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(CASE REPORT)

Treatment of white spot lesions: A minimal intervention approach: Case Report

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Abstract

Background: A case report that seeks a minimally invasive alternative as a solution to one of the problems in dental esthetics, the presence of white spots.

Objective: To identify non-invasive alternatives for the elimination of white spots in healthy teeth.

Methods: Two patients were selected with white stain lesions on the vestibular surface. Three different techniques were applied for the removal of white stains. One technique called Microabrasion (Opalustre, Ultradent), another technique known as Infiltration (Icon Vestibular, DMG) and finally a combination in which both products were applied, following in all cases the manufacturer's indications.

Results: The different techniques and products eliminated the white spot lesion when these are no more than 0.20 mm deep at the enamel level.

Conclusions: Enamel alterations which can be related to different factors such as white spots caused by caries in the first phase, hypomineralization, hypoplasias in dental pieces of which an alternative treatment is the use of microabrasion (Opalustre, Ultradent), and infiltrating resins (Icon Vestibular, DMG) as a non-traumatic method for the dental pieces, thus maintaining their structure without tenacity.

Keywords: White spot; Vestibular; Opalustre; Infiltrating resin

1. Introduction

One of the problems in aesthetic dentistry is enamel alterations, which can be eliminated with different alternatives, such as the use of microabrasives (Opalustre, Ultradent), and infiltrating resins (Icon Vestibular, DMG) as a non-traumatic method for dental pieces, thus maintaining their structure without the need for mechanical wear. (1)(3)

White spots on dental pieces are an alteration that can be caused by a highly cariogenic diet, poor oral hygiene, previous orthodontics, acidic salivary pH or fluoride consumption, and are the result of an imbalance which causes demineralization of the tooth enamel due to the presence of bacteria and acids in the oral cavity. (4)(5). It is necessary to mention that one of the indications of the microabrasion and infiltration system is non-cavitated caries, since the action of an abrasive chemical product could change the structure of the tissues. (1)(3)

Furthermore, the demands of the population have been increasing due to the search for a more aesthetic and unified smile in recent decades. That is why the conservative treatment of discolorations has been proposed using a microabrasive and an infiltrating, which is an alternative to the use of veneers, crowns, internal bleaching, and at the same time preserving the dental structure to the maximum. (1)

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Microabrasives are a paste of chemical and mechanical abrasion used to polish and brighten dental surfaces. It contains fine abrasive particles that help remove surface stains and smooth irregularities in the dental enamel. (11) Resin infiltrating is used to treat white spots on the dental enamel, such as those caused by incipient caries, hypomineralization, or hypoplasia. This product is applied directly to the spots and penetrates the enamel due to the application of an etching acid composed of 15% hydrochloric acid, the resin infiltrating composed of TEGMA 0% filler will also be applied, which will have the function of filling the pores and improving the aesthetic appearance of the teeth. (2)(10)

When used together, microabrasion and infiltration can complement each other in the treatment of white spot lesions and aesthetic defects on dental enamel. Opalustre, Ultradent is used to polish and brighten dental surfaces before applying vestibular resin infiltrating, preparing the enamel for better adhesion of the resin infiltrating (Icon Vestibular, DMG). This way, a more complete and long-lasting aesthetic improvement can be achieved. (12)

The objective of this work is to identify minimally invasive techniques for the treatment of white spot lesions.

2. Methods

2.1. Research design

This case report followed the guidelines of the CARE for reporting clinical cases. (17). Two products indicated for the treatment of white spot lesions with a minimal intervention approach were selected. The manufacturer's instructions were followed for both the microabrasion technique (Opalustre, Ultradent) and the application of the infiltrating resin (Icon Vestibular, DMG), as well as for the mixed technique.

