

## Overdenture as a Restorative Option for Hypocalcified-hypoplastic Amelogenesis imperfecta: A Case Report

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### Abstract

**Aim:** The aim of this report is to describe the restorative treatment of an 18-year-old patient diagnosed with autosomal recessive hypocalcified-hypoplastic amelogenesis imperfect (AI).

**Background:** Esthetic and functional rehabilitations in AI cases are challenging and should consider individual aspects, such as age, socioeconomic status, AI type, and intraoral condition.

**Report:** AI was diagnosed in an 18-year-old patient.

**Summary:** Considering the short length of crowns and roots, patient life expectancy, minimal invasiveness, amount of treatment time required, and lower costs, oral rehabilitation with overdentures provided an adequate functional and esthetic rehabilitation of the patient.

**Clinical Significance:** This report demonstrated overdentures to be a viable, relatively inexpensive, and non-invasive treatment choice of a patient with AI with concerns about treatment longevity, invasiveness, cost, esthetics, and long-term maintenance.

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**Keywords:** Overdenture, amelogenesis imperfecta, AI, diagnosis

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## Introduction

Amelogenesis imperfecta (AI) is a rare hereditary disorder affecting the formation of dental enamel in primary and permanent dentitions.<sup>1</sup> At least ten types of AI have been described with each characterized by different mutations in genes. These genes are related to the deposition, calcification, and maturation of the enamel determining the variety of clinical appearances and modes of inheritance. The variation in AI types has resulted in the creation of several classification systems based on phenotypical and/or genetic aspects of the disease.

Clinically, AI has been classified as hypomaturation, hypoplastic, and hypocalcified types. The hypoplastic type is characterized by thin enamel with pits or grooves on enamel surfaces. The enamel appears soft, discolored, and is easily removed in the hypocalcified type, whereas the hypomaturation type has the clinical aspect of chalky and opaque enamel.<sup>2</sup> In addition to enamel defects AI may also be associated with eruptive disturbances, severe attrition, vertical overbite, loss of vertical dimension,<sup>1</sup> and an open bite.<sup>3,4</sup> More severe problems are found in the hypocalcified type.<sup>2</sup> In all cases the lack of esthetics is usually the primary complaint.

The development of new techniques and materials in restorative dentistry made conservative approaches for AI treatment possible. The available options include resin composite restorations,<sup>5</sup> onlay restorations,<sup>6</sup> porcelain or ceramic restoration crowns,<sup>7-10</sup> and overdentures.<sup>11</sup> Esthetic and functional rehabilitation in AI cases are always challenging so individual aspects of the patient, such as age, socioeconomic status, type of AI, and intraoral condition must be considered during treatment planning.<sup>6,8</sup>

Traditionally, placement of adhesive composite restorations was given the highest priority in the treatment of AI patients because of the esthetic

benefit that can be achieved. However, in some AI patients this treatment strategy has shown high failure rates due to structural defects not only in the enamel<sup>12,13</sup> but also in the dentin.<sup>14</sup> The high cost of restoring the dentition of a patient with AI can be a limiting factor. Furthermore, factors such as the presence of hypocalcified enamel, severity of the disorder, number of teeth to be restored, and the short length of crowns and roots can make the long-term prognosis of oral rehabilitation with full crowns unpredictable. On the other hand, the overdenture is not invasive and is a time-saving treatment alternative for AI patients.

The aim of this report is to describe the oral rehabilitation of an 18-year-old patient diagnosed with autosomal recessive hypocalcified-hypoplastic AI using an overdenture.

## Case Report

### Diagnosis

An 18-year-old woman was admitted at the Araçatuba Dental School (São Paulo State University - UNESP, Brazil) for evaluation and treatment of severe attrition on the occlusal surfaces of her teeth resulting in a loss of vertical dimension (Figure 1).

