

Synchronizing a multi-disciplinary team to rehabilitate an aesthetically handicapped patient suffering from developmental abnormality of amelogenesis imperfecta

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Abstract

Purpose: Reported literature has focused largely on the early management of children and young adolescents. This article describes systematic, sequential and synchronized, psychological and restorative management of an adult patient suffering from amelogenesis imperfecta with a fairly good prognosis. The focus of this report is to attribute the specific roles of various medical and dental specialties'.

Materials and Methods: Extensive treatment in four basic phases has been outlined which in turn help suffering patient to understand the extent of treatment in advance. The treatment ranges from patient education and motivation to full mouth rehabilitation. Various methods that educate the patient in advance, about his role towards achieving a successful outcome have not been followed.

Results: patients suffering from amelogenesis imperfecta should never be treated casually. A serious preventive and basic psychological therapy followed by extensive restorative treatment over a period of time is advised. Correct sequence of treatment phases is essential to not only eliminate patient's fear and apprehension but also install confidence in his judgment during the entire course of rehabilitation.

Conclusion: Extensive treatment such as full mouth rehabilitation should be approached with caution and planned in phases without compromising need of a multidisciplinary approach.

Introduction

Esthetically acceptable appearance is one of the primary requisite for social acceptance in civilized world, and a pleasing natural dentition is a significant contributor to aesthetics of human face. The dentition however is vulnerable to developmental abnormalities like amelogenesis imperfecta (AI) which renders a person aesthetically handicapped. Amelogenesis imperfecta is a genetically determined and rare

enamel mineralization defect reported by Spokes¹ in 1980 as "hereditary brown teeth." Amelogenesis imperfecta has been characterized as a clinical entity in 1945, and its clinical manifestations, histological appearance and genetic pattern are characterized by their heterogeneity. A widely used classification system for AI is based on genetic inheritance, histopathology and specific clinical dental characteristics.² Amelogenesis imperfecta is an enamel defect that can be inherited in a sex-linked or autosomal manner. ³ Within affected families, there is an extremely variable clinical appearance of enamel hypoplasia, hypocalcification or hypomaturation, depending on which stages of enamel formation are involved.⁴

Clinical features associated with amelogenesis imperfecta include: quantitative and qualitative enamel deficiencies, pulpal calcification, taurodontism, root malformations, failed tooth eruption, impaction of permanent teeth, progressive root and crown resorption, congenitally missing teeth, unaesthetic appearance, dental sensitivity and attrition.⁵⁻⁹ General features may be related to depression, lack of social interaction, indifferent attitude and poor facial expressions. AI is rare with a prevalence of 0.06:1,000 in a study of 4 to 12 years old in the united states¹⁰ and 0.1:1,000 in children between 6 and 18 years old in Israel,¹¹ 0.2:1,000 is reported among 3- to 19- years old in the western part of Sweden¹² and 1.4:1,000 in all children between 0 and 19 years old in the northern part of Sweden.¹³ Restoration of these defects is important not only because of esthetic and functional concerns 14-18 but also because there may be a positive psychological impact for the patient.^{19,20,21}

This clinical case report describes formulating a multidisciplinary systematic approach and implementing the same to effectively manage cases of amelogenesis imperfecta.

Clinical case report

CLINICAL CASE REPORT

A male patient, aged 34 years was referred to the Department of prosthodontics from department of oral medicine, with chief complaint of discontent with the size, shape and shade of his existing natural dentition (Fig 1 and Fig 2). Once the possibility of successful rehabilitation was predicted by a prosthodontist, a multidisciplinary team including the psychologist, oral radiologist, preventive dentist, periodontist, physiotherapist, oral pathologist, endodontist, dental technician, ceramist and the prosthodontist were consulted.

A thorough dental, medical and social history was recorded. Family history revealed that the patient's mother, sister and his brother were having similar dental problems with variable severity, different clinical picture and different mental attitude. For effective, systematic and sequential treatment plan, diagnostic casts were mounted on Hanau Widevue semi adjustable articulator (Waterpik, Ft Collins, CO, USA) using an arbitrary face bow (Hanau Spring bow) and through centric and protrusive interocclusal record (Take 1, Kerr, Romulus, MI, USA).

