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Case Report

Comprehensive rehabilitation of a case of Amelogenesis imperfecta

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this paper is to outline the comprehensive management of esthetics and function with prosthodontic approach in a patient with Amelogenesis imperfecta of the hypocalcified form.

Case report

A18-year old male patient presented with a chief complaint of stained teeth since childhood and associated complain of difficulty in chewing. Medical history was noncontributory. Past dental history shown that his deciduous teeth were also similarly discoloured. The family medical history revealed that the patient's brother had like clinical appearance. Extra oral examination did not reveal any pertinent findings. Intraoral examination shown full complement of teeth except third molars, 17, 27, 37 and 47 were affected with dental caries, extensive plaque accumulation in the anterior segment, probing depths in both arches were between 2 and 3 mm and bleeding on probing. The cusps of all molar teeth were abraded and hypersensitive. Tooth crowns were clinically satisfactory in length and presented yellow-brown colored surfaces [Fig. 1]. There was no discrepancy between centric occlusion position and maximum intercuspation. All the routine investigations including blood, urine, panoramic and fullmouth periapical radiographs were carried out (Fig. 2). Radiographic evaluation shown impacted third molars. Pulp chambers had normal size and shape, lamina duras were intact excluding mandibular left first and second molars. 36 & 37 were involved with dental caries, pulp exposure and periapical radiolucency. Radiographically, the enamel layers of all teeth were relatively thin and it was difficult to differentiate the density of dentin from enamel. So it was assumed that the patient could have been suffering from hereditary

Introduction

Amelogenesis imperfecta (AI) symbolizes a group of inherited defects of enamel unassociated with any other generalized defects.¹ It is entirely an ectodermal disturbance, as the mesodermal components of the teeth are not affected. This genetic aberration of enamel is usually classified into two distinct types based on whether the defect is related to faulty mineralization (hypomineralised type) or imperfect matrix formation (hypoplastic type).^{2,3} Hypomineralised form is further subdivided to hypocalcified and hypomaturational types. In hypocalcified type, matrix formation is normal but calcification is abnormal while in hypoplastic type matrix formation is defective but any formed is normally mineralized. The teeth in these various forms of AI could differ significantly in clinical appearance from type to type.^{4,5} Hypocalcified type is the most common form. The aim of

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Fig. 1 – Pre-operative intra oral view of discoloured dentition.

hypocalcified type of AI. A provisional diagnosis of hypocalcified AI was proposed along with a differential diagnosis of environmental enamel hypoplasia, dentinogenesis imperfecta and dentin dysplasia. The diagnosis of hypocalcified AI was confirmed on the basis of typical family history, clinical and radiographic features. Full mouth rehabilitation using complete coverage porcelain fused to metal (PFM) restorations was carried out.

The restoration protocols were started after getting informed consent from the patient. Firstly thorough oral prophylaxis was carried out followed by restorations of cariously involved teeth and endodontic treatment of 36 and 37. The diagnostic impressions were made, casts mounted on the semi-adjustable articulator (Hanau, H-2series) using the Hanau face bow and a centric relation record. Diagnostic wax patterns were prepared on diagnostic mounting. The wax patterns were used for preparation of provisional restorations and patient education. During the subsequent appointment, maxillary and mandibular teeth were prepared for PFM restorations. Heat-cured acrylic resin provisional restorations (DPI-Heat Cure Tooth Molding Powder; Dental Product of India, Mumbai, India) were fabricated, relined intraorally and cemented with eugenol free interim cement. They were

