

## Resin Infiltration in the Treatment of Enamel Hypoplasia: Case Report

*Resina Infiltrante no Tratamento da Hipoplásica de Esmalte: Relato de Caso*

*Resina Infiltrante en el Tratamiento del Esmalte Hipoplásico: Reporte de Caso*

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### Abstract

Objective: this case report aims to describe the clinical the treatment of enamel hypoplasia in tooth 11, in a 23-year-old female patient, through the resinous infiltrating. Case report: briefly, the hypoplastic lesion was treated with 15% hydrochloric acid for 2 minutes. Then 99% alcohol was applied over the lesion for 30 seconds and resin infiltration for 3 minutes, followed by light curing for 40 seconds. Again, infiltrating resin was applied for 1 minute and light cured. After that, finishing and polishing were carried out with finishing cup and polishing discs, followed by a felt and paste disk. Conclusion: it can be concluded that the protocol used in this case report proved effective and produced excellent esthetic results.

**Descriptors:** Resin Infiltration; Dental Enamel Hypoplasia; Cosmetic Dentistry.

### Resumo

Objetivo: este relato de caso tem como objetivo descrever o tratamento clínico da hipoplasia de esmalte no dente 11, em uma paciente do sexo feminino de 23 anos, por meio de um infiltrante resinoso. Caso clínico: resumidamente, a lesão hipoplásica foi tratada com ácido clorídrico 15% por 2 minutos. Em seguida, aplicou-se álcool 99% sobre a lesão por 30 segundos e infiltração da resina por 3 minutos, seguida de fotopolimerização por 40 segundos. Novamente, a resina infiltrante foi aplicada por 1 minuto e fotopolimerizada. Posteriormente, foram realizados o acabamento e o polimento com taças de acabamento e discos de polimento, seguidos por disco de feltro e pasta. Conclusão: pode-se concluir que o protocolo utilizado nesse relato de caso mostrou-se eficaz e produziu excelente resultado estético.

**Descritores:** Infiltração Resinosa; Hipoplasia do Esmalte Dentário; Odontologia Estética.

### Resumen

Objetivo: este caso clínico tiene como objetivo describir el tratamiento clínico de la hipoplasia del esmalte en el diente 11, en una paciente de 23 años, utilizando un infiltrante resinoso. Caso clínico: brevemente, la lesión hipoplásica se trató con ácido clorhídrico al 15% durante 2 minutos. Luego, se aplicó alcohol al 99% a la lesión durante 30 segundos e infiltración de resina durante 3 minutos, seguido de fotopolimerización durante 40 segundos. De nuevo, la resina infiltrante se aplicó durante 1 minuto y se fotopolimerizó. Posteriormente, se realizó el acabado y pulido con cuencos de acabado y discos de pulido, seguido de disco de fieltro y pasta. Conclusión: se puede concluir que el protocolo utilizado en este reporte de caso demostró ser efectivo y produjo un excelente resultado estético.

**Descritores:** Infiltración Resinosa; Hipoplasia del Esmalte Dental; Odontología Estética.

### INTRODUCTION

The change in the esthetic perception of teeth can be caused by white staining, hypocalcifications of color imperfections and other flaws, which can generate frustration and worry when smiling and negative impacts on the quality of life of individuals<sup>1</sup>.

The development of enamel hypoplasia involves alterations that affect the dental enamel during the matrix formation stage, resulting in the reduction of enamel quantity and/or quality. Teeth with small levels of hypoplasia may change only in quality, as in color (milk-white, beige, brown or dark yellow). Great changes in

the matrix affect fossils, cracks, or cause major loss of some areas of enamel<sup>1,2</sup>. The severity of hypoplastic sequelae is associated with different factors, especially trauma to deciduous teeth that affect permanent ones, which are currently considered a public health problem<sup>1</sup>.

The treatment of dental hypoplasia depends on the extent of the destruction of enamel. For mild and moderate levels of enamel hypoplasia, tooth bleaching is the better option of procedure, however it is often insufficient to satisfy the esthetic results expected by patients<sup>3</sup>. In these cases, resinous infiltration of the white spot lesions is an excellent treatment option.

