Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Case Report

Aesthetic Reconstruction in Amelogenesis Imperfecta of Hypocalcified Type Using E-MAX for Anterior Smile Rejuvenation and PFM For Posterior Teeth: A Case Report with three years of follow-up

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***ABSTRACT*:**

Amelogenesis imperfecta (AI) is a rare heterogeneous group of condition characterized by inherited enamel defect causing developmental, structural and chemical alteration of enamel. From understanding the molecular basis of this condition, presenting abnormal manifestation as thin, soft, irregular surfaces, rough enamel edges, fragile, pitted and/or badly discolored enamel with poor function and aesthetics. This leads to various problems such as early tooth loss wear, discolored teeth with severe embarrassment due to negative social outcome, discomfort following sensitivity, eating difficulties and sometimes pain. AI was first diagnosed in early 1980's, without any exact knowledge of gene theories. Later on in year 1991 the exact cause of AI was known from Mutations in the gene AMELX, encoding an extracellular matrix protein secreted by ameloblasts cells during enamel formation. This disorder has an adverse impact on oral health and the quality of life of the individual causing physiologic and psychological problems. The correction of such severely worn out dentition may require extensive multiple disciplinary restorative treatment to achieve appropriate functions with aesthetic results. It is important to identify the type of AI depending upon manifestations and 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 natural principles. Full mouth reconstruction in such patients improves esthetics, function and comfort. The following case report presents a systematic approach in rehabilitating a case of AI hypocalcified type using full ceramic restoration in anterior region using E-MAX crowns and metal reinforced porcelain restorations PFM crowns in posterior region.

Key words: Amelogenesis imperfect AI, Full mouth reconstruction, Restoration, Vertical dimension, Aesthetics E-MAX and PFM crowns.

Received: 02/05/2020 **Modified:** 20/05/2020 **Accepted:** 15/06/2020

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This article may be cited as: Agroya P, Nagargoje GD, Agroya A, Tiwari RVC, Managutti A, Tiwari H. Aesthetic Reconstruction in Amelogenesis Imperfecta of Hypocalcified Type Using E-MAX for Anterior Smile Rejuvenation and PFM For Posterior Teeth: A Case Report with three years of follow-up. J Adv Med Dent Scie Res 2020;8(7):104-109.

INTRODUCTION:

Amelogenesis Imperfecta (AI) is a genetic condition that affects the enamel formation in all the teeth of both the dentition.[1] Various types of this condition are hypoplastic, hypomineralized and mixed (with multiple focal pits and opacities). Further hypomineralized has two more types as hypocalcified and hypomaturation.[1,2] Most common complaints from patients are sensitivity, loss of facial height, improper oral functions and poor looks. Reconstruction of this condition is important and compulsory to restore the functions, aesthetics and psychological comfort of the patient. Advanced materials with technology and improved clinical techniques have enabled esthetic and functional reconstruction for patients with such severely worn out unaesthetic dentition made easy.[2] The following clinical report demonstrates a multidisciplinary approach in treating a AI patient.

A CASE REPORT & CLINICAL PRESENTATION:

A 27-year-old female patient reported to the Department of Prosthodontics with a complaint of discolored teeth, generalized sensitivity, chipping off teeth, and difficulty in chewing hard food. No any relevant medical history. Intraoral examination revealed discolored teeth, generalized attrition, some sharp and uneven enamel edges, dentinal craters, decreased vertical dimension, grossly decayed poor prognosis with 36 (Figure 1). Discrepancy between centric relation and maximum inter-cuspation was also found when she was guided to CR with Bimanual Technique. Freeway space was measured to be 5-6mm, which is greater than normal values of 2-4mm. From this planned to increase the VD by 3mm. Extraoral examination revealed oval shape face, normal competent lips and no any TMJ disorder. Radiological examination revealed generalized loss of enamel, previously RC treated teeth with 35 36 & 46 and periapical lesion with furcation involvement seen with 36 (Figure 2). Based on the above features, the patient was diagnosed with amelogenesis imperfect of hypomineralized type.

TREATMENT PLANNING:

A comprehensive treatment plan was designed and followed with three phases as- Pre-prosthetic phase: Deep scaling and polishing. Extraction in relation to 36 and full mouth root canal treatment was adviced (Figure 3). Prosthetic phase: Pankey Mann Schyuler philosophy of full mouth rehabilitation was planned for this patient. Maintenance phase: Involving oral hygiene measures and follow up.

