

Case Report

Comprehensive Interdisciplinary Approach to Restorative Dentistry for Patients under 18 with Amelogenesis Imperfecta

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Abstract: Amelogenesis imperfecta (AI) is a genetically inherited disorder characterized by defective enamel formation, posing a significant challenge in esthetic treatment for clinicians. The choice of an appropriate treatment modality is largely dictated by the specific type of AI. This paper aims to elaborate on therapeutic options available for patients under 18 with amelogenesis imperfecta, emphasizing a multidisciplinary treatment approach.

Keywords: Amelogenesis Imperfecta; Esthetic; Periodontal Correction; provisional crowns.

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1. INTRODUCTION

Amelogenesis imperfecta (AI) represents a heterogeneous group of inherited disorders that predominantly impact the quantity, structure, and composition of enamel [1]. The inheritance pattern of AI can manifest as autosomal dominant, autosomal recessive, or X-linked [2].

The Witkop classification system categorizes AI into four main forms: type I, characterized by hypoplastic enamel; type II, featuring hypomatured enamel; type III, exhibiting hypocalcified enamel; and type IV, presenting with hypomatured-hypoplastic enamel accompanied by taurodontism [1].

The clinical presentation of amelogenesis imperfecta (AI) displays considerable variation among the different types. In the hypomature type, affected teeth present with mottled, opaque white-brown, or yellow discolored enamel, which is softer than normal. The hypocalcified type is characterized by pigmented, softened, and easily detachable enamel. In the hypoplastic type, although the enamel is well mineralized, its quantity is reduced. Clinically, grooves and pits can be observed on the enamel surface. The tooth is tapered towards the incisal/occlusal face and exhibits open contact points [3, 4].

Amelogenesis imperfecta (AI) can be associated with various other dental and skeletal developmental defects or abnormalities. These include unerupted teeth, congenitally missing teeth, taurodontism, pulpal calcification, crown and root resorption, cementum deposition, truncated roots, interradicular dentinal dysplasia, gingival hyperplasia, follicular hyperplasia, constricted maxillary arch (omega-shaped arch), reversed curve of Spee, vertical growth pattern, and dental and skeletal open bite [5]. Patients with amelogenesis imperfecta (AI) commonly experience tooth sensitivity, unsatisfactory esthetics, and a loss of occlusal vertical dimension due to the rapid wearing of dentition [5, 6].

The formulation of a treatment plan for AI patients involves consideration of various factors, including the patient's age, socioeconomic status, the type and severity of the disorder, and the intraoral situation. An interdisciplinary approach is crucial for evaluating, diagnosing, and addressing the challenges faced by AI patients, employing a combination of orthodontic, periodontal, prosthodontic, and restorative treatments [7-9].

This clinical report details the application of an interdisciplinary approach in the rehabilitation of a patient with AI.

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2. CASE REPORT

An 18-year-old female patient presented with the chief complaint of discolored teeth, primarily seeking resolution for aesthetic concerns (Figure 1).



Figure 1: Initial extraoral view

Additionally, the patient reported experiencing tooth sensitivity and difficulties with chewing. No significant findings were noted in the patient's medical records, and she had not undergone any prior dental treatments.

The patient's family pedigree revealed that the patient's sisters exhibited a similar amelogenesis imperfecta phenotype. However, in contrast, the patient's brother did not present with any dental problems. Notably, the patient's parents were identified as cousins,

suggesting a consanguineous relationship. Given this pattern, the inheritance of amelogenesis imperfecta in this family is indicative of an autosomal recessive mode (Figure 2).

