Case Report

Dental Rehabilitation of Amelogenesis Imperfecta in the Mixed Dentition

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Abstract

Amelogenesis Imperfecta represents a group of hereditary defects of enamel unassociated with any other generalised defects. It is entirely an ectodermal disturbance, since the mesodermal components of the teeth are basically normal. This clinical report describes the management of a 10 year-old boy with a X-linked hypocalcified type of AI. The first phase of the treatment was preventive measures to improve dental and periodontal health. On the second phase the root stumps were extracted and the molars were endodontic treated and covered with stainless steel crowns. Polycarbonate crowns on maxillary permanent incisors and direct composite veneers on mandibular permanent incisors were placed.

Keywords: Amelogenesis imperfecta, Composite, Esthetics, Polycarbonate crowns, Stainless steel crowns

INTRODUCTION

Amelogenesis imperfect comprises of group of developmental anomalies affecting the morphology and appearance of enamel of a few teeth or all teeth. This may also be assocaied with other biochemical changes in the body.[1] There are four main types of AI based on phenotype namely hypoplastic, hypomaturation, hypocalcified and hypomaturation–hypoplastic with taurodontism.[2] AI has genetic origin and the mode of inheritance may vary. It can affect both primary and permanent dentition.[3]

Type	Forms of AI	Clinical features
Type I	Hypoplastic Enamel	Well-mineralized enamel but in reduced amount
Type II	Hypomatured Enamel	Mottled, opaque white-brown or yellow discoloured enamel
Type III	Hypocalcified Enamel	Pigmented, softened and easily scrapable enamel
Type IV	Hypomatured-hypoplastic Enamel	Combined features of hypomatured and hypoplastic

According to the literature, AI patients, regardless of subtype, have similar oral complications: tooth sensitivity, poor dental esthetics, and decreased occlusal vertical dimension. Other dental anomalies associated with AI include, but are not limited to multiple impacted teeth, congenitally missing teeth, open occlusal relationship, taurodontism, pulpal calcification, root malformations, progressive root and crown resorption and anterior open bite occlusion.[5]

The treatment of patients with AI should be planned taking both the clinical and the emotional demands into consideration. Historically, patients used to cover their teeth with either pieces of paper or chewing gum in order to have an ordinary appearance.

The psychological impact on an individual who has teeth affected by amelogenesis imperfecta cannot be underestimated. The individual may be too embarrassed to smile because they are unhappy with the appearance of their teeth.[6] Therefore, the planning of esthetic restorations on the anterior teeth may not only preserve the tooth structure and reduce sensitivity, but also eliminate the adverse social impact of their teeth.

Treatment is as ever based on the principles of prevention before intervention. However, since AI has genetic origin so preventive care cannot be possible and intervention is to be done early in a more radical manner.

This report describes the clinical management of a case of amelogenesis imperfecta in the mixed dentition, with special emphasis on the esthetic demands of the patient and the longevity of the restorations.

CASE PRESENTATION

A 10 year old male attended the clinic because of discolored primary and permanent teeth which manifested some thermal

sensitivity. A detailed medical, dental, and social history was obtained. The patient was examined dentally and medically.

Clinically, the child's oral hygiene was unsatisfactory and he exhibited moderate chronic marginal gingivitis. On examination it was found that enamel thickness of all teeth was reduced and in some teeth dentin was exposed. The teeth had orange brown discoloration, with diffuse pitting present on all surfaces of the teeth. (Figure 1a-e).

Radiographic investigation included an Orthopantomogram (OPG). OPG showed retained 54 root stumps, 65 with completely resorbed roots and pulpally involved 85 and 75. Crowns of all teeth showed reduced enamel thickness with normal dentin. Root morphology of all teeth was completely normal (Figure 2). The clinical and radiographic features and the family history were consistent with a diagnosis of X-linked hypocalcified Amelogenesis Imperfecta.

