

Treatment of traumatic hypomineralisation lesions by resin infiltration Icon^R

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Abstract

It is not uncommon in our practice to observe white spot lesions (WSLs) because of dental caries, developmental defects of enamel (DDE), dental fluorosis (DF), or postorthodontic decalcification (POD) or a traumatic past.

Different treatments have been proposed to improve the appearance of these white spots lesions including restorative procedures, remineralization using high concentrations of topical fluoride or casein phosphopeptide amorphous

calcium phosphate (CPP-ACP), chewing gum to help remineralization, microabrasion, and argon-laser irradiation. This case report illustrates the use of remineralization using resin infiltration exhibiting significant improvement in esthetics.

Keywords: White Spot Lesions, remineralization, conservative treatment, traumatic hypomineralisation, resin infiltration

Introduction

White spot lesions are subsurface enamel porosities caused by enamel demineralization.

Traumatic hypomineralization is one of the etiologies of white enamel spots. She defines herself as a white enamel lesion without dysplasia occurring as a result of trauma to the temporary tooth overlying.¹ Therefore, the early diagnosis and treatment by a practitioner of these lesions would be of great importance.

Different treatments have been proposed to improve the appearance of these white spots lesions including restorative procedures, remineralization using high concentrations of topical fluoride or casein phosphopeptide amorphous calcium phosphate (CPP-ACP), chewing gum to help remineralization, microabrasion, and resin infiltration.¹

The resin infiltration technique allows the intercrystalline spaces of the enamel to be infiltrated in a microinvasive manner with a polymerizable, hydrophobic, low-viscosity resin to prevent the progression of enamel lesions. On the other hand, its refractive index being close to that of enamel (IR Icon = 1.52 and IR enamel = 1.62), it makes it possible to hide white spots.²

Case report

A 18 years-old male consult after a dental traumatism to treat the causal teeth and the demineralization of the two upper central incisor. The clinical examination by visual inspection revealed the existence of opaque, matt and white areas on the incisal bord of two upper central incisor.

The use of spiked probes is not recommended because it can cause defects in the softened enamel a study conducted by Yassin and coll³ showed that with micro radiological methods in an in vitro study, the use of spiked probes in a robust demineralized enamel model can cause cavitation in WSLs Figure 1.



Figure 1 View of the global arcade.

The diagnosis of white spot lesions (WSLs) has been established.

The treatment plan consists first on the motivation on oral hygiene to change the behavior of the patient then dental scaling was conducted to remove the dental plaque and calculus.

Because the white spot lesion concerns the outer 1/3 of the enamel, the resin infiltration was decided:

- Preparing the Icon kit
- Cleaning of dental surface (Figure 2A)
- Setting up the rubber dam to protect the patient from hydrochloric acid (HCL) and ethanol, which can cause burns to the mucous membranes or being ingested, thus protecting the TEGDMA resin (tri-ethylene glycol dimethacrylate) from saliva because it is hydrophobic.
- Initial erosion with Icon Etch (Figure 2B): Etch with 15% hydrochloric acid for 120 seconds, time recommended by Knosel et al. to remove the hypermineralized superficial layer of enamel and allow resin penetration into the body of the lesion.^{2,4} Then, rinse for 30 seconds (Figure 2C) and dry (Figure 2D).
- Apply the Icon-infiltrant for 3-5 minutes (Figure 2E)
- Remove excess and cure for 40sec
- After polishing (Figure 2F), this is the final result (Figure 3),

