

Case Report

Microinvasive esthetic approach for deep enamel white spot lesion

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ABSTRACT

The white spot lesion on the dental enamel is an optical alteration that compromises the esthetics of smile. It can be caused by many factors, among them, defects in mineralization and formation of tooth enamel. Resin infiltrants are agents that penetrate, by capillarity, through the pores of the demineralized or hypomineralized enamel, altering the refractive index (RI) of the tooth structure and totally or partially masking the appearance of the white spot. The aim of this work was to report the use of resin infiltration to minimize the visualization of white spot lesion, present in an upper central incisor, as a microinvasive approach for the esthetic treatment of deep enamel hypomineralization. A 20-year-old female patient sought care with the esthetic complaint of extensive white spot lesion on the buccal face of her upper right central incisor. The diagnosis established was a deep white stain associated with the incisor molar hypomineralization syndrome, and the treatment of choice for the resolution of the case was the application of the Icon[®] resin infiltrant (DMG, Hamburg, Germany). To reach the body of the lesion, three cycles of acid erosion, using 15% HCl, were necessary to obtain a satisfactory aspect of masking the white lesion. A camouflage effect of the deep white spot lesion was achieved with the use of the resin infiltration, without the need of additional and irreversible wear of the dental structure.

Key Words: Case report, dental enamel, dental enamel hypomineralization, esthetics dental

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INTRODUCTION

The white spot lesions on the enamel are caused by a defect in its structure and mineralization. These optical changes occur mainly due to the presence of empty spaces between the hydroxyapatite crystals and which are now occupied by organic fluids. The difference in the RI of the fluid, basically composed of water (1.33) and enamel (1.62), leads to the visual identification of the porous area of the enamel as a white spot.^[1] The increased porosity located in the enamel can have a preeruptive etiology, due to alterations such as dental

fluorosis; traumatic hypomineralization or molar and incisor hypomineralization; or posteruptive, as dental caries.

The diagnosis of enamel defects can be performed through visual examination, considering the shape, size, color, and location of these defects.^[1] The deep of the lesion is also an important factor to be analyzed in order to define the treatment.^[2] For this, the white lesion must be transilluminated, and where the darker the transilluminated spot appears, the deeper it is.^[2,3]

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Traditionally, the treatment options for preeruptive white superficial spots were tooth whitening or microabrasion, and the restorative technique, for deep spots.^[4] However, such techniques can cause, respectively, sensitivity and thickness reduction of the enamel and even the beginning of the restorative cycle.^[5]

The use of infiltrant, a low-viscosity fluid resin that penetrates the body of the white stain lesion due to capillarity, has been proposed to mask the appearance of this enamel defect, as it has a RI around 1.52, which is closer than healthy enamel RI.^[5] This is considered a microinvasive treatment since it requires only a previous erosion of the healthy enamel for application.^[5] Initially indicated for the treatment of incipient caries lesions, infiltrants had their indications expanded for the treatment of white spots of fluorosis and traumatic hypomineralization.^[6] However, when indicated for hypomineralization white spots of molars and incisors or in other deep hypomineralization spots, some authors suggest the association with more significant wear of the dental structure, although still superficial, followed by restorative procedures, in order to guarantee satisfactory esthetic results.^[2]

Although the diagnosis is decisive for the choice of treatment, the patient's agreement to wear his/her tooth for esthetics needs to be considered. Thus, the objective of this work is to describe the microinvasive approach for deep white spot lesion of molar and incisor hypomineralization, present in an upper central incisor, using resin infiltration. This case report was structured based on the Care Checklist, the case report guideline.

