

Immediate Desensitization in Teeth Affected by Amelogenesis Imperfecta

Rudá França Moreira¹, Rossana Gomes Figueiredo¹, Henrique Eduardo Oliveira², Ana Christina Lamosa da Fonseca¹, Mauro Sayão de Miranda¹

¹UERJ - Universidade do Estado do Rio de Janeiro, Rio de Janeiro, RJ, Brazil
²UFF - Universidade Federal Fluminense, Rio de Janeiro, RJ, Brazil

Correspondence: Dr. Rudá França Moreira, Rua Ana Leonídia, 343, Bl. B, apto 705, Engenho de Dentro, 20730-390 Rio de Janeiro, RJ, Brasil. Tel: +55-21-99347-8525. e-mail: rudamoreira@hotmail.com

The aim of this paper was to describe a clinical case of immediate dental desensitization using a self-etch adhesive system in an adolescent patient diagnosed with amelogenesis imperfecta (AI). AI was associated with severe tooth sensitivity, treated by the application of a universal adhesive system for desensitization of the teeth affected by AI. Reduction of tooth sensitivity was assessed using a visual analog scale during all reevaluations. The technique was effective for reducing tooth sensitivity. It was concluded that the adhesive system for tooth desensitization had an immediate effect and maintained its effectiveness during a 12-month follow-up period.

Key Words: amelogenesis imperfecta, dental materials, dental enamel, dental clinics, dental enamel hypoplasia.

Introduction

Amelogenesis imperfecta (AI) is a hereditary anomaly of the enamel, which affects both dentitions and may cause tooth sensitivity, loss of vertical dimension, enamel deficiencies, pulp calcification, failed tooth eruption, impaction of permanent teeth and aesthetic commitment (1,2). Enamel synthesis or amelogenesis occurs by the activity of ameloblasts after dentin formation (3). Historically, AI has been known and studied since 1890, but only in 1938 it was classified separately from dentinogenesis imperfecta and considered to possibly affect both deciduous and permanent teeth (4,5).

AI can be classified according to phenotype and clinical aspect as follows: Type I or hypoplastic, involves problems in enamel secretion; Type II or hypomature, related to enamel maturation; Type III or hypocalcified, involves mineralization and Type IV, hypoplastic, hypomature and taurodontic (6). These teeth present different levels of color alteration, presenting dark brown color, increase of roughness and susceptibility to attrition, which results in the reduction of vertical dimension (4,5,7).

Oral hygiene is often unsatisfactory owing to the irregularity of the tooth surface and sensitivity, contributing to a greater susceptibility to staining (8). According to the literature, the main sequelae in these patients, regardless of AI classification, are intense tooth sensitivity, poor aesthetics, risk of dental caries and decreased vertical dimension (9,10). Thereby, different treatment strategies are available, according to the degree of damage, including the use of all types of glass ionomer cements, stainless steel crowns, amalgam restorations, adhesive restorations, metaloceramic crown, prefabricated resin veneer and multiple extractions requiring an overdenture (7,11-14). This paper reports a case of a simple and useful protocol

for immediate reduction of tooth sensitivity in a young patient with AI by using a self-etch adhesive system.

Case Report

The patient authorized publication of this case and written informed consent was obtained from his parents. A male, aged 11 years, sought dental care at the Clinic of Adolescent Oral Health discipline at UERJ accompanied by his family. The main complaint reported by the patient was extreme sensitivity of the posterior teeth, especially with drinks and cold food. The patient was subjected to clinical and radiographic examinations and received orientation for oral hygiene and treatment of sensitivity with fluoride.

During anamnesis, his mother did not know if anyone else in the family had the same problem and reported that the son was diagnosed with attention-deficit hyperactivity disorder. An intraoral examination revealed teeth with alterations in size and shape, yellow-brown discoloration (Fig. 1) and covered by rough enamel. Clinical examination revealed the presence of generalized bacterial plaque on the surface of the teeth. A complete periapical radiographic



Figure 1. Initial aspect of the teeth.

examination was ordered, which revealed absence of enamel in some places. Study models were made to complement the clinical examination.

For the anterior teeth, was planned a future rehabilitation with direct veneers using composite resin for aesthetic recovery. Desensitization was not recommended because the patient did not report pain in the region. However, in the posterior teeth, the patient reported pain when ingesting cold or citrus foods and sensitivity level 8 on the visual analogue scale to classify tooth sensitivity as mild, moderate or severe, after application of an air jet at a distance of 10 cm, for about 2 s. Thus, immediate desensitization using self-etching adhesives was proposed.

