

Use of Resin Infiltrate for the Treatment of White spot Lesions on Dental Enamel: Case Report

Utilização de Infiltrante Resinoso Para o Tratamento de Lesões de Mancha Branca do Esmalte Dental: Relato de Caso

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Recebido em: 29/01/2019

Aprovado em: 30/04/2019

Abstract

Early diagnosis of white spot lesions allows non-invasive treatment to be indicated for the remineralization of active lesions. The goal was to report the clinical Protocol for the treatment of white spot lesion of a patient by the technique of resin infiltration, observing whether there is change of color on the white spot of the dental enamel after its treatment. The selected patient was 16 years old with good overall health, who featured white spot lesion of the dental enamel on tooth 13, classified as ICDAS score 2. The tooth was photographed, and its color was evaluated with the spectrophotometer in accordance with the CIELhC system. For comparison purposes, the color of tooth enamel in an area adjacent to the lesion was evaluated. The treatment of the lesion was performed with the resin infiltrate Icon (DMG, Hamburg, Germany), following the manufacturer's instructions. The color of the tooth was re-evaluated after the application of the resin infiltrate. At the end of the procedure, it was observed that the treatment of white spot lesion by resin infiltration technique reached its goal because, in addition to being minimally invasive, it was highly approved by patient and it provided the masking of the white spot lesion on the dental enamel.

Keywords: Dental Caries. Dental Enamel. Composite Resins.

Resumo

O diagnóstico precoce de lesões de mancha branca permite que um tratamento não invasivo seja indicado para a remineralização das lesões ativas. O objetivo foi relatar o protocolo clínico para tratamento de lesão de mancha branca ativa de um paciente pela técnica do infiltrante resinoso, observando se existe alteração de cor da mancha branca do esmalte dental após o seu tratamento. Foi selecionada uma paciente, de 16 anos de idade, com boa saúde geral e que apresentava lesão de mancha branca no esmalte dental do dente 13, classificada pelo escore 2 do ICDAS. O dente foi fotografado e sua cor foi avaliada com o espectrofotômetro de acordo com o sistema CIELhC. Para fins de comparação, foi avaliada a cor do esmalte dental em uma área adjacente à lesão. O tratamento da lesão foi realizado com a resina infiltrante Icon (DMG, Hamburgo, Alemanha), seguindo as recomendações do fabricante. A cor do dente foi reavaliada após a aplicação do infiltrante. Ao final do procedimento, observou-se que o tratamento da lesão de mancha branca pela técnica da resina infiltrante atingiu seu objetivo pois, além de ter sido minimamente invasiva, foi bem avaliada pela paciente e proporcionou o mascaramento da lesão de mancha branca do esmalte dental.

Palavras-chave: Cárie Dentária. Esmalte Dentário. Resinas Compostas.

1 Introduction

Caries is an infectious disease of nature, of slow progression, which includes local factors, such as the microorganisms present in saliva, the host's diet and the presence of biofilm on the surface of the enamel, as well as the modifying factors, such as the frequency of oral hygiene and the socio-cultural condition of the individual.¹ The enamel is a rigid structure that covers the entire dental crown and is in direct contact with the oral environment. It is the most mineralized tissue of the human body, consisting of more than 96% of inorganic matter, in the form of crystals of apatite, and traces of organic matter. Though the enamel is a tissue without vitality, it is permeable, and ionic exchange can occur between the enamel and the environment of the oral cavity, particularly with the saliva.² The ionic exchange with the biofilm and loss

of structures in the enamel can cause its demineralization, leading to the appearance of white spots on the hard tissue.¹

The white spot lesions indicate the beginning of dental caries. Clinically, they may be active or inactive. The active spots are characterized by rugged and opaque white enamel, in places of retention of biofilm. Whereas the white inactive spots have a glossy appearance and surface smoothness. It is also possible that these lesions become brownish due to absorption of extrinsic pigments by decalcified enamel.³

Recent studies showed that the diagnosis of white spot lesions allows non-invasive treatment to be indicated for the remineralization of active lesions.^{4,5}

A method regularly used in dental offices is the topical application of fluoride. In addition to the remineralization of teeth, the advantages of topical application of fluoride

professional include low cost, duration of treatment and the low risk of ingestion of fluoride, reducing the chances of appearance of dental fluorosis.⁶ However, in spite of the fluoride compounds remineralize the tooth, the enamel is affected by the lesion will continue to present a more whitish appearance, contrasting with the tissue healthy appearance, compromising the tooth aesthetics.⁷

