

CASE REPORT

Amelogenesis Imperfecta: A Multidisciplinary Approach for Esthetic and Functional Full-mouth Comprehensive Rehabilitation

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ABSTRACT

The purpose of this case report is to present the esthetic and functional rehabilitation of a 17-year-old female patient who sought treatment for teeth severely affected with amelogenesis imperfecta (AI). Her teeth showed alterations in enamel thickness, color, and shape, all of which compromised esthetic appearance and masticatory function. Management of such cases requires more than just a restorative approach. The challenge lies in the comprehensive treatment planning and successful execution of the action plan for such patients. Treatment plan comprised of improvement in the patient's oral hygiene, endodontic and restorative therapy, orthodontic correction of malposed teeth, crown lengthening, and prosthetic rehabilitation. This case report is our successful attempt to rehabilitate the patient for esthetics and function, which has also contributed to increased self-esteem and better quality of life in the patient.

Keywords: Amelogenesis imperfecta, Endodontic therapy, Esthetics, Porcelain fused to metal crowns.

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INTRODUCTION

Amelogenesis imperfecta represents a diverse range of inherited developmental enamel defects resulting in

changes in the quantity, structure, and composition of enamel.¹⁻³ The AI can be classified as hypoplastic, hypomaturation, hypocalcified, and hypomaturation-hypoplastic with taurodontism.¹ Based on clinical features and inheritance pattern, 15 subtypes of AI can be distinguished.^{2,3} X-linked recessive hypomaturation AI is one of the least common forms of AI. One form of the hypomaturation type of amelogenesis is inherited as an X-linked trait showing a lyonization effect in females.¹ In the hypomaturation type, enamel appears with a mottled, opaque white to red-brown coloration, and is softer than normal and tends to chip from the underlying dentin. Most variants of AI require extensive dental treatment.²⁻⁶ Clinicians must, therefore, consider treatment alternatives to balance the patient's needs, financial implications for the patient's family, and the long-term prognosis. This clinical report describes the interdisciplinary treatment approach for a patient with X-linked hypomature AI with complex needs.

CASE REPORT

A 17-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College & Research Institute, Bengaluru, India, with severely discolored teeth and functional concern as she complained of generalized sensitivity and pain in her teeth. No history of tetracycline ingestion by herself as a child or her mother during pregnancy was found. The patient's younger sister and father also exhibited similar discoloration of their teeth, but to a lesser extent. The diagnosis of the AI hypomaturation X-linked variety was established along with other peers and superiors following a complete clinical evaluation. Clinical examination revealed profusely discolored yellowish brown teeth. Patient's posterior teeth were severely sensitive and eroded occlusally. Over-retained deciduous canine 63 was present, which was firm. Teeth 23 and 24 were malposed. Hyperplastic gingiva with friable oral mucosa was observed. Radiographic examination showed poor contrast of enamel with respect to dentin; narrow pulp chambers in all the teeth were observed. Diagnostic casts were made. Photographic records were taken (diagnostic Fig. 1). Treatment plan was formulated in three phases as illustrated in Table 1.

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Figs 1A to F: Diagnostic photographs. (A) Frontal view—vertical dimension of occlusion (VDO) at rest. (B) Frontal view—VDO at occlusion. (C) Right side occlusion. (D) Left side occlusion: overretained deciduous canine, 23 is malposed. (E) Maxillary arch: overretained deciduous canine, malposed 23 and 24. (F) Mandibular arch

BACKGROUND

Phase I

Palliative treatment in the form of emergency access openings and pulp debridement was made for teeth 16, 17, 46, 47. Caries excavation followed by glass ionomer restorations were made for teeth 25, 26, 35. Instructions for maintenance of oral hygiene, and nutritional supplements in the form of multivitamins were advised. The diagnostic casts were mounted on a semiadjustable articulator and treatment plan was formulated.

Phase II

Endodontic therapy was planned for all her symptomatic teeth. Initial randomized controlled trial (RCT) involved treatment of teeth 16, 17, 46, 47 in two visits, followed by RCT for restored 35. After this, the patient was followed up for a week before the placement of postendodontic (Fuji type IX) glass ionomer restorations for all her RCT-treated teeth. Single-visit RCT was completed for 14, 15, 44, 45 and recall checkup after 1 week and placement of postendodontic (Fuji type IX) glass ionomer restorations were undertaken. Similarly, single-visit RCT and

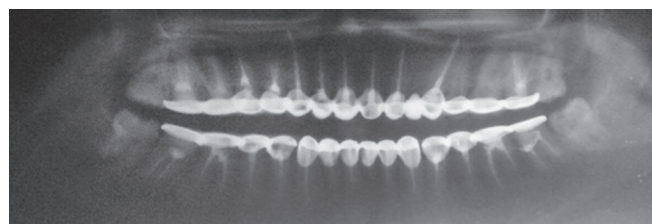
Table 1: Treatment plan with treatment objectives