2.1.1. Microabrasion

1) Determination of the area to be treated, 2) Performing dental prophylaxis, 3) Taking photographs, 4) Protection of soft tissues with rubber dam along with gingival protector, 5) Application of microabrasives on the dental surface, approximately 1 mm thick in the area to be treated using the cup provided by the manufacturer at 500 rpm (revolutions per minute) for 1 minute with moderate to strong pressure, 6) Aspirate and rinse and 7) Repeat as necessary

2.1.2. Infiltrating Resin

1) Determination of the area to be treated, 2) Performing dental prophylaxis, 3) Taking photographs, 4) Applying ICON Etch for 2 minutes, 5) Rinse and dry for 30 seconds to prepare, 6) Apply ICON Dry for an additional 30 seconds (repeat this procedure 3 times), 7) Apple infiltrating resin (Icon Vestibular, DMG) for 3 minutes, disperse for 40 seconds, 8) Use dental floss to remove excess material, 9) Light-cure for 40 seconds and 10) Polish the surface

2.1.3. Combination of microabrasive followed by infiltrating resin

1) Determination of the area to be treated, 2) Perform dental prophylaxis, 3) Take photographs, 4) Protect soft tissues with a rubber dam and gingival protector, 5) Application of microabrasives on the dental surface, approximately 1 mm thick in the area to be treated, using the cup provided by the manufacturer at 500 rpm (revolutions per minute) for 1 minute with moderate to strong pressure, 6) Aspirate and rinse, 7) Repeat as necessary, 8) Placement of ICON Etch for 2 minutes, 9) Rinse and dry for 30 seconds to place, 10) Apply ICON Dry for an additional 30 seconds (repeat this procedure 3 times), 11) Apply infiltrating resin for 3 minutes, disperse for 40 seconds, 12) Pass dental floss to remove excess material, 13) Photocure for 40 seconds and 14) Polish the surface

2.2. Participants

Two female participants, aged 17 and 31, were selected. One of them had white spot lesions on the vestibular surface of two teeth associated with previous orthodontic treatment. The second participant had a white spot lesion associated with enamel hypoplasia. Both patients met the inclusion criteria for the application of the products: healthy periodontium, white spot lesions on the vestibular surfaces without cavitation, teeth free from cavitated white spot lesions, teeth free from calculus, and poorly adapted restorations.

2.3. Consensus process

Initially, scientific articles on microabrasion and resin infiltration (Opalustre, Ultradent) were reviewed, including their composition, benefits, contraindications, and application protocols. Informed consents with detailed information were sent to the participants, including their identification, and they were asked if they agreed with the procedures.

Additionally, it was explained that photographs would be required for data collection, and that all the obtained information would be used confidentially and for non-profit purposes. Furthermore, it would be published for informational and research purposes.

3. Clinical case report

In the following cases, the classification of Gorelick, et al, were took into account for white spot based on both the size and intensity of the lesions. Class I: Healthy enamel, without the formation of white spot lesion; Class II: Mild white spot lesion present; Class III: Severe white spot lesion present; Class IV: Cavitational white spot.

3.1. Case 1

A 17-year-old mixed-race female patient presented for consultation due to the presence of Class II white spots on premolars caused by previous orthodontics, which she wished to eliminate, for which the use of the resin infiltration technique (Icon Vestibular, DMG) was selected. To begin with, the piece to be treated was selected, in this case it was piece 1.5, a prophylaxis was performed and photographs were taken (A) the resin infiltration protocol in which we first applied ICON Etch for 2 minutes (B), after this time we washed and dried for 30 seconds (C) to apply ICON Dry for 30 seconds more (D), we repeated this procedure 3 times. Figure 1.

Figure 1(A) Initial clinical case, showing the presence of white stains in tooth 1.5. (B) Application of ICON Etch. (C) washing and drying. (D) application of ICON Dry on piece 1.5, protocol was repeated 3 times consecutively.

Next, ICON Inflitrant (A) was applied for 3 minutes, we dispersed for 40 seconds and flossed to avoid excesses, after that time we light cured (B) for 40 seconds and polished (C). The result after placement of the white stain was attenuated by 90% after placement of the initial product, the results being favorable. Immediately after the application of the resin infiltrating (Icon Vestibular, DMG), the final result of tooth 1.5 (D) shows a homogenization of the white stains on the vestibular side compared to the initial image, the white stain was attenuated by about 90%. Figure 2.

Figure 2 (A) Application of ICON Infiltrating. (B) light curing and. (C) polishing. (D) Final result after placing the resin infiltrating in the piece 1.5. (E) Control 1 month after treatment

To conclude, one month after the placement of the infiltrating resin (E), control photographs were taken to see if there was any change and it was found that there was no regression of the white spot lesion.

3.2. Case 2

The same patient as in the previous case, presents white class II stains, which want to be eliminated, for which the microabrasion technique (OPALUSTRE, ultradent) was selected.