CASE REPORT

A female patient, 20-year-old, denying allergies and systemic diseases, was seen at the Dentistry Service of the School of Dentistry of the Federal University of Bahia (FO-UFBA), after presenting an esthetic complaint due to the presence of an extensive white spot, located in the incisal third of the buccal face of her right upper central incisor. The patient also described that she had already sought esthetic treatment for that white spot and that, as she always received treatment indications that included wearing out her tooth, she never felt comfortable to accept them. On clinical examination, the presence of an extensive white spot with a high degree of opacity, with defined margins, and with an elongated shape is

noted, occupying a large part of the incisal third of the buccal face of tooth 1.1. In the mesial, still in the incisal of the buccal face, the presence of two smaller and less opaque white spots is noted [Figure 1a]. To assess the depth, a tooth transillumination was performed, with the aid of a photoactivating device emitting LED light (light emitted by diode) (VALO® Cordless-Ultradent, South Jordan, USA). It is observed that the most opaque and centralized part of the stain was darker when transilluminated, showing more depth [Figure 1b]. The two less opaque white spots and the marginal part of the spot were lighter, characterizing less depth [Figure 1b]. The diagnosis was a deep white spot due to molar and incisor, hypomineralization due to the location, and clinical characteristics of the mentioned spot and the fact that molar teeth 2.6 and 2.7 also present hypomineralized spots.

In order to establish the esthetic treatment, the clinical and transillumination examinations and the patient's request to not significantly wear out her tooth were taken into account. Therefore, the use of the Icon® resin infiltrant (DMG, Hamburg, Germany) was suggested. After detailed information about the treatment, the patient agreed with the planning and signed the free and informed consent form.

Prophylaxis of the tooth and adjoining teeth was performed with Robson brush and nongreasy disinfection abrasive prophylactic paste (Consepsis® Scrub, Ultradent South Jordan, USA). Then, a rubber dam isolation from the first upper right premolar to the upper left first premolar was performed, using two isolation clips No. 209 (Duflex-SSWhite, Rio de Janeiro, Brazil) and a latex membrane for absolute insulation, medium thickness (Nic Tone, MDC Dental, Zapopan, Mexico) [Figure 1c].

The application of the resin infiltrant followed the manufacturer's recommendations, starting with the erosion of the stain surface by applying Icon® Etch (15% hydrochloric acid) with circular movements, for 2 min, over the entire length of the lesion, in order to remove the more superficial enamel layer and make the lesion body permeable to the infiltration of resin monomers [Figure 2a]. The tooth was washed with an air-water spray (30 s) to remove acid residues and mineral compounds from the acid's action on the dental enamel [Figure 2b]. The surface was air-dried [Figure 2c]. Then, Icon® Dry was applied for 30 s, which is a drying agent

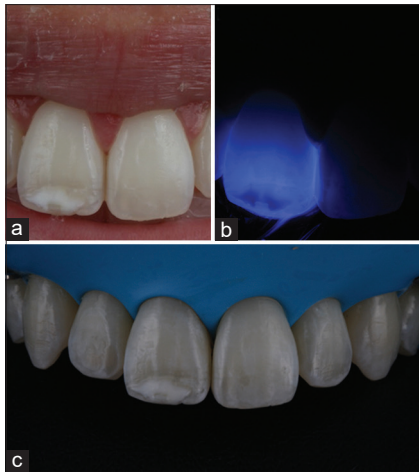


Figure 1: (a) Clinical aspect of the white spot lesion. (b) Transillumination of the white spot with photopolymerizer device, showing that the deeper the stain, the darker it appears when being transilluminated. (c) Rubber dam isolation from the first upper right premolar to the upper left first premolar.

composed of 99% ethanol, so that the water contained in the enamel pores was evaporated [Figure 2d]. The presence of alcohol on the white spot, after using hydrochloric acid, allows a prior visual assessment of how the infiltrant will work to mask it [Figure 2e]. Moreover, consequently, if there will be a need to repeat the steps of applying the acid and checking the masking of the white spot. Afterward, the white stain is dried with air from the triple syringe, to aid water evaporation [Figure 2e].

In the present clinical case, the stage of checking the masking of the lesion, to assess its degree of opacity, occurred three times. The visible opacity of the white spot was gradually reduced with this sequence of procedures [Figure 2f-h]. The application of the acid, washing, and drying must also be accompanied by evaluations of the dental volume, to verify the degree of wear in the stain region, making sure that the wear was not excessive to the point of generating the need for additional restorations.