Treatment phase	Planned treatment	Expected outcome
Phase I	Palliative care, oral prophylaxis, oral hygiene instructions, multivitamin tablets	Symptomatic relief, improvement in patient's oral hygiene and nutrition
Phase II	Endodontic therapy for symptomatic teeth, followed by orthodontic correction of malposed teeth	To alleviate pain and sensitivity prior to orthodontic correction. Correction of malposed teeth
Phase III	Correction of vertical dimension in posterior teeth. Crown lengthening procedure for all posterior teeth. Tooth preparations to receive PFM crowns	New corrected vertical dimension. Increased height of clinical crowns for posterior teeth. Esthetic rehabilitation of all 28 teeth by PFM crowns

postendodontic composite restorations were done for 34, 36, 37. During the RCT, it was observed that the pulp tissue was more fibrotic with lesser vascular elements. All the 11 anterior teeth were treated by a single-visit endodontic therapy followed by postendodontic (Fuji type IX) glass ionomer restorations except for 23. The patient was referred to the Orthodontic Department in the institute. Extraction of 24 was undertaken and 23 was brought into the dental arch. Successful correction of malposed teeth after 8 months with removable orthodontic therapy was done. (Fixed orthodontic treatment could not be undertaken as bonding of brackets was difficult with defective enamel.) Thermopolymerizable acrylic retainers were applied for 4 months and the patient was referred to the periodontist for evaluation. Coronal lengthening techniques were considered for improving the height of the clinical crown for the posterior sector. After alignment, 23 was treated by intentional RCT followed by glass ionomer (Fuji type IX) postendodontic restoration. The RCT was not planned for 25, 26, as conservative resin-modified glass ionomer restoration was satisfactory.

Phase III

Third phase involved correction for vertical dimension by 1 mm with occlusal stent made of vacuum-pressed transparent soft material. Temporization of occlusion and esthetics with polymethyl methacrylate crowns were accomplished by indirect technique. After 6 weeks, the patient was comfortable in the new functional position. This was followed by final esthetic correction. Over-retained deciduous canine 63 was extracted as the tooth showed grade 1 mobility. The extraction space between 22 and 23 was planned and closed by a ceramic pontic

**Fig. 2:** Panoramic radiograph after 5 years of follow-up

(3M ESPE) using 22 and 23 as abutments. All 27 teeth were prepared to receive porcelain fused to metal (PFM) (3M ESPE) crowns. Crowns were cemented with luting glass ionomer cement (Fuji-Plus, GC). Esthetic rehabilitation has significantly improved the patient's self-esteem and confidence. We have followed up the patient for 5 years, which has been uneventful. Postoperative follow-up orthopantomograph reveals completely erupted all four third molars. No evident radiographic changes in the treated teeth and no other abnormalities was observed (Fig. 2).

Figures after esthetic rehabilitation are shown in Figure 3.

DISCUSSION

Hypoplastic AI includes an imperfectly formed matrix, deficiencies in the quantity of enamel formed, and irregular deposition of enamel. In hypomaturational, the final stages of the mineralization process are abnormal. Hypocalcification type AIs have a normal matrix that is not fully calcified, resulting in easily abraded enamel. The bulk of the forms of AI are inherited as autosomal dominant, autosomal recessive, or X-linked characters.¹⁻⁴ Witkop¹ was the first to describe hypomature enamel. The affected teeth show a soft enamel of normal thickness, a radiodensity similar to dentin, which chips and wears easily, and as may having a less affected cervical area of posterior teeth. According to Seow,⁴ the primary clinical problems of AI are esthetics, dental sensitivity, and loss of occlusal vertical dimension. All of these features were characteristically seen in our 17-year-old female patient.

The patient presented with yellowish brown pigmented teeth, with occlusally chipped out enamel in the posterior teeth. All the 28 teeth were erupted. Teeth #23 and #24 were malposed. Over-retained deciduous canine 63 was also observed. Patient complained of severe generalized sensitivity in her teeth, more so with her posterior teeth. Along with these clinical presentations, the oral cavity examination revealed gingivitis and gingival hyperplasia due to association of plaque and bacteria with the anomalous adamantine surfaces. Oral mucosa was thin and fragile and commissures and patient lips also showed cracks indicative of nutritive deficiency.



Figs 3A to D: Photographs after esthetic rehabilitation. (A) Frontal view—vertical dimension of occlusion in occlusion. (B) Maxillary arch. (C) Right side occlusion. (D) Left side occlusion

Phase I of treatment was palliative in nature. This included improving the patient's oral hygiene by oral prophylaxis and maintenance thereafter.^{7,8} Restoration of chipped out posterior teeth was undertaken. Emergency access opening and debridement were done for symptomatic posterior teeth. We also prescribed multivitamins as nutritional supplements along with diet counseling.

Endodontic therapy was considered for all the 28 teeth.⁵ The management of severely affected patients can be challenging for the dentist. Innovations in adhesive and esthetic materials have opened up new horizons in treatment options. Conservative management was difficult as the defective enamel posed a challenge for the bonding procedure. Patient had severe tooth sensitivity with cavitated symptomatic teeth. Evident need for correction of vertical height, the patient's age, and the quantity and quality of the affected enamel and financial implications made us opt for endodontic therapy and metal-ceramic crowns. Laminates or porcelain jacket crowns were a good esthetic option for the anteriors. To balance patient's demand for more predictable options and due to the financial constraints, we choose PFM crowns. Before the prosthetic placement of crowns, orthodontic therapy was done to correct the malposed 23

and 24. We decided to retain 23 over 24 as canines are the cornerstones of the dental arch. Removal orthodontic therapy and retention were administered. Vertical dimension up to 1 mm in the posteriors was corrected.^{8,9} All the teeth were prepared sequentially to receive PFM crowns.⁸⁻¹⁰ Glass ionomer cement was used to lute the crowns on the prepared teeth.

CLINICAL SIGNIFICANCE

Often, AI patients experience lower self-esteem along with other dental problems, affecting their overall quality of life. Therefore, a comprehensive treatment plan with multidisciplinary approach is deemed necessary to treat the complex needs of patients with AI to instill confidence and improve their self-esteem.

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