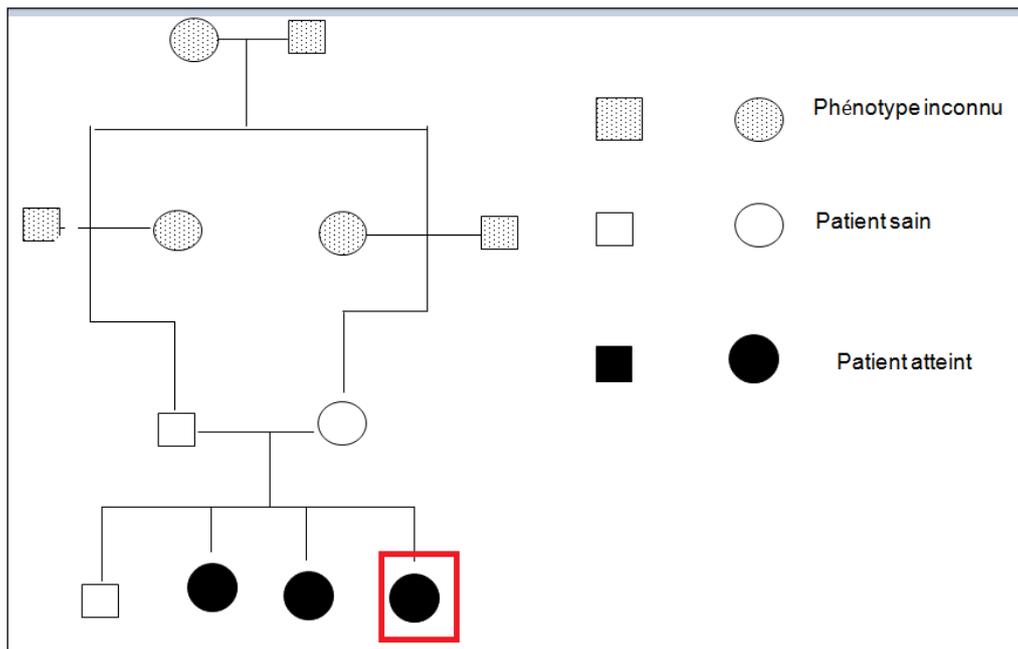


Figure 2: The patient's family pedigree

In the extraoral examination, the patient displayed competent lips with no signs of facial asymmetry, muscle tenderness, palpable lymph nodes, or indications of joint disorders.

Upon intraoral examination, it was observed that the upper permanent canines were impacted and

exhibited characteristics consistent with the hypoplastic and hypomature types of amelogenesis imperfecta (AI) in the posterior and anterior teeth, respectively (Figure 3). The incisal edges appeared thin, and the cuspal structures were aberrant.



Figure 3: Initial intraoral view: (a) frontal view; and (b) view in occlusion

Noteworthy findings included short clinical crowns, particularly in the posterior regions. Additional observations comprised wear on posterior teeth and the presence of caries on teeth numbered 14, 15, 36-47.

The patient exhibited generally poor oral hygiene, indicated by bleeding on probing and plaque index findings. No periodontal pockets deeper than 4 mm were recorded, but the gingiva appeared hyperemic and edematous.

An esthetic evaluation revealed a "dental smile" in the anterior maxilla, along with asymmetry in the gingival contours of anterior teeth. The interocclusal

distance measured at the premolar region during physiological rest was 3 mm. Unfortunately, it was not possible to determine the molar and canine relationship.

The panoramic radiograph depicted in Figure 4 disclosed a thin layer of enamel along the occlusal surfaces of most erupted teeth. Notably, the crowns of the upper impacted canines displayed signs of resorption. Tooth 38 was found to be missing. While the roots of all teeth appeared normal in size and shape, there were instances of closely approximated roots. Additionally, abnormally large pulp chambers and root canals were evident in the majority of teeth.



Figure 4: Pretreatment panoramic view

The renal ultrasonography examination of the patient's kidneys, as illustrated in Figure 5, revealed the absence of any calcifications.

