AMELLOGENESIS IMPERFECTA: REORGANIZING OCCLUSION WITH HOBO TWIN STAGE TECHNIQUE

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Abstract

Amelogenesis imperfecta is a hereditary disorder displays a group of conditions which cause developmental alterations in the structure of enamel. This disorder has an adverse impact on oral health and quality of life of the individual. The correction of such severely worn out dentition may require extensive restorative treatment to achieve appropriate results. It is important to identify the factors that contribute to the excessive wear and loss of vertical dimension. The correction of the defects has to be done without violating the biologic or mechanical principles. Rehabilitation in such patients improves esthetics, function and comfort. This case report presents a systematic approach in rehabilitating a case of Amelogenesis Imperfecta (AI) hypomaturation type using full mouth metal reinforced porcelain and metal restorations.

Introduction:

Amelogenesis imperfecta is a group of rare genetic conditions in which the outer layer of the teeth (enamel) fails to develop properly.1 People with amelogenesis imperfecta will have small, yellow, or brown teeth that are very prone to damage and breakage.

The incidence of Amelogenesis imperfecta ranges from 1 in 718 to 1 in 14,000 depending on the population studied2,3. According to Witkop4, Amelogenesis Imperfecta (AI) can be classified as

1. Hypoplastic,
2. Hypomaturation,
3. Hypocalcified, and
4. Hypomaturation-hypoplastic with taurodontism5,6

Treatment of a patient with amelogenesis imperfecta (AI) was challenging from both functional and esthetic points of view. An esthetic makeover will result in an improvement in the patient's quality of life. This clinical report
illustrates the oral rehabilitation of a young 20-year-old male patient diagnosed with hypomature type of Amelogenesis imperfecta AI. The aim of treatment was both to restore esthetics and improve masticatory function.

Esthetic expectations of the patient was successfully attained by placing metal ceramic crowns from premolar to premolar in each arch, and metal crowns on molars on the both arches were also fabricated for the patient's masticatory function. No deterioration in the restorations and no pathology associated with the rehabilitation were found at the 1-year recall, and the patient's esthetic and functional expectations were satisfied.7

Rehabilitation of a patient with amelogenesis imperfecta involves a complex interplay of various factors. The restoration of esthetics and function in patients can be accomplished by an accurate diagnosis and appropriate treatment planning involving multidisciplinary approach. The primary goal of treatment should be to tackle each problem along with a comprehensive plan, which would take care of any future treatment needs. Psychological demands of these patients should also be handled with a lot of sensitivity. All-inclusive and judicious approach toward rehabilitation is reassuring to the patient and will help to relieve their anxiety. The patient complained of severe sensitivity due to decreased enamel thickness and dentin exposure. The patient had carious teeth with considerable loss of tooth structure. Furthermore, there were high chances of pulpal exposure in teeth during crown preparation since disproportionate crown preparation was required to compensate for the shift in midline. Hence, all the teeth were root canal treated and post and core buildup was indicated in those teeth requiring reinforcement of tooth structure and minor changes in tooth alignment.

The teeth were prepared for metal-ceramic final restorations from premolar to premolar and metal restorations for molars. Metal-ceramic and metal restorations were considered as the treatment option due to financial restraints of the patient. All teeth were restored with separate single crowns to facilitate future removal.8

The extent, appearance and the status of the pulp will determine the type of restorations necessary to achieve esthetic, functional, and harmonious stomatognathic system. The treatment of permanent dentition in amelogenesis imperfecta usually involves a multifaceted treatment plan with intervention from multiple disciplines. Prosthodontic, periodontal, endodontic, and orthodontic consultation may be necessary.9

In the present case, the patient requested a treatment plan, which was economical, of a shorter duration without surgical and orthodontic intervention. Hence, it was decided that the rehabilitation would involve predominantly endodontic, periodontal, and prosthodontics treatment approaches.

Case Report
A 20 year young male reported to the department of prosthodontics with a chief complaint of difficulty in chewing food and unsatisfactory esthetic brown and yellow teeth. (Figure 1, 2 and 3)

The patient gave no significant medical history and not any signs of temporomandibular joint disorder. Dental history showed he had endodontic treatment with lower 1st molars on the both sides of arches and FPD with acrylic facing in both upper and lower anteriors that is from canine to canine. (Figure 1). A discrepancy between centric occlusion (CO) and maximum intercuspal position (MIP) was found when he was guided to a centric relation position with Dawson’s bimanual technique.

