once teeth emerge in the oral cavity is largely responsible for the beneficial effect of fluoride on dental caries. On the other hand, dental fluorosis, which is caused by systemic absorption during tooth development, has deleterious effects.[2] An increase in enamel porosity along the striae of Retzius is the first sign of dental fluorosis. [3]. Clinically, the opacity of enamel is a reflection of the porosity in its subsurface. Increased porosity in the tooth surface is seen across the enamel due to increased fluoride exposure during tooth development. Highly hypomineralized enamel is extremely fragile, and as a result, it is subject to surface damage from mastication, attrition, and abrasion as soon as it emerges into the oral cavity.

Enamel demineralization brought on by cariogenic activity, fluorosis brought on by excessive fluoride exposure, or enamel hypoplastic/hypo-mineralized due to impairment of enamel growth and formation prior to tooth eruption are the causes of enamel opacities, also known as white spot lesions (WSL) (4,5). A number of precautionary measures have been taken to either keep a safe distance from demineralization or, in the event that it does develop, to halt and reverse its progression. While they can halt the advancement and remineralize the lesions, natural and additional remineralization treatments such casein phosphor peptide amorphous calcium phosphate (CPP-ACP) and fluoride topically or systemically cannot fully disguise the WSL(6,7).

The severity of fluorosis determines the options for treatment. [8] Depending on a number of factors, it may consist of micro/macro abrasion, bleaching, resin infiltration, composite restorations, veneers, or full crowns. The Minimal Invasive Dental (MID) technique has been the subject of a recent dental evidence base. The idea behind this method was to maximise the preservation of natural dental structures rather than relying primarily on reparative dentistry[9, 10]. Common MID techniques include bleaching, microabrasion, and resin infiltration; in some clinical situations, these alternative therapies offer less invasive and innovative solutions.

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II.Case report

A 20 year old female patient reported to the department of Conservative Dentistry and Endodontics ,with a chief complaint of severe discoloration of all teeth. Patient gave history of discoloration after the eruption of permanent teeth. Patient was a heavy tea consumer(10 to 12 tea per day).No other relevant medical history was elicitated.

On examination she had moderate grade of fluorosis according to Dean’s fluorosis index in almost all teeth(fig 1).No caries or missing teeth were found.Oral hygiene was fair enough

Treatment started with oral prophylaxis. It was followed by rubber dam isolation(Fig 2) and the dental enamel surface was treated with an application of the microabrasive product (Opalustre, Ultradent Products Inc, South Jordan, UT, USA). Using a high torque-low (500) rpm 10:1 gear reduction contra angle fitted with an OpalCup" rotary applicator, the material was rubbed above the labial surfaces of all anterior teeth. Circular movements of 15 seconds were used per teeth(fig 3). After one round result was not much satisfactory. So same steps were

repeated. After completion of second round, satisfactory results were obtained. There was considerable reduction in the discoloration. But still some white spot lesions were left.

To treat white spot lesion we decided to go for resin infiltration in the same day. For that, Icon DMG was used. Enamel surfaces having WSLs were etched with Icon-Etch (15% HCl; DMG), rinsed with water for 30 seconds, and air-dried. All specimens were etched for 2 minutes without extra etching steps. Next applied icon dry(DMG) which contains ethanol. Ample amount applied on teeth surfaces and let it for drying for 30 seconds. When wetted with Icon-Dry, the whitish-opaque coloration on the etched enamel should diminish. Here as it is not diminished much etching step was carried out twice for 2 min each and rinsed and dried the teeth again as above. Next applied an ample amount of Icon-Infiltrant onto the etched surface and kept for 3 min to set(fig 4). Excess material was removed with a cotton roll and dental floss. Icon-Infiltrant was light-cured for 40 s. A second layer of resin was applied for one minute following the same previous steps. Finally, the teeth surfaces were coated with a remineralizing paste to reduce the sensitivity. Post treatment outcome was satisfactory and the patient was well satisfied with the result. Patient was advised not to take any stain-producing food for 24 hours and recalled after 1 week(fig 6). Recall appointment was also well satisfactory.