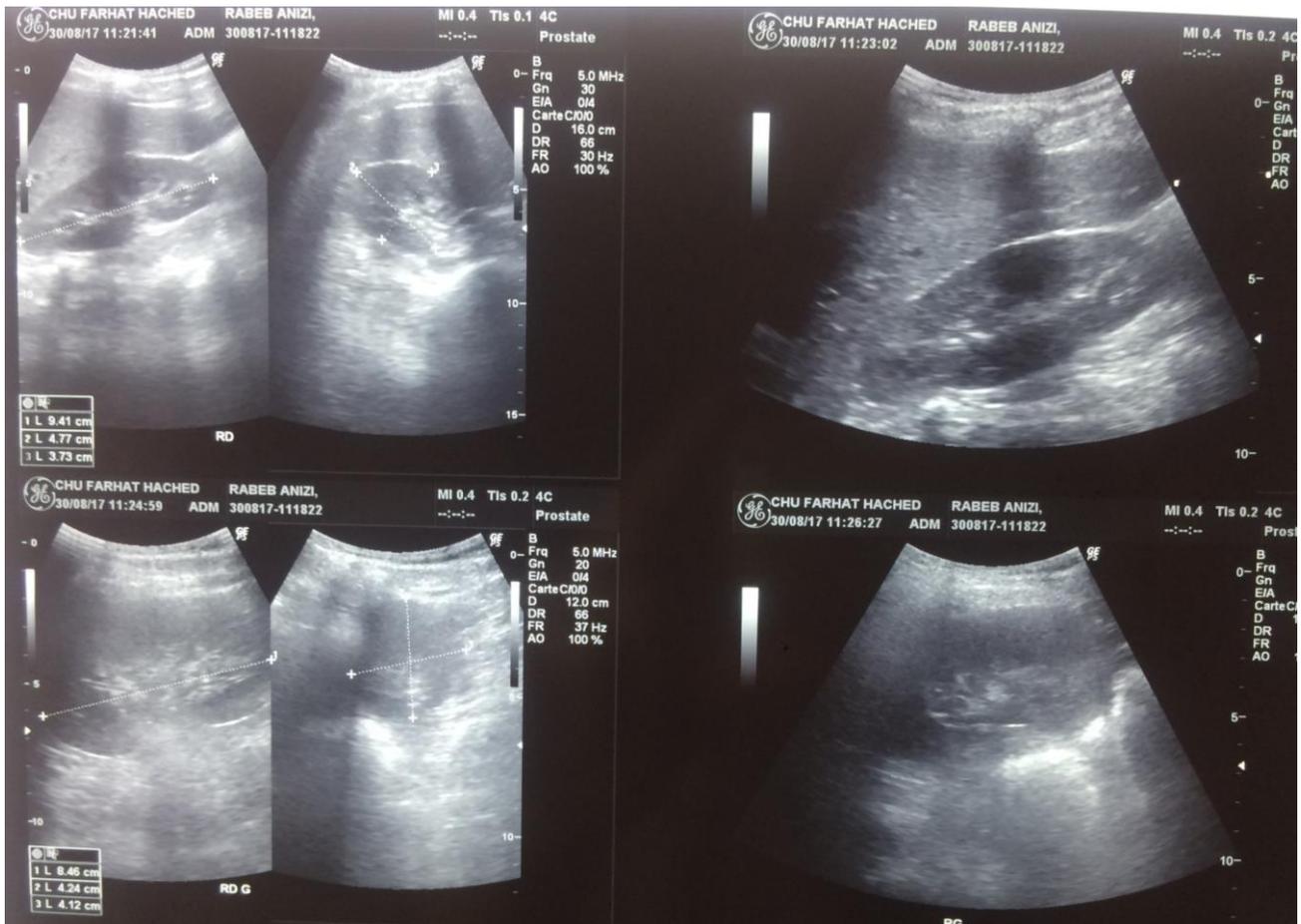


Figure 5: Renal ultrasonography

Treatment

A comprehensive treatment plan was formulated with several objectives in mind:

- **Pain Control and Preventive Care:**
Prioritizing pain control for all teeth.
- **Improvement in Oral Hygiene:**
Implementation of preventive measures was prioritized, with a strong emphasis on enhancing oral hygiene practices. Following scaling and oral hygiene instruction, the patient demonstrated adherence to the recommended oral health care program within a 2-week period. Notably, the gingival edema resolved, and the hyperemic appearance of the gingiva returned to normal. Additionally, both bleeding on probing and plaque index findings normalized, indicating a positive response to the prescribed oral health measures.
- **Caries Removal and Root Canal Therapy:**
Caries removal and root canal therapy planned for teeth nos. 11 and 21.
- **Orthodontic Treatment:**
The original plan included orthodontic intervention to address impacted canines and correct

anterior and posterior crossbites. However, due to financial constraints, the patient is currently unable to proceed with this aspect of the treatment.