All teeth presented irregular, rough, thin, and porous enamel which could be easily removed manually. According to the parents, the patient's primary dentition presented the same appearance when she was a child. Despite the severe attrition and dentin areas partly devoid of an enamel covering, there was no pain complaint or dental sensitivity. Radiographically, there was a lack of contrast between enamel and dentin radiodensities, a lack of proximal contact points, and no pulp chamber or dentin malformations (Figure 2).

Past medical reports revealed malnutrition during childhood and frequent treatments with antibiotics.



**Figure 1.** A. Intraoral anterior view of patient diagnosed with AI at initial presentation. Intraoral occlusal views of: B. Maxillary arch. C. Mandibular arch.

The familial history revealed a consanguinity marriage between her parents. The history also identified five siblings, one of which is a younger brother with the same dental condition but with no history of malnutrition and antibiotic treatment during his childhood. The final diagnosis of autosomal recessive hypocalcified-hypoplastic AI was determined after having analyzed four generations of the family. The patient was then referred for prosthodontic treatment.

### Treatment

A 3 mm loss in the occlusal vertical dimension (OVD) was verified by using the following methods:

- A phonetics test using the pronunciation of the words Mississippi, sixty-six, Massachusetts, for example
- Measurement of the interocclusal distance
- Swallowing (to verify if there is lip contact after swallowing)
- Patient's approval regarding the esthetics obtained
- Assessment of the facial appearance by evaluating the quality of the esthetics of the inferior third of the patient's face

Diagnostic impressions were made using stock trays with irreversible hydrocolloid (Hydrogum, Zhermack S.p.A. Rovigo, Italy) then poured in dental stone (Gesso-Rio, Orlando Antonio Bussioli-ME, Rio Claro, SP, Brazil). The casts were articulated in a semi-adjustable articulator (Bio Art, Equipamentos Odontológicos Ltd, São



**Figure 2.** Panoramic radiograph of patient at initial presentation.



**Figure 3.** Panoramic radiograph of patient after seven years. Note that most of her maxillary teeth were extracted during that time.

Carlos, SP, Brazil) using a wax centric relation record and a face-bow transfer.

All treatment options (porcelain or ceramic restoration crowns and overdentures) were discussed with the patient with consideration for factors such as life expectancy, invasiveness of the treatment, clinical time, clinical condition, and socioeconomic status. The patient chose rehabilitation with overdentures, so conventional endodontic treatment was carried out on all maxillary and mandibular teeth. However, the patient abandoned the treatment for personal reasons. She returned after seven years and presented with most of her maxillary teeth lost to extractions during that time (Figure 3). The plan to treat the patient using overdentures was reactivated and treatment resumed.

The remaining teeth were then prepared to receive copings. Impressions were made using individual trays (Jet, Artigos Odontológicos Clássico Ltd, São Paulo, SP, Brazil) along with vinyl polysiloxane impression material (Aquasil ULV, Dentsply, Caulk Milford, DE). Size #0 Ultrapak gingival retraction cord was used to expose the cervical margins of the preparations (Ultradent Products, Inc., South Jordan, UT, USA). The patient was provided an interim prosthesis to wear during endodontic treatment and the fabrication of the overdenture in order to maintain masticatory functions and an esthetic appearance.



**Figure 4.** Intraoral lateral view of patient during overdenture try-in.

OVD and centric relation were obtained in a wax block (Wilson Cera Rosa 7, Polidental Indústria e Comércio Ltd, Cotia, SP, Brazil) and mounted on acrylic resin record bases which allowed the casts to be mounted in a semi-adjustable articulator (Bio Art, Equipamentos Odontológicos Ltd). Artificial acrylic resin teeth (Biotone, Dentsply Ind. e Com., Rio de Janeiro, RJ, Brazil) were selected and arranged in accordance with normal prosthodontic procedures.<sup>15</sup> Vertical dimension and proper support of the lips by the denture teeth were confirmed.

