



Case Report

Esthetic reconstruction of teeth in dentinogenesis imperfecta – A case report

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ABSTRACT

Dentinogenesis imperfecta (DI) is the result of autosomal dominant genetic defect and affects both the deciduous as well as permanent dentition. It is characterized by: opalescent teeth composed of irregularly formed and under-mineralized dentin with obliteration of pulp chamber and root canal. The teeth with DI show a greyish-blue to brown hue, dislodged enamel, dysplastic dentine with irregular dentinal tubules and interglobular dentine, short roots and pulpal obliteration. All this might lead to rapid and extensive attrition which requires adequate crown reconstruction. The aim of this case report is to show reconstruction of frontal teeth in adult patients with DI thereby providing functional and esthetic dentition.

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1. Introduction

Dentinogenesis imperfecta (DI) is a hereditary defect consisting of opalescent teeth composed of irregularly formed and under-mineralized dentin with obliterated pulp chamber and root canals. DI may be present as a single disorder or in association with osteogenesis imperfecta (OI).¹

DI is classified into three types: type I- associated with osteogenesis imperfecta; type II- present with same clinical, radiological, and histological findings as DI type I but is not seen with osteogenesis imperfecta; and type III -a rare type which is seen in the Brandywine tri-racial population from Maryland and Washington DC, in the United States of America.²

Clinically, the teeth are of normal size, but the crowns are bulb-shaped. Enamel does not have sufficient support;

it gets easily broken, and the teeth appear opalescent, changing its color from brown to blue and sometimes amber/gray. Radiographically, the pulp chambers and root canals are narrowed or get completely mineralized. The roots can be shorter than usual.²⁻⁴ The enamel is normal or thinner. Hypoplastic or hypocalcific defects are present in the enamel in one third of patients. The exposed dentin may be subjected to severe and rapid attrition.³

The dentinoenamel junction is not interwoven to that of a normal extent. The mantle dentin structure is normal in most cases; the dentin tubules are irregular and decreased in number. Intertubular dentin mineralization and the number of odontoblasts are also decreased. There is collagen disorder of the dentin and primary defects in the calcified matrix. The cementum, periodontal membrane, and supporting bone appear to be normal in appearance.⁵⁻⁹

The treatment of DI is focused on protecting the affected dentin from caries, attrition, abrasion, and erosion. Options for restorative treatment commonly include crowns. Some

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of the authors recommend splinting the crowns, while some do not recommend using those teeth as abutments for crowns because of their brittleness.^{10–12}

Except in DI type II, endodontic procedures are usually not possible for patients suffering from DI because of the obliteration of the root canals. If the canals can be found, endodontic treatment may be done. However, in cases where endodontic treatment cannot be possible properly, post and core restorations might have a questionable prognosis due to the morphologic changes in the tooth structure which may lead to tooth fracture.^{13,14}

The purpose of this clinical report is to describe a restorative as well as prosthetic treatment solution through CAD/CAM (computer-aided designing/ computer-aided manufacturing) crowns for young adult patient with DI.

2. Case Report

A 25-year-old male reported to the clinic to improve the appearance of his teeth; his chief complaint was pale-yellowish discoloration of teeth in the upper and lower front tooth regions. The patient was primarily concerned with esthetics. He did not have any relevant medical history, while his family history revealed some similar features in the dentition of his siblings.

The extraoral examination was in limits while the intraoral revealed generalized attrition. The teeth were brownish in appearance, with enamel loss at the incisal and occlusal edges without significant caries, labial surfaces were slightly eroded. Radiograph showed teeth had generalized thin enamel with blunt roots; pulp was partially obliterated in few teeth; however, root canals exhibited normal morphology. Based on clinical and radiological findings DI was diagnosed. Earlier classical procedure of veneering was followed to mask the discoloration by the previous dentist but it did not even last for a month which led to failure of veneers due to improper bonding as dentin and enamel were compromised.

2.1. Treatment plan

It was decided that this time the treatment plan would focus on restoration and maintaining the remaining dentition with special note on improving the esthetics of the anterior.