- **Periodontal Correction:**
Periodontal correction was planned to adjust gingival contours in the anterior sextants, and crown lengthening was planned for the posterior sextants. The execution of periodontal surgery procedures, guided by fabricated stents, took place over four sessions.

We then performed a surgical exposure procedure to facilitate the eruption of the two impacted canines.

- **Prosthetic Treatment:**
After 6 weeks, prosthetic intervention was initiated, involving the fabrication and placement of full-coverage provisional crowns for both maxillary and mandibular teeth. These crowns were created with the assistance of a diagnostic wax-up and were subsequently relined using Tempron (GC Dental Products Corp.) (Figure 6). The occlusion on the provisional restorations was meticulously adjusted to establish a mutually protected scheme in the oral cavity.



Figure 6: Provisional crowns (a) maxillary and (b) mandibular

Looking ahead, the long-term plan encompasses transitioning to ceramic crowns for all teeth, a step scheduled to be undertaken once the patient reaches 20 years of age.

This comprehensive approach encompasses various disciplines, ensuring a holistic treatment strategy addressing both immediate concerns and long-term oral health objectives 4.

3. DISCUSSION

The interdisciplinary management of patients with amelogenesis imperfecta in the context of restorative dentistry involves a comprehensive and coordinated approach to address the various challenges associated with this developmental disorder. This management typically integrates the expertise of multiple dental specialties, including orthodontics, periodontics, prosthodontics, and restorative dentistry. The focus is on providing restorative solutions that enhance both the functional and esthetic aspects of the dentition affected by amelogenesis imperfecta. The interdisciplinary team collaborates to tailor treatment plans to individual patient needs, considering factors such as age, severity of the condition, patient expectations, and financial considerations. The goal is to achieve successful outcomes, improve oral health, and enhance patient satisfaction through a well-coordinated and holistic approach [10, 11].

Numerous clinical reports have detailed the restoration of individuals affected by amelogenesis imperfecta (AI) [8, 10]. A preference for full porcelain restorations has been expressed by several authors as a treatment modality for patients with AI [13]. Progress in esthetic dentistry, particularly advancements in bonding to dentin, enables practitioners to restore both function and aesthetics to an acceptable level [12]. However, it's important to note that some drawbacks, such as marginal adaptation and bonding issues, have been highlighted in the context of laminate veneers [9].

Several factors can influence the success of restorative treatments, particularly in the acid-etching and bonding of teeth affected by amelogenesis imperfecta (AI). For instance, the etch pattern of AI enamel variants may be altered, resulting in a less

optimal match to normal enamel [14-18]. Moreover, the morphological pattern of dentin in hypocalcified AI closely resembles sclerotic dentin, responding differently to acid etch conditioning compared to normal dentin [18, 19]. Modern dentin-bonding systems, in contrast to earlier methods, offer more reliable bonding to dentin and more effective infiltration of enamel prisms. Consequently, these systems may provide more durable dentin bonding when dealing with abnormal enamel. Despite severe enamel abnormalities, successful bonding of porcelain restorations has been achieved with few adhesion complications, as seen in several previously reported cases [20, 21].

The decision regarding whether to preserve an enamel layer and opt for adhesive restorations or to entirely remove the enamel and employ complete coverage crowns is contingent upon the extension and depth of the patient's enamel lesions [22, 23].

4. CONCLUSION

Amelogenesis imperfecta (AI) is a developmental disorder that can significantly diminish the quality of oral health and contribute to psychological challenges. As a result, individuals affected by AI often require comprehensive treatment. The success of the treatment relies on well-coordinated efforts in orthodontics, periodontics, prosthodontics, and restorative dentistry, taking into careful consideration the patient's expectations and financial situation. Early intervention in patients with AI is crucial to prevent the progressive deterioration of dentition and mitigate the psychological impact associated with this condition, ultimately leading to a successful outcome and increased patient satisfaction.

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