

Rehabilitation of dental function and aesthetics in a young patient presenting amelogenesis imperfecta

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Abstract: The aim of this study was to report a clinical case of conservative treatment modality for the amelogenesis. Amelogenesis imperfecta is a condition that shows different clinical manifestations and genetic pattern. The main clinical manifestation is compromised aesthetics. This clinical condition in a

15-year-old male patient was treated with direct restorations using microhybrid composite resin (Amelogen Plus, Ultradent Products, Inc., South Jordan, USA), by means of the clear matrix technique. Treatment not only restored function and provided a more favorable aesthetic appearance for the smile, but also showed a

positive psychological impact and thereby improved perceived quality of life. Thus, it was possible to use a conservative approach in these teeth with amelogenesis imperfecta treated by direct composite resin restorations. **Keywords:** Amelogenesis imperfecta. Composite resins. Dental restoration, Permanent.

72

How to cite: Cocco AR, Baldissera RA, Lund RG, Martos J. Rehabilitation of dental function and aesthetics in a young patient presenting amelogenesis imperfecta. *J Clin Dent Res.* 2017 Apr-June;14(2):72-82.

Submitted: August 02, 2016 - **Revised and accepted:** April 25, 2017

DOI: <https://doi.org/10.14436/2447-911x.14.2.072-082.oar>

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» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

INTRODUCTION

Amelogenesis imperfecta (AI) refers to a group of hereditary diseases, often inherited disorder that affect the structure of the enamel. AI shows alterations in both primary and permanent dentition.¹ However, the incidence is more severe in permanent dentition.² The exact incidence of AI is uncertain and the prevalence may range from 1:14000 to 1:400.³⁻⁵

AI is characterized by heterogeneity in its clinical manifestations, histological appearance and genetic pattern⁶⁻⁷. It can be subdivided in various forms, according to the type of defect and stage at which enamel formation is disturbed. The most widely accepted classification contains three groups: hypoplastic, hypomineralized or hypomaturational. At hypoplastic condition the enamel is thinner and mineralized. It can cause white flecks, narrow horizontal bands, grooves and discoloration of the teeth, varying from yellow to dark brown. The enamel appears to be hard and shiny, but malformed. In hypomaturational condition, the enamel is harder, with a mottled opaque white to yellow-brown or red-brown color. Lastly, hypocalcification or hypomineralized show insufficient mineralized, the enamel is soft, friable and can be easily removed from dentin.^{1,6,8-16}

Moreover, AI produces a diversity of problems, and the main reports from patients are extensive loss of tooth tissue, poor esthetics, tooth sensitivity with temperature variation, decreased occlusal vertical dimension, and psychological problems.^{6,12} Besides, eruption or impaction, anterior or lateral open bite, and abnormal enamel structure that increase risk of gingival inflammation can be associated.^{13,14}

Treatment of AI is defiance to the dentist. The functional and esthetic rehabilitation are a clinical challenge. The treatment plan depends to

many factors, like patient's age, socioeconomic status, the type and severity of the disorder and intraoral situation.¹⁵ Prosthetic crowns,^{4,16,17} laminates^{3,13} and composite resin restorations^{18,19} can be used to perform the treatment of AI. The present report describes a minimally invasive approach to the functional and esthetic rehabilitation in a young patient presenting amelogenesis imperfecta by utilizing a direct adhesive technique.

CASE REPORT

A 15-year-old male patient with impaired self-esteem was referred to College of Dentistry reporting discomfort with their esthetic teeth condition. According to the patient, his teeth cause a negative psychological impact on his social life, affecting his desire to smile in front of their classmates.

After careful history, clinical examination revealed sensitive, discolored (yellow-brown spots) and mutilated teeth, with rough aspect and exacerbated wear, with compromised occlusion, diastema, and anterior open occlusal relationship (Fig 1). Patient was diagnosed with amelogenesis imperfecta.

In addition, dental analysis of width/length ratio (85%) of maxillary central incisors was found to be within the normal esthetic range. Oral screening was negative, and temporomandibular disorder screening was found to be positive for teeth clenching and bilateral reciprocal clicking without subjective symptoms. All components were within the patient's adaptive capacity. Intraoral findings included mild deficiency in orofacial dimension, absence of caries activity, showing only destruction of the first molars, minimal anterior vertical overlap, unhealthy surrounding soft tissue, and bad periodontal condition (Fig 2).