STEP-BY-STEP PROCEDURE:

Diagnostic impression and casts were obtained. Following this a Facebow record and transfer was completed. The centric relation position was recorded using aluwax and the casts were mounted on a semi adjustable articulator (Hanau^{TM}Wide Vue Whipmix) (Figure 4 & 5). The vertical dimension was increased by 3 mm. Diagnostic wax up was completed with an increased vertical dimension (Figure 6). The wax up helped in assessing the outcome of the final prosthesis and it also helped in fabricating the temporary restorations through putty index. The maxillary and mandibular anterior teeth were prepared and restored with provisional restorations. The provisional restorations helped in assessing the esthetics and establishing the customized anterior guidance. Full mouth provisional restorations were restored using zinc-oxide non-eugenol cement (Temp-Bond Kerr).These provisional restorations with increased vertical dimension were analyzed for one month, no any discomfort in muscles or TMJ pain was noticed. (Figure 7) After a month. preparations were refined according to the all-ceramic crowns and impressions were made using polyvinyl siloxane putty and light body Elite HD Zhermack following gingival retraction and two stage impression technique (Fig 8 & 9). Anterior E-MAX crowns (lithium disilicate) were cemented using Relyx^{TM} (3M ESPE) (Figure 10). The next step was the restoration of the mandibular posterior teeth for which the occlusal plane was established using a Broderick's occlusal plane analyzer. Diagnostic wax pattern was fabricated for mandibular posteriors and verified using the Broderick's occlusal plane analyzer (Figure 11). Definitive impressions of the prepared teeth were made using polyvinyl siloxane putty and light body Elite HD Zhermack by a two-stage impression technique following gingival retraction (Fig 12). The working cast was mounted onto the articulator using interocclusal records. The cementation of the mandibular posteriors was followed by the fabrication of the maxillary posteriors for which the functionally generated path (FGP) technique was used. The philosophy of Pankey-Mann Schulyer and Meyer Functionally Generated Path Technique was used in maxillary posterior using soft inlay wax followed by 3D stone template. This template helped in recording border pathways and used in ceramic build up procedure. Also used in removal of occlusal interferences in centric and eccentric relations. Finally a canine guided occlusal scheme was given to the patient (Fig 13). And final restorations were cemented using GIC (GC) (Fig 14).

Fig 1: Pre-Operative Intraoral Picture AI

Fig 2: Pre-Operative OPG

Fig 3: Post RCT OPG

Fig 4: Facebow Record

Fig 5: Interocclusal record

Fig 6: Diagnostic Wax-Up

Fig 7: Full Arch Temporization

Fig 8: Anterior Preparation And Gingival Retraction

Fig 9: Final impression

Fig 10: Anterior E-MAX Cementation

Fig 11: Broderick's Occlusal Plane Analyzer

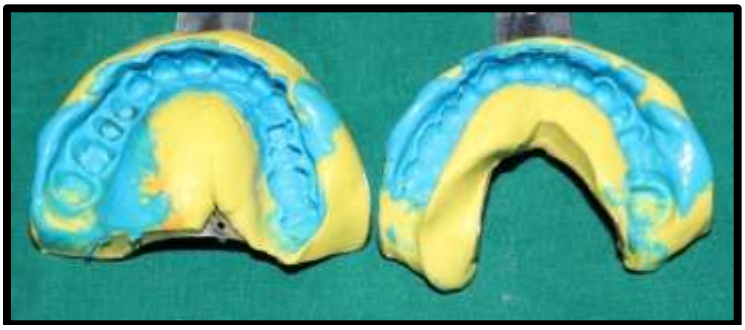

Fig 12: Final impression

Fig 13 A&B: Canine Guided Occlusion On Right And Left Side

Fig 14 A&B : Post-Operative with Rejuvenated Smile

DISCUSSION:

The clinical presentation of AI varies according to the type of defect. The hypocalcified type includes brown discolouration and early post-eruptive enamel loss seen on the radiograph. In this case, the patient presented with a decreased vertical dimension and freeway space of 5-6 mm which is more than normal values, hence it was decided to increase the vertical dimension by 3 mm. Collapse of posterior dentition results in loss of normal occlusal plane and decreased vertical dimension. A comprehensive treatment plan was designed with contributing interdisciplinary approach. Starting from deep scaling with finishing and polishing, extraction, full mouth RCT all the pre-prosthetic treatments were carried out. In prosthetic phase standard technique given by Pankey-Mann Schulyer was used for reconstruction with long term results. Advanced materials with superior properties were used to make impressions, for laboratory procedures and final cementation. For anteriors E-MAX crowns were preferred for rejuvenating the aesthetic smile and porcelain fused to metal in posterior region as this would double the mechanical durability, recover esthetics and protect the residual dentin.

CONCLUSION:

In this clinical report, it was described the oral reconstruction of a woman affected by amelogenesis imperfecta. A plan to improve her low self-esteem and confidence, was accomplished with an interdisciplinary approach. The treatment of such cases involves a careful analysis of the relationship between natural teeth and the stomatognathic system. All the standard techniques and materials are used in the reconstruction to restore function, aesthetics and confidence of patient. An every 6 months of follow-up was done in three years for evaluating the prognosis of treatment. In every follow up the patient was instructed to maintain oral hygiene.

CLINICAL SIGNIFICANCE:

The above case reflects the importance of all the essential prosthodontic principles and strategic planning & designing in addition to a multidisciplinary approach in managing a patient of AI of hypocalcified type using E-MAX for anterior smile rejuvenation and PFM in posterior region for long term durability and aesthetics. The three years of follow up revealed an excellent prognosis of the treatment, with no any kind of pain or discomfort. Patient was instructed to maintain the proper oral hygiene.

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