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Aesthetic Resolution of Enamel Hypomineralization in Single Central Incisor: a Case Report

Resolução Estética de Hipomineralização de Esmalte em Incisivo Central Unitário: Um Relato de Caso

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Abstract

Enamel development defects are important complaints of patients, being common in both primary and permanent dentition. This study aims to report a clinical case involving the aesthetic resolution of a permanent maxillary central incisor affected by enamel hypomineralization in a juvenile patient, through the direct restorative technique in a clinical-academic setting. A 16-year-old male patient attended the Clinic School of a college in the north of the state of Minas Gerais complaining of discomfort due to a white spot on the central incisor. In the dental clinical evaluation, a large opaque white spot was observed on tooth 21. The enamel had normal thickness and no surface alteration was observed, consistent with enamel hypomineralization. The decision of the appropriate treatment was taken after the transillumination exam, carried out with the photo-activator device, verifying that the spot was deep. Thus, the treatment option was the restoration with composite resin. The procedure was performed using the stratified technique, using enamel, dentin and effect resins, obtaining an excellent aesthetic result with a wear restricted to the staining area. It may be concluded that a correct diagnostic approach is extremely important for the selection of the appropriate therapy for enamel developmental defects. Composite resin becomes a material of choice when the wear is necessary. Composites have good optical properties and allow less wear compared to dental ceramics.

Keywords: Esthetics, Dental. Composite Resins. Tooth Demineralization.

Resumo

Os defeitos de desenvolvimento de esmalte se apresentam como queixas importantes dos pacientes, sendo comuns tanto na dentição decídua quanto na permanente. O objetivo deste trabalho é relatar um caso clínico que envolve resolução estética de um incisivo central superior permanente afetado por hipomineralização de esmalte em paciente juvenil, através da técnica restauradora direta em ambiente clínico acadêmico. Paciente do sexo masculino, 16 anos de idade, compareceu à Clínica Escola de uma faculdade no norte do estado de Minas Gerais queixando incômodo devido a uma mancha branca em um incisivo central. Na avaliação clínica odontológica observou-se um manchamento branco opaco de grande extensão no dente 21. O esmalte encontrava-se com espessura normal e sem nenhuma alteração superficial, sugerindo ser uma hipomineralização do esmalte. A decisão do tratamento apropriado para o caso então foi tomada mediante um exame de transiluminação, realizado com o próprio aparelho fotoativador, constatando-se que a mancha era profunda, sendo escolhido como terapêutica o desgaste da área de manchamento com posterior restauração em resina composta. O procedimento foi realizado pela técnica estratificada, através de resina de esmalte, dentina e efeito, obtendo-se ao final um resultado estético satisfatório com um desgaste restrito a área de manchamento. Conclui-se que a correta abordagem diagnóstica é de extrema importância para a seleção da terapêutica adequada para os defeitos de desenvolvimento de esmalte. A resina composta torna-se um material de escolha quando há a necessidade de desgaste devido as suas propriedades ópticas interessantes e possibilidade de menor desgaste quando comparado as cerâmicas odontológicas.

Palavras-chave: *Estética Dentária. Resinas Compostas. Desmineralização do Dente.*

1 Introduction

In current daily practice, the dentist has been faced with a growing demand from patients with aesthetic concerns, especially in relation to the shape and color of teeth[1]. Thus, enamel development defects are important complaints of patients, being common in both primary and permanent dentition[2]

Environmental and genetic factors seem to be the main responsible for the enamel developmental disorders, called hypomineralization and hypoplasia. Enamel is characterized as a rigid and calcified tissue, being considered a kind of protection and coating of the internal structures of teeth. Its origin is based on the cellular activity of ameloblasts, which in turn, have high metabolic sensitivity, and as a result, several factors can change these cells, causing anomalies on the tissue surface[3]. These changes may be related to the enamel matrix deposition, mineralization and/or its final maturation, which may result in changes in color, translucency, structure and sometimes in the degree of hardness[2,3].

Understanding how enamel defects occur and the correct nomenclature represent an adequate knowledge of their causes and result in more accurate diagnoses, so that more conscious, conservative and lasting therapeutic actions can be planned and executed[4]. If the disorder occurs during the secretion phase, the enamel defect is called hypoplasia. On the

other hand, if it occurs during the mineralization or maturation phase, it is called hypomineralization, the exact cause being difficult to determine[4].