Figure 1: Pretreatment view of the patient.

74

The patient presented with a tendency for a Class III Skeletal relationship and with a bilateral Class I molar relationship. The panoramic radiograph illustrated large pulp chambers and root canals and undistinguishable dentoenamel borders. The enamel structure seemed to exist only on the anterior mandibular incisors and not on any other tooth. Gingival embrasures were narrow, especially in the posterior areas.

The patient and his family were informed of this diagnostic condition and available treatment modalities. Before he decided a conservative treatment by means of restorations, only oral hygiene was reinforced, because of the amount of gingivitis. The main planning was to provide a conservative esthetic solution to reestablish the oral functions with the least amount of tooth structure removal. Based upon all the diagnostic findings, a minimally invasive approach utilizing an adhesive restorative technique with direct

composite resin was proposed as a definitive clinical procedure for amelogenesis imperfecta rehabilitation.

Scraping, smoothing and polishing in all teeth and instructions of daily oral hygiene practices were performed to minimize gingivitis. Orthodontic and prosthetic therapies were discussed as possible future options. After one week, the patient managed to maintain an acceptable level of oral hygiene. It was performed a molding of the upper and lower hemiarches to obtain a stone model (Fig 3A). Through this model, it was realized a silicone guide. The bis-acryl resin-based material (Protemp 4, 3M ESPE, St Paul, USA) was used (Fig 3B) to make provisional restorations in the upper anterior elements (Fig 3C-G). Then, it was performance other anterior teeth model to confection of a vacuforming clear laminate matrix (Fig 3H-I) to assist in the final restorations.



Figure 2: Preoperative images of the teeth. **A**, frontal view of the maxillary. **B**, frontal view of the mandibula. **C**, occlusal view of the maxilla, **D**, occlusal view of the mandibula, **E**, Lateral view, right side. **F**, Lateral view, left side. **G**, frontal view.



76

Figure 3: Procedures and materials. **A)** Diagnostic dental cast. **B)** Silicon guide impression after diagnostic wax-up. **C)** Bis-acryl resin-based material. **D)** Insertion of the provisional material. **E)** Silicon guide in position. **F)** Mock-up to establish esthetic parameters. **G)** Intraoral view with mock-up. **H)** Vacuumforming clear laminate material. **I)** Clear matrix in position.

Treatment was initiated on the anterior teeth, and the posterior teeth were left for last. Rubber dam isolation was not always possible, especially in the anterior teeth due the use of a clear matrix. Cotton rolls, salivary shields, polytetrafluoroethylene (PTFE) Teflon tape, and retraction cords (Ultrapack #00, Ultradent Products, Inc., South Jordan, USA) were used for field control instead (Fig 4A). Following the procedures, it was applied a 35% phosphoric acid gel (Ultradent Products Inc., South Jordan, UT, USA) for 30 seconds in enamel (Fig 4B). The etching gel was thoroughly washed away for 30 seconds using a water spray, then dried and adhesive system (AdheSE, Ivoclar Vivadent, Schaan, Liechtenstein) was applied and photopolymerized following manufacturer's instructions (Fig 4C). Microhybrid composite resin, A2 shade, (Amelogen Plus, Ultradent Products, Inc., South Jordan, USA), was delicately insert in a clear laminate matrix (Fig 4D), and positioned on the tooth to be restored (Fig 4E). After correct insertion, clear matrix was kept in position through slight digital pressure, and composite

resin was photoactive for 60 s in vestibular and palatine/lingual region (Fig 4F-H).

To posterior region, A3 shade of Amelogen composite resin was utilized. In this region, the clear matrix technique was not used., due to the creation of too much excess at the proximal region. So, the restorations were carried out manual and directly. Placement of a rubber dam with ligatures was successfully accomplished by using an adequate rubber dam (Hygenic, Coltene/Whaledent AG, Altstätten, Switzerland). At the proximal face of each tooth, it was used a composit-Tight 6.4 mm molar matrix bands, wedge and ring (Garrison Dental, MI, USA). Contouring, finishing, and initial polish of the composite resin crowns was accomplished with Sof-Lex disks (3M Espe, St. Paul, MN, USA) followed with high-luster polishing paste (Opal L, Renfert GmbH, Hilzingen, Germany) aided with bison and goat hair bristles.