Intra oral examination established grossly attrited dentition in both maxillary and mandibular arches. (Figure 2, 3 & 4). Both the arches were fully dentate with Fixed partial denture with acrylic facing maxillary and mandibular anterior teeth when reported. The patient had a class I molar relation and group function occlusion. Approximately 5 mm of loss in VDO was established.

Full mouth reconstruction with Hobo twin stage technique was planned to reconstruct the attrited dentition in harmony with stomatognathic system while providing a canine guided disocclusion during eccentric movement’s. An increase of 4mm of vertical dimension was also planned.

The amount of bite rise to be achieved was also evaluated using the closest S speaking space or the Freeway space technique.
Procedure:
1. Impressions of both maxillary and mandibular arches were made with irreversible hydrocolloid material and diagnostic casts were obtained. (Figure 5)
2. Face bow transfer done (Figure 6) and maxillary cast was mounted on a semi adjustable articulator (Hanau wide Vue) and mandibular cast was mounted using interocclusal records in the posterior region (Figure 7)
3. Extensive prosthetic procedures result in major occlusal changes, this case required prior selective grinding. So that a stable functional mandibular position is established for the new restorations.¹⁰
4. An Occlusal splint was provided to the patient as part of reversible interventional modalities to evaluate adaption of the patient to altered VDO. The patient was kept in observational periods of 6 weeks before the definitive restorative phase of rehabilitation was started.
5. A Diagnostic wax-up of the full mouth restoration was carried out at the increased vertical dimension for posterior teeth without the anterior segment of maxillary cast. (Figure 9)
6. Broadrick’s occlusal plane analyser is a simple and practical method was used for determining the preliminary occlusal plane on diagnostic casts, It assists in locating the cusp tips of the posterior teeth. In addition, it also demonstrates how much tooth reduction or porcelain addition is needed to idealize the occlusal plane.¹¹
7. Posterior interferences and abnormal muscle activity can be avoided by reconstructing the curve of Spee to pass through the mandibular condyle, which has been demonstrated to allow posterior disocclusion on mandibular protrusion. To produce standard effective cusp angles the condylar and therefore the incisal guidance were set to condition 1. At this position, the diagnostic wax up was balance in protusive excursion and lateral excursions. The anterior segment of the cast was reassembled and the condylar guidance and incisal guidance were set again (condition 2) and the wax-up was completed so as to generate posterior disocclusion.
8. The teeth were prepared (Figure 10 &11 ) and stage I temporary restorations were fabricated chairside quadrant by quadrant during several appointments to minimize patient discomfort (Figure12). The Patient’s VDO was maintained by using unprepared second molar teeth as occlusal vertical stops, Which was prepared later. Minimal occlusal reduction is indicated for patients scheduled for rehabilitation at an altered VDO.
9. Then, the second molars were prepared and stage II temporaries were fabricated using index of the diagnostic wax up and cemented with ZNO non eugenol cement and left for 3 weeks.
10. Once the patient was adapted to this, a final full arch impression for maxillary and mandibular teeth were made using Poly vinyl siloxane impression material and casts were poured in die stone. (Figure13). The final cast was mounted on a Hanau Wide Vue articulator using the face bow transfer.
11. Now, to transfer the vertical dimension and centric relation temporaries were removed from both maxillary and mandibular left posterior region while temporaries of right and anterior maxillary and mandibular region acted as a stop. Interocclusal recording material was injected between the left maxillary and mandibular prepared tooth.
12. Likewise, the temporaries were removed from right maxillary and mandibular region while the temporaries were present in left and anterior region of both arches, interocclusal record was injected between the right maxillary and mandibular prepared tooth and the same procedure was followed in the anterior region. The 2 segmental interocclusal records thus obtained were used to mount the mandibular cast. (Figure 14)
13. The wax pattern was fabricated with the anterior mandibular segment removable following conditions 1 and 2. (Figure 15 and 16 ) and confirmation of occlusal plane was made using plane analyser. (Figure 17) All the wax patterns as shown in (Figure 18 ) were cast and metal copings were tried in the patient’s mouth. (Figure 19). Definite restorations with PFM crowns exhibiting a vital and natural appearance with proper contour and shade were fabricated.
14. Permanent cementation was done with with GIC luting cement. Oral hygiene instructions were given and follow up was carried out at regular intervals. (Figure 20)

