

Determining The Fate of Developmental White Spot Lesion: A Case Report

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Abstract

White spot lesions of different etiologies can cause functional and esthetic concerns that must be managed properly to meet patients’ expectations. Treatment planning and management should emphasize proper sequencing, starting with the most conservative treatment option. The patient should also be part of the decision-making process from start to finish. (1) Recently, resin infiltration technique was introduced with the development of highly-flowable resin material. This paper describes and illustrates a case report that employs resin infiltration treatment of a tooth affected with a developmental variety of white spot lesion.

Keywords: Caries, esthetics, fluorosis, resin infiltration, white spot lesions

Introduction

The presence of clinically detectable, localized or diffuse areas of enamel opacities can be observed as white spot lesions. The subsurface porosity caused by demineralization gives the lesion a milky appearance that can be found on the smooth surfaces of teeth. Determining the cause of these lesions is essential to successful treatment and esthetic improvement. (1)

Noncarious (Developmental)	Early carious WSLs
Fluorosis	Smooth surface
Molar-incisor hypomineralization	Proximal surface
Enamel hypoplasia	
Enamel hypomaturation	

The white appearance is due to an optical phenomenon which is caused by mineral loss in the surface or subsurface enamel. Enamel crystal dissolution begins with subsurface demineralization, creating pores between the enamel rods. The resultant alteration of the refractive index in the affected area is then a consequence of both surface roughness and loss of surface shine and alterations in internal reflection, all resulting in greater visual enamel opacity, as porous enamel scatters more light than sound enamel. (2)

Table2: Treatment modalities for treating white spot lesions (3)	
Carious	Non-carious
Promoting remineralization	Enamel microabrasion
Arresting demineralization	Tooth whitening
Enamel microabrasion	Resin infiltration
Resin infiltration	Restorative treatment i.e., direct and indirect veneering

The Concept of minimally invasive techniques in dentistry requires a good diagnosis of risk and lesions, the use of the right preventive treatment to stop disease, the restorations of the lesions with as little healthy tissue loss as possible, the use of durable materials and the prevention of recurring disease. (4)

Resin infiltration technique is a novel technology that seems to bridge the gap between noninvasive and minimally invasive treatment of initial dental caries, postponing as long as possible the need for a restoration. The principal of resin infiltration is to perfuse the porous enamel with resin by capillary action. This aims to arrest lesion progression by occluding the microporosities that provide diffusion pathways for the acids and dissolved materials. (4)

The infiltrated white spot lesions appear to be similar to the surrounding sound enamel because of the negligible difference in the refractive indices between the sound enamel (RI = 1.62) and the infiltrant (RI= 1.46). (5)

This paper describes and illustrates a case report that employs resin infiltration treatment of a tooth affected with developmental white spot lesion.

Case Report

A 23 year old male patient reported to the department with a chief complaint of a white spot on upper front tooth. Clinical examination revealed a localized moderate sized

white spot lesion on the incisal third of upper right central incisor. The lesion was hard, non-cavitated and localized. Resin infiltration, microabrasion and direct composite veneering were suggested as treatment options. Patient opted to try resin infiltration. The procedure was explained to the patient, treatment consent was signed and intraoral photographs were taken. (Fig.1a- Fig. 1c)

Teeth were cleaned with pumice using a rubber cup followed by placement of rubber dam and resin infiltration was applied according to the manufacturer’s instructions. The teeth were etched with 15% hydrochloric acid gel (ICON®-Etch; DMG, Hamburg, Germany) for 2 min to remove the highly mineralized surface and expose the lesion body (Fig.2a). Thorough rinsing with water for 10 seconds followed this step(Fig. 2b). Ethanol (ICON®-Dry) was applied for 30 seconds and then air-dried(Fig.2c). The infiltrant (ICON®-Infiltrant) was applied to the teeth and allowed to penetrate for 3 minutes(Fig.2e). This was followed by light-curing the resin for 40 seconds(Fig.2f). The teeth were polished with composite finishing discs (Sof-Lex disk; 3M ESPE, Saint Paul, MN, USA) (6).

