DOI: 10.7860/JCDR/2013/6665.3860

Case Report

Dentistry Section

Multidisciplinary Approach for Restoring Function and Esthetics in a Patient with Amelogenesis Imperfecta: A Clinical Report

VAIBHAV D. KAMBLE[1], RAMBHAU D. PARKHEDKAR[2]

ABSTRACT

Amelogenesis Imperfecta (AI) is a genetically determined and enamel mineralization defect reported, depicted as "Hereditary brown teeth." AI is characterized as a clinical entity and its clinical manifestations, histological appearance, and genetic pattern are characterized by their heterogeneity. The need for prosthodontic management of this group of patients varies. Some patients need oral hygiene instructions only, whereas others need extensive dental treatment that includes composite restorations, metal ceramic crowns, all ceramic crowns, porcelain veneers. A 20-year-old male patient presented with sensitive, discoloured, and mutilated teeth, with a decreased vertical dimension of occlusion. The 4-year recall examination revealed no pathology associated with the full mouth rehabilitation, and the patient's aesthetic and functional expectations were satisfied. The rehabilitation included all-ceramic crowns on anterior teeth and metal-ceramic crowns on posterior teeth following endodontic treatment and a crown-lengthening procedure for eliminating tooth sensitivity, improving the aesthetics and occlusion, and for restoring function.

Keywords: Aesthetics, Zirconia, Full-mouth rehabilitation

CASE REPORT

A 20-year-old male patient was referred to the Department of Prosthodontics at Government Dental College and Hospital, Nagpur, for examination, evaluation and treatment of gross attrition and considerable sensitivity of his teeth. Prior to treatment, a detailed dental, medical, and social history was obtained from the patient. The medical history and general physical condition were unremarkable. The family history revealed that his older brother was also affected by AI. Clinical examination revealed that tissue loss had affected all his teeth. The enamel layer was very thin, the cuspal structure was completely absent in the occlusal portion of the molars which were most severely affected. However, the clinical appearance of cervical and proximal enamel seemed to be normal. Clinical examination of the patient revealed short clinical crowns, occlusal wear with exposed dentin in posterior areas; high smile line [Table/Fig-1]. The exposed dentin was hypersensitive. The patient had acceptable oral hygiene; however, gingival hyperplasia and mild to moderate gingivitis were present, especially in maxillary segment. No other abnormalities were observed. Intraoral photographs and panoramic radiograph were obtained prior to the treatment. The roots of all teeth appeared to be normal in shape and size in radiographic evaluation [Table/Fig-2]. However, the teeth had rather large pulp chambers that would increase the risk of pulpal damage during tooth preparation. The patient was referred to Oral and Maxillofacial Surgery Department for the extraction of impacted third molars. A histological examination was performed to confirm the diagnosis. It was diagnosed that the patient suffered from hereditary hypomaturation-type of AI. The patient's VDO and vertical dimension at rest were assessed. The interocclusal rest space had increased because of loss of tooth structure on the molars. A treatment plan was developed with the aim of restoring masticatory function, improving the aesthetics, reducing the reported tooth sensitivity. The patient was informed of the diagnosis, treatment procedure and other treatment options, including cost differences, levels of tooth structure removal, time period for treatment completion, possible aesthetic results and expected clinical longevity. The treatment plan included all-ceramic and metal-ceramic restorations in maxillary and mandibular anterior and posterior teeth respectively.

Following a dental prophylaxis and oral hygiene instructions, patient was placed on an intensive oral hygiene programme with 0.12% chlorhexidine gluconate (Periogard, Colgate Oral Pharmaceuticals, Canton, Mass), twice daily. Complete maxillary and mandibular arch impressions were made using irreversible hydrocolloid (Neocolloid; Zermack, Rovigo, Italy). Diagnostic casts were fabricated from type III gypsum product (Kalstone; Kalabhai Karson, Mumbai, India] and they were mounted on a semi-adjustable articulator [Whip Mix; Model 8500, Whip Mix Corp, Louisvlle, USA) with a face bow transfer (Quick mount face bow; Model 8645, Whip Mix Corp, Louisvlle, USA) and a centric relation record using polyvinylsiloxane occlusal registration material (EXABITE II; GC Corp., Tokyo, Japan). The articulator was programmed using protrusive and lateral records. The diagnostic preparations and wax-up revealed insufficient interocclusal space for fixed prostheses.VDO was increased by 4 mm using occlusal splint device for a period of 3 months. Niswonger's technique and phonetics were used to establish the new VDO. Diagnostic preparations and waxing on the casts were done to evaluate the amount of tooth reduction for planned all-ceramic and metal-ceramic restorations, after confirming that the patient could tolerate the increase in the vertical dimension [Table/Fig-3]. Crown lengthening procedure was performed on both maxillary and mandibular teeth [Table/Fig-4]. A mutually protected occlusal scheme was developed by doing a diagnostic wax-up. A tooth preparation with a circumferential sloped shoulder margin configuration for all-ceramic crowns and a chamfer margin configuration for metal-ceramic crowns was performed [Table/Fig-5A and 5B]. Provisional restorations (Protemp III; 3M ESPE, St Paul, USA) were fabricated from the diagnostic wax up and they were cemented with zinc oxide eugenol temporary cement (Temp NE; 3M ESPE, St Paul, USA). The patient wore the provisional restorations at the new vertical dimension for 3 months [Table/Fig-6A]. A custom incisal guide table was fabricated from the acrylic resin (Rapid Repair; Dentsply India, Gurgaon, India) to preserve the anterior guidance of provisional restorations for the fabrications of definitive restorations [Table/Fig-6B]. Gingival retraction was maintained to accurately record finish lines in the definitive impressions using a knitted cord (Ultrapack; Ultradent Products Inc, Salt Lake City, Utah) soaked in aluminium



