

# Restoring function and esthetics in a pair of twins with amelogenesis imperfecta

## Clinical Report

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### ABSTRACT

**Background:** Rehabilitation of complicated cases poses difficulty in clinical practice, both with respect to restoring function as well as esthetics. One such condition where the clinical practitioner has to give importance to proper planning of the treatment and execution of the plan is amelogenesis imperfecta, wherein both esthetics and function are compromised. A review of literature showed that there are no reports of management of amelogenesis imperfecta (AI) in twins. **Case Description:** This report discusses the esthetic and functional rehabilitation of a pair of fraternal twins with amelogenesis imperfecta. Both patients presented with esthetic disharmonies and sensitivity of teeth. The treatment plan was custom made for both the patients and executed successfully. **Clinical Implications:** Cosmetic rehabilitation of patients with AI has been open to a variety of treatment options. There is no set rule in planning the treatment for such cases. The aim is to properly diagnose the case and provide durable functional and esthetic management of these patients, where the unaesthetic appearance has a definite negative psychological impact.

**KEY WORDS:** Amelogenesis imperfecta, ceramic, esthetics, rehabilitation

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### INTRODUCTION

Amelogenesis imperfect (AI) encompasses a heterogeneous group of developmental disorders that demonstrate alterations in the enamel.<sup>[1]</sup> It is characterized by clinical and genetic heterogeneity in the absence of systemic abnormalities or diseases.<sup>[1,2]</sup> AI is caused by mutations in genes that control amelogenesis and follows inheritance patterns of autosomal-dominant, autosomal recessive or X-linked modes of transmission.<sup>[1-3]</sup> There are also patients for whom a family history cannot be identified but where a mutation is present.<sup>[3]</sup> The enamel defects of this condition are clinically divided into hypomineralized and hypoplastic forms. Both primary and permanent dentitions are usually affected.

Clinically, AI appears as an alteration of enamel formation resulting in hypoplasia, hypocalcification, and hypomaturation. Enamel hypoplasia results in

a decreased quantitative enamel formation. The enamel in hypocalcification appears normal but poorly mineralized while hypomaturation results in an abnormal mineralization in the final stages of tooth formation.<sup>[2,3]</sup> The most common form, the hypoplastic type, is deficient in normal enamel. The crowns of the teeth appear blanched, snowcapped, yellow-brown, pitted, or grooved. Radiographic examination usually shows a full complement of teeth, but the crowns of the teeth either have very thin enamel or lack enamel completely.<sup>[1,3-5]</sup>

### CASE REPORTS

#### Case 1

A 24-year-old male patient presented with the chief complaints of considerable sensitivity of his teeth, difficulty in chewing and displeasure with his present dental appearance. A detailed medical, dental, and social history was obtained. The enamel of all teeth was

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hypoplastic and yellow-brown in color. The surfaces of the teeth were rough, and the enamel was either not visible or very thin over the crowns of all teeth. The dentin, where it was exposed, was brown and hypersensitive. Examination also revealed a dental midline discrepancy, presence of root stumps of teeth 12, 26 and 36, short clinical crowns, occlusal wear, carious lesions involving the pulp space in 16, 23, 24, 25, 35, 37 and 47; aesthetic disharmonies and poor oral hygiene manifested by generalized gingivitis [Figure 1]. There was a definite loss of vertical dimension because of grossly carious right upper and lower molars as well as root stumps in the left quadrant. The patient's medical history was unremarkable and he reported that his twin brother and father's sister had similar clinical findings. Radiographically the teeth showed normal pulpal morphology while the enamel appeared to be very thin or missing in the anterior region.

A diagnosis of hereditary AI was made from the clinical and radiographic features. Vitality testing was performed for the carious teeth with pulp involvement using an electric pulp tester (Parkell Digitest Digital pulp tester, Parkell Inc, NY, USA) and 16, 25, 37, and 47 were diagnosed as nonvital whereas 23, 24, and 35 were diagnosed as chronic irreversible pulpitis. Complete arch maxillary and mandibular impressions were made with irreversible hydrocolloid (Vival NF, Ivoclar Vivadent, Liechtenstein) and used to obtain diagnostic casts, using Type III dental stone (Labstone, Kalabhai Karson, Mumbai, India).

The complete treatment plan and options were discussed with the patient. All factors, including the amount of tooth structure removal, cost factor, need for endodontic therapy, expected clinical longevity, and duration of treatment as well as the possible esthetic outcome were discussed with the patient and informed consent was obtained.

In the first phase of treatment, oral prophylaxis was performed and the patient was advised a 0.2% chlorhexidine mouthwash. From the diagnostic waxing procedure, it was determined that the mandibular right and left, first and second molars would need crown lengthening. The root stumps were extracted sequentially. After 1 week, the healing of the extraction sockets was evaluated. Good initial healing was observed after one week and the healing was again evaluated after 3 weeks. The prosthodontic phase of the treatment was begun after 4 weeks. In the second phase of therapy, endodontic treatment was performed for the nonvital teeth (16, 25, 37, and 47) and teeth with chronic irreversible pulpitis (23, 24, and 35).