The white lesions almost disappeared at the end of appointment and the patient was impressed with the results(Fig.3a-3c). Patient was kept under regular follow-up and it revealed a progressive blending of the lesion at follow-up appointments (Fig. 3d-3e). The treatment done had shown to boost patient’s self esteem and confidence.

Discussion

White spots or patches on permanent incisors are common among young adolescents; this may cause aesthetic concerns for both the patient and the parents equally. Management of developmental defects of enamel (DDE) is challenging and highly dependent on the type, severity, and appearance of the defect. The masking effect of resin infiltration on DDE was studied by Kim *et al.*, The study

showed that the masking effect was dramatic in some cases, but not in others and that only 60% of teeth with DDE were completely masked. However, aesthetic improvement was still observed in teeth with incomplete penetration. (6)

If we compare with enamel microabrasion or conventional restorative techniques, resin infiltration seems to be much less invasive, and only negligible tooth substance must be sacrificed by etching and polishing.(7). Surface polishing is essential for the success of infiltration. This additionally minimizes bacterial adhesion and, consequently, plaque accumulation. (8)

Conclusion

Considering the various etiologies of white spot lesions, it is imperative to establish a proper diagnosis. Upon identification of demineralization, clinicians must assess lesion activity in order to plan proper treatment. Minimal intervention is an ideal approach in managing white spot lesions, and should start with remineralization therapies. If a white spot lesion is an esthetic concern, tooth whitening should be considered in an attempt to blend the lesion in with the natural dentition. Restorative treatment is indicated when conservative approaches — such as remineralization, tooth whitening, microabrasion and resin infiltration — are unsuccessful in removing or masking the white spot lesion.(1)

Resin infiltration is a novel technique which stops lesion progression which is not achieved by any material till date. Microinvasive treatment with no drilling or anesthesia while preserving healthy tooth structure. It is a simple, one visit procedure with better shade matching seen during the follow-up visits. This microinvasive technique is designed to bridge the gap between prevention and restoration by filling and reinforcing the pore system of a noncavitated white spot with a light curable resin. (9)

However, long-term studies are required to establish the longevity of the esthetic improvement as achieved by this technique. Not to be used on exposed dentin or on cementum as it may cause pain to the patient. The surface properties of resin-infiltrated enamel lesions may deteriorate with time in the oral environment and result in an increase in surface roughness and discoloration. Microcracks may appear on the resin-infiltrated surfaces after thermocycling challenges, which may further render the surface vulnerable to staining and discoloration. (10) Tri Ethylene Glycol Dimetha Acrylate is a hydrophobic resin which raises a question about the hydric stress and there is no enough literature about the aging of this kind of restorations. (11) Also, there is the need to follow accurate diagnosis criteria to distinguish between the developmental and non-developmental opacities, because the resin infiltration shows limited effects in cases of developmental defects; furthermore it is a radiolucent material, which may be a concern to some dentists. These factors determine the success of treatment. (12). In order to aesthetically manage stained enamel opacities, the stain must be totally removed by performing an external bleaching. (13) In some cases contact allergies with similar products have been reported. Its use should be avoided in case of known allergies to one of the material components or existing contact allergies. (14)

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References

1. <http://decisionsindentistry.com/article/lesions-0116>
2. Son JH, Hur B, Kim HC, Park JK. Management of white spots: resin infiltration technique and microabrasion. *Journal of Korean Academy of Conservative Dentistry*. 2011 Jan 1;36(1):66-71.

