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A Minimally Invasive Approach- Microabrasion with Resin Infiltration: Two Case Report

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Abstract

Enamel hypoplasia occurs because of a defect in formation of the organic matrix during the development of tooth enamel. Minimally invasive procedures of the slightly altered enamel contribute to a greater longevity of teeth and prevent them from relapsing into the repetitive restorative cycle. This case history report aimed to show a sequential technique of minimally invasive procedures for esthetic resolution in anterior teeth. Maxillary incisors presented with intrinsic brown stains on the labial surface. maxillary central incisors were treated with two sessions of microabrasion with resin infiltration. Antivet kit [MDC Dental, Mexico] as a process of microabrasion. A low pH enamel cleaning solution i.e.21% hydrochloric acid applied to tooth surface with a cotton pellet, and gently rub the solution until the stain was removed. Following treatment with the enamel cleaning solution, a neutralizing solution i.e

calcium hydroxide was applied for 2 mins and washed off. Followed by resin infiltration.

Keywords: White-spot lesions, Refractive index, Porosity, Tooth enamel

Introduction

Smiles are instinctive, a common signal of friendliness. Smile is a first-rate expression of feelings like happiness. White marks and white lesions are usually seen on anterior enamel may be unsightly. They ruin the look through discoloration. Patients regularly are trying to find treatment to eradicate these marks. White-spot lesions (WSL) are defined as demineralization of the enamel surface and subsurface without cavitation. They have chalky white and opaque appearance. It can arise from developmental reasons which include fluorosis, idiopathic cause or early caries lesion.

Tooth fluorosis results due to more intake of chronic Fluoride, that exceeds the optimum daily dose of 1 ppm. Depending on the quantity of fluoride intake, the teeth may also display different changes in its enamel. Enamel affected by fluorosis may have an altered structure in general, leading to an increased susceptibility to fracture and wear.

Histologically, it consists of hypomineralized sub-surface areas limited to few micrometers from the external mineralized surface and it can have increased level of porosity[1]. The specific appearance of these lesions is due to an optical phenomenon, the process of demineralization causing an increase in the pore volume and the refractive index (RI) of the enamel changes due to the presence of air and water. There are predisposing risk factors such as poor oral hygiene, impaired salivary flow and the presence or absence of areas of fluoridation[2]. The ultrastructural studies about the affected structure have reported the appearance of highly uniform, flattened, hexagonal crystals in the outer regions and irregular crystals in the inner regions, more similar to those explained for normal enamel[3].

The therapeutic approach changes according to the different lesion types: cavitated and non- cavitated. A restorative approach is needed in the cavitated lesion; on the contrary, in the non- cavitated case, preventive therapies make sense. The mode of treatment for such cases may range from ceramic veneer bonding restorations to abrasive chemical treatments, depending on the extent or degree of enamel stains. Bleaching, micro-abrasion and composite resin restorations are widely used as minimally invasive approaches because they are less expensive and less time-consuming treatment[3].

Microabrasion technique being a conservative, modifies the superficial enamel to improve discolorations as it is limited to outer enamel layer only[3]. It also removes the entrapped stains, by rubbing a gel that contains an acid and an abrasive compound similar to dental prophylaxis with pumice and water. It should be the first option for managing teeth with intrinsic stains because it removes brown stains and opaque spots and smoothens surface irregularities providing a smoother and more lustrous surface[4]. The combination of mechanical rubbing and chemical action of acid causes penetration of the agent into fluorotic enamel prisms, leaches out the fluoride ions and reduces the stains.

Resin infiltration is an adjunct approach for masking these hypocalcified areas. The goal is to occlude the microporosities within the lesion body by infiltration with low-viscosity light- curing resins that have been optimized for rapid penetration into the porous enamel[5]

Therefore, the aim of the current article is to describe and discuss the treatment of mild to moderate dental fluorosis treated with microabrasion technique using Antivet solution applied over brown spots present on

maxillary anterior teeth and then resin infiltration technique for blending microporous lesions.