After defining a satisfactory masking of the stain, the Icon® Infiltrant was applied, in slight excess, and left for 3 min in contact with the hypomineralization region, to allow the penetration of the material, by capillarity, in the empty spaces of the lesion body [Figure 2i]. The excess of the infiltrant was removed from the interproximal regions, with a dental floss [Figure 2j], and photoactivated for 40 s (VALO® Cordless-Ultradent, South Jordan, USA) [Figure 2k]. The second application of Icon® infiltrant was

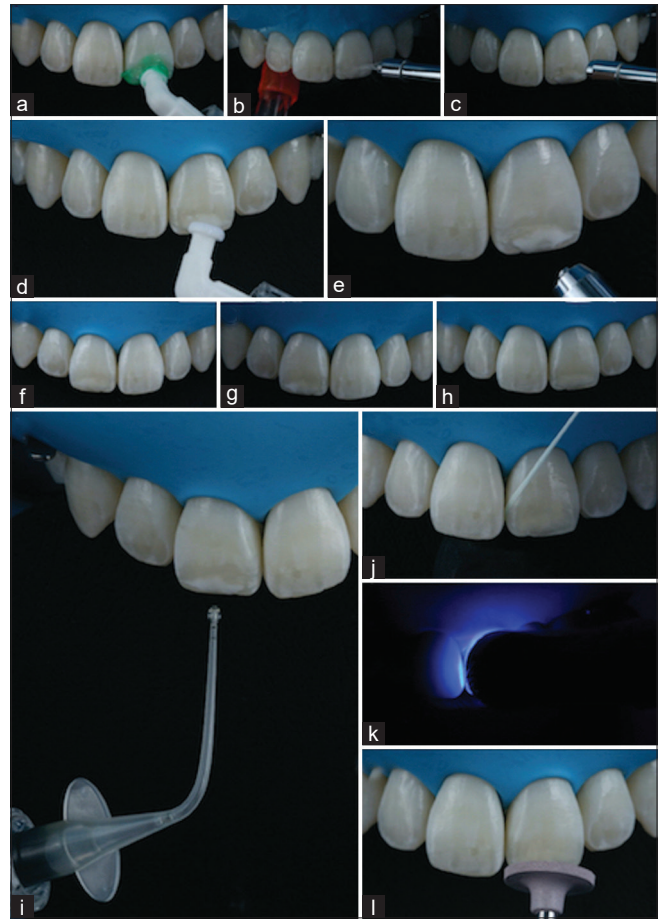


Figure 2: (a) Application of Icon® Etch (15% hydrochloric acid) for 2 min. (b) Removal of Icon® Etch by air-water jet for 30 s. (c) Drying the surface with a triple syringe. (d) Application of Icon® Dry (99% ethanol) for 30 s. (e) Drying the surface with air from the triple syringe. Evaluation of the white spot lesion opacity after the application of Icon® Etch and Icon® Dry. After the first application in (f), after the second in (g), and after the third in (h). (i) Application of Icon® Infiltrant for 3 min; (j) removal of excess with dental floss; (k) light curing of Icon® Infiltrant for 40 s; (l) polishing the tooth with a rubber cup.

performed, 60 s was waited, the excess was removed, and new photoactivation was performed.

To obtain a more homogeneous surface, the stage of finishing and polishing of surface with abrasive rubbers (Dura-Gloss®-American Burrs, Palhoça, Brazil) was followed [Figure 2l].

The initial appearance of the white spot and the final result of the treatment carried out by the surface erosion followed by the application of the resinous infiltrant are observed in Figure 3. Although still visible, the infiltrated white spot showed a considerable reduction in opacity. The patient reported being quite satisfied with the treatment, since it was comfortable, fast, and effective, promoting a much more harmonious smile.



Figure 3: (a) White spot lesion before treatment with resin infiltrant. (b) White spot lesion after treatment with resin infiltrant. (c) Facial initial picture of the patient at a frontal angle. (d) Facial final picture of the patient, after the treatment and at the same day of the treatment.

Patient perspective

The procedure was smooth, I felt good all the time, and I had no pain or discomfort. I was very pleased with the result, since there was no need to wear the tooth.

The stain always bothered me a lot, so the treatment served to make me happier and more confident about my smile.

