

FULL MOUTH REHABILITATION OF DILAPIDATED DENTITION DUE TO AMELOGENESIS IMPERFECTA

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Abstract:

Amelogenesis imperfecta is a congenital disorder which affects deposition, calcification and/or maturation of dental enamel. This genetic disorder affects teeth in both deciduous and succedaneous dentition leading to functional as well as esthetic inadequacies. This condition exerts radical repercussions on stomatognathicsystem mandating effects on the confidence of the patient. This clinical report elaborates on the multidisciplinary approach adopted for full mouth rehabilitation of a dentition affected by this genetic disorder in young adult patient. The treatment plan aimed at upheaving esthetics, restoring the vertical dimension and reinstating the masticatory function. Pankey–Mann–Schuyler philosophy of full mouth rehabilitation was adhered to achieve these treatment objectives. Full mouth rehabilitation albeit restoring esthetics and functional so imparts a substantial positive psychological upliftment and therefore revamps the patient confidence.

Key words: Amelogenesis Imperfecta, Full Mouth rehabilitation, Pankey-Mann-Schuyler philosophy, Broadricks Occlusal Plane Analyser

Introduction

Amelogenesis imperfecta has been described as a complex group of genetic disorder that primarily affects the enamel structure and exists independent of any related systemic disorder.¹⁻² Both deciduous and permanent dentitions are affected by this enamel anomaly.³ It is entirely ectodermal, and the mesodermal components of the teeth are unaffected. Amelogenesis imperfecta trait can be transmitted either by autosomal dominant, autosomal recessive or X-linked mode of inheritance. It is caused by mutation or altered expression of genes such as: enamelin, ameloblastin, tuftelin, MMP-20, and kallikrein.²

Amelogenesis imperfecta [AI] can be broadly classified into four primary groups based on phenotype—hypoplastic, hypomaturational, hypocalcified and hypomaturational-hypoplastic. However, at least fifteen subsets of amelogenesis imperfecta have been identified when phenotype and mode of inheritance are considered³. Clinical findings of AI include, enamel deficiencies, root malformations, impaired tooth eruption, pulpal calcifications, impaction of permanent teeth, progressive

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root and crown resorption, congenitally missing teeth and tooth sensitivity. Since enamel thickness is severely affected, teeth are undersized with prominent spaces between the adjacent teeth, compromised oral hygiene and mouth breathing with associated gingivitis, gingival hyperplasia and other periodontal problems. Other clinical findings associated with amelogenesis imperfecta include congenitally anodontia, open occlusal relationship, multiple impacted teeth and taurodontism.⁴

Management of amelogenesis imperfecta is quite challenging and arduous to accomplish. Comprehensive treatment planning shouldn't be undermined and the critical procedure in the treatment planning is the evaluation of vertical dimension using mounted diagnostic casts and a diagnostic wax-up. Age of the patient, type and severity of the disorder, socioeconomic status and intraoral condition at the time of treatment planning are some of the influential factors that impact the treatment planning in such patients. The final objective of the treatment plan should be to weave esthetics, masticatory function and general oral health into harmony.

The rehabilitation of entire dentition for patients with amelogenesis imperfecta can be achieved successfully by using the philosophies of full mouth rehabilitation. They provide tangible and everlasting esthetic result in tandem with occlusal harmony. Full mouth rehabilitation procedures are a complex set of procedures which restore the teeth to their natural form, function, and enhances esthetics in harmony with the temporomandibular joint and the associated hard and soft tissues.^{5,6}

Although several philosophies and protocols have been widely documented, two of them are routinely employed. They are, Hobo's twin stage technique and Pankey-Mann-Schuyler (PMS) technique. This clinical case report illustrates the treatment procedures carried out sequentially in a full mouth rehabilitation using porcelain fused to metal crowns

strictly adhering to Pankey–Mann–Schuyler philosophy in a patient with dilapidated dentition due to amelogenesis imperfecta.

Case Report

A 22-year-old female patient reported to the Department of Prosthodontics with a chief complaint of generalized discolouration & stained appearance of her teeth. She also expressed concerns regarding her teeth size, shape and shade along with poor masticatory efficiency [Fig 1]. The patient had no history of any major systemic illnesses. Clinical and radiographic examination of the patient revealed no abnormality in temporomandibular joint movements, generalized mild attrition and discoloured teeth with irregular pattern of mineralisation. The patient did not have any loss of vertical dimension of occlusion. Based on the clinical and radiographic findings, the patient was diagnosed with amelogenesis imperfecta and the patient was advocated for full mouth rehabilitation to address her chief complaint.

Preliminary impression of maxillary and mandibular arch was made using irreversible hydrocolloid and diagnostic casts were mounted on a semi-adjustable articulator using interocclusal record after a facebow transfer. Protrusive record was obtained from the patient to program the articulator. Preliminary analysis was carried out on the mounted casts followed by diagnostic wax-up without altering the vertical dimension was performed on the maxillary and mandibular anterior teeth [Figure 2].