Discussion:-
Although AI affects only the enamel formation, it has significantly affects patients. Often AI patients experience difficulty in maintaining oral hygiene, decreased masticatory function, and a lower self-esteem, affecting their overall quality of life [3,4]. Furthermore, most variants of AI require extensive dental treatment, which can be time consuming and often poses a significant economic burden on their family. Clinicians must therefore consider treatment alternatives to balance the patient’s esthetics and functional needs, the status of patient’s growth and development, the financial implications for the patient’s family, and the long-term prognosis.¹²
Legends for figures-

**Figure 1:** Pre-operative intraoral view with acrylic facing FPD in the anteriors.

**Figure 2:** Pre-operative view after removal of acrylic facing FPD in maxillary and mandibular arches.

**Figure 3:** Pre-operative occlusal view of maxillary arch.

**Figure 4:** Pre-operative occlusal view of mandibular arch.
Figure 5: Diagnostic impression with irreversible hydrocolloid impression materials.

Figure 6: Face bow transfer.

Figure 7: Diagnostic cast mounting on a semiadjustable articulator.
Figure 8: Diagnostic wax up.

Figure 9: Teeth preparation of maxillary arch.

Figure 10: Teeth preparation of mandibular arch.

Figure 11: Temporization.
Figure 12: Final impression of prepared teeth of maxillary and mandibular arches.

Figure 13: Bite registration using sectional trays.

Figure 14: Final wax up with HOBO left lateral.
Figure 15: Final wax up with HOBO right lateral.

Figure 16: Broadricks plane analyser was used to confirm during final wax up.

Figure 17: Wax pattern ready for investing with sprue attached.
Figure 18: Metal try in mandibular arch.

Figure 19: Metal try in maxillary arch.

Figure 20: Final restoration cemented.

References:
1. P Rajesh et al. Full mouth rehabilitation of a patient with Amelogenesis Imperfecta: A case report. J Intl Oral Health 2014 Jul-Aug; 6(4): 76-79.
2. Chaudhary M, Dixit S, Singh A, Kunte S. Amelogenesis imperfecta: Report of a case and review of literature. J Oral Maxillofac Pathol 2009;13:70-7.
3. Backman B, Holm AK. Amelogenesis imperfecta: prevalence and incidence in a northern swedish county. Community Dent Oral Epidemiol. 1986; 14(1):43–47.
4. Witkop CJ. Amelogenesis imperfecta, dentinogenesis imperfecta and dentin dysplasia revisited: problems in classification. J Oral pathol. 1989; 17(9–10):547–553.
5. Seow WK. Clinical diagnosis and management strategies of Amelogenesis imperfecta variants. Pediatr Dent. 1993; 15(6):384–393.
6. Coffield KD, Phillips C, Brady M, Roberts MW, Strauss RP, Wright JT. The psychosocial impact of developmental dental defects in people with hereditary Amelogenesis imperfecta. J Am Dent Assoc. 2005; 136 (5):620–630.
7. Hakan Akin 1, SemihTasveren, DefneYalızYeler.Interdisciplinary Approach to Treating a Patient With Amelogenesis Imperfecta: A Clinical Report. J EsthetRestor Dent 2007;19(3):131-5.
8. Naik M, Bansal S. Diagnosis, treatment planning, and full-mouth rehabilitation in a case of amelogenesis imperfecta. ContempClin Dent 2018;9:128-31.
9. Originating Council. Guideline on oral health care dental management of heritable dental developmental anomalies.AmAcadPediatr Dent 2008; 37:266-71.
10. Okeson J.P., Management of Temporomandibular Disorders and Occlusion. 7th edition Elsevier, Mosby 2013.
11. RenuGupta,RPLuthra ,Hardik, Hitesh Sheth.International Journal of Applied Dental Sciences 2019; 5(1): 95-98.
12. Mi-Young Song, DDS, MSD, Ji-Man Park, DDS, MSD, and Eun-Jin Park, DDS, MMSc,PhD.JAdvProsthodont. 2010 Sep; 2(3): 106–110.