This technique is less invasive compared to conventional methods, such as restorative procedures with composite resin or porcelain veneers and full crowns<sup>4</sup>.

The concept of resinous infiltration was developed by Charite Berlin as a noninvasive approach in the treatment of carious lesions not cavitated on smooth surfaces<sup>5</sup>. The erosion technique with small enamel removal (30–40 µm), using acid attack and subsequent resin infiltration, aims to interrupt caries<sup>6</sup>. Nowadays, the infiltrating resin is used to fill the microporosity and opacity of hypomineralized tooth enamel, which is an innovative proposal as an esthetic method in the treatment of hypoplasia stains and enamel fluorosis, presenting promising results to mask the defect of white spots *in vitro* and *in vivo* studies<sup>7,8</sup>.

Therefore, the purpose of this article is to present a clinical case of esthetic treatment of removal of enamel hypoplasia stain using the resin infiltration.

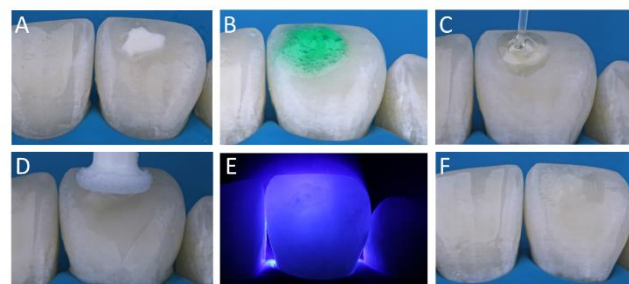
#### CLINICAL CASE

A female patient, 23 years old, was complaining about the evident white spot on tooth 11. After anamnesis and clinical examination, the esthetic treatment with application of resin infiltration (Icon-DGM) was proposed to remove the hypoplastic enamel spot.

Firstly, dental prophylaxis was performed with Robson's brush and pumice stone (Kerr Corporation, Orange, CA, USA) followed by shade selection (Vitapan Classical® Shade Guide, Bad Säckingen, Germany).

The resin infiltration technique on smooth surfaces (Icon®, smooth surface kit, DMG, Hamburg, Germany) was carried out as recommended by the manufacturer. For this, prophylaxis of the region was performed using a rubber cup and prophylactic paste followed by absolute isolation with a rubber dike from premolar to premolar of the upper arch. Subsequently, the white spot lesion was treated with 15% hydrochloric acid (Icon-Etch, DMG, Hamburg, Germany) for 2 minutes. The hydrochloric acid (Icon-Etch) was aspirated, and the tooth surface was rinsed with distilled water for 30 seconds and dried with air for 30 seconds. Then 99% alcohol (Icon-Dry, DMG, Hamburg, Germany) was applied over the lesion for 30 seconds and an air-jet application for 30 seconds. Afterwards, the methacrylate-based resin infiltration (Icon-Infiltrant, DMG, Hamburg, Germany) was applied for 3 minutes, followed by light curing for 40 seconds. Again, infiltrating

resin (Icon-Infiltrant) was applied for 1 minute, and the removal of excess material and photopolymerization (Radii Cal Plus®, SDI®, Melbourne, Australia) for 40 seconds (Figure 1). For the final finishing of the resin a finishing cup was used (Jiffy cups abrasives, Ultradent, Indaiatuba, SP, Brazil) and for the polishing, disks were used (Diacomp Plus, Twist, Baden-Württemberg, Germany) in the medium and fine granulations, respectively, followed by felt disk with polishing paste (Enamelize, Cosmedent, Illinois, USA).



**Figure 1:** A) clinical case after tooth whitening with hydrogen peroxide 35%; B) application of 15% HCl (Icon-Etch) for 2 minutes; C) application of alcohol (Icon-Dry) for 30 seconds; D) application of the resin infiltrant for 3 minutes (Icon-infiltrant); E) light-polymerized for 40 seconds; F) postoperative view.