[Table/Fig-1]: Pretreatment Intraoral View, **[Table/Fig-2]:** Panoramic Radiograph after endodontic treatment, **[Table/Fig-3]:** Diagnostic wax-up



[Table/Fig-4]: Crown-lengthening procedure, **[Table/Fig-5A]:** Tooth Preparation: Maxillary arch, **[Table/Fig-5B]:** Tooth Preparation: Mandibular arch



[Table/Fig-6A]: Provisional restorations, **[Table/Fig-6B]:** Post–treatment intraoral view of teeth in maximum intercuspation, **[Table/Fig-7]:** Post-treatment extraoral view

chloride (Visco Stat Clear Ultradent Products Inc.; Salt Lake City, Utah). Shades for the definitive restorations were determined prior to tooth preparation and they were reviewed after tooth preparation. Definitive impressions of the prepared maxillary and mandibular anterior teeth were made using polyvinyl siloxane impression material (Exaflex and Examix; GC America Inc, Alisip, Illinois, USA) by putty wash technique. Working casts were fabricated from type IV gypsum product (Ultrarock; Kalbhai Karson Pvt Ltd, Mumbai, India) and they were mounted on the semi-adjustable articulator using interocclusal records. Anterior all-ceramic crowns were fabricated from lithium disilicate-reinforced glass ceramic material (IPS Empress 2; Ivoclar Vivadent, Schaan, Liechtenstein) using the heat press technique, according to the manufacturer recommendations. A trial evaluation of the ceramic material, prior to glazing, enabled final occlusal refinement. The crowns were evaluated and adjusted for optimal contacts, contours, and aesthetics intraorally and they were luted with resin luting agent (RelyX™ ARC; 3M ESPE, St Paul, USA) [Table/Fig-7]. On posterior teeth, metal-ceramic crowns with ceramic occlusal surfaces were fabricated, evaluated intra-orally, adjusted, and cemented with glass-ionomer cement [GC Fuji I, GC Corporation, Tokyo, Japan] using the manufacturer's recommended powder/liquid ratio [Table/Fig-7]. The outcome of the treatment in terms of function and aesthetics satisfied the expectations of patient. The patient was monitored at 3 month intervals for 1 year and then once a year for recall, and he has not experienced any complications since past 4 years.

DISCUSSION

Amelogenesis Imperfecta (AI) has been classified into three groups, based on clinical and radiographic features, histologic appearance and mode of inheritance: Type 1 Hypoplastic; Type 2 Hypocalcification; and Type 3 Hypomaturation [1]. In the hypoplastic forms, the enamel does not develop to its normal thickness. The hypomaturation forms differ from hypocalcification in that the enamel is harder, with a mottled opaque white to yellow-brown or red-brown colour, and it tends to chip away from the underlying dentin rather than wear away [2-4]. According to Seow [5], patients with AI are often aesthetically and functionally affected because of tooth discolouration, with accompanying hypersensitivity and loss of vertical dimension of occlusion [VDO]. Restoration of such inherited defects is essential, not only due to functional and aesthetic reasons, but also because there is a positive psychological impact on young patients. Treatment planning for patients with AI is related to many factors, including age and socio–economic status of the patient, the type and severity of the disorder and the intraoral situation at the time that the treatment is planned [1]. Historically, treatment of patients with AI has included multiple extractions and fabrication of complete dentures. This treatment option is psychologically harsh, especially when addressing adolescent patients [2]. When patient requires a comprehensive approach, a mutual understanding and communication among the prosthodontic, endodontic, and periodonic disciplines is very critical, to achieve the improved functional and aesthetic outcome. In this complex rehabilitation, it is essential for the prosthodontist to play a key role in the multidisciplinary team, in supporting both patient and parents [6,7]. For rehabilitation of patients with AI, several treatment alternatives, with different materials and methods for restorative procedures, are available. Recently, several studies have illustrated the use of over dentures, stainless steel crowns, adhesive casting, composite resin