3. Shivanna V, Shivakumar B. Novel treatment of white spot lesions: A report of two cases. *Journal of conservative dentistry: JCD*. 2011 Oct;14(4):423.
4. Azizi Z. Management of white spot lesions using resin infiltration technique: a review. *Open Journal of Dentistry and Oral Medicine*. 2015;3(1):1-6.
5. Yim HK, Min JH, Kwon HK, Kim BI. Modification of surface pretreatment of white spot lesions to improve the safety and efficacy of resin infiltration. *The Korean Journal of Orthodontics*. 2014 Jul 1;44(4):195-202.
6. Omar SI. Using resin infiltration to treat developmental defects of enamel: Three case reports. *Journal of Restorative Dentistry*. 2013 Jan 1;1(1):31.
7. Hind Amarir., et al. "Treatment of Labial Enamel White Spot Lesions by Resin Micro-Infiltration". *EC Dental Science* 5.4 (2016): 1149-1155.
8. Schoppmeier CM, Derman SH, Noack MJ, Wicht MJ. Power bleaching enhances resin infiltration masking effect of dental fluorosis. A randomized clinical trial. *Journal of dentistry*. 2018 Dec 1;79:77-84.
9. Gugnani N, Pandit IK, Gupta M, Josan R. Caries infiltration of noncavitated white spot lesions: A novel approach for immediate esthetic improvement. *Contemporary clinical dentistry*. 2012 Sep;3(Suppl 2):S199.
10. Zhao X, Ren YF. Surface properties and color stability of resin-infiltrated enamel lesions. *Operative dentistry*. 2016 Nov;41(6):617-26.
11. Muthuvel P, Ganapathy A, Subramaniam MK, Revankar VD. Erosion Infiltration Technique': A Novel Alternative for Masking Enamel White Spot Lesion. *Journal of pharmacy & bioallied sciences*. 2017 Nov;9(Suppl 1):S289.
12. Fonseca NMAH, Públio JC, Hernandes DKL, Barros TEP, Borelli Neto L and Alves N. Minimally Invasive

Technique to Mask White Spot Lesion with Resin Infiltration (Icon®, DMG): Case Report. *J Dent & Oral Disord*. 2016; 2(8): 1043.

13. Marouane O, Douki N, Chtioui F. A Combined Approach for the Aesthetic Management of Stained Enamel Opacities: External Bleaching Followed by Resin Infiltration. *Case reports in dentistry*. 2018; 2018.

14. www.dmg-dental.com

Legends Figure



Fig 1a: Preoperative intraoral frontal view

Fig 1b: Pre-operative intraoral lateral view

Fig 1c: Black outline showing presence of localized white spot lesion wrt tooth no. 11

Fig 1d: DMG icon resin infiltration kit.

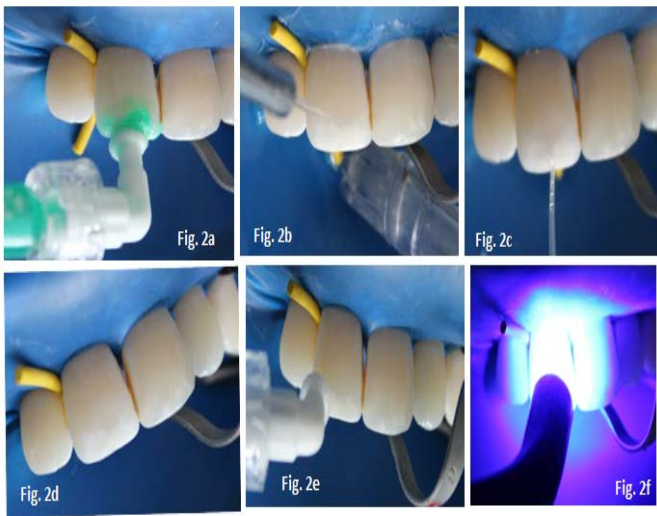


Fig. 2a: Application of icon etchant

Fig. 2b: Rinsing with water

Fig. 2c: Application of icon dry

Fig. 2d: Partial disappearance of the lesion seen after drying the tooth

Fig. 2e: Application of icon infiltrant

Fig. 2f: Light curing the resin



Fig. 3a: Immediate post-treatment photograph before removal of rubber dam

Fig. 3b: Immediate post-treatment photograph after removal of rubber dam

Fig. 3c: Immediate post-treatment photograph after finishing and polishing

Fig. 3d: Post treatment 3 months follow-up photograph

Fig. 3e: Post treatment 6 months follow-up photograph