At the end of the restorative treatment, follow-up appointments were scheduled. The patient expressed great satisfaction with the outcome and promised to care for his new teeth (Fig 5A-E).



78

Figure 4: A) Teflon tape isolation. B) Acid-etching with 35% phosphoric acid. C) Application of the adhesive. D) Insertion of the composite resin in clear matrix. E) Clear matrix in position. F) Immediate aspect of the right central and left lateral incisors restored. G) View of the restorative procedures. H) Partial rehabilitation of the maxillary teeth.



Figure 5: Intraoral views after restorative rehabilitation with composite resin. **A)** Frontal view of the maxilla. **B)** Frontal view of the mandibula. **C)** Lateral view, right and left position. **D)** Anterior view.

DISCUSSION

The main goal in the treatment of this patient was to eliminate tooth sensitivity and restore esthetic appearance by closing the open occlusal relationship and diastemas, thus restoring patient's self-confidence. Functional and esthetic rehabilitation of AI patient has been open to a variety of treatment options, among which the adhesive rehabilitation with composite resins.^{18,19} Composite resin, as well as other esthetic materials, such as ceramics, are considered golden pattern in anterior region.^{20,21} Actually esthetic played an important role, due there is a greater awareness of an attractive visual appearance. Besides the aesthetic pattern, current dentistry has sought a more conservative trend with minimally invasive techniques.²²

AI manifested with many esthetic problems, but there is not a standard formula to success of the treatment. Esthetic treatment is limit of removing stains, removed defect of dental tissue and masking. Therefore, in this case objectify the preservation tooth,²³ performing restorations with composite resin. Other factors that influenced this choice were age and the financial condition of the patient.

Finishing the anterior restorations along with first premolars and the posterior restorations later gave the opportunity to safely keep the present vertical dimension of occlusion and manage better establishing occlusal guidance using the natural teeth.

Our patient was diagnosed with AI, which is heterogeneous condition, with changes both clinically and genetically.^{1,6,9,11,24} Clinically, can be distinguished in many classes: hypoplastic, hypomineralized or hypomaturation, as mentioned previously. In this case, patient was diagnostic clinically as hypoplastic AI. Moreover, other clinically change common in AI patients

was find in our patient, anterior occlusal relationship.²⁵ There are many reports in orthodontic literature about association between AI and anterior occlusal relationship.^{26,27} The incidence varies between 24–60%. Moreover, these studies believe that this association is due lingual interposition to minimize the sensibility of heat and cold.^{26,27} Other study reports this association with less local factors and more genetic factors such as malformation of craniofacial growth, which would include open bite problem.²⁶

Often patients with AI have aesthetic experience negative effects from tooth discoloration and crown reduced size and show less social interaction with reduced perception of quality of life.^{5,13,15,19,28,29} For them, the treatment has a positive psychological impact.³⁰

Furthermore, studies show genetic changes in patients with AI.³¹⁻³³ Heritage of AI is mainly autosomal dominant, can be also autosomal recessive or X- linked heritage. This variation happens in phenotype due of variable gene expression or different gene defects.³⁴

This patient had a bad gingival and periodontal condition when he first presented as he had undergone an intensive oral hygiene program that included mechanically removing of dental plaque and calculus. According to most reports.³⁵⁻³⁸ AI patients have poor oral hygiene when first referred for treatment. The relaxation after the treatment makes oral hygiene learning difficult. Therefore, continuous oral hygiene maintenance motivation may be crucial for the success of the treatment of these patients. Due dental enamel does not regenerate itself, developing strategies to mimic dental enamel or minimize these defects are necessary for clinical applications. Many strategies have been attempted such as artificial enamel, amelogenin hydrogel.³⁸ However, these strategies were test-

ed only *in vitro* and further studies are required. Our study showed a clinic case of AI which was rehabilitated with current conditions and we hope that in the future new strategies and enamel biomimetic materials are developed. We believe it was the best choice, mainly due to the fact that the patient was still young.

CONCLUSION

The treatment of AI with direct composite resins not only restored function and provided a more favorable aesthetic appearance for the smile, but also showed a positive psychological impact in the patient.

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