Following a final satisfactory try-in with the teeth arranged in position (Figure 4), three individual Co-Cr copings (StarLoy C, DeuDent, Hanau-Wolfgang, Germany) were fabricated for the maxillary teeth and ten for the mandibular teeth, two of which contained a ball attachment system



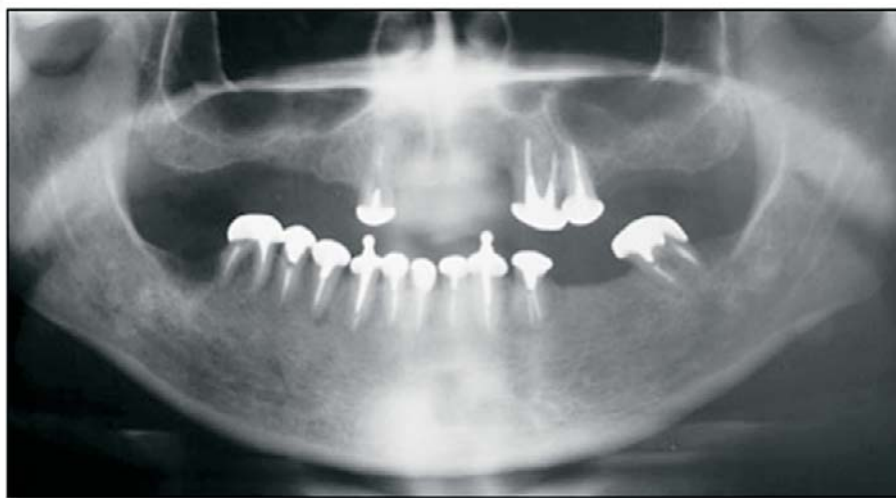
**Figure 5.** The cobalt chromium copings on the upper and lower casts. In the mandibular cast two copings contained a ball attachment system.

(049071, Conexão Sistemas de Prótese Ltd, São Paulo, SP, Brazil) (Figure 5).

The copings were placed in position to check the accuracy of the marginal fit. The dentures were then processed in heat-polymerized resin (Classico, Artigos Odontológicos Clássico Ltd, São Paulo, SP, Brazil). The housings of the ball attachment were captured after polymerization of the mandibular acrylic resin base.

Cementation of the copings was done with RelyX ARC dual-cure dental adhesive system (3M ESPE, St. Paul, MN, USA) applied to the inner surfaces of copings and to dried and isolated teeth. The metal copings were seated firmly using finger pressure and removal of excess cement. The material was then light-cured until optimal polymerization at the cavosurface margins could be achieved (Figure 6).

Final occlusal adjustment was made intraorally. Detailed instructions regarding maintenance and oral hygiene were given to the patient, making her aware of the increased susceptibility to caries and periodontal disease related to the use of overdentures.<sup>16</sup> The patient was recalled at 2-month intervals. Two years after the completion of treatment, no deterioration was visible in the restoration and teeth and the periodontal tissues and oral mucosa remained healthy. The patient considered the treatment outcome both esthetically and functionally satisfactory (Figure 7).



**Figure 6.** Panoramic radiograph after insertion of the copings.



**Figure 7.** Frontal facial appearance with overdentures two years after placement.

### Summary

The complexity of the management of patients with AI supports the suggestion the dental professional should adopt appropriate methods for the rehabilitation of rare dental disorders. The treatment of patients with AI should start with early diagnosis and intervention to prevent

restorative problems later. However, there is no standard treatment for AI because of the variation in clinical presentations so each case needs to be evaluated individually.

Improvement in personal esthetics can have an important psychological impact for young patients at a time when they may be very self-conscious about their appearance. Additional advantages of overdentures are the preservation of tooth structure in the presence of attrition, improved function through the creation of a more harmonious occlusion, and the preparation of patients for conventional dentures should they lose additional teeth in the future.

### Clinical Significance

This report demonstrated overdentures can be a viable, relatively inexpensive and non-invasive treatment choice of a patient with AI with concerns about treatment longevity, invasiveness, cost, esthetics, and long-term maintenance.

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