To begin with, prior to the microabrasion, a prophylaxis of the surface to be treated was performed, then the operative field was isolated from the first molar to the central incisor, with a rubber dam, staples and gingival protector to hold the staple more firmly in the molar (A). Next, the Luer cap of the Opalustre, was removed and the white mac tip was adapted (B), before applying it intraorally, the flow of the substance was checked and then a layer of 1.0mm thickness was applied on the vestibular side of the premolar (C), a rubber cup (D) was fitted and medium to strong pressure was applied for 60 seconds. Figure 3.

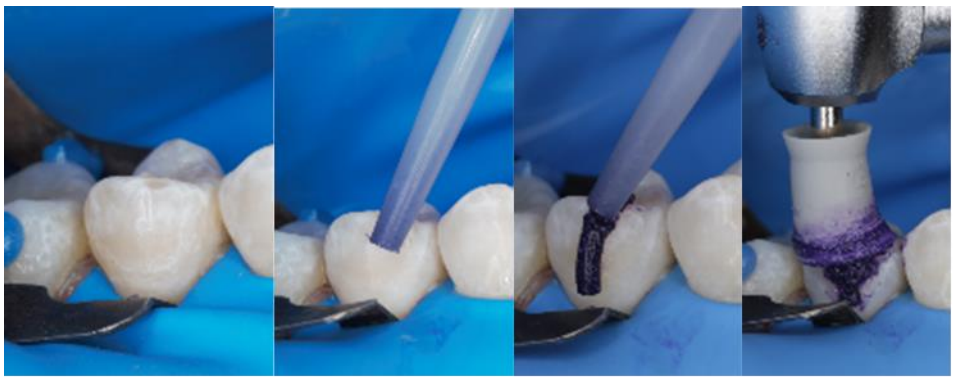

Figure 3 (A) The presence of white spots is observed in the piece 2.5. (B) Adaptation of the White mac tip. (C) Application of OPALUSTRE. (D) Adaptation of rubber cup, application of OPALUSTRE

Finally, the tooth surface was dried and washed (A) and immediately after the application of the products the final result of the piece 2.5 (B) is observed where there is a homogenization of the white stains on the vestibular side compared to the initial image, the white stain was attenuated by about 80%. To conclude after one month after the placement of the products (C) control photographs were taken to see if there was any change and it was found that there was no regression of the white spot lesion. Figure 4.

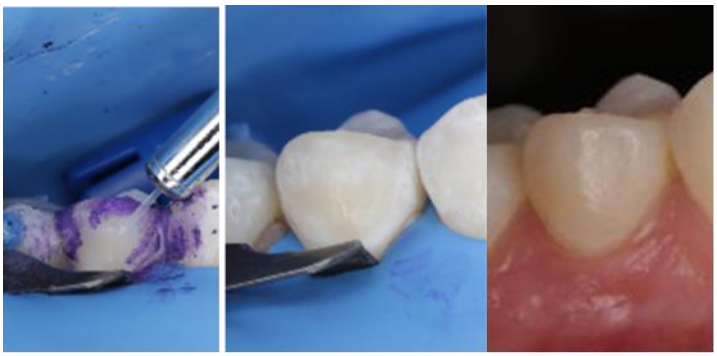

Figure 4 (A) Washing and drying. (B) Final result. (C) Control 1 month after treatment

3.3. Case 3

Patient 31 years old, with a white spot lesion in piece 3.3 (A) class III due to orthodontic retainer. To begin with, a prophylaxis of the surface to be treated was performed, photographs were taken and then relative isolation was performed.

Next, three applications of Opalustre, Ultradent (B) of 1 mm thickness were performed, using Young's cup at 500 rpm for 1 minute and; after washing, we performed three applications of resin infiltrating. We started by placing ICON Etch (C) for 2 minutes, washed and dried for 30 seconds, as a second step we applied ICON Dry for 30 seconds more, and repeated this process 3 times; and, finally, we applied infiltrating resin (D) for 3 minutes and dispersed for 40 seconds, flossed to avoid excesses, light cured for 40 seconds and polished the surface.