In an attempt to achieve a reduction in the progression of this white spot lesion, some studies have been conducted on the use of a resinous infiltrating, which would be able to penetrate in the demineralized enamel and promote its remineralization. These infiltrates, developed at the beginning of the 21st century, are described as a low-viscosity resin that penetrates the enamel creating a barrier to diffusion inside the white spot lesion, allowing replacement to be performed of the mineral lost by the resin applied.⁸ This minimally invasive technique allows initial caries lesions to be treated in a single session, without anesthesia, cavitory preparation, abrasion of the enamel or complaints of pain. The literature shows that the treatment with infiltrating resins turns the treated enamel more resistant to the action of acids.⁹

In 2009, the commercialization of the infiltrating resin ICON (DMG Chemisch-Pharmazeutische Fabrik GmbH, Hamburg, Germany) which exhibits low viscosity and high coefficient of penetration.¹⁰ It acts by capillary force, this highly viscous infiltrate is absorbed by the system of pores of the caries lesion, filling, stabilizing it and preventing further penetration of cariogenic acids, promoting caries control. This biomaterial encapsulates the enamel prisms that were demineralized enamel by the caries process, hindering the progression and the cavitation of the lesion through strengthening the remaining structures of the enamel.¹¹

According to Torres et al. an important difference between the technique of infiltration and the techniques of topical application of fluorides create a barrier to diffusion only superficially, while in the technique of resinous infiltration the barrier is formed both on the surface and in the interior of the enamel, reinforcing the demineralized structure with a resinous matrix, hindering the progression of the lesion.¹² When using the technique of infiltrating resin it is possible to obtain some benefits, such as the mechanical stabilization of the demineralized enamel achieved after the polymerization of the infiltrating resin, the preservation of the hard healthy structure, stimulating the remineralization process, the permanent closure of superficial pores and cavities and a minimized risk of development of secondary caries for not leaving gaps for infiltration of saliva and microorganisms.¹³⁻¹⁵ The initial caries lesions are active as a characteristic of the white spots, which are the result of the optical effect from the scattering of light, which occurs due to the different indices of refraction. When the porosities are filled by air there is a greater dispersion, in virtue of the index of refraction of the air (1.00) to be lower than that of the hydroxyapatite (1,62-1,65),

leading to an opaque and whitish appearance. Even though out non-invasive treatment with fluoride is performed, the white spot may remain, even if there is a standstill of the lesion. This is because, the remineralization is only superficial. On the other hand, in the infiltration technique the filling occurs by capillary action, reaching the interior of the lesion, where they may be masking of that lesion, since the index of refraction of the infiltrating resin is 1.51 being similar to the hydroxyapatite.¹¹

Thus, it was observed that the technique of infiltrating resin is innovative and has the potential to establish itself in the daily practice of the dental surgeon.

The objective of this study was to evaluate the feasibility of treating the white spot lesion through the technique of infiltrating resinous, reporting the clinical protocol of treatment in a patient, observing if there is a change in the color of the white spot of the enamel after its treatment.

2 Case Report

The study herein was approved by the Committee for Ethics in Research with human beings (CAAE No. 65927817.4.0000.5145.)

A 16-year-old female patient was chosen, who had a good general health and presented the tooth 13 with active white spot lesion on the face of the incisal tooth. (Figure 1). The selected tooth got the score 2 of the ICDAS criterion-II (International Caries Detection and Assessment System) for diagnosis of caries.¹⁶ The evaluated tooth showed no restorations, but a small fracture in the incisal face. According to the literature, patients in this age group comprise a group with a high incidence of white spot lesions in the enamel, mainly due to the lack of proper hygiene.¹⁷

Figure 1 - Initial clinical aspect of the lesion of white spot lesion tooth 13.



Source: The authors.

After acceptance of participation in the research, by signing the informed consent form by the patient, and through the signing of the informed consent by the patient, a minor one, the clinical procedures were initiated.

The tooth received prophylaxis with prophylactic paste and rubber bowl (Figure 2). Prior to the reading of the initial color

of white spot and the enamel adjacent to the lesion with the spectrophotometer Easysshade Compact Advance V (Wilcos do Brasil Indústria e Comércio Ltda., Petropolis-RJ, Brazil) (Figure 3), in accordance with the CIELCh system, where L represents the brightness, C represents the chroma and h represents the tone or hue of the face of the tooth. The initial analysis showed, for the white spot lesion, the values of L=-0.5; C= 5.4 and h= 1.5. In accordance with the spectrophotometer, these values lead to color A3 of the scale Vita Classic (Wilcos do Brasil Indústria e Comércio Ltda). Whereas to the enamel adjacent to the lesion, the initial values were found for L=9.1; C= 11.2 and h=0.2, corresponding to the color a3,5 in Vita Classic scale.

Figure 2 - Prior prophylaxis.



Source: The authors.

Figure 3 - Reading of the initial color of white spot and the enamel adjacent to the lesion



Source: The authors.

