

**ORGANIZED APPROACH FOR THE REHABILITATION OF MUTILATED
DENTITION ASSOCIATED WITH AMELOGENESIS IMPERFECTA- A CASE
REPORT**

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ABSTRACT

This case report describes the full mouth rehabilitation of a young adult male patient diagnosed with hypoplastic amelogenesis imperfecta with mutilated dentition due to attrition of hypoplastic enamel. The aim of the treatment was to reduce dental hypersensitivity and to restore esthetics and masticatory function. These treatment objectives were successfully met by sequential fixed prosthetics treatment using a custom-made Broderick occlusal plane analyzer with a semi adjustable articulator which provides an easy and practical method to determine an occlusal plane that fulfill the esthetic and functional occlusion requirements. Final treatment included full mouth rehabilitation with metal-ceramic crowns using Pankey-Mann-Schuyler philosophy of complete occlusal rehabilitation which resulted in improved function, esthetics and self-confidence of the patient.

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INTRODUCTION

Amelogenesis imperfecta has been described as a complex group of hereditary enamel defects that disturbs the enamel structure and exists independent of any related systemic disorder^[1]. This enamel anomaly affects both the primary and permanent dentition. Amelogenesis imperfecta affects only the epithelial derivatives (enamel). Therefore, the mesenchymal derivatives (dentine, pulp and cementum) are normal. Investigators have demonstrated that it is possible to delineate at least 12 distinct types of amelogenesis imperfecta using a combination of clinical, radiographic, histological, and genetic criteria^[2]. On the clinical and radiographic basis these anomalies can be classified in three broad groups -Type 1: Hypoplastic - enamel is reduced in quantity but is relatively well mineralized; Type 2: Hypocalcification - enamel is formed in normal amounts but is relatively less mineralized; and Type 3:

Hypomaturation – in which the final stages of mineralization are abnormal^[3].

The primary clinical problems associated with Amelogenesis imperfecta are poor esthetics, dental sensitivity, chewing difficulties, loss of tooth substance due to chipping and attrition, higher risk for dental caries and loss of vertical dimension of occlusion. The severity of dental problems experienced by the patient varies with each type of Amelogenesis imperfecta^[4]. Clinical features distinguish the hypoplastic and hypocalcified types. In the former the enamel does not develop to normal thickness, whereas in the latter the enamel of a newly erupted tooth is of normal thickness but soft and friable, and can be easily removed from the underlying dentin. The hypo maturation type differs from the hypo calcification type in that the enamel is harder with a mottled opaque white to yellow-brown or red-brown color and tends to chip away from the underlying dentin^[5].

Historically, treatment of patients with Amelogenesis imperfecta included multiple extractions and fabrication of complete denture^[4]. This treatment option is psychologically harsh especially when addressing an adolescent patient^[6]. The treatment plan for a patient with Amelogenesis imperfecta depends upon factors such as the age of the patient, the socioeconomic status, the type and severity of the disorder and the intra-oral situation at the time of presentation.

In fixed prosthodontics, procedures like Full mouth rehabilitation which require restoration of all or most of the teeth, it is necessary to determine proper occlusal plane that will fulfill esthetic and functional occlusion requirements. The plane of occlusion represents the average curvature of the occlusal surface. The position of the anterior teeth is determined by esthetics, the demand for anterior guidance, and phonetic considerations. Posterior tooth positions are defined by two curves, an anteroposterior curve referred to as the curve of Spee and the mediolateral curve referred to as the curve of Wilson^[7].

The three most commonly used methods for establishing an acceptable plane of occlusion are direct analysis on natural

teeth through selective grinding, indirect analysis of facebow-mounted casts with properly set condylar paths, and indirect analysis using the Pankey- Mann-Schuyler (PMS) method with the Broderick occlusal plane analyzer (BOPA)^[7]. When it has been determined that restoration of all or most of the posterior teeth is necessary, the PMS technique using Broderick occlusal plane analyzer provides an easy and practical method to assist in determining the preliminary occlusal plane on diagnostic casts that will fulfill esthetic and functional occlusion requirements.

A recently published survey reported the importance of treating the Amelogenesis Imperfecta patient not only from a functional standpoint, but from a psychosocial health standpoint as well. According to survey the patients with Amelogenesis Imperfecta experience higher levels of social avoidance combined with a reduced perceived quality of life compared to those without Amelogenesis Imperfecta and that the treatment has a positive psychosocial impact^[8].

