Comprehensive oral rehabilitation of a case of amelogenesis imperfecta using all-ceramic veneers and tabletop restorations: A case report.

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Abstract

Introduction—Managing a severe and widespread amelogenesis imperfecta case presents significant challenge for the dental team, especially the dentist responsible for prosthetic restorations.

Challenges in Treating Amelogenesis Imperfecta—The disease's enamel defects cause various issues that must be carefully planned and addressed before treatment begins, particularly concerning the materials used for restorations.

Primary Diagnosis- Given that the affected patients are usually young, a conservative approach is necessary. Preserving the occlusal dental surfaces from abrasion and achieving acceptable aesthetic outcomes are the important objectives of the therapy. If not treated then the abrasions can lead to loss of vertical dimension and significant dentinal hypersensitivity.

Conclusion—A multidisciplinary treatment plan is essential to creating optimal conditions for prosthetic restoration. A well-designed treatment plan and advanced adhesive ceramic materials enable good functional and esthetic outcomes with a more conservative approach than traditional methods.

Keyword- Amelogenesis imperfecta, lithium disilicate, tabletops, veneers.

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Introduction

Enamel, originating from epithelial cells, undergoes the sequential stages of amelogenesis: presecretory, secretory, and maturation. Ameloblasts, responsible for enamel production, develop a protein synthesis mechanism in the presecretory phase to form the organic matrix of enamel. They deposit the entire enamel thickness during the secretory phase, incorporating hydroxyapatite crystals with organic components and water. Ameloblasts replace organic substances with inorganic ions in maturation, increasing enamel's mineral content and prism dimensions. Defects in amelogenesis imperfecta (AI) correlate with disruptions in enamel formation timing, where disturbances at the dentino-enamel junction can lead to enamel detachment from dentin. Secretory stage defects result in thin enamel with insufficient crystal growth. In contrast, maturation stage issues produce enamel of standard thickness but with pathological softness due to inadequate matrix breakdown and absorption. Enamelin, amelogenin, ameloblastin, tuftelin, amelotin, dentin sialophosphoprotein, and enzymes like kallikrein-4 and matrix metalloproteinase-20[1] are some chemicals and enzymes that make up the enamel matrix, which is controlled by ameloblasts. Research indicates that patients with any form of AI face similar

oral challenges, including tooth discolouration, sensitivity, and susceptibility to pre- or post-eruption degradation, significantly impacting their quality of life.[2] Studies by Hashem and colleagues underscore the profound psychological impact of AI on adult patients, affecting their self-esteem and well-being across physical, psychological, and social dimensions.[3] Despite diverse treatment modalities available for adults and children, effectively managing AI remains a formidable task for clinicians.

This article outlines minimally invasive approaches for prosthetic treatment in a young female patient with amelogenesis imperfecta (AI), focusing on conservative and adhesive methods involving laminate veneers and tabletop crowns.

Case report

A female patient aged 21 was diagnosed with a hypocalcified type of AI. The patient's medical records revealed a family history of similar dental abnormalities, as her brother exhibited comparable issues. During the examination, the enamel was arduous, mottled opaque white to yellow brown in colour, and discoloration teeth (anterior and posterior teeth). OPG and RVGs revealed no missing teeth or periapical lesions. The patient was dissatisfied with her dental appearance.

The objectives of the procedure were to save teeth from future deterioration, enhance appearance, and normalise oral function. Initial diagnostic impressions were made, and models were obtained. Using Medit link software, a plane correction was done for the upper anterior. Using a face bow transfer record, study models were mounted to a SEMI-ADUJASTABLE articulator. A wax model was created to establish the vertical dimension, and a composite resin mock-up was then performed directly in the patient's mouth. After checking the occlusion and esthetics, further preparation was done.

The posterior teeth on both the upper and lower jaws were prepared concurrently for tabletop crowns. For the anterior teeth, a 0.5 mm veneer preparation was done in order to make adequate thickness for monolithic lithium disilicate crowns (IPS E-max; Ivoclar Vivadent). Finish lines of the tooth preparations were on the enamel. After the tooth preparations, immediate dentine sealing was done, and temporary PMMA crowns were milled and cemented by spot etching.