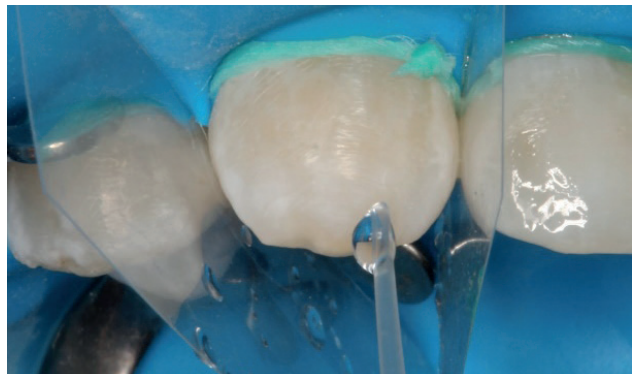
The treatment of white spot lesions was performed according to the instructions provided by the manufacturer of the resin infiltrating Icon (DMG, Hamburg, Germany). After the absolute isolation of the anterior teeth, the conditioning of the white spot lesion was performed with Icon-Etch hydrochloric acid (15%) for 2 minutes (Figure 4), followed by washing with water for 30 seconds. After the removal of the Icon-Etch, the surface was dried with compressed air for 30 seconds, followed by the application of Icon-Dry (99% ethanol) for 30 seconds (Figure 5) and drying with compressed air for 30 seconds.

Figure 4 - Conditioning of the white spot lesion with Icon-Etch (hydrochloric acid 15%) for 2 minutes.



Source: The authors.

Figure 5 - Application of Icon-Dry (99% ethanol) for 30 seconds.



Source: The authors.

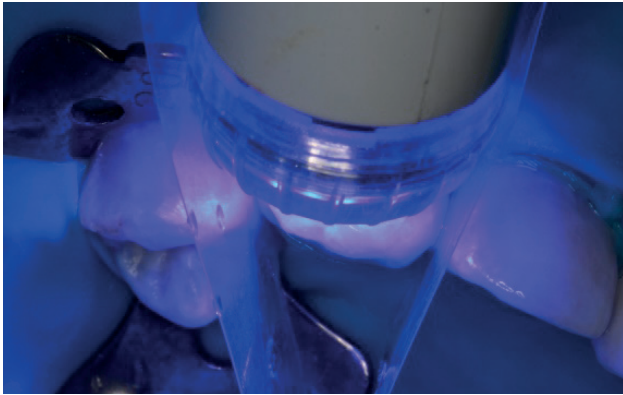
After drying, the Icon-Infiltrate (resin matrix based on methacrylates, initiators and additives) was applied on the surface (Figure 6), leaving it to operate on the demineralized enamel for 3 minutes. Then, the excesses of the infiltrating resin were removed from the proximal surfaces with floss and, subsequently, photo activation was performed of the product for 40 seconds (Figure 7) with the light curing unit Radium-cal (1200mW/cm²; SDI Limited, Bayswater, Victoria, Australia). After the application of light, the Icon-Infiltrate was reapplied on the enamel surface of the cured unit. Then polishing of the treated surface was performed with abrasive rubber tips (Figure 8). For the purpose of standardization, the treatment will be performed by the same researcher.

Figure 6 - Application of Icon-Dry (99% ethanol) for 30 seconds.



Source: The authors.

Figure 7 -Photo activation for 40 seconds.



Source: The authors.

Figure 8 - Polishing of the photo activated enamel surface.



Source: The authors.

After the treatment, the color of the treated enamel was again evaluated by a spectrophotometer. At the end of treatment (Figure 9), it was observed that, clinically, the result was effective, because it was able to change the color of the white spot, turning it more similar to other regions of the tooth. In accordance with the final reading of the spectrophotometer, the treated lesion presented $L=2.4$; $C=4.8$ and $h=0.2$. This shows that the treated lesion was clearer, less saturated and with yellowish tone similar to the adjacent enamel. According to the equipment, the treated lesion corresponded to the color A3,5 Vita Classic scale, the same y of the adjacent enamel.

Figure 9 - Final result.



Source: The authors.

After the conclusion of the case, the patient was counseled and motivated to achieve an adequate oral hygiene, stressing the importance of the use of fluoride compounds to prevent the appearance of new white spot lesions in the enamel. Due to the results obtained, it was observed that the treatment of white spot lesion by resin infiltration technique reached its goal because, in addition to being minimally invasive, it was highly approved by the patient and it provided the masking of the white spot lesion of the dental enamel.

3 Conclusion

It was observed that the technique of infiltrating resin has the potential to establish itself in the daily practice of the Surgeon-Dentist, because the clinical evaluation and the results obtained in the initial evaluation with the spectrophotometer provided the masking of the lesion of white spot lesion in dental enamel.

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