This clinical report describes the effective application of a custom made Broderick occlusal plane analyzer for the prosthetic rehabilitation of mutilated natural

dentition associated with an amelogenesis imperfecta patient.

CASE REPORT

A 26 year old male patient reported to the department of prosthodontics, with chief complaint of discoloration of teeth and functional inadequacy of the permanent teeth along with teeth sensitivity. A detailed medical, dental and social history was obtained. Family history revealed that his brother was suffering from similar condition. Medical history didn't show any systemic condition or disease that contraindicates dental treatment. Past dental history revealed that patient had undergone restorative treatment due to caries, endodontic treatment of 46 and fixed dental prosthetic treatment at the age of 21 years in the form of metal crowns on 46 and 47. On clinical examination, there was no facial asymmetry or muscle tenderness. Mandibular movement was within normal limits. Temporomandibular joint, muscles of mastication and facial expression were asymptomatic.

The patient's intra-oral examination revealed that all his teeth were hypoplastic with yellowish brown discoloration (Figure1).



Figure 1: Pre-operative

The molars were attrited and the enamel layer was either not visible or very thin over the crown. The dentin where it was exposed was brown and hypersensitive. Loose metal crowns were present on 46 and 47, later which were removed. Patient's oral hygiene was unsatisfactory along with many carious teeth and old restorations. The radiographic examination revealed very thin layer of enamel over the crowns. Multiple restorations were present in teeth 25, 27, 35, 36, 46, 47 and pulp exposure with respect to 36 and 47. His third molars were not erupted except 48.

The patient's occlusal vertical dimension and rest vertical dimension was assessed. The inter-occlusal rest space had increased because of attrition of posterior teeth. Through family history and clinical examination, it was concluded that the patient was suffering from the hypo maturation type of Amelogenesis imperfecta.

Complete maxillary and mandibular arch impressions were made using irreversible hydrocolloid impression material (Zelgan; Dust free Alginate, Dentsply DeTrey GmbH, Germany). Diagnostic casts were fabricated from type III dental stone (Lab stone; Kalabhai Karson, Mumbai, India) and mounted on a semi-adjustable articulator using a face bow transfer and centric interocclusal record.

Using mounted diagnostic models along with clinical and radiographic findings a treatment plan was drawn with the following aims: improving the esthetics, increasing the vertical dimension of occlusion, restoring the masticatory function and reducing hypersensitivity of attrited teeth. Fabrication of full coverage metal ceramic crowns for all teeth were planned following Pankey- Mann-Schuyler philosophy of complete occlusal rehabilitation. The patient was informed about periodontal, endodontic and restorative procedures required, the expected clinical longevity, the time period necessary to conclude the treatment and the possible esthetic results.

According to treatment plan, oral prophylaxis was followed by restorative treatment of carious teeth with amalgam restoration, teeth 36 and 47 having pulp

exposure were treated endodontically and the patient was placed on a 0.12% chlorohexidine gluconate (Periogard Oral Rinse, Colgate Oral Pharmaceuticals, Canton, Mass) oral rinse, with a recommended use of twice daily. His un-erupted third molars were left as such because patient was not willing for disimpaction surgery, so it was decided not to restore them and get them extracted whenever symptomatic.

Maxillary and mandibular arch impressions were made using irreversible hydrocolloid impression material and diagnostic casts were fabricated from type III dental stone (Lab stone; Kalabhai Karson, Mumbai, India). And these diagnostic casts were mounted on a semi-adjustable articulator (Whip Mix articulator; Model 8500, Whip Mix corporation, Louisville, USA) using a face bow transfer (Quick mount face bow; Model 8645, Whip Mix corporation, Louisville, USA) and centric interocclusal record using bite registration sheet (Maarc-Aluminum filled bite registration sheet, Shiva products, Thane, India),(Figure 2).

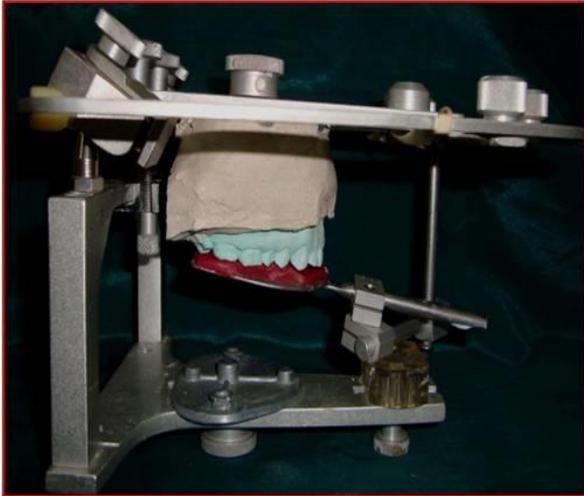


Figure 2: Facebow transfer and programming of articulator

The articulator was programmed using centric and lateral records. It was planned to increase the vertical dimension of occlusion by 2 mm using occlusal splint for a period of 4 weeks. Phonetics and Niswonger's technique were used to establish the new vertical dimension of occlusion.

