The Restoration of Function and Esthetics of a Patient with Amelogenesis Imperfecta Using a Combination of Orthodontic and Prosthodontic Treatment: A Case Report

Sandeep Kumar, BDS, MDS; Seema Gupta, BDS, MDS

Abstract

Aim: The purpose of this case report is to present the esthetic and functional rehabilitation of the teeth in a 20-year-old patient with amelogenesis imperfecta (AI), facial asymmetry due to functional mandibular shift, and unilateral posterior crossbite.

Background: AI is a group of hereditary defects of enamel unassociated with any other generalized defects. AI results in poor development or the complete absence of the enamel of the teeth caused by improper differentiation of ameloblasts.

Case Description: This report describes the diagnosis and treatment of a young female patient with AI and facial asymmetry using a combined orthodontic-prosthodontic approach. Initially, the posterior crossbite, mandibular shift, and facial asymmetry were treated orthodontically. Later, metal-ceramic crowns for posterior teeth and all-ceramic crowns for anterior teeth were fabricated for final restorations.

Summary: Coordinated orthodontic and prosthodontic treatment, with careful consideration of patient expectations and requests, were critical for a successful outcome and patient satisfaction.

Clinical Significance: The complexity of the management of patients with AI supports the suggestion that the dental profession should have appropriate methods for the rehabilitation of rare dental disorders.

Keywords: Amelogenesis imperfecta, facial asymmetry, mandibular shift, unilateral posterior crossbite, porcelain restoration

Introduction

Amelogenesis imperfecta (AI) has been defined as a group of hereditary enamel defects. On a clinical and radiographic basis, three broad types of the disease can be distinguished as follows:\textsuperscript{1-4}

1. \textit{Hypoplasia}. The enamel is reduced in quantity and does not develop to its normal thickness but is relatively well-mineralized. The enamel thickness on newly erupted teeth closely approaches that of normal teeth, but it is soft and friable, and can easily be removed from the dentin.

2. \textit{Hypocalcification}. The enamel is formed in relatively normal amounts but is poorly mineralized. Enamel thickness on newly erupted teeth closely approaches that of normal teeth, but it is soft and friable, and can easily be removed from the dentin.

3. \textit{Hypomaturation}. The final stages of the mineralization process are abnormal. The enamel is of normal thickness and is harder, with a mottled opaque white to yellow-brown or red-brown color, and tends to chip away from the underlying dentin.

The primary clinical problems associated with AI include poor aesthetics, dental hypersensitivity, loss of vertical dimension, and poor occlusal function. This clinical report describes an interdisciplinary approach used to treat an AI patient with a severe mandibular shift, a unilateral posterior crossbite, and facial asymmetry.

Clinical Report

Diagnosis

A 20-year-old female patient presented to the Department of Prosthodontics of the Manipal College of Dental Sciences in Manipal, Karnataka, India, with severe attrition of all of her teeth. She was very self-conscious about her appearance. A detailed medical, dental, social, and family history was obtained and revealed her mother and aunt had a similar appearance of their teeth. The extraoral examination revealed a long face with severe facial asymmetry, a mandibular shift to the right side on closure, and an asymmetric smile (Figure 1).

The intraoral examination revealed a Class I malocclusion when evaluated at the initial occlusal contact but then transformed to a Class II, subdivision right molar relationship on final closure because of a 5-mm functional lower midline shift to the right while the upper midline was in alignment with the facial midline (Figure 2). There was functional interference in upper left canine area and the maxilla was bilaterally constricted. As a result, there was a unilateral posterior crossbite on the right side with an end-on molar relation on the right and a Class I on the left side.

The surfaces of the teeth were rough with the enamel either not visible or very thin and hypoplastic over the crowns of all teeth and yellow-brown in color. The dentin, where it was exposed, was brown and hypersensitive. The patient had all the permanent teeth erupted including third molars.

Radiographically the panoramic radiograph revealed that the teeth had normal pulpal morphology while the enamel appeared to be very thin or missing on all the teeth (Figure 3).

The condyles were long and thin. Cephalometric examination revealed a skeletal Class III relationship with proclined upper and retroclined lower incisors, an increased mandibular plane
Figure 2. Pretreatment intraoral photographs.

Figure 3. Pretreatment radiographs.
The anterior area, the upper anterior teeth were proclined with a protraction utility arch (Figure 5).