Case report

A 20-year-old female(fig 1) and second 25-year-old female (fig 2) patient reported to Department of Conservative Dentistry and Endodontics in Pandit Deendayal and Upadhyay Dental College and Hospital, Solapur, Maharashtra with a chief complaint of discoloured upper front teeth. There was no significant associated sign & symptoms. Patients does not report any other relevant medical history. On clinical examination, maxillary incisors presented with intrinsic brown stains on the labial surface. The patient had a history of discoloration since childhood. No dental caries was found in any of her teeth. According to Dean's fluorosis index, it was categorized as mild to moderate grade of fluorosis. Treatment planning involved microabrasion with resin infiltration. The procedure was thoroughly explained and Full written consent form was taken from both patients.

Fig.1.1: Pre-operative

Fig.2.1: Pre-operative

The upper incisors were isolated using conventional rubber dam to protect soft tissues (Figure 2) and achieve clean and dry working conditions. After applying dam, the tooth surface was treated with Antivet kit [MDC Dental, Mexico] as a process of microabrasion. A low pH enamel cleaning solution i.e.21% hydrochloric acid applied to tooth surface with a cotton pellet, and gently rub the solution until the stain was removed. Following treatment with the enamel cleaning solution, a neutralizing solution i.e calcium hydroxide was applied for 2 mins and washed off.

Fig.1.2: Rubber dam application

Fig.2.2: Rubber dam application

Fig.1.3: After microabrasion

Fig.2.3: After microabrasion

A total of 4 applications for 5 minutes for each tooth was done to get the desired results. The rubber dam was removed and the teeth were polished using a polishing kit. The stains were removed after microabrasion procedure but there were microporosities present in enamel for which the patient was recalled after 1 week for resin infiltration.

Rubber dam was applied and in first case- surface layer was eroded with application of 37% phosphoric acid for 30 seconds (ETCH d-tech). The etching gel was washed away using water spray. The etching process removed the surface discoloration and the highly mineralized surface layer, which could otherwise hinder resin penetration. To remove the water retained within the microporosities of the lesion body, subsequent air drying was done. After air-drying, the whitish look of teeth lesions turned more pronounced.

Shade selection was done. A2 shade was selected. Bonding agent (Beauti Bond shofu) was applied on tooth surface along with flowable composite resin (BEAUTIFIL Flow shofu) so that the resin will flow homogenously on tooth surface.

It was applied with the help of smooth surface tips and allowed to penetrate for a period of 2-3 minutes. Because the goal of the infiltration was to create a barrier to spread into the lesion and not on the lesion surface, excess resin was cleaned out of the proximal spaces using dental floss before the polymerization was exposed for 40 seconds. After light curing, it was recommended that the application of material and light polymerization of the resin should be repeated once to minimize enamel porosity.

In second case- the resin-infiltration technique was performed according to the manufacturer's instructions on the upper teeth. The surface layer of enamel was eroded by the application of 15% hydrochloric acid gel (ICON-Etch;) for 120 s. Afterward, the etching gel was thoroughly washed away for 30 s using a water spray, and the teeth were dried. Next, the enamel surfaces were desiccated using ethanol (99%; ICON-Dry;) for 30 s, followed by air-drying. Then, low viscosity resin (ICON-Infiltrant) was applied to the enamel surfaces of the eroded teeth and was allowed to penetrate for 3 min. Excess material was removed from the surface before light curing. After the infiltration of the low-viscosity resin, it was light-cured for 40 s. The application of infiltrating resin in the same tooth was repeated once for 1 min, followed by light curing for 40 s.

After removal of the rubber dam, the roughened enamel surface was polished using Shofu polishing disks to avoid re-discoloration by food stains.

An improvement in the aesthetic appearance was achieved even after follow up of 2 months . Until the follow up, no sensitivity or any relapse of stains was seen.

Fig.1.4: After Resin Infiltration

Fig.2.4: After Resin Infiltration

Fig.1.5: 6 month followup

Fig.2.5: 6 month followup

Discussion

The correct diagnosis according to the depth of the lesion and the prognosis of the technique are crucial factors for the treatment decision and the success of the case. The goal of clinical management of tooth discoloration was to produce an acceptable esthetic result in the most conservative manner possible. Dental fluorosis causes intrinsic discolouration which may affect only the enamel or dentin, or both.

Studies have proven good outcomes of microabrasion and resin infiltration method in covering hypoplasia in mild to moderate instances of fluorosis. Indications for microabrasion typically include cases of fluorosis, post-orthodontic demineralization, localized hypoplasia due to infection or trauma and idiopathic hypoplasia in which the discoloration is limited to the outer enamel layer[6].