Mock preparations on the mounted casts of articulator were done to evaluate the amount of tooth reduction to correct the contour and alignment. The Occlusal scheme was developed at increased vertical dimension of occlusion through diagnostic wax-up on the articulator (Figure3).



Figure 3: Diagnostic wax up

After checking the anterior wax up for proper anterior guidance to achieve disocclusion in eccentric movements, posterior occlusal plane was analyzed using custom made occlusal plane analyzer with Broderick flag. The use of a Broderick flag was indicated to assess and to redesign the level and orientation of the occlusal plane. Since no such flag was supplied by the manufacturer, a custom made flag was fabricated using a 2 mm thick clear acrylic resin sheet (4 inch x 4 inch), which would fit into a slot of the same dimension in a clear acrylic resin base attached to the upper member of the articulator.

A sheet of blank paper was attached to both sides of the flag to receive the markings. The maxillary cast was removed from the articulator and the flag was attached on top of the upper member of the articulator.

The anterior survey point (ASP) was chosen on the midpoint of the disto-incisal edge of the Mandibular left canine from which a long arc with a 4-inch radius was drawn on the flag with a compass. A second arc was drawn from posterior survey point (PSP) which is center of condylar element of the articulator on the flag to intersect the long arc at the center of the anteroposterior curve.

This point of intersection is the centre of the curve of the Spee (Figure 4). The point of the compass was placed at the center of anteroposterior curve on the flag with the cutting blade (Rotex, Mumbai, India) attached at another end, and a 4-inch radius was drawn through the buccal surfaces of the mandibular wax up and the over waxed patterns were cut back to the correct height. The angle of the blade automatically produced an acceptable mediolateral curve, positioning the lingual cusps more apically than the buccal cusps.

In this way, the occlusal plane of both sides was established in mesiodistal and buccolingual direction. Patient's maxillary and mandibular teeth were prepared to receive metal ceramic crowns (Figure 5,6).

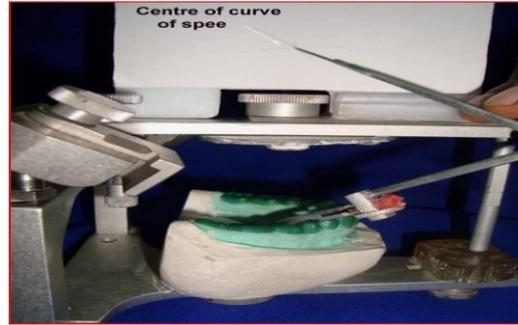


Figure 4: Broadrick flag assembly recordings



Figure 5: Maxillary teeth preparation completed



Figure 6: Mandibular teeth preparation completed

Provisional restorations (Protemp II Temporization material; 3M ESPE, USA) were fabricated from the diagnostic wax up. The provisional restorations were evaluated intra-orally & adjusted for centric and eccentric contacts and cemented on the prepared tooth using non-eugenol temporary cement (Temp-bond cement; Kerr, USA). The

patient wore the provisional restorations at the new vertical dimension of occlusion for 3 months. During this period patient did not report any discomfort and was very happy with esthetic and function with temporaries. So it was decided to proceed with permanent restorations. After taking the new face-bow records and the casts of provisional restorations were mounted on the articulator at increased vertical dimension. A custom incisal guide table was fabricated from acrylic resin (Pattern Resin LS, GC America) to preserve the same anterior guidance of provisional restorations for fabrication of definitive restorations (Figure 7).