Initially, the diagnosis of these lesions is made through clinical observation, due to the fact that there are no associated symptoms, because enamel is acellular, avascular and nerve-free[2]. The dentist can also use the transillumination method as a detection tool in the evaluation and diagnosis, which consists of an advanced visual inspection technique, based on light scattering properties in enamel through different light sources[5].

The choice of esthetic treatment for enamel defects depends on the diagnosis of the type of defect and the degree of tissue involvement[4]. Whenever possible, conservative approaches such as tooth whitening, microabrasion and resin infiltration should be the first choice[4]. However, for cases where the staining is deeper or there is marked mineral loss, direct restoration in composite resin becomes the best option[4]. Thus, when properly indicated, the direct restorative technique provides good aesthetic and functional results through a conservative treatment, when compared to the indirect technique[7,8].

This paper aims to report a clinical case involving esthetic resolution of a permanent maxillary central incisor affected by enamel hypomineralization in a juvenile patient, through the direct restorative technique in an academic clinical setting of a Dentistry School in Brazil.

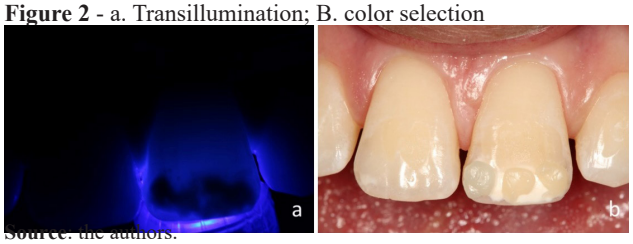
2 Case Report

A 16-year-old male patient attended the clinical-school of a college in the north of the state of Minas Gerais, Brazil, complaining of discomfort due to a white spot on a central incisor. In the clinical dental evaluation, a large opaque white stain was observed on tooth 21 (figure 1). The enamel had a normal thickness and no surface changes, suggesting enamel hypomineralization. The patient was asked about any complications in his pregnancy or some trauma during childhood, however he was unable to inform. Neither the patient nor his mother recognized any possible factor that could cause the white spot. The decision on the appropriate treatment for the case was then taken by means of a transillumination exam, performed with the photo-activator device Radii-Cal (SDI, Victoria, Australia) activated by the palatal surface of the tooth with staining. In this examination, it was observed that the stain was deep and ill-defined (figure 2a). Then, the chosen treatment was a minimum wear restricted to the stained area and subsequent restoration with composite resin.

Figure 1 - Initial appearance

Source: the authors.

Figure 2 - a. Transillumination; B. color selection



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Initially, the composite resin color was selected through a small amount of resin on the enamel. Composite OA3 Brilliant Ever glow (Coltène, Whaledent, Altstätten) was chosen for the dentin area, A1 (Brilliant Ever Glow) for enamel and Translucent Blue Opallis (FGM, Santa Catarina, Brazil) for incisal effect (figure 2b). Then, the preparation of the stain area was carried out with a small diameter diamond tip (1011) in a conservative way, removing only the large stain area (Figure 3a). After preparation, the teeth were absolutely isolated with rubber dam (figure 3b), proceeding to the adhesive stage through etching using phosphoric acid (Condac 37%, FGM, Santa Catarina, Brazil) (Figure 3c), followed by application of the adhesive system Single bond Universal (3M ESPE, St Paul, MN, USA) (Figure 3d). The application of composite resin was performed in 3 increments (dentin, effect and enamel) (figure 4a) following the homologous tooth anatomy (Figure 4b).