Patient this time wanted some definitive treatment, as dentin and enamel thickness was compromised this time we planned to go for some better bonded restorative as well as esthetic treatment, to get definitive outcome so we planned to fabricate full coverage crowns through CAD/CAM in maxillary and mandibular anteriors. After informed consent, we began the treatment by performing endodontic procedures in the maxillary anteriors, followed by tooth preparation for full coverage crowns on both the maxillary and mandibular anterior teeth. (Figure 1A,B)

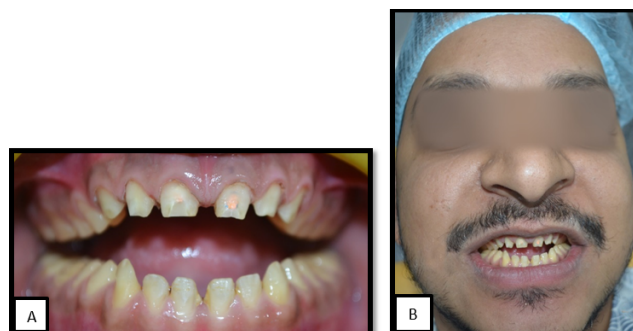


Fig. 1: A,B: Endodontic treatment and tooth preparation done on anterior teeth.

As the teeth were prepared impression was taken by CEREC (Chairside Economical Restoration of Esthetic Ceramic) and were sent for manufacturing of the prosthesis, firstly maxillary crowns were made from Lithium disilicate glass-ceramic CAD/CAM block (ivoclar vivadent IPSe.max CAD LT A1/ C14 block) (Figure 2A,B) (Figure 3A,B)

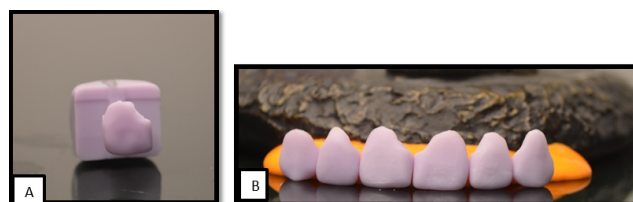


Fig. 2: A,B: Crown manufacturing from Lithium disilicate glass-ceramic CAD/CAM block

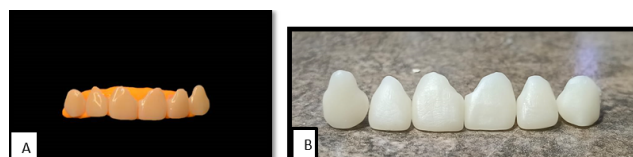


Fig. 3: A,B: Full coverage maxillary crowns

Mandibular anterior teeth were then fabricated with the same protocol. A chairside trial was then done into the patient's mouth to check for fit and occlusion on the same day. A suitable amount of resin cement (GC Fuji PLUS) was used for final cementation of crowns. Same day delivery of prosthesis was given. (Figure 4A,B,C,D)

Oral hygiene instructions were reinforced and patient was placed on 6 months hygiene recall.

Patient was happy and satisfied with the treatment as whole procedure was completed in just within 3days including endodontic as well as esthetic reconstruction. (Figure 5A,B,C)



Fig. 4: A,B,C,D: Final cemented maxillary and mandibular anterior crowns.