After preparing the maxillary and mandibular anterior teeth [Figure 3] the provisional crowns which were fabricated using the putty index of the diagnostic wax-up were luted using a provisional cement. The provisional restorations given to the patient were utilised to assess the anterior esthetics and help determine the anterior guidance for the patient. Once the patient got accustomed to the established anterior guidance, a custom incisal

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guide table was fabricated on the articulator [Figure 4]. The final restorations for the maxillary and mandibular anterior teeth were fabricated and cemented after metal try-in procedure [Figures 5].

The subsequent procedure was to restore the mandibular posterior teeth. Diagnostic wax-up of mandibular posterior teeth was performed on the mounted cast prior to preparation of teeth in the patient. The occlusal plane and Curve of Spee were established by using Broadricks Occlusal Plane Analyser [Figures 6]. Then, to fabricate the provisional restorations, putty index of the wax-up was made. The temporary crowns fabricated were cemented provisionally after teeth preparation. Tooth preparation and provisionalization of mandibular posterior teeth were completed segmentally.⁷ Patient's occlusion and comfort were evaluated for the next three weeks. When provisional restorations were considered acceptable,

they were used to develop form and contour of definitive restorations for the mandibular posterior teeth. The final restorations of the mandibular posterior teeth were cemented and succeeded by the fabrication of maxillary posterior restorations using the functionally generated pathway [FGP] technique.

The maxillary posterior teeth were prepared [Figure 7] and a final impression was made to obtain the maxillary master cast. Centric relation record was made and utilised to mount the maxillary and mandibular casts to the articulator. The patient was asked to perform the centric and eccentric movements which were recorded using functional wax. This provided the FGP record. Quick setting plaster was poured into this record to obtain the functional core index which was articulated against the maxillary mastercast [Figure 8] to develop the wax patterns for maxillary crowns



Figure 1. Preoperative photograph

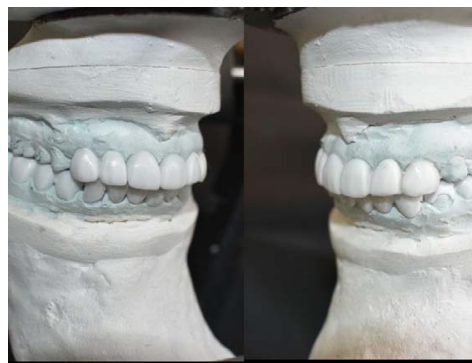


Figure 2. Diagnostic wax up of maxillary and mandibular anterior teeth



Figure 3 A,B. A. Maxillary anterior teeth preparation. B. Mandibular anterior teeth preparation

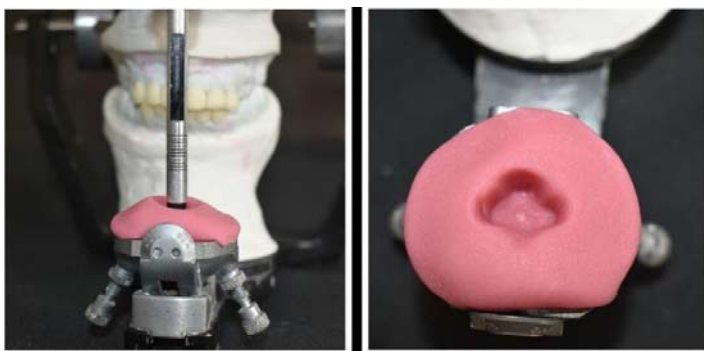


Figure 4. Custom incisal guide table



Figure 5 A,B. A. Anterior metal try in. B. Anterior permanent restorations

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in group function occlusion. After a bisque trial, final restorations were luted and group function occlusion was achieved. [Figure 9]

Regular recall and review protocol were effectively employed and oral hygiene maintenance instructions were reiterated and reinforced. The patient was recalled after one week, one month and three months for follow-up. [Figure 10] The patient was comfortable and had gotten accustomed to the rehabilitated stomatognathic system. Oral hygiene instructions were reiterated and reinforced. On completion of the treatment, the masticatory

efficiency was improved and esthetics also was enhanced in harmony with the temporomandibular joint. After a follow up of one year, the patient was satisfied with the outcome of the treatment and was gratified with the enhanced esthetics and function.

Discussion

Amelogenesis imperfecta is a genetic condition that causes mottling of enamel in both primary and permanent dentitions. This condition leads to crippled appearance and deprived function of



Figure 6. Anterior and posterior survey points on Broadricks occlusal plane analyser



Figure 7. Maxillary posterior teeth preparation



Figure 8. Functional core index obtained using functionally generated pathway mounted against prepared maxillary teeth



Figure 9. A, B. Right side excursive movement of mandible. A. Group function on [right] working side. B. Disclusion on [left] nonworking side. C, D. Left side excursive movement of mandible. C. Group function on [left] working side. D. Disclusion on [right] nonworking side.