Enamel microabrasion helps to remove the stains, improve aesthetic and recover remineralization. It removes superficial parts of the lesion by abrasion with hydrochloric acid and a neutralizer, and the enamel surface becomes smooth and glossy.[7] Donly et al. found that microabrasion re-created the outer, prism-free region and teeth became glassy and named 'abrosion effect.[8] This layer reflects or scatters light and masks slight imperfections.

Unfortunately, however, significant amounts of enamel often need to be removed to improve the appearance of the using this technique.[9]

The resin infiltration technique is an alternative approach to prevent further progression of enamel lesions. This treatment aims to occlude microporosities within the lesion body by infiltrating low-viscosity, light-curing resins optimized for rapid penetration into porous enamel.[5] A positive side effect of resin infiltration is that enamel lesions lose their whitish appearance and look similar to sound enamel when their microporosities are filled with theresin.[10]

The principle of masking enamel lesions by resin infiltration depends upon changes in light scattering within the lesions. Sound healthy enamel has a refractive index (RI) of 1.62. The microporosities of carious enamel lesions are filled with either a watery medium (RI 1.33) or air (RI 1.0). The difference in refractive indices between the enamel crystals and the medium inside the porosities causes light scattering those results in a whitish opaque appearance of these lesions, especially when they are desiccated.[10]

The microporosities of infiltrated lesions are filled with resin (RI 1.46) which unlike the watery medium, cannot evaporate. Therefore, the difference in refractive indices between porosities and enamel is negligible and lesions resemble the surrounding sound enamel.[11] Therefore, this treatment can be used not only for the arrest of enamel lesions, but also to improve the aesthetic appearance of oral white spots.

Conclusion

The results of the present case report indicated that the minimally invasive "microabrasion with resin infiltration technique" appears to be effective and efficient for correction of the white spot lesion and should be used with caution in case selection. This type of approach has the advantage of being safe, extremely conservative and very well accepted by patients, as the technique results in a reduction in tooth surface wear, minimal discomfort to the patient and finally an improvement in the smile of the patient cause and aesthetics. It is a less invasive approach with no sensitivity.

References

1. Peariasamy K, Anderson P, Brook AH. A quantitative study of the effect of pumicing and etching on the remineralisation of enamel opacities. Int J Paediatr Dent 2001;11:193– 200.
2. Angela Pia Cazzolla, Anna Rosa De Franco, Mariagrazia Lacaita, Vitantonio Lacarbonara. Efficacy of 4-year treatment of icon infiltration resin on postorthodontic white spot lesions. BMJ Case Rep 2018
3. Baranwal AK. A minimally invasive approach for aesthetic and smile enhancement using enamel microabrasion technique: Reports of two cases. Arch of Dent and Med Res 2015;1(4):40-45
4. Nubia Inocencya Pavesi Pini, Daniel Sundfeld-Neto, Flavio Henrique Baggio Aguiar, Renato Herman Sundfeld, Luis Roberto Marcondes Martins, Jose Roberto Lovadino, Debora Alves Nunes Leite Lima. Enamel microabrasion: An overview of clinical and scientific consideration.
5. Paris S, Meyer-Lueckel H, Kielbassa AM. Resin infiltration of natural caries lesions. J Dent Res 2007;86(7):662–6.
6. Wray A, Welbury R. Treatment of intrinsic discoloration in permanent anterior teeth in children and adolescents. Int J Paedia Dent 2001;11(4):309-15
7. Ardu S, Castiono NV, Benbachir N, Krejci I. Minimally invasive treatment of white spot enamel lesions. Quintessence Int 2007;38(8):633-636
8. Donly KJ, Oneil M, Croll TP. Enamel microabrasion: a microscopic evaluation of the "abrosion effect". Quintessence Int 1992;23(3):175-179
9. Tong LS, Pang MK, Mok NY, King NM, Wei SH. The effects of etching, micro-abrasion, and bleaching on surface enamel. J Dent Res 1993;72(1):67-71
10. Kidd EA, Fejerskov O. What constitutes dental caries? Histopathology of carious enamel and dentin related to the action of cariogenic biofilms. J Dent Res 2004; 83(Spec No C):C35-38
11. Paris S, Meyer-Lueckel H. Masking of labial enamel white spot lesions by resin infiltration - A clinical report. Quintessence Int 2009;40(9):713-718.