Figure 3 - a. Cavity preparation; B. Rubber dam isolation; c. Etching with 37% phosphoric acid. d. Adhesive system application

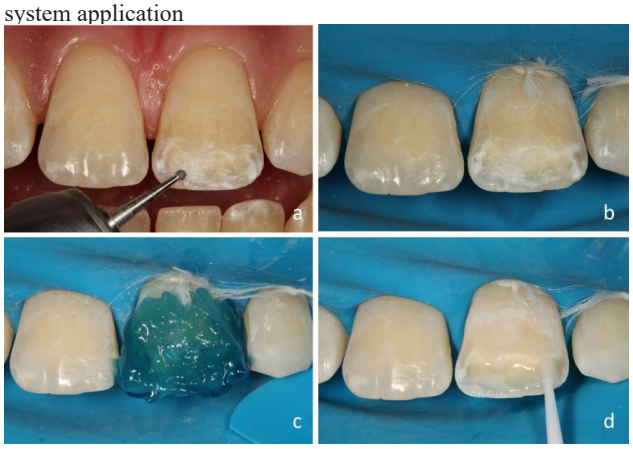

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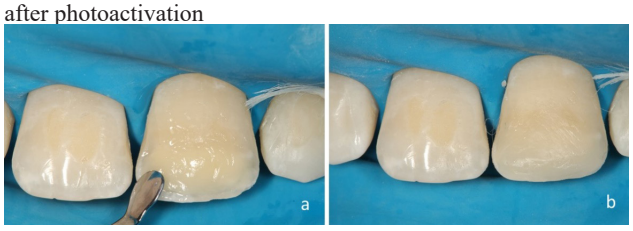
Figure 4 - a. Insertion of composite resin; B. Final appearance after photoactivation



Source: the authors.

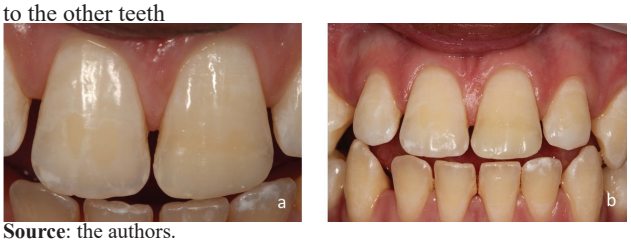
In a subsequent session, the restoration was finished and polished. Initially, the shadow and mirror areas were marked for correct light reflection, and the buccal shape was adjusted

with abrasive discs (TDV Dental Ltda., Pomerode, SC, Brasil) (Figure 5a) followed by thicker abrasive rubber (American Burrs; Porto Alegre, Brazil) (Figure 5b). Then, the texturing phase was carried out with the making of developmental grooves and Horizontal micro texture (perikymata) with a #2135 diamond tip (Figure 5c), which were then smoothed with fine abrasive rubber (American Burrs; Porto Alegre, Brazil). The final polishing was achieved with a goat hair brush associated with a diamond paste (Diamond Polish, Ultradent Products Inc, South Jordan, Utah), obtaining a good contour and surface smoothness (Figure 6a-b).

Figure 5 - a. Initial finish with abrasive disc; b. Use of coarse abrasive rubber; c. Texturing with diamond tip; d. Application of diamond paste with a goat hair brush

Source: the authors.

Figure 6 - a. Final result after polishing b. Front view in relation to the other teeth



Source: the authors.

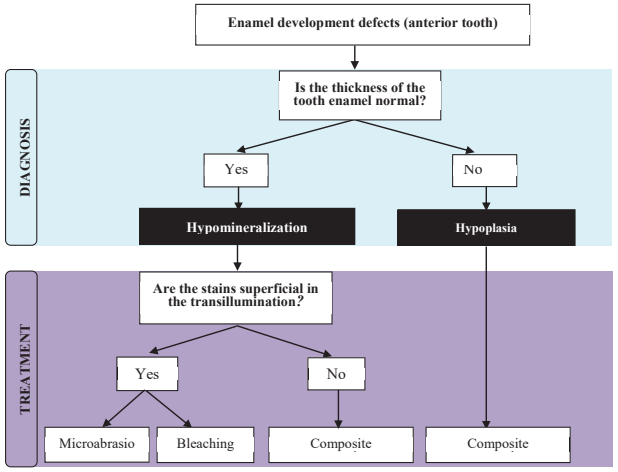
As this is a case report, the proposal was submitted in the form of a scientific paper to the Ethics and Research Committee (CEP) of Pitágoras college (Montes Claros city, Minas Gerais state, Brazil) and approved with number 5.170.310. All the ethical precepts were adopted in accordance with Brazilian Resolution 466/12, ensuring data preservation and confidentiality. This study also contains an Informed Consent Form duly signed by the patient assisted at the school clinic, and thus, the same was informed about the study and also there is an authorization of the educational institution. Thus, the research followed all the necessary ethical precepts.