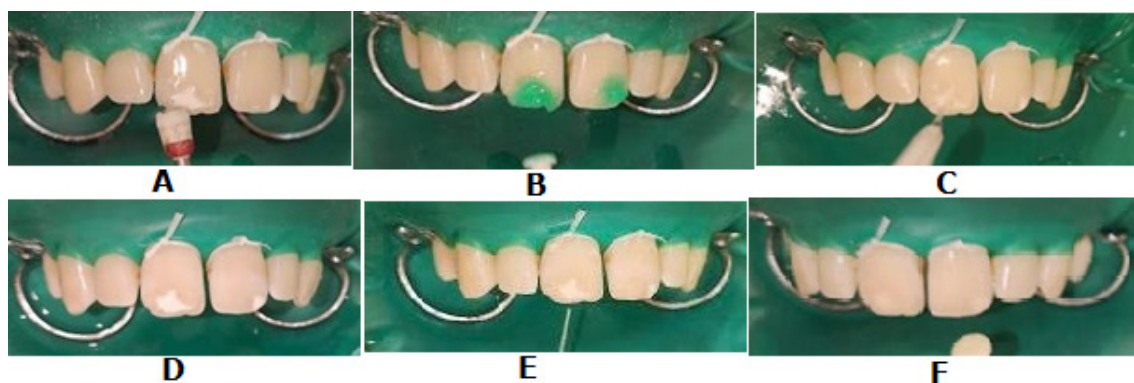


Figure 2 Pictures for the clinical steps.



Figure 3 Final result.

Discussion

The whitish discoloration of enamel can be caused by pre- or post- eruptive damage. Fluorosis, traumatic hypocalcification and molar- incisal hypomineralization (MIH) are conditions caused by disturbances during enamel development. The post-eruptive discoloration resulting from caries is known as White Spot Lesions (WSL). All of these conditions are associated with a reduction in the mineral phase of enamel, altering its chemical composition and consequently its optical characteristics.

When these discolorations occur on anterior teeth, compromising the aesthetic appearance.⁵

WSLs

White spot lesions are defined as “white opacity” that occur as a result of subsurface enamel demineralization that is located on smooth surfaces of teeth.⁶

The white appearance is a consequence of changing in optical properties of the decalcified enamel.⁶ Various risk factors such as acid-producing bacteria, fermentable carbohydrates, and many host factors, such as poor oral hygiene, low salivary volume, and a sugary diet were found in the literature. It was proved that WSLs develop as a result of prolonged “undisturbed” plaque accumulation on the affected teeth surface.⁷

The diffusion of the acids into the enamel and the demineralization continues in the enamel subsurface, then the intact enamel surface collapses and becomes cavitated a period of 4 weeks is sufficient for their visual detection.

The white-spot lesion’s shape is determined by the distribution pattern of the biofilm and the direction of the enamel prisms.⁸

The traumatic hypomineralisation:

Traumatic hypomineralization is the consequence of a disruption of the maturation stage of ameloblasts following trauma or peri-apical infection. During an earlier disturbance, hypoplasia may be associated.⁹

The onset of sequelae is sporadic regardless of the severity of the trauma. A simple concussion that went unnoticed during early childhood can thus be implicated in the appearance of these¹⁰ defects.

Resin infiltration:

Resin infiltration technique is a novel approach that was first experimented by Robinson & al. 2001¹¹ to arrest carious lesions by the infiltration of the demineralized enamel pores with resorcinol-formaldehyde resins, then it has been modified and commercially developed in Germany and marketed under the name Icon® (DMG America Company, Englewood, NJ). It is described as a micro-invasive technology that fills, reinforces, and stabilizes demineralized enamel without scarifying the structure in which the porosities of enamel lesion are infiltrated with a low viscosity resin, known as “resin infiltration”.

Several In vitro studies have shown that enamel lesions treated with a low viscosity infiltrating resin are more resistant to demineralization lesions than conventional and preventive treatments.¹¹⁻¹³ It presented also the lowest means of color change and the high stability of mechanical properties.¹¹⁻¹⁵ In the other hand, Several studies have shown during a period of follow-up ranging from 6 months to 7 years that infiltration resin is an effective treatment to improve the aesthetic appearance of the enamel.¹⁵⁻¹⁷

Conclusion

The management of white spots on the enamel begins with knowledge of the etiological diagnosis and the severity of the enamel involvement.

Whatever the etiology, it will always be necessary to start with the least invasive treatment and to control the camouflage of the enamel spot and the satisfaction of the patients before moving on to the more invasive treatment.