#### DISCUSSION

The removal of hypoplastic enamel stains on anterior teeth has become a common procedure in the dental office, mainly at the request of patients.

Infiltrating resins are basically composed without the addition of inorganic charge in their composition, consisting basically of TEGDMA, an aliphatic dimethacrylate monomer of low viscosity and a high penetration coefficient<sup>9</sup>. Their action mechanism consists of penetrating, infiltrating and consequently sealing the microspaces of subsurface lesions (up to a depth of 450 µm). The TEGDMA monomer is hydrophobic in nature so its penetration in the dental structure is linked to the decrease of water present in the enamel<sup>9</sup>. Therefore, it is necessary to prepare the enamel with hydrochloric acid, followed by alcohol, which causes demineralization, increases porosity, and facilitates the penetration of the resinous infiltrator. Moreover, the penetration is driven by capillary forces and is therefore time-dependent<sup>6</sup>. Resinous infiltration increases the mechanical resistance of hypomineralized and stained enamel<sup>10</sup>, moreover it provides excellent surface smoothness due to the absence of charge particles in the organic matrix.

Resin aging is a disadvantage to taken into account, particularly in patients with poor hygiene and a diet rich in pigmented foods,

constituting a challenge to the clinician<sup>1,6,10,11</sup>. However, studies show that a well-executed polishing technique provides color stability for a period of between 6 to 18 months<sup>5,10,12</sup>. Thus, an excellent polishing and preventive conservation with periodic resin repolishing is of extreme importance for the durability and clinical stability of the material.

Different types of treatment can be used for the esthetic resolution of hypoplastic enamel white spot; however, the choice of treatment should be based on the severity of the disease<sup>1</sup>. In light levels of enamel hypoplasia, as presented in this case, resinous infiltration improves esthetics by eliminating the whitish appearance of the enamel by filling the microporosities of the lesion. When compared to other treatments, such as microabrasion and direct restoration with composite resin, resinous infiltration is a more conservative treatment, because the loss of enamel is minimal - on average 35  $\mu\text{m}$ <sup>13</sup>. In microabrasion, substantial amounts of enamel need to be removed for the complete disappearance of hypoplastic enamel stain and an improvement in the dental esthetics<sup>1</sup>. This can cause a difference in the superficial topography of the enamel and yellowing of the tooth due to a greater visualization, by translucency, of dentin. Moreover, the direct or indirect restoration techniques promote larger enamel wear to mimic the color of the restorative material with the tooth color. When selecting a restorative protocol, it is evident that it is the start of a repetitive restorative cycle, which consists of successive restoration changes over time and consequently successive and progressive wearing out of the tooth structure<sup>9</sup>. The restorative cycle should be extended whenever possible, preventive, and conservative treatment not being an option because most patients seeking this type of treatment are teenagers and young people bothered by small white patches of hypoplasia<sup>1</sup>.

In some cases, bleaching therapy is not enough to produce excellence in esthetic results. This can be explained by the difference in the refractive indices of the different substrates, which in healthy enamel is around 1.65<sup>6,14</sup>, and the hypoplastic enamel is around 1.33 when filled by water and 1.0 when filled by air<sup>15</sup>. The tooth whitening does not fill or seal the empty spaces of the hypoplastic lesion, so the refraction index does not change, so the hypoplastic spot remains clinically noticeable<sup>3</sup>.

In contrast, the hypoplastic enamel filled

with resinous infiltration produces a refractive index of 1.62, which is very close to the refractive index of healthy enamel (RI=1.65), because the resin occupies the empty spaces, which were previously occupied by air and water and thus the lesion becomes clinically imperceptible.

Therefore, it is possible to conclude that resinous infiltration was a viable and efficient technique for the removal of hypoplastic enamel spots of a light degree, producing excellent esthetic results and patient satisfaction.

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#### **CONFLICTS OF INTERESTS**

The authors declare no conflicts of interests.

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