2.1 Discussion

The prevalence of enamel developmental defects (EDD) shows a wide variation in the permanent dentition in developed countries, ranging from 9 to 68%[9]. These disorders can have a significant impact on the individual's well-being and quality of life related to oral health[10,11].

Conceptually, enamel defects can be classified as hypomineralization or hypoplasia. Hypomineralization is related to a reduced quality of enamel, which will have a normal thickness, but not fully mineralized. Hypomineralization may be seen due to differences in translucency, with the enamel appearing opaque, milky white, or having yellow or brownish discolorations. The appearance of the opaque area characteristic of hypomineralization may be diffuse or well demarcated[4]. On the other hand, enamel hypoplasia refers to a reduced amount of enamel that results in irregularly shaped teeth, which may be pitter, thinner or smaller in size[4]. Given the above, the clinical case in question is characterized as enamel hypomineralization and not hypoplasia, according to the diagnostic criteria established in the flowchart (Figure 7).

Figure 7 - Diagnosis and treatment flowchart of enamel developmental defects



Source: the authors

Hypomineralized enamel may be more prone to caries lesions (when in areas susceptible to bacterial accumulation), in addition to being common for posteruptive breakage, often requiring complex restorations, thus becoming a challenge for the clinician [2]. Some studies have shown relationship between the degree of lesion opacities and degree of porosity[12-14], revealing that creamy/white lesions are less porous when compared with yellow/brown–colored enamel[13]. Thus, it is evidenced that yellow/brown opacities are more prone to evolve into post eruptive degradation when compared with white/creamy opacities[15].

Once the diagnosis of hypomineralization has been made, the next step is to define the treatment to be instituted. For that, the transillumination exam must be performed (Figure 7). In the clinical case referred to, the stain was identified as deep, because it was darkened and poorly defined when light from the photo-activator device was used on the tooth's palatal surface. Thus, the treatment plan involved a conservative composite resin restoration.

When the therapeutic option is composite resin restoration, the removal of enamel defect must be made, however, as the involvement is only of the enamel, removal must be restricted

to it, not requiring any type of dentin intervention. Thus, the direct restoration ends up being more conservative than the indirect technique, minimizing the amount of dental tissue removed from teeth that were damaged by changes in enamel[8]. In addition, the direct technique also offers the advantage that the restoration can be repolished or repaired in case of small defects and fractures over time[16]. As reported in the present clinical case, the stain was white/creamy, suggesting a more conservative restoration should be made according to the degree of porosity of enamel.

Composite resin restorations have increased considerably in popularity and predictability mainly due to improvements in terms of resin composition as the evolution of adhesive systems and light curing units[17-19]. The advances in physical and mechanical properties of composites are reflected in their clinical performance, providing the execution of esthetic, functional and excellent longevity in anterior restorations[8]. However, adhesion in hypomineralized enamel may be a challenge, once micromorphological changes may adversely affect the adhesion between the restorative materials and the dental substrates[3,20]. Studies has shown poorer bond strength in hypomineralized enamel when compared to sound enamel regardless of the kind of adhesive strategy (total-etch or self-etch systems)[21,22]. In this case report , a universal adhesive was applied, however following the etch and rinse strategy, because total-etch strategy demonstrated higher bond strength to hypomineralized enamel when compared with self-etch strategy[21]. Also, to obtain a better adhesive quality, all the margins of the stain were removed. This approach assured margins in sound enamel that shows better bonding capability[23].

3 Conclusion

Enamel hypomineralization can be described as an insufficient enamel mineralization, i.e., a qualitative defect. The present clinical case report describes the esthetic restorative treatment of hypominerilized enamel teeth using direct resin composite restoration. The correct diagnosis related to the type of defect or even the deep of stain allows a better understanding of the lesion aspects, thus ensuring the correct treatment choice. In the treatment plan, minimally invasive methods should be used as much as possible to protect the tooth structure. The patient was satisfied with the clinical esthetic outcomes from the described technique, improving his quality of life.

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