In the preventive and early stages were performed dental prophylaxis, removal of dental calculus, topical fluoride application, oral hygiene instruction and sealing of the posterior teeth with adhesive. Desensitization using the Single Bond Universal self-etch adhesive system (3M ESPE, St. Paul, MN, USA) was performed after careful prophylaxis with pumice and water, followed by relative isolation of the regions that would be subjected to the clinical protocol. At the buccal, lingual or palatal and occlusal faces (Figs. 2A and 2B) of all the posterior teeth, the adhesive system was applied in two layers. The first was actively applied with a microbrush for 20 s, without curing. The second was applied in a passive way, waiting

for 20 s and the light polymerization was performed for 40 s on each side of the face by a LED light-curing unit (Radii-Cal, SDI, Bayswater, VIC, Australia). On the proximal face, adhesive was applied with a dental floss after the same steps described for the other faces (Figs. 2C and 2D). However, before curing, polyester matrices were placed in order to prevent adhesion to the adjacent teeth and ensure polishing of these surfaces.

Results

After 7 days, 1 month, 2 months and 1 year of adhesive application, the patient was re-evaluated, and an adhesive layer was still covering tooth surfaces. The patient reported that he was consuming food and cold drinks without tooth sensitivity. Before application of the adhesive system, he had already been using desensitizing toothpaste, although he could not eat cold food because of the high sensitivity. The patient showed improvement in hygiene and considerable reduction of gingival inflammation. The patient is currently under observation and direct composite restorations are planned to provide better aesthetics and function.

Discussion

AI is a hereditary anomaly of the enamel, which affects both dentitions and may cause many unfavorable conditions such as tooth sensitivity, loss of vertical