In the third phase of treatment, the vertical dimension

was increased by 2 mm in the incisor region to restore the premolar teeth and molar teeth in a favorable occlusal relationship. This was done using an occlusal splint for a period of 4 weeks. Phonetics was used to confirm that the increase of vertical height was within the physiologic limits. Preparations were done with radial shoulder finish margins on the molar, premolar, and canine teeth for metal ceramic restorations. Impressions were made using polyvinyl siloxane impression material (Virtual, Ivoclar Vivadent, Liechtenstein) using stock trays and interocclusal relationships were recorded. All prepared teeth were restored with provisional crowns (Systemp C and B, Ivoclar Vivadent, Liechtenstein). The occlusal records were transferred to a semi-adjustable articulator with a face bow (Type ARH-2, Dentatus, Hagersten, Sweden), and the final casts were mounted. Following the metal framework and ceramic try in sessions, the crowns and bridges were cemented temporarily using a noneugenol temporary cement (RelyX Temp NE Temporary cement, 3M ESPE, USA). The preparation of central and lateral incisors was delayed by three weeks to assess the acceptability of the new vertical dimension.

The next phase of treatment consisted of tooth preparation for the central and lateral incisors. Preparations were done with radial shoulder margins for central and lateral incisors for metal ceramic restorations. Impressions were made with polyvinyl-siloxane impression material (Virtual, Ivoclar Vivadent, Liechtenstein) using stock trays, and an interocclusal record was made. The prepared teeth were restored with provisional crowns (Systemp C and B, Ivoclar Vivadent, Liechtenstein). The same mounting procedures were performed as for the posterior teeth and interocclusal records were transferred using a face bow. The crowns were fabricated and a ceramic try-in was performed for the crowns and bridges. The marginal fit and esthetic appearance of crowns were verified. In the final steps of the treatment, metal-ceramic crowns were permanently cemented first for the posterior teeth, followed by the anterior teeth (Rely X ARC Adhesive Resin Cement, 3M ESPE, USA) [Figure 2].

The patient was instructed and counselled to maintain his oral hygiene by proper brushing, use of mouthwashes and dental check up once in at least 6 months.

#### Case 2

The second case was a 24-year-old male patient, who was the fraternal twin of the patient discussed in report 1. The patient presented with the chief complaint of displeasure with his present dental



**Figure 1:** Clinical appearance of amelogenesis imperfecta - Labial view of maxillary and mandibular teeth



**Figure 2:** Postoperative view



**Figure 3:** Preoperative view of amelogenesis imperfecta (case report 2)



**Figure 4:** Postoperative view

appearance. A detailed medical, dental, and social history was obtained. Examination revealed that the enamel was similar to the previous case (hypoplastic and yellow brown). Examination also revealed retained deciduous teeth (71, 81) and a dental midline discrepancy, short clinical crowns, occlusal wear, and aesthetic disharmony [Figure 3]. There was no loss of vertical dimension. The patient's medical history was unremarkable. Both the patients reported that their father's sister had similar features. Radiographic examination revealed teeth with normal pulpal morphology while the enamel appeared to be very thin. Panoramic radiograph also showed impacted 28, 38, and 48. A diagnosis of hereditary AI was made from the clinical and radiographic features.

The treatment plan was drafted and explained to the patient and informed consent was obtained from the patient. In the first phase of treatment oral prophylaxis was performed. In the second phase, the retained deciduous teeth were extracted. After 2 weeks, the healing of the extracted sockets was evaluated. Good healing was noted at 2 weeks and the prosthodontic phase of the treatment was begun after 2 weeks.

In the third phase of treatment, preparations were done with chamfer finish margins on the molar teeth

for full metal restorations and radial shoulder on the premolar teeth and canine teeth for metal ceramic restorations. Impression making and other procedures in fabrication of the crowns were followed similar to the first case. The next phase of treatment consisted of tooth preparation for the central and lateral incisors. Preparations were done with radial shoulder margins for central and lateral incisors for metal ceramic restorations. Crowns were fabricated and cemented as mentioned for the first case [Figure 4]. The patient was encouraged to maintain his oral hygiene by proper brushing, use of mouthwashes and dental check up once in at least 6 months.

## DISCUSSION

The objective of esthetic dentistry is to treat diverse problems and achieve natural appearing results. The treatment of patients with amelogenesis imperfecta presents an interesting challenge to the restorative dentist. The main clinical characteristics are extensive loss of tooth tissue, poor aesthetics, and tooth sensitivity.<sup>[2,4-7]</sup> The treatment plan for patients with AI is related to many factors including the age of the patient, the socio-economic status, the type and severity of the disorder and its intra oral manifestation.<sup>[8,9]</sup> The complexity of the management

of patients with AI should start with early diagnosis to prevent restorative problems at a later stage.

This is the first clinical report discussing the rehabilitation of a pair of dizygotic twins diagnosed with AI; the treatment plan having a common final goal - functional and esthetic rehabilitation, yet the approaches being slightly different.

This clinical report describes a treatment sequence based on a multidisciplinary approach. Treatment is usually combined to meet biologic, restorative, and esthetic requirements imposed by short clinical crowns.<sup>[9,10]</sup> Several materials and methods are available to the dental practitioner as far as restorative modalities are concerned. However, several limitations may exist in many of these modalities and hence should be critically reviewed prior to deciding a treatment

plan.<sup>[7-10]</sup> The most important disadvantage of restoring with full veneer crowns is the aggressive removal of tooth structure.<sup>[8,11,12]</sup> A more conservative option is ceramic veneers. But the esthetic and functional result of veneers in such cases is questionable.<sup>[13]</sup> Developing proper occlusion is probably the most important factor in full mouth rehabilitation. Canine-protected occlusion was developed in the final restorations to decrease lateral forces on the posterior dentition.<sup>[7,9]</sup>

For the patients described above, enhanced aesthetics was possible because the clinical crown and root form were favorable for complete coverage restorations. Metal-ceramic crowns and metal crowns were given because of the inability of the patients to afford all ceramic restorations. However, the results were satisfactory and pleasing with respect to both marginal fit as well as esthetics.

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