In comparison between Case 1 and 2 we can conclude that both protocols are functional in superficial stains not greater than 0.2 mm in depth since in Case 3 in the final result (E) there was no notable clinical improvement in the reduction of the extension and appearance of the stain lesion in spite of using a combination of microabrasive followed by infiltrating resin. Figure 5.

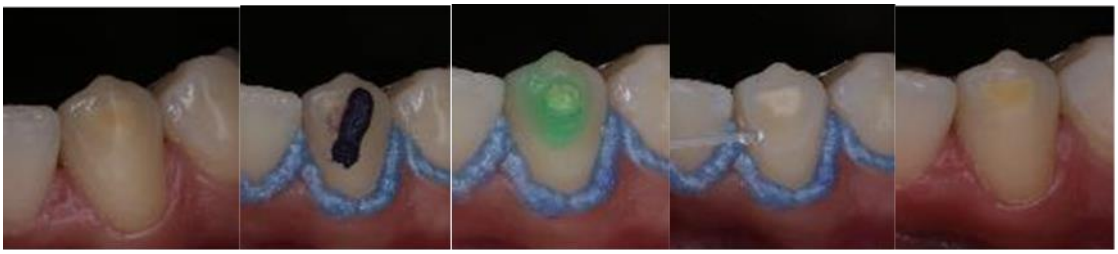

Figure 5 (A) The presence of white spots is observed in the piece 3.3. (B) Placement of opalustre. (C) ICON Etch resin infiltrating protocol. (S) Completion of resin infiltrating application. (T) Final result

4. Discussion

Current studies demonstrate that microabrasion is a highly conservative and effective treatment for minimal enamel alterations. The depth of the defect is crucial for the success of enamel microabrasion, correcting up to a maximum of 0.2 mm of depth in opaque white, brown, or multicolored stains caused by demineralization. (1)(6). The way in which this product inhibits the progression of the demineralization process is through the blocking of diffusion channels, preventing hydrogen ions from penetrating the enamel. In this way, the tooth will not lose minerals, and the advancement of tooth decay will be halted even in the presence of acids. One of the main advantages of resin infiltrating (Icon Vestibular, DMG) is the remineralization of non-cavitated cariogenic lesions, both in the interproximal area and on the free surfaces.

In a study conducted at Süleyman Demirel University in Turkey, 100 patients with hypomineralization and fluorosis on anterior teeth were treated with resin infiltrating (Icon Vestibular, DMG) and microabrasives (Opalustre, Ultradent). The results showed a clinically significant difference. Similarly, a study at Cairo University in Egypt treated 20 patients with post-orthodontic white spots using the same techniques, yielding good results. These findings align with our cases, which also demonstrated satisfactory results in the elimination of white spots. (14)(15)

In a review conducted at the University of Baghdad, Iraq, 48 teeth with white spots were treated with microabrasive (Opalustre, Ultradent) and resin infiltrating (Icon Vestibular, DMG). The results indicated that the resin infiltrating was more effective, although both treatments showed good results, highlighting that the effectiveness depends on the depth of the spot, which aligns with our conclusions. Similarly, a literature review at the Catholic University of Cuenca evaluated 13 clinical cases of patients with various dental stains, using the same techniques. It was determined that both treatments were effective for stains less than or equal to 0.2 mm, while deeper stains showed no significant difference in results, corroborating our findings in three similar clinical cases. These studies support the efficacy of microabrasion and resin infiltrating as conservative treatments for eliminating white spots, coinciding with our results.

Finally, in a randomized clinical experimental study conducted in Tungurahua, Ecuador, the satisfaction level of patients with dental fluorosis treated with Opalustre (Opalustre, Ultradent) was evaluated, and a maximum satisfaction level was obtained. These results coincide with the success of our case 2, in which we only used Opalustre (Opalustre, Ultradent) and obtained good results. (13)

5. Conclusion

The alterations of the enamel can be related to different factors, and one alternative treatment is the use of microabrasives and infiltrating resins as a non-traumatic method for dental pieces. It is worth noting that the use of both methods will have better results if performed on superficial lesions of a maximum of 0.2 mm and not on deeper stains, as there will be no noticeable changes.

Clinical photographs are a highly useful tool for documenting the treatment's progress and comparing its success. As observed in the photographs taken one month after the application of the procedures, we can conclude that it was a successful treatment, as there were no unfavorable changes and the results were evidently immediate.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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