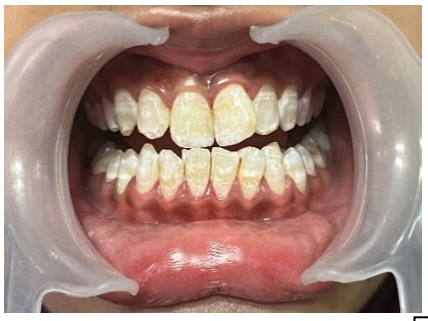

Fig 1 Preoperative view

Fig 2 After rubber dam application

Fig 3 After microabrasion

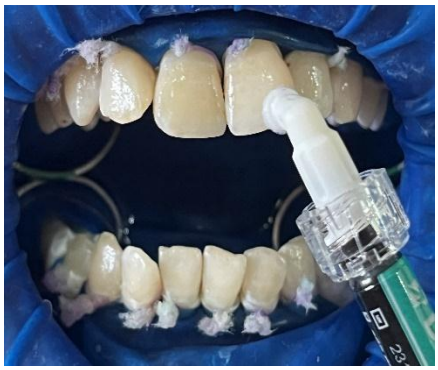

Fig 4 Resin infiltration

Fig 8 Review after 6 months

Fig 9 Review after 1 year

III.Discussion

By the end of the 20th century, dentistry underwent a significant shift towards minimally invasive or noninvasive treatment. Due to its numerous advantages, MID has emerged as the first treatment option that uses the least intrusive surgical technique. Patients find this to be highly acceptable.(9,10). In the present clinical case, the patient required two microabrasion sessions to decrease the opacity of the enamel, with the maximum amount of enamel surface layer that could be removed being 5–10%. Through this process, the damaged enamel's optical appearance is altered, and it becomes almost as glossy and lustrous as natural enamel. In order to reach the deepest subsurface micro porosities and visually conceal the central chalky appearance, resin infiltration was carried out after microabrasion.

The sound enamel has a refractive index (RI) of 1.62, while the porous enamel has a RI of 1.33 when filled with a watery medium and 1.0 when filled with air. White patches occur as a result of greater crystalline space of porous enamel, which significantly altered the RI and changed the external scattering (11). Common MID techniques include bleaching, microabrasion, and resin infiltration; in some clinical cases, these alternative

therapies offer less invasive and innovative alternatives. Research suggests that enamel micro-abrasion is a feasible and dependable method for improving the esthetic appearance of teeth. Clinical research has shown that it is a minimally invasive, safe procedure that yields consistent, long-lasting esthetic results. Additionally, clinical research revealed that phosphoric acid microabrasion demonstrated resistance to bacterial colonisation on the enamel surface. Since microabrasion works better on the superficial enamel, it is crucial to take the degree of any stains or defects into account while treating fluorosis. In an in vitro investigation, Sundfeld et al. (2007) observed that the enamel microabrasion results in a loss of 10% of surface enamel. In 1916, there was an early description of the use of several acids to remove stains on enamel (13). Numerous iterations of this concept have been explained since then. For esthetic improvements, the enamel microabrasion technique has been proposed. It uses a mixture of 18% hydrochloric acid and pumice (16), 6.6% and 10% (15) hydrochloric acid with silica carbide particles, or even 37% phosphoric acid gel (16) in equal volume proportions with extra fine grain pumice.Research has demonstrated that the use of acidic or abrasive products for enamel microabrasion produces rapid and long-lasting esthetic results with negligible and undetectable enamel loss (15). If the uneven surface texture caused by the enamel stain is limited to the outermost superficial layer of enamel, that is the only way to determine the success of the procedure. In case of teeth in which it is difficult to diagnose the extent of intrinsic stains, microabrasion can be used to achieve the maximum amount of improvement, which can then be followed by further treatments such resin infiltration, tooth bleaching, or bonding materials for restoration.

Resin infiltration employs infiltration of a low viscosity material that is primarily composed of triethylene glycol dimethacrylate (TEGDMA), in to the microporous inner and outer enamel surface. After using resin to seal the micro porosities, the lesion will become more resistant to bacterial acid attack and light scattering will be lessened. The lesion will also proceed more slowly or stop entirely. Resin infiltration intends to create a surface barrier inside the body of lesion instead of just on the surface, and to totally block subsurface microporosities. Furthermore, the idea of resin infiltration attempts to stop early caries rather than eliminate it by blocking the pathways that allow acids to demineralize enamel. Because there is less difference in the refractive indices of the intact and resin-infiltrated enamel, less light is scattered, making the infiltrated enamel more similar to the healthy enamel (17, 18). Resin penetrates deeper lesions and appears to have a quicker effect than remineralization agents, thus it can optimize the colour scheme of enamel even in lesions with higher depth (19). In comparison to non-infiltrated lesions, Park et al.(20) observed that cariogenic activity had exhibited a substantially slower rate in the infiltrated enamel. The patient who had resin infiltration was the most satisfied, and the masking of WSL in the mild to moderate fluorosis case report utilizing resin infiltration is much greater than that of natural remineralization or the routine administration of fluoride varnishes (21). Deeper WSL may have a partial or no masking effect, and inactive WSL have thicker surface layer which prevents infiltration. The researchers came to the conclusion that the depth and activity of the lesion determine how different the outcomes are (21).

IV.Conclusion

Patients perceive minimally invasive therapy as a simple, agreeable, and effective method of treatment. Following microabrasion, the resin infiltration resulted in a noticeable improvement in the teeth's appearance right away and a positive follow-up outcome for six months. The patient's self-esteem was restored when the microabrasion technique was applied correctly. This improvement was made possible whether or not composite resin was used, as well as bleaching or other esthetic procedures. To confirm durability and identify variables that can impact treatment quality, more thorough and extended clinical trials are required.

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