In the case of traumatic hypomineralization, tooth whitening is preferable followed by resin infiltration and deep infiltration

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None.

Conflicts of Interest

The authors declare that they have no conflict of interest.

References

1. K Indrapriyadharshini, Madan Kumar PD, Sharma K, et al. Remineralizing potential of CPP-ACP in white spot lesions - A systematic review. *Indian J Dent Res.* 2018 July-Aug;29(4):487–496.
2. Bassant A Abbas, Eiman S Marzouk, Abbas R Zaher. Treatment of various degrees of white spot lesions using resin infiltration-in vitro study. *Prog Orthod.* 2018 Aug 6;19(1):27.
3. Yassin OM. In vitro studies of the effect of a dental explorer on the formation of an artificial carious lesion. *ASDC J Dent Child.* 1995;62:111–117.
4. R Mehta, B Nandlal, S Prashanth. Comparative evaluation of remineralization potential of casein phosphopeptide-amorphous calcium phosphate and casein phosphopeptide-amorphous calcium phosphate fluoride on artificial enamel white spot lesion: an in vitro light fluorescence study. *Indian J Dent Res.* 2013 Nov-Dec;24(6):681–689.
5. Borges AB, Caneppele TMF, Masterson D, et al. Is resin infiltration an effective esthetic treatment for enamel development defects and white spot lesions? A systematic review. *J Dent.* 2017;56:11–18.
6. Hicks J, Garcia-Godoy F, Flaitz C. Biological factors in dental caries Role of saliva and dental plaque in the dynamic process of demineralization and remineralization (Part 1). *J Clin Pediatr Dent.* 2003;28:47–52.
7. Guo L, Shi W. Salivary biomarkers for caries risk assessment. *J Calif Dent Assoc.* 2013;41:107–109.
8. Bjorndal L, Thylstrup A. A structural analysis of approximal enamel caries lesions and subjacent dentin reactions. *Eur J Oral Sci.* 1995;103(1):25–31.
9. Denis M, Atlan A, Vennat E, et al. White defects on enamel: Diagnosis and anatomopathology: Two essential factors for proper treatment (part 1). *Int Orthod.* 2013;11(2):139–165.
10. H Aboutarik S, Dhoun A, El Ouzzani. Les traitements à minima des taches blanches de l'email: Revue détaillée de littérature.
11. Manoharan Vidya, S Arun Kumar, Selva B Arumugam et al. Is resin infiltration a microinvasive approach to white lesions of calcified tooth structures?: a systemic review. *Int J clin pediatr dent.* 2019;12(1):53–58.
12. Torres Carlos Rocha Gomes, Alessandra Buhler Borges, Luciana Marcondes Sarmiento Torres, et al. Effect of caries infiltration technique and fluoride therapy on the colour masking of white spot lesions. *J dent.* 2011;3(39):202–207.
13. Sebastian Paris, Vera Mendes Soviero, Susanne Seddig, et al. Penetration depths of an infiltrant into proximal caries lesions in primary molars after different application times in vitro. *Int J Paediatr Dent.* 2012;5(22):349–355.
14. Arslan Soley, Yahya Orcun Zorba, Mustafa Altay Atalay, et al. Effect of resin infiltration on enamel surface properties and Streptococcus mutans adhesion to artificial enamel lesions. *Dent mater J.* 2015;1(34):25–30.
15. Knösel M, Vogel R, Sandoval P. Infiltration of white-spot- lesions and developmental enamel defects. *Rev Clin Periodoncia Implantol Rehabil Oral.* 2017;2(10):101–106.
16. Denis Maud, Anthony Atlan, Elsa Vennat, et al. White defects on enamel: diagnosis and anatomopathology: two essential factors for proper treatment (part 1). *Int orthod.* 2013;(11)2:139–165.
17. Attal JP, Atlan A, Denis M, et al. White spots on enamel: treatment protocol by superficial or deep infiltration (part 2). *Int Orthod.* 2014;12(1):1–31.