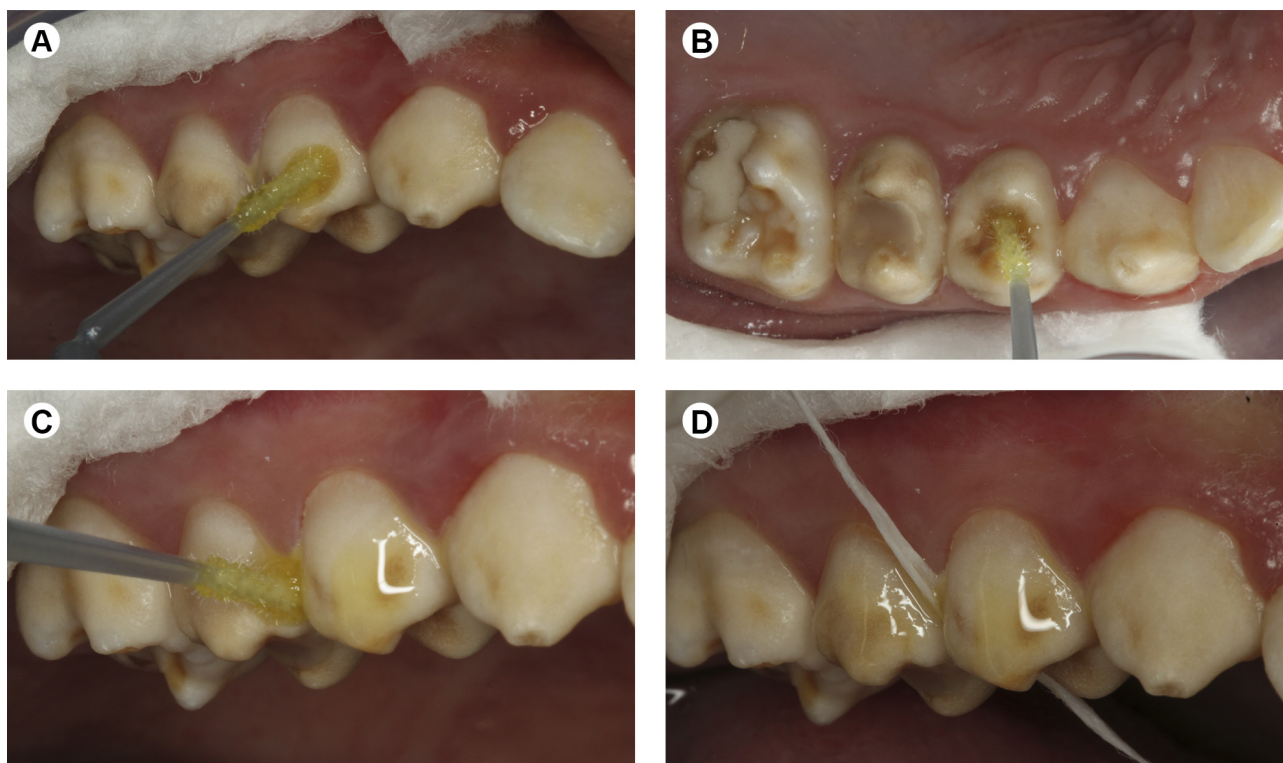


Figure 2. Application of the adhesive system on the buccal (A), occlusal (B) and proximal (C,D) surfaces.

dimension, enamel deficiencies, failed tooth eruption, impaction of permanent teeth, aesthetic commitment and anterior open bite (1,2,15). The treatment of these cases is related to many factors, including age, damage severity, aesthetics, socioeconomic status, psychosocial aspects, and functional and social demands (14,16,17).

The literature presents different treatments that use all types of glass ionomer cements, stainless steel crowns, amalgam restorations, adhesive restorations, metal-ceramic crowns, prefabricated resin veneer, and multiple extractions requiring an overdenture (7,11-14). The main treatment goals are to preserve maximum tooth structure, restore masticatory functions and aesthetics, and eliminate tooth sensitivity (7,13,17). Dashash et al. (11), in a Cochrane-based review, evaluated the success rates (aesthetics, masticatory function and longevity of restoration) of different interventions. However, the authors of this systematic review failed to identify the best intervention. Thus, without a high-quality evidence, the authors planned the treatment in stages according to priority. Normally, the dentist should first reduce or eliminate tooth sensitivity, improve aesthetics and provide oral hygiene orientation. The dentist should then eliminate the loss of vertical dimension and finally complete the rehabilitation (7,12-14,17).

Fluoride is important to AI patients because of their high risk of caries and it may reduce a little bit the hypersensitivity and improve this effect when associated with the occlusion of the dentin tubules (18). Bonding agents are used to obliterate dentin tubules by reducing or eliminating tooth sensitivity (11,14). The present study showed elimination of this problem by the Single Bond Universal adhesive (3M ESPE). Another positive effect of the protocol was the improvement of the patient's oral care because he no longer felt pain during tooth brushing.

The bond strength in dentin AI is significantly lower than that in normal dentin because of the hypermineralized sclerotic tissues. These sclerotic areas are probably more resistant to demineralization by acid etching, impairment or prevention of resin infiltration. Extending the etching time showed no significant difference and the hypermineralized layer was dissolved by acid. However, over-etching of the underlying mineralized dentin may occur; thus, resin monomers would not penetrate the full depth of the demineralized dentin, producing a porous, non-resinous, infiltrated zone (19). The universal adhesives showed equivalent bonding quality to that of dentin regardless of etching mode (20). In AI enamel, this adhesive system without previous etching provided a bond strength similar to that of etch-and-rinse adhesive systems (21).

The choice of this protocol was based on sensitivity control and reduced clinical time, because the patient had attention-deficit hyperactivity disorder and had no

loss of vertical dimension. The use of a universal adhesive eliminated the etch, rinse and dry phases, and showed relevant results in terms of bond strength (20,21), thereby obliterating the dentin tubules, and reducing or eliminating tooth sensitivity (11,14). Thus, based on the present clinical case, it may be concluded that the sealing of the exposed dentin on teeth affected by AI by a universal self-etch adhesive system effectively reduced or eliminated tooth sensitivity immediately and maintained this effect during the 12-month follow-up period. Further clinical studies are required, but the technique seems promising, as it greatly improved the patient's quality of life. It had an immediate effect, was effective and was a simple clinical option.

Resumo

O objetivo deste estudo foi descrever uma técnica de dessensibilização dental imediata, usando o adesivo universal em paciente adolescente diagnosticado com amelogenese imperfeita. O paciente afetado pela amelogenese imperfeita apresentava dentes extremamente sensíveis, e foi submetido a aplicações de adesivo universal para dessensibilizar os dentes afetados por amelogenese imperfeita. A redução da sensibilidade dentária foi avaliada pela escala analógica visual durante todas as reavaliações. A técnica foi efetiva na redução da sensibilidade dental. Concluiu-se que o uso do sistema adesivo foi eficaz na imediata dessensibilização dentária e mantida após doze meses de avaliação.

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