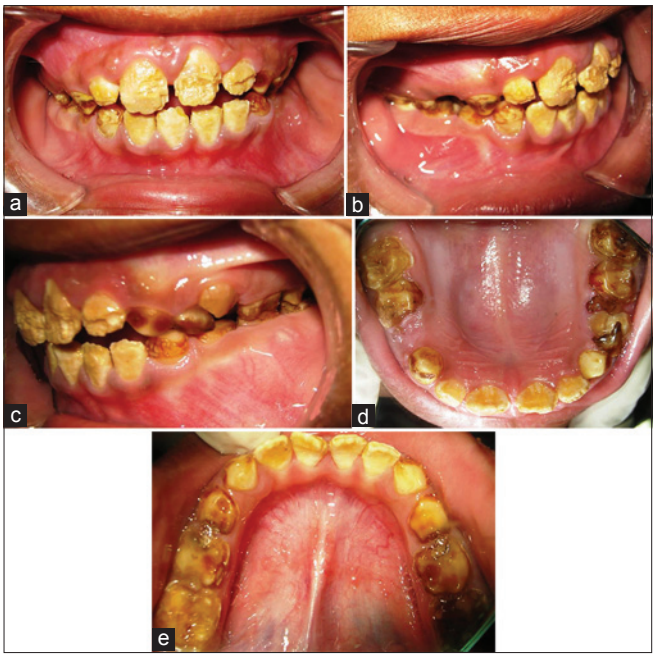

Figure 1: (a-e) Preoperative clinical picture showing irregular dark yellow to brown discolored labial surface of maxillary and mandibular teeth

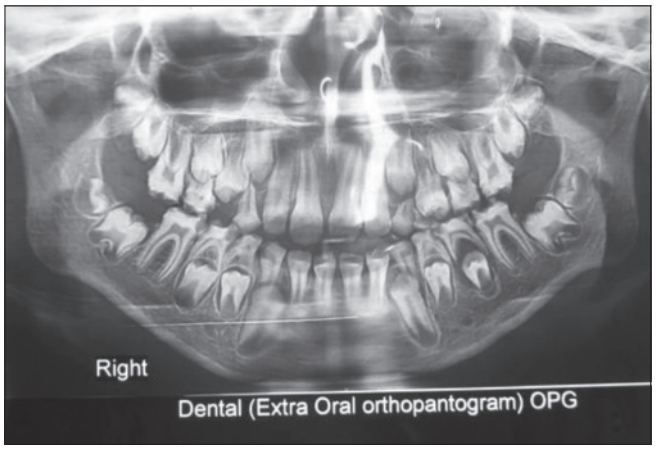

Figure 2: The radiographic appearance of the dentition panoramic radiograph showing diminished enamel on the erupted teeth and all of the developing teeth consistent with the patient's chronological age

The treatment objectives were to improve the esthetics, eliminate the tooth sensitivity, prevent further loss of tooth structure, modify the child's attitude and behavior towards dental treatment and improve his periodontal health. The parents were informed of the diagnosis and all the treatment modalities were discussed with them. As part of the treatment plan, the treatment alternatives were explained to the child and his parents. This included the amount of tooth structure that would need to be removed, the expected clinical longevity of the restorations and the length of the treatment period. After considering all of the treatment options, it was decided to place direct composite veneers (3M™ ESPE™ Filtek™ Z250 Universal Restorative) on the permanent lower incisors, Polycarbonate preformed Crowns (3M™ ESPE™) on the permanent upper incisors and stainless steel crowns (3M™ ESPE™) on the primary and permanent molars; the parents understood that this could temporarily compromise the esthetics in the molar regions.

Initial periodontal therapy consisted of oral prophylaxis and oral hygiene instructions, scaling, and root planning. This was followed by extractions of retained 54 root stumps and 65.

A Universal restorative composite was chosen to restore the defective tooth structure of the permanent incisors. No preparations were preformed on the incisors, other than cleaning with a rotary bristle brush with pumice prior to acid-etching with 35% phosphoric acid for 30 seconds followed by rinsing with water spray. The labial surfaces of the mandibular incisors were then directly restored with resin composite. Conservative tooth preparation was

Figure 3: Postoperative clinical picture showing esthetic composite veneering in mandibular teeth and Polycarbonate crowns on maxillary teeth

performed on the maxillary permanent incisors prior to placement of the polycarbonate crowns (Figure 3).