After one month, 3-shape intraoral scanner was used to fabricate a definitive prosthesis. Subsequently, monolithic lithium disilicate pressed crowns for both the upper and lower teeth were fabricated. Lithium disilicate laminate veneers (IPS e.max Press) were custom-made for this case. The veneers' bonding surface was prepared by etching them for ten seconds with 9.6% hydrofluoric acid, then thoroughly rinsing with water and air-drying. After applying a silane coating (Monobond-S) to the etched surfaces for 60 seconds, the surfaces were left to dry. After applying 37% phosphoric acid to the enamel surfaces for 20 seconds, they were cleaned and dried. After applying a bonding agent, light air spray were used until the surface was glossy. A thin layer of photo-cured resin cement (RelyX U200) was applied to the bonding surface of each veneer prior to the veneers being positioned on the teeth. The extra material was removed, and the resin was light-cured for 20 seconds. In addition to polishing and finishing the margins, occlusion was verified.

Six months later, the patient came back for a follow-up exam and expressed satisfaction with the care. The restorations were in place, dental hygiene was up to date, and the gingival tissues showed no symptoms of recession or inflammation at this visit.

Discussion

AI profoundly affects the composition and amount of enamel in primary and permanent

teeth. In this case, enamel abnormalities were distinguishable from dentin, though not uniform across the surface. The severity of enamel damage is linked to gene mutations, resulting in various AI phenotypes.[4]

Caring for young patients with AI presents significant challenges for clinicians, as treatment approaches need to be tailored to age, AI type, austerity, and oral conditions.[5] Treatment options include composite resins, stainless steel crowns, all-ceramic crowns, and laminate veneers. Although all-ceramic crowns are frequently utilised, less invasive alternatives like composite resin and laminate veneers are also effective.[6]

By carefully applying tints and opaquers to enhance aesthetics, as well as by layering anatomically, composite resin can imitate the colour of teeth. Patient selection, cavity size and location, material selection, and surgical technique all affect how long-lasting direct composite restorations are. However, dangers exist, including fractures and partial loss of the filler material.[7] Gresnigt et al.'s research revealed an 87.5% survival rate for direct laminate veneers made of two different kinds of resin-composite materials. Apart from total breakdowns, common problems were minor discolouration and surface roughness.[8]

Ceramic restorations offer several advantages over composite resin, including superior aesthetics, durability, biocompatibility, and reduced plaque accumulation. However, applying laminate veneers requires enamel preparation, typically around 0.5 mm. If dentin becomes exposed during the procedure, protective measures between the preparation and cementation stages are essential to avoid sensitivity and bacterial contamination. [9,10]

Following assessment of a mock-up and discussion of the patient's concerns about treatment lifespan and aesthetics, ceramic laminate veneers were selected for the complete restoration of all teeth. Ceramic laminate veneers have a minimal clinical failure rate.[11] According to Gresnigt et al. for a maximum of 36 months, the survival rates of ceramic and composite laminate veneers are similar. However, problems with surface quality are more likely to affect composite veneers. Her excellent dental hygiene and lack of parafunctional behaviours further supported the choice to move forward with ceramic veneers.[12]

Conclusion-

In conclusion, treatment for amelogenesis imperfecta (AI) with ceramic veneers, in this case, demonstrated significant improvements in both aesthetic and functional outcomes for the patient. The choice of ceramic veneers was guided by the patient's desire for long-lasting and visually appealing results, addressing both the physical manifestations of AI and the psychological impact associated with the condition. The successful application of veneers enhanced the patient's smile and contributed positively to their self-esteem and overall quality of life. Future follow-ups and longitudinal studies will be essential to monitor the durability and performance of the veneers, ensuring continued patient satisfaction and oral health.

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FIGURES

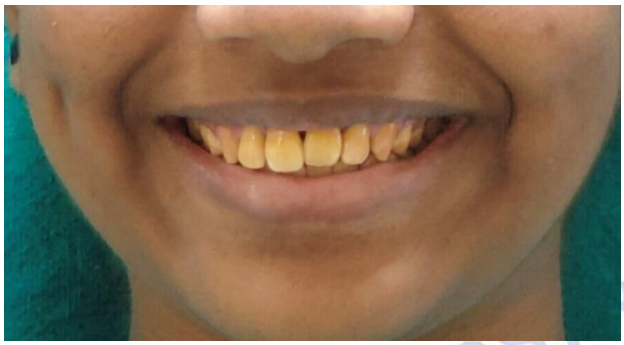

Figure 1.

Figure 2.