Figure 10. Postoperative photograph

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the masticatory system. The permanent solution to revitalise the teeth would be to rebuild them using the various philosophies of full mouth rehabilitation laid down by several authors.

The routinely followed techniques are the Pankey-Mann-Schuyler (PMS) and Hobo's technique. Schuyler proposed the concept of "Freedom Centric"⁸ and in 1960, Pankey and Mann advocated an organised sequential approach to full mouth rehabilitation based on the principles of occlusion advocated by Schuyler. Hobo adopted the concept of posterior disclusion and gave the Twin-tables Technique. The Twin-Stage Procedure was developed as the advanced version of the Twin-Table technique. Youdelis scheme is advocated for advanced periodontitis cases and for extremely advanced cases of periodontitis Nyman and Lindhe scheme is employed.⁹ All these philosophies have deep rooted concepts and fundamentals upon which occlusal rehabilitation is carried upon. However, it is the clinician's discretion to choose an appropriate occlusal scheme for a particular reconstruction case after a holistic review of the presenting clinical condition so as to intertwine predictable results with a stable functional occlusion.

The present case, occlusal rehabilitation was carried out using Pankey-Mann-Schuyler [PMS] concept. The anterior guidance was established first followed by rehabilitation of the mandibular posteriors and finally the maxillary posteriors.^{7,10} Restoring the anterior teeth serves as a precursor to achieve functional and aesthetically viable anterior guidance. Anterior guidance is the dynamic relationship of the lower anterior teeth against the lingual slopes of the upper anterior teeth through all ranges of function. Anterior guidance forms the anterior control to provide posterior disclusion.¹¹ The three main things that were taken care of while replacing posterior teeth viz establishing the plane of occlusion, achieving posterior disclusion and deciding the type of occlusal scheme. PMS concept endorses the development of group function occlusion which has been incorporated in the

patient as well. Functionally generated pathway technique (FGP) was employed to achieve group function occlusion. The plane of occlusion was developed in tandem with the Curve of Spee and Curve of Monsoon. Broadricks Occlusal Plane Analyser was used for this purpose.

PMS technique allows step wise sequential restoration of teeth. The significance of that is the treatment outcome can be envisaged even before preparing any teeth in the patient. This philosophy breaks down the complex treatment procedures into fathomable quantum. The other advantages of PMS technique include free domincreating desired occlusal plane, occlusal scheme and intercuspsation, creating and controlling porcelain esthetics, teeth are prepared done quadrant/segment at a time, chair side temporary restorations can be constructed by quadrant or segment, final impressions involve few teeth per impression. It eliminates the chances of alterations to the vertical dimension established since teeth are prepared and restored in segmented simultaneous and phased manner.¹²

The utilisation of PMS technique in this patient was a deliberate choice considering its merits and the patient factors. Simultaneous preparation of all teeth for reconstruction could have jeopardised the established vertical dimension. Since the teeth were brittle due to genetic condition, a conscious choice was made to adopt PMS technique over others. The patient reaped maximum benefits from this in the form of a well laid out treatment protocol and reduced appointment length. Also, sufficient gap between each appointment provided adequate time for the patient to adapt and make corrections to the prosthesis if required. The temporaries made were ensured to be devoid of any discrepancies and only after sufficient evaluation, they were converted to permanent restoration. Porcelain fused to metal restorations were used for all the teeth and subgingival margins with appropriate shade matching were done to achieve superlative esthetic results. The definitive restorations were adjusted to remove any interferences in centric

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and eccentric movements to incorporate group function occlusion

The patient was reiterated about instructions regarding proper oral hygiene measures and reinforced to adhere to strict maintenance protocol. Regular follow-ups were conducted and the restorations were assessed to ensure optimum oral health and function. Patient was elated and satisfied at the end of receiving the prostheses and adhered to the maintenance protocol.

Conclusion:

The crucial elements to a successful treatment outcome in full mouth rehabilitation for a patient are meticulous planning and thorough fathoming of the procedural steps. A well-established anterior guidance synchronous to functional jaw movements must be ensured to garner maximum benefits and comfort. A detailed diagnosis and treatment plan help to deduce and fragment the complex procedures into simpler ones and provides predictable success. Pankey- Mann Schuyler philosophy, is the least cumbersome and unequivocal concept that can be adhered to restore normal function of a debilitated masticatory system. This case report highlights the pertinence of a full mouth rehabilitation technique as an effective and efficient strategem in expediting restoration of a mutilated dentition due to genetic conditions.

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