accustomed to provide a mutually protected occlusion. After 12 weeks of comfortable functioning in the provisional restorations, maxillary and mandibular full arch impressions were made using addition silicone impression material (Express, 3M ESPE). Gingival displacement was obtained using retraction cord size 000 moistened with astringent (Ultradent, Germany) [Fig. 3]. Each impression was poured twice with type IV dental stone and casts retrieved. The casts were articulated using a semi-adjustable articulator with interocclusal records and sent to the laboratory for lab procedures. The articulator settings was done as per Hobo's recommendations to accomplish mutually protected occlusion and laboratory procedures carried out using Hobo's twin stage technique.⁶ The metal frameworks were tried for accuracy of fit and necessary adjustments done. Porcelain application was done on the well-fitting castings following manufacturers recommendations and in the subsequent sitting bisque trial was carried out. Occlusion was tested intraorally using articulating paper and 12-mm thick shimstock. The first occlusal contact markings was made with blue color articulating paper (100µ). This was then followed by use of the shimstock (red colored metallic polyester film 12µ) which marked clearly the middle of the relevant blue marks. The red spots provided the exact spots to remove in the occlusal adjustments. Therefore by using this technique of combination of articulating paper and shimstock, one typically sees a blue larger zone, with a clear halo in between and a red spot in the middle. This technique minimized occlusal errors. The inner surfaces of the restorations were microetched with 50 µ aluminum oxide, cleaned and luted with glass ionomer cement (Fuji-1, GC, Japan). The cementation was done section wise to control the occlusion as the rest of the provisional crowns in place acted as stops. Initially posterior region followed by anteriors. Radiovisio-graphs (RVG) were taken as a baseline for future follow-up and to verify the complete removal of excess cement. Oral hygiene instructions included use of interdental brushing, flossing and routine oral care. He was placed on periodic recall and the prognosis was favorable. There was considerable improvement in esthetics as seen in the comparison of pre rehabilitation and post rehabilitation views (Fig. 4).

Discussion

The bulk of forms of AI are inherited as autosomal dominant, autosomal recessive or X linked characters. But these are not connected to the clinical expressions which show either mainly hypomineralisation, hypoplasia, or a mixture of both.^{7,8} The basic issue may be due to mutations leading to faulty amelogenin synthesis, resulting hypoplasia or hypomineralisation based on the expression in different individuals.^{9,10}

AI disturbs the deciduous and permanent dentitions and most of the enamel on all of the teeth is usually involved. In the hypocalcified type, the enamel is of a soft, chalky consistency and is quickly lost by abrasion and attrition uncovering the dentine. The crowns of the teeth may or may not show staining and discoloration. If existing, it varies from yellow to dark brown. Contact points between the teeth are frequently open and occlusal surfaces and incisal edges normally are

Fig. 2 – Orthopantomogram (OPG).

Fig. 3 – Completed maxillary, mandibular teeth preparations and poly vinyl siloxane impressions.

Fig. 4 – Comparison of pre and post rehabilitation views.

severely abraded. The clinical picture observed in the case presented is more or less similar. The enamel could appear completely absent on the radiograph or, when existing, may appear as a very thin layer chiefly over the tips of the cusps and on the interproximal surfaces (Fig. 2). In some cases, calcification of enamel may be so affected that it appears to have the same radio density as the dentine, making distinction between the two difficult.

In the hypomaturation forms, the enamel is usually of normal depth on eruption but displays variable opaque, mottled, brownish yellow to white looks. The enamel is soft and attrition occurs, but not as rigorously as in the hypocalcified type. In the hypoplastic type of AI, the enamel does not attain normal thickness and there is considerable disparity in clinical appearances. In some cases, confined areas of hypoplasia are haphazardly distributed over the surface of the enamel producing widespread roughness and pitting or irregular vertical grooving and creasing. In the smooth form, the enamel over the entire of the crown is affected and the teeth have sharp needle like cusps.

Few clinical reports have been presented describing management of AI following concepts of full mouth rehabilitation. The different treatment options includes a combination of partial (porcelain/composite laminates) and complete coverage restorations (porcelain fused to metal/all ceramic). In the present case, Porcelain fused to metal restorations was preferred considering the durability, mechanical advantage especially in the posteriors and long term prognosis. Although AI affects only the enamel development, it has noteworthy consequences for the affected patients. Often AI patients experience difficulty in preserving oral hygiene, diminished masticatory function, and a lower self-esteem, affecting their over-all quality of life. In conclusion, AI is a serious problem that can result in reduced oral health-related quality of life and causes some physiological problems. Moreover, although rare, some dental anomalies may accompany the AI cases. These include taurodontism, congenitally missing teeth, delayed eruption, crown resorption, and abnormal enamel

density. In these cases, multidisciplinary approach is important for treatment success.

Conflicts of interest

All authors have none to declare.

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