Endodontic procedures were performed on 85, 75 and 74. Furthermore, preformed stainless steel crowns (3M) were placed following minimal slice preparations of the teeth bilaterally at each visit so as to balance the occlusion and alter the vertical dimension (Figure 4a, 4b). The adaptation and quality of the margins of the preformed stainless steel crowns were evaluated using a panoramic radiograph. Maxillary primary canines were left un-restored as they were about to exfoliate.

The stainless steel crowns on the first permanent molars are considered to be only temporary restorations. Once the second permanent molars and the premolars have established the level of the occlusal plane, the stainless steel crowns on the first permanent molars will be replaced by cast full-coverage restorations (Figure 5).

Six monthly follow up was done till 18 months. Six months after the completion of treatment, no deterioration was visible in the restorations. The Gingiva was slightly inflamed, because of insufficient brushing.

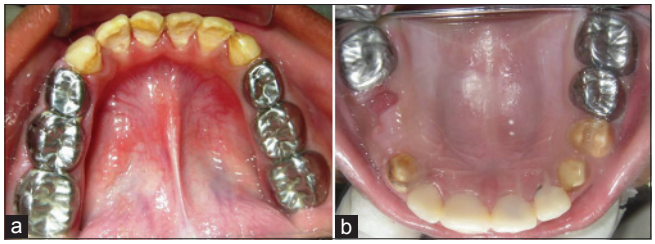

Figure 4: (a) Postoperative clinical picture showing composite veneering and stainless steel crowns in posterior teeth in mandibular arch. (b) Postoperative clinical picture showing polycarbonate crowns and stainless steel crowns in posterior teeth in maxillary arch

Figure 5: The post-operative panoramic radiograph after restorations of all the erupted teeth and extraction of the retained root stumps

DISCUSSION

Treatment of the different amelogenesis imperfecta types depends on the specific AI type and the character of the affected enamel. Treatments range from preventive care using oral prophylaxis, sealants and bonding for esthetics to extensive removable and fixed prosthetic reconstruction. The treatment approach should ideally be developed considering the specific AI type and underlying defect. Nowadays, there is a range of materials used to restore the teeth that includes the use of composite resin, polycarbonate crowns, stainless steel crowns (SSCs), glass ionomer cement and functional maintenance dispositives to restore a mutilated dentition.[7] In most cases, full coverage restorations are preferable for posterior primary teeth due to the extensive loss of enamel and also to prevent further loss of tooth structure.[8] In primary and the early mixed dentition, stainless steel crowns prove to be the most effective type of restoration.[7,8]

The successful management of amelogenesis imperfecta during childhood requires the cooperation and motivation of both the patient and parents need to be fully assessed before a definitive treatment plan is formulated.[9] Usually, the treatment will extend over many years and long term success will depend on regular attendances for restorative procedures and the maintenance of a high level of oral care.

Frequent topical fluoride applications and dietary control are strongly recommended to prevent caries. Plaque retention and calculus formation resulting from the rough enamel surfaces necessitate high levels of oral health care.[10] The exposed dentin can be sensitive to such stimuli as sweet, hot and cold; topical fluoride applications can control this until definitive restorations can be placed. The newly available Tooth Mousse (GC®) which contains Recaldent® CPP-ACP may prove useful in this regard.

Scott H Rosenblum treated a 13-year-old with full coverage stainless steel crowns on the molars with an increase in vertical dimension and stainless steel crowns with veneer phasing on the anterior teeth.[11] In adolescents, porcelain veneers are also likely to be useful; however their use with amelogenesisimperfecta has not been extensively reported. Porcelain jacket crowns which provide esthetic permanent restorations, have reportedly been successful in affected adults, but their use in young patients is contraindicated because of the presence of large pulp chamber and the likely need for frequent replacement due to passive eruption.[12]

CONCLUSION

The psychosocial effects of amelogenesis imperfecta on affected individuals are significant.[6] Although there

are technical difficulties associated with performing extensive restorative care in the mixed dentition, they are outweighed by the psychosocial benefits to the affected child. Nevertheless, preserving as much tooth structure as possible is highly desirable because the restorations will need to be replaced several times during adulthood.[12]

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How to cite this article: Ruby Kharkwal. "Dental Rehabilitation of Amelogenesis Imperfecta in the Mixed Dentition". International Journal of Scientific Study. 2014;1(6):56-59.

Source of Support: Nil, **Conflict of Interest:** None declared.