Clinical data necessary to plan rehabilitation included determination of interocclusal distance (>6 mm), existing vertical dimension of occlusion, closest speaking space (3 to 10mm), coincidence of centric occlusion with centric relation (centric occlusion coincided with centric relation), occlusal plane discrepancy, oral hygiene index, evaluation of mandibular movements, patients attitude towards extensive dental treatment and need for root canal therapy. Radiographs in the form of digital orthopantograph and intra oral periapical views were taken. Mounted diagnostic casts on a programmed articulator were evaluated for existing occlusion. A treatment plan was developed with the aims of improving the patient's mental attitude towards extensive dental treatment, correcting malocclusion, restoring masticatory function, reducing the reported tooth sensitivity and improving the patient's appearance with porcelain fused to metal restorations. The treatment objectives were accomplished in the following four phases.

DIAGNOSTIC PHASE

Provisional clinical diagnosis was first established by experts in the field of oral medicine and oral pathology based on the family history and clinical picture. The clinical picture closely resembles type 1D amelogenesis imperfecta (hypoplastic smooth, autosomal dominant) as per Witkops classification². The case presented with generalized discoloration and extrinsic staining, labial, buccal and occlusal wear, sensitivity to hot and cold, smooth facial and lingual

surfaces, spacing between teeth, decreased vertical dimensions of occlusion, generalized gingivitis with localized periodontitis and more importantly patients consciousness regarding his social acceptance. Radiographic examination revealed impacted mandibular third molars, impacted maxillary right third molar and a periapical lesion in relation to mandibular left second molar. Other significant clinical findings included occlusal plane discrepancy, apical periodontitis in relation to maxillary anterior teeth, class 2 carious lesions in relation to teeth number 15,16,36,37 and 47.

The next step in diagnostic phase included determination of the amount of vertical dimensions that could be increased. This was accomplished by fabrication of occlusal splint at established vertical dimensions. The splint was worn by the patient for a period of three months which he was able to tolerate biologically without any discomfort (Fig 3). A mock preparation was done on diagnostic duplicated casts and wax patterns were made on them using Inlay wax (Harvard, Germany). The same would be utilized later in the fabrication of provisional restorations. The patient was also referred to a psychologist to assess the mental attitude of the patient towards maintenance of extensive restorations. Counseling was done and significance of patient's role in success of occlusal rehabilitation was demonstrated through verbal and audio visual aids.

PREPARATORY PHASE

During this phase the patient was put on an oral hygiene maintenance program for a period of six months prior to onset of restorative phase. The program included initial scaling and polishing followed by surgical crown lengthening (Fig 4). Superficial scaling was done initially which was then followed by thorough scaling, polishing along with root planning, six weeks after removal of surgical sutures (Fig 5). The patient was educated and motivated regarding his role in oral hygiene maintenance program. Fluoride prophylaxis was carried out by use of a fluoride varnish (Flouritop) applied directly on tooth surfaces. During this phase, endodontic treatment was done in all the natural teeth except the maxillary molars (Fig 6). After obturation, the teeth were initially filled with intermediate restorative material. After determining the success of endodontic treatment, the teeth were filled using type II glass ionomer cement (Ketac-Cem; 3M ESPE, St. Paul, Minn) and light cure composite resins (Clearfil Photocore, Kuraray Dental, Japan)

RESTORATIVE PHASE

This phase began only after the periodontist assured

that the patient was following use of various oral hygiene maintenance aids regularly. The mandibular anteriors were prepared first to receive metal ceramic crowns. Gingival retraction was done and impressions were made of addition polyvinyl siloxane material (Reprosil, Dentsply/Caulk; Milford, DE, USA). The amount of tooth reduction was gauged by the use of indexes that were prepared on the diagnostic casts after wax pattern fabrication. Temporary restorations were cemented using noneugenol cement. Shades were selected for individual teeth using shade guide VITA shade guide (Vita Zahnfabrik, Badsackingen, Germany). High resolution digital photographs of the patients existing dentition were taken and sent to the ceramist along with individual shades. The restorations were cemented with zinc phosphate cement (Harvard) (Fig 7). The maxillary anterior teeth were then prepared to receive porcelain fused to metal restorations. The anterior guidance between the definitive restorations was kept the same as was present when the temporary restorations were made. The final restorations in the form of single crowns were cemented using zinc phosphate cement (Fig 8). The next step included tooth preparation of maxillary and mandibular right sided posterior teeth. Maxillary right side posteriors were fabricated followed by fabrication of mandibular right side and then cemented using zinc phosphate cement (Fig 9). After cementation of fixed restorations on the right side the restorations on the left side were fabricated and cemented using zinc phosphate cement (Fig 10).