veneers, porcelain veneers, and ceramics for restoring dentitions mutilated by severe attrition [8-10]. Besides, the advances in the field of aesthetic dentistry, especially in bonding to dentin, help practitioners to restore function and aesthetics to an acceptable level [7]. The most predictable and durable aesthetic option is to restore the affected teeth with full coverage crowns. It has been suggested that all-ceramic restorations should be bonded to tooth structure with adhesive resin cements, to enhance fracture resistance of the restorations, [11-12] abutment tooth, [13] and to prevent postoperative sensitivity [14]. When reliable bond between the ceramic and tooth is established, tooth may act as a supportive core to the ceramic material [12]. IPS Empress 2 with adequate strength and good bonding properties is a good option, although all ceramic systems such as In-Ceram Zirconia with higher flexural strength are also available. The clinician must carefully balance the aesthetic needs of the patient, strength of the restoration, protection of remaining teeth, and long-term prognosis of the treatment. Marginal fit and colour acceptability of the restorations were satisfactory in our case, that improved the patient's self-confidence. It is very important for restorative treatment to prevent the development of psychological problems arising from the appearance of teeth affected by amelogenesis imperfecta [11]. This treatment option, however, requires a meticulous oral hygiene programme.

CONCLUSION

This clinical report describes the use of all-ceramic and metal-ceramic restorations for rehabilitation of a patient with hypo-maturation type of AI. The restoration of aesthetics and function in patients with AI can be achieved by making an accurate diagnosis, meticulous treatment planning, together with a dedicated team approach involving different disciplines in dentistry. Further use of modern ceramic materials such as zirconia and adhesive bonding and a justifiable reliance on the predictable artistic abilities of the dental technologist, allow both aesthetic and durable restorations.

ACKNOWLEDGEMENT

Authors thanks Dr. Sana Naqvi for her valuable help in manuscript preparation.

REFERENCES

[1] Sari T, Usumez A. Restoring function and esthetics in a patient with amelogenesis imperfect: A clinical report. *J Prosthet Dent* 2003;90:522-25.
[2] Sengun A, Ozer F. Restoring function and esthetics in a patient with amelogenesis imperfecta: a case report. *Quintessence Int* 2002;33:199-204
[3] Witkop CJ Jr, Kuhlmann W, Sauk J. Autosomal recessive pigmented hypo-maturation amelogenesis imperfecta. Report of a kindred. *Oral Surg Oral Med Oral Pathol* 1973;36:367-82.
[4] Ooya K, Nalbandian J, Noikura T. Autosomal recessive rough hypoplastic amelogenesis imperfecta. A case report with clinical, light microscopic, radio-graphic, and electron microscope observations. *Oral Surg Oral Med Oral Pathol* 1988;65:449-58.
[5] Seow WK. Clinical diagnosis and management strategies of amelogenesis imperfecta variants. *Pediatr Dent* 1993;15:384-93.
[6] Williams WP, Becker LH. Amelogenesis imperfecta: functional and esthetic restor-ation of severly compromised dentition. *Quintessence Int* 2000; 31: 397-403.
[7] Lindunger A, Smedberg J. A retrospective study of the prosthodontic management of patients with amelogenesis imperfecta. *Int J Prosthodont* 2005;18:189-94.
[8] Lamb DJ. The treatment of amelogenesis imperfecta. *J Prosthet Dent* 1976; 36: 286–91.
[9] Harley KE, Ibbetson RJ. Dental anomalies–are adhesive castings the solution? *Br Dent J* 1993;174:15–22.
[10] Patel RA, Hovijitra S, Kafrawy AH, Bixler D. X-linked (recessive) hypomaturation amelogenesis imperfecta: a prosthodontic, genetic, and histopathologic report. *J Prosthet Dent* 1991;66: 398–402.
[11] Blatz MB. Long-term clinical success of all-ceramic posterior restorations. *Quintessence Int* 2002;33:415-26.
[12] Malament KA, Socransky SS. Survival of Dicor glass-ceramic dental restorations over 16 years. Part III: effect of luting agent and tooth to tooth-substitute core structure. *J Prosthet Dent* 2001;86:511-9.
[13] Burke FJ. The effect of variations in bonding procedure on fracture resistance of dentin bonded all-ceramic crowns. *Quintessence Int* 1995;26293-300.
[14] Sensat ML, Brackett WW, Meinberg TA, Beatty MW. Clinical evaluation of two adhesive composite cements for the suppression of dentinal cold sensitivity. *J Prosthet Dent* 2002;88:50-3.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Prosthodontics, Government Dental College & Hospital, Nagpur, Maharashtra, India.
2. Professor, Department of Prosthodontics, Saraswati Dhanwantri Dental College and Hospital, Parbhani, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Vaibhav D. Kamble,
Assistant Professor, Room No. 121, Department of Prosthodontics, Government Dental College & Hospital, GMC Campus, Medical Square,
Nagpur, Maharashtra–440003, India.
Phone: +91-9561381468, E-mail: vaibhavk056@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Jun 09, 2013**
Date of Peer Review: **Jul 18, 2013**
Date of Acceptance: **Oct 27, 2013**
Date of Publishing: **Dec 15, 2013**