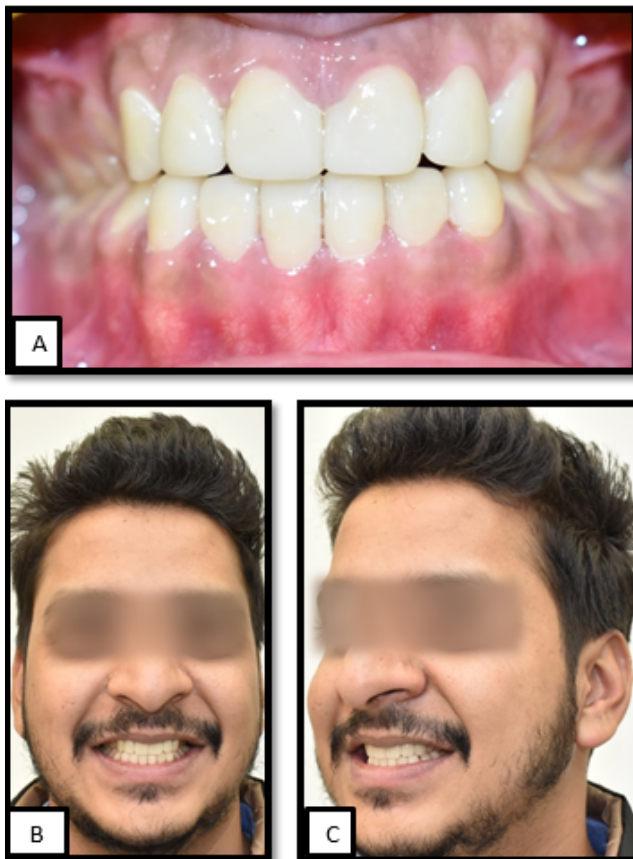


Fig. 5: A: Esthetic reconstruction of anterior teeth; B,C: Satisfied outcome

3. Discussion

The dentinal approach for managing the DI totally depends upon the severity of clinical expression. Major treatment goals include protection of dentin with restoration of lost vertical dimension, tooth structure, function, esthetics, and phonetics. Treatment focuses on the prevention of any further additional tissue loss and protecting the dentin from caries, attrition, abrasion and erosion. Routine treatment might be used in patients who do not exhibit enamel fracturing or rapid crown wear; among these individuals, composites can be used. In more severe cases where rapid dental wear and significant attrition can occur, full coverage crowns are the treatment of choice.¹⁵ In our case, veneers could not be successful, so full coverage crowns were given.

Esthetics are one of the greatest concerns, especially in young adult patients, and should be included in the treatment plan. One of the proper solutions is composite veneers. The esthetic is satisfactory and the teeth are minimally involved. For appropriate placement of composite and for the duration of composite restoration, the preparation of the tooth before composite placement is important. The inorganic phase in DI dentin was investigated by Kerbel et al.¹² who reported that the crystallites in dentin, are less numerous than in normal dentin. Electron microprobe analysis indicated significant differences in the mineral content between DI dentin and normal dentin; in the former, the author observed a higher Ca/P ratio, an overall reduction in both Ca and P, and significantly less Mg. The decrease in the mineral content of DI dentin has been corroborated by chemical analyses.¹³

Composite veneers are indicated in patients affected by DI in frontal region where teeth are without caries and with low abrasion. This treatment allowed maintaining optimal esthetic and function, as well as preserving the tooth structure. In cases where enamel is totally lost, self-etching dentine adhesives have advantage due to the lower mineral content in dentine. In contrary, total etching of the tooth before composite resin application, with a shorter etching time (10–15 second) is indicated.¹⁴

This case report demonstrates that extensively bonded restorations, including CAD/CAM-manufactured lithium disilicate ceramic veneers and crowns, can be used successfully in teeth affected by Dentinogenesis imperfecta. One of the authors reported reasonable success with bonded restorations in 3 patients with DI over a 10-year period. Within the limitations of this report, it seems that bonding was not compromised from the dentin defect resulting from Dentinogenesis imperfecta. Similar case reports have suggested that bonded all-ceramic restorations, especially CAD/CAM-manufactured all-ceramic restorations, can be used successfully in patients with DI.^{16–18} In the present case too CAD/CAM manufactured crowns were given which gave satisfactory outcome thereby maintaining function and esthetics and also saved time as manufacturing

was done chair side with CEREC.

4. Conclusion

Early diagnosis of DI can enable dentists and patients to take preventive measures in order to minimize the effects of DI. Even in cases with moderate wear, less invasive treatments like veneers can be done but based on the condition. Although bonding with resin to defective tooth structure where dentine is less, restoration success may be compromised. Patients with Dentinogenesis imperfecta can exhibit a wide range of clinical features; therefore, dentists need to use their own judgment in material selection and treatments that are appropriate on a case-by-case basis. A long-term clinical study is still needed to establish the treatment protocol for patients with DI in terms of bonding restorations. CAD/CAM manufactured full coverage crowns can be successfully used in DI patients with quick delivery of prosthesis.

5. Source of Funding

None.

6. Conflict of Interest

None.

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