MAINTENANCE PHASE

The post treatment follow up was planned strictly according to basic norms in each discipline. To gauge the effect of full mouth rehabilitation, the patient was asked to consult the same psychologist once in every month. During the psychological evaluation, three months after cementation of last restorations, the patient was extremely satisfied with the result of the treatment (Fig 11) and he was ready to recommend the same for his rest of the family who were having same condition. During the next two years after treatment, the problems that were encountered was porcelain fracture in relation to two crowns, endodontic failure in relation to mandibular right second molar (Fig 12). These were corrected without repeating the restoration. The patient was also advised to consult a physiotherapist who could help with masticatory muscle relaxation whenever the patient felt masticatory spasms.

DISCUSSION

Amelogenesis imperfecta is a clinical condition whose management requires a coordinated effort from a

multidisciplinary team and in order to achieve successful results, a systematic approach was devised which was carried out as follows:

Diagnostic Phase

1. Clinical diagnosis of type of Amelogenesis imperfecta
2. Determination of tolerance towards increase in occlusal vertical dimensions
3. Psychological evaluation of patient's mental attitude and need for education and motivation.

Preparatory Phase

1. Fluoride prophylaxis.
2. Oral hygiene maintenance program.
3. Surgical Crown lengthening.
4. Endodontic therapy of existing teeth.

Restorative Phase

1. Full mouth restorations

Maintenance / Follow up Phase

1. Prosthodontic - One week, one month and then quarterly each year.
2. Periodontal – One week, fifteen days, once a month for first six months and then quarterly each year.
3. Endodontic – 3 months after each obturation and then quarterly each year.
4. Psychologic – 3 months after cementation of last restorations followed by quarterly each year.
5. Physiotherapist – every 3 months to evaluate the effort required to masticate.

The chief complaints of generalized sensitivity are a result of loss of enamel due to tooth wear with subsequent exposure of dentinal tubules. The exposure of tubules makes them prone to sensitivity and deposition of stains due to consumption of food and beverages. Fluoride when used as a prophylactic measure not only increases the resistance of the tooth to caries but at the same time it provides temporary relief to the sensitive dentin.

Psychological determination of patient's mental attitude, requiring extensive restorations should be an important phase of multidisciplinary approach in their rehabilitation. Prediction of success in such patients directly depends on patients understanding of their existing problem and the role they play in long term success of full mouth rehabilitation. In this case, the patient was moderately higher secondary educated therefore determination of his mental attitude and his level of motivation to undergo such extensive and long treatment becomes necessary. Financial implications of over more than 70 visits over a period of more than

one and a half year are significant for any patient and therefore motivation should be a part of a multidisciplinary approach. The dental history in this case revealed the patients knowledge about the sequence in which his condition progressed in the past. Patient's motivation was increased by the fact that he was well aware of the events in the recent past and realized the timing of seeking definitive dental treatment. The progression of the condition if left untreated were analyzed and presented before the patient. More importantly the existing means of oral hygiene maintenance, practiced by the patient came into limelight. Use of plaque control measures other than tooth brushing are not enough for long term health of the periodontium serving extensive number of restorations. In this case, the patient was given demonstration of various plaque control measures that he would be required to practice. After a period of six months the periodontist was sure that the patient had learned and was practicing regularly all plaque control measures, which he scientifically determined through the use of oral hygiene and periodontal indices.

Full mouth rehabilitation along with increasing the vertical dimensions of occlusion should be carefully progressed after thorough determination of the amount of vertical dimensions that could be increased without affecting the balance of the stomatognathic system. In this case this was achieved by first determining the existing freeway space, closest speaking space and vertical dimensions of occlusion. The patient's freeway space was in the range of 5-6 mms and closest speaking space ranged from 3 to 10 mms when patient pronounced various sounds. The thickness of occlusal splint was initially kept to 1mm and was then gradually increased in increments upto 3 mms, by adding self cure clear acrylic over already processed heat cure acrylic. After using the splint, it was determined that a maximum of 2.5 mm increase in vertical dimensions would be biologically acceptable by the patient.

Surgical periodontal therapy consisted of clinical crown lengthening procedures for all teeth excepting maxillary molars. The surgery was performed with local anesthesia, 2% Xylocaine with epinephrine 1:200,000. The patient was preloaded with 400 mg NSAID (Motrin), 1 hour before each surgical procedure, and instructed in the management of postoperative discomfort. Interrupted 4-0 chromic sutures were placed, followed by a surgical periodontal dressing. Any evidence of suture material was removed, and all surgical sites were lightly debrided at the 1-week postoperative visit. Good initial healing was noted after 1 week. Any evidence of localized periodontitis was

eliminated during the surgical procedure. Both hard tissue and soft tissue recontouring were carried to gain increase in clinical crown length. The gain ranged from 1 mm in posterior region to 2 mm in anterior region. Radiographic evaluation, diagnostic cast analysis, and clinical examination were used to decide the amount of hard and soft tissue reduction required to gain adequate clinical crown length for each tooth. The diagnostic information suggested that the short clinical crowns could be lengthened with conservative osseous reduction affecting small changes in the crown-root ratio.

Endodontic treatment was carried depending upon the diagnostic findings. Those teeth showing evidence of periapical pathology were treated in multiple appointments after thorough disinfection of the root canals. Where there was no evidence of such pathology, single sitting root canal therapy was done. Clinical success of endodontically treated teeth was determined 2-3 months after their obturation. The teeth were asymptomatic when prosthodontic treatment was started.

Different methods have been employed to establish anterior guidance in full mouth rehabilitation cases. The use of temporary crowns with increased vertical dimensions and established anterior guidance is one method. The use of occlusal splint in this method allows having temporary restorations have the same anterior guidance which the final restorations would have. This was achieved during diagnostic mock preparation, wherein wax patterns were fabricated on a programmed articulator and the necessary anterior guidance that would lead to a mutually protected occlusion was established. Once the required anterior guidance was known, the temporary and the permanent restorations were fabricated accordingly. The occlusal scheme included posterior disclusion by all anterior teeth during protrusion, canine protected during lateral excursion, incorporation of long centric in centric occlusion and freedom from centric during opening and closing the mandible. The long centric and freedom in centric accommodates the effect of immediate and progressive mandibular translation of the condyles on the restoration and permits a more concave lingual surface on teeth numbers first and second molars.

A physiotherapist should always be a part of the multidisciplinary team because in such cases long term evaluation of efficient mastication can be easily judged clinically by a physiotherapist. With wearing of occlusal surfaces, more effort is required by patients to masticate which in turn affects muscles and the temporomandibular joint. The physiotherapist should

be consulted before rehabilitation so that he determines later whether extra effort is being applied with current rehabilitation or not.

Summary and Conclusion

This clinical case report describes an ordered, sequenced and organized treatment planning of a multidisciplinary team to achieve desired objectives of a patient with a hypoplastic, autosomal dominant smooth pattern of amelogenesis imperfecta. Very often the presenting clinical features like spacing, open contact points, hypoplastic teeth and occlusal relationships will complicate the treatment planning progress. An awareness of role played by various disciplines leads to a successful treatment.

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Illustrations

Illustration 1

Extra Oral View of The Patient

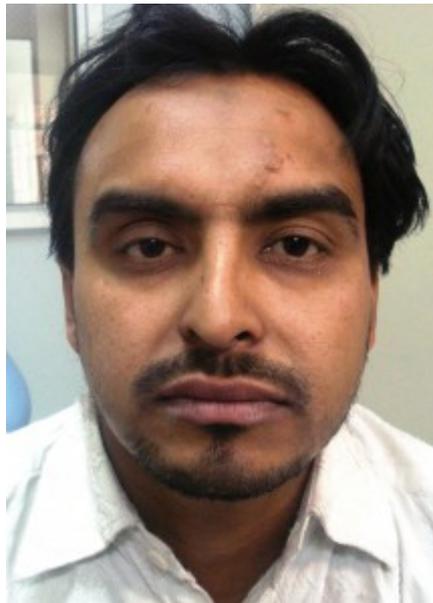


Illustration 2

Intra Oral View of the Dentition



Illustration 3

Diagnostic Occlusal Splint With Increased Dimensions



Illustration 4

Crown Lengthening



Illustration 5

Increased Clinical Crown Length



Illustration 6

OPG Showing Endodontic Treatment Done In Relation to Natural Teeth



Illustration 7

Restoration Of Mandibular Anterior Teeth With Established Anterior Guidance



Illustration 8

Maxillary Anterior Teeth Cemented With Established Anterior Guidance



Illustration 9

Rehabilitation of Right Sided Maxillary and Mandibular Posterior Teeth



Illustration 10

Rehabilitation of Maxillary and Mandibular Left Side Posterior Teeth



Illustration 11

Extra Oral View After Full Mouth Rehabilitation



Illustration 12

Two Year Follow up Result