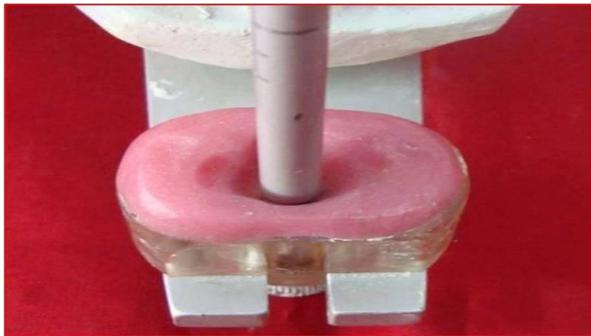


Figure 7: Custom incisal guide table with acrylic resin

Mandibular and maxillary anterior temporaries were removed, gingival tissue was retracted using knitted cord (Ultradent products Inc., Salt Lake City, Utah) soaked in aluminum chloride (Visco Stat Clear Ultradent products Inc., Salt Lake City, Utah) and

definitive impressions were made in polyvinyl siloxane impression material (Reprosil; Dentsply India, Bangalore, India) using putty wash technique.

Working casts were generated from Type IV die stone (Ultrarock, Kalabhai Dental, India) and mounted on the articulator using face-bow record & inter-occlusal record. Metal coping (KeraN, Germany) were fabricated & tried intraorally to check marginal accuracy and fit (Figure 8,9).



Figure 8: Maxillary anterior metal try-in



Figure 9: Mandibular anterior metal try-in

Ceramic (Ceramco III, Dentsply Ceramco, Burlington, NJ) build up was carried out followed by bisque trial. After

minor adjustments ceramic crowns were glazed, polished & cemented in place using glass ionomer cement (Ketac-Cem Maxicap, 3M ESPE, St. Paul, Germany) and after evaluating & establishing the anterior guidance intra orally (Figure 10), the maxillary and mandibular posterior temporaries were removed, gingival tissue was retracted using retraction cord and final impressions were made in polyvinyl siloxane impression material. Impressions were poured in Type IV dental stone and mounted on the articulator using face-bow record & inter-occlusal records.

Wax up for posterior teeth was completed and posterior occlusal scheme was modified by using custom made Broadrick's occlusal plane analyzer and customized acrylic incisal table (Figure 11). Wax up was evaluated for centric contacts and disocclusion in eccentric movements followed by casting, coping trial, ceramic build up and bisque trial. After minor adjustments, metal ceramic crowns were glazed & finally cemented in mouth (Figure 12). A vacuum-formed maxillary night guard prescribed for night-time use was fabricated, adjusted and placed. Instructions regarding maintenance of proper oral hygiene was given to the patient and recall for evaluation at 4-month intervals

occurred for a period of 2 years. At recall visits, patient did not experience tooth sensitivity or any other complication associated with the oral rehabilitation. On clinical examination soft tissues were healthy and patient was satisfied with the esthetic and functional outcome and showed improved self-confidence.

The outcome of the treatment in terms of function and esthetics satisfied the expectations of both the patient and the dentist.



Figure 10: Anterior guidance established with final prosthesis



Figure 11: Posterior guidance established with customized acrylic incisal table



Figure 12: Post-operative

DISCUSSION

The prosthetic rehabilitation of Amelogenesis Imperfecta patients has been previously presented in several case reports^[5,6,9,10]. Different materials and methods for restorative procedures available is responsible for confusion among dental practitioners. These techniques available have their own limitations with most common being the patient compliance and cost factor. The treatment plan is dictated by many factors with most common factors being the age of patients, the socio- economic status, the type and severity of the disorder, its intra oral manifestation and esthetic and functional demands. The treatment plan can have different approaches with one common goal i.e. functional, esthetic and longevity of restoration. It has been reported that adhesive restorative techniques, overdentures, porcelain fused-to-metal crowns, fixed partial dentures, full porcelain crowns, and inlay/onlay

restorations are all used for the prosthodontic treatment of Amelogenesis Imperfecta patients^[8,10,11].

In the present case porcelain fused to a precious metal alloy approach was utilized for the restoration. Pankey Mann Schuyler's philosophy of full mouth rehabilitation was used for the restoration of all teeth, which is the simplest and effective means of achieving treatment objective in stepwise manner. The anterior guidance was established first with diagnostic wax up and it was incorporated in temporary restorations. This was followed by developing posterior occlusal scheme using Broadrick's occlusal plane analyzer. In this way, occlusion with stable contacts in centric and no interferences in eccentric movements was developed. Both the marginal fit and the color acceptability of the restorations were satisfactory.

CONCLUSION

There are several alternatives for treatment of Amelogenesis Imperfecta. The most predictable and durable esthetic option is to restore the affected teeth with complete crowns. The use of Broadrick's occlusal plane analyzer aids the clinician in the development of an initial mandibular occlusal plane in diagnostic casts and diagnostic wax up and later, as an integral part of the definitive restorations.

Conflict of Interest Statement-

There is no conflict of interest.

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