The crossbite, midlines, and facial asymmetry were corrected, but settling of the occlusion and finishing was still required. Since the patient had a limited time before moving away, she insisted on completing her treatment as rapidly as possible. As a result, she was debonded and Begg Wraparound retainers were placed in both the arches to prevent relapse and she was referred back to the prosthodontic department to complete her remaining treatment.

**Prosthodontic Treatment**

The vertical dimension of the patient was determined and her 5 to 6 mm of interocclusal space needed to be modified. An occlusal splint with an increased vertical dimension of 3 mm was placed for one month in order to assess the acceptability of the new vertical dimension. The patient was asymptomatic and tolerated the new vertical dimension well.

Diagnostic casts were made, as were face-bow and protrusive records. Casts were mounted in centric relation in a semi-adjustable articulator (Hanau™ Wide-Vue Arcon Articulator, Waterpik, Fort Collins, USA). A diagnostic wax up was done and the articulator was set for condylar and incisal guidance.

**Orthodontic Treatment**

Orthodontic correction of the mandibular shift, unilateral posterior crossbite, and facial asymmetry.

Crown restorations to reduce the reported sensitivity of the teeth, improve the esthetics, and restore masticatory function.
Preparation of the anterior teeth was carried out for the all-ceramic restorations. Impressions were made with polyvinyl-siloxane impression material using custom trays and interocclusal relationships were recorded. The marginal fit and esthetic appearance of the crowns were verified. They were then luted with a resin luting agent (Dual Cure Dental Adhesive System, Panavia™ F2.0, Kuraray Medical Inc, Japan).

The anterior all-ceramic and posterior metal-ceramic crowns were satisfactory both esthetically and functionally (Figures 6 and 7). The patient was highly satisfied with the treatment results.

Later, preparations of all the posterior teeth were done to receive metal-ceramic restorations. Impressions were taken using polyvinyl-siloxane impression material (ReprosilR; Dentsply Caulk, Dentsply International Inc.) using custom trays and interocclusal relationships were recorded. The vertical dimension was increased by 3 mm in the premolar region in order to restore a favorable occlusal relationship. All prepared teeth were restored with provisional crowns cemented with Provicol (Voco GmbH, Germany). The occlusal records were transferred to a semi-adjustable articulator with a facebow, and the final casts were mounted. Metal frameworks were fabricated and were evaluated intraorally to determine the marginal fit, followed by the ceramic firing. Prior to glazing of the ceramic material a trial insertion was performed, again to enable final occlusal refinement. The patient’s natural occlusal scheme (canine-protected occlusion) and anterior guidance were preserved in the definitive restorations to decrease lateral forces on the posterior dentition. The crowns were then completed in the laboratory and cemented with glass ionomer cement (GC, luting & lining cement, GC Corporation, Tokyo, Japan).

Preparation of the anterior teeth was carried out for the all-ceramic restorations. Impressions were made with polyvinyl-siloxane impression material using custom trays, and an interocclusal record was taken. The prepared teeth were restored with provisional crowns. The mounting procedures and recording of the interocclusal relationships used were the same as were done for the posterior restorations. All restorations were fabricated with IPS Empress 2 material (Ivoclar Vivadent, Schaan, Liechtenstein) according to the manufacturer's directions. The marginal fit and esthetic appearance of the crowns were verified. They were then luted with a resin luting agent (Dual Cure Dental Adhesive System, Panavia™ F2.0, Kuraray Medical Inc, Japan).

The anterior all-ceramic and posterior metal-ceramic crowns were satisfactory both esthetically and functionally (Figures 6 and 7). The patient was highly satisfied with the treatment results.
Clinical Significance

The complexity of the management of patients with AI supports the suggestion that the dental profession should have appropriate methods for the rehabilitation of rare dental disorders.

References

About the Authors

Sandeep Kumar, BDS, MDS  
(Corresponding Author)

Dr. Kumar is an assistant professor in the Department of Prosthodontics and Maxillofacial Prosthetics of the Manipal College of Dental Sciences in Manipal, Karnataka, India.

e-mail: mdssandy07@gmail.com

Seema Gupta, BDS, MDS

Dr. Gupta is an assistant professor in the Department of Orthodontics of the Manipal College of Dental Sciences in Manipal, Karnataka, India.