DISCUSSION

White spot lesions may be the result of incipient caries lesions, dental fluorosis, and hypomineralization of dental enamel, and its diagnosis is essential for establishing the treatment plan for them.^[4,7,8] The differential diagnosis of these lesions is not simple and should be performed through visual inspection of the stain, during the clinical examination, after prophylaxis. For an easier and more detailed examination, clinical microscopes can be used to increase the visualization of the operative field.^[3] There is also the method of transillumination in which a light-curing device is positioned on the lingual face of the tooth, and when the light is activated, it crosses better healthy regions or superficial spots, while deeper regions of the lesion appear darker because they allow little light to pass through them, as shown in Figure 1b. In the present clinical case, the opaque and irregular lesion was diagnosed as enamel hypomineralization, caused by molar and incisor hypomineralization, being

classified as deep both by the etiology and by means of transillumination, since it was darkened on that examination [Figure 1a and b].^[1,3,9,10]

Esthetic treatments for deep white spots are usually restorative, since more conservative alternatives such as whitening and/or microabrasion are more effective for more superficial white spots.^[4] Esthetic restorations, in turn, are invasive procedures that require considerable wear of the dental structure and insert the tooth into the restorative cycle that leads to further additional dental wear.^[5,11] It is noteworthy that the patient, in the present case, declined from restorative esthetic treatments previously proposed to her, due to her option to avoid any more significant wear of your teeth. Therefore, the restoration of this white spot would not be considered as a therapy for this case.

Thus, aiming at an individualized treatment, less invasive, and with a minimum of dental wear, we opted for the use of infiltrants, as it is an alternative that has shown promising and interesting results for the masking of white spot lesions.^[2,7,11-15] The mechanism of action of the infiltrant occurs from the initial application of 15% hydrochloric acid, similar to microabrasion, followed by washing and application of a solvent that removes water from the spaces that should be occupied by hydroxyapatite. In this way, the resinous monomers of the infiltrant ($RI = 1.52$) can penetrate through the enamel porosities, and the spaces previously occupied by water ($RI = 1.33$) and/or air ($RI = 1.00$) are now filled by resin in a hybridization process, changing the RI of the white spot in order to make it closer to the healthy enamel ($RI = 1.62$) and thus making the color of the lesion similar or closest to the tooth color.^[7]

Despite the clinical descriptions of esthetic success in masking white spot lesions, the majority reports the treatment of superficial white spots, which are best achieved and infiltrated by fluid resin.^[7,11,14,15] The infiltrant has also been indicated in deep lesions, when associated with an increase in the number of acidic cycles applied or even associated with superficial restorations, after dental microwear on the body of the lesion.^[2] For the present clinical case, an increase in acidic cycles was chosen in order to avoid additional wear of the tooth, as requested by the patient herself, even if this resulted in not completely eliminating of the white spot. The possibility of not completely masking the white spot was previously discussed and

accepted by the patient, the most interested and active agent in this decision.

The most relevant doubts regarding the indication of this treatment refer to its longevity and the color stability of the infiltrated resin, since there are no reports of side effects in the literature.^[12] Cazzolla *et al.*^[7] reported satisfactory and stable results after 4-year follow-up of infiltrated white spot, using a protocol similar to that described in this clinical case.^[7] It should be noted that the esthetic result of infiltrated white spots seems to improve over time and that improvement seems to be justified by the rehydration of the enamel and the spot, previously dehydrated by the use of alcohol.^[5,15] In the present case report, the infiltrating product was able to mask the entire length of the white spot, which lost the opaque aspect and started to appear brighter and with a color closer to the tooth. Although the treatment was not able to completely eliminate the white spot, its esthetic result contemplated the patient's desires for improvement in her smile, without the need to receive esthetic restoration in composite resin.

The use of resin infiltrant has been reported as a safe, microinvasive approach with stable results for masking superficial white spot lesions in dental enamel, although this is not an indication of the manufacturer. In the present clinical report, the application of the resin infiltrant was able to mask a deep white spot caused by molar and incisor hypomineralization, without the need for additional dental wear, being effective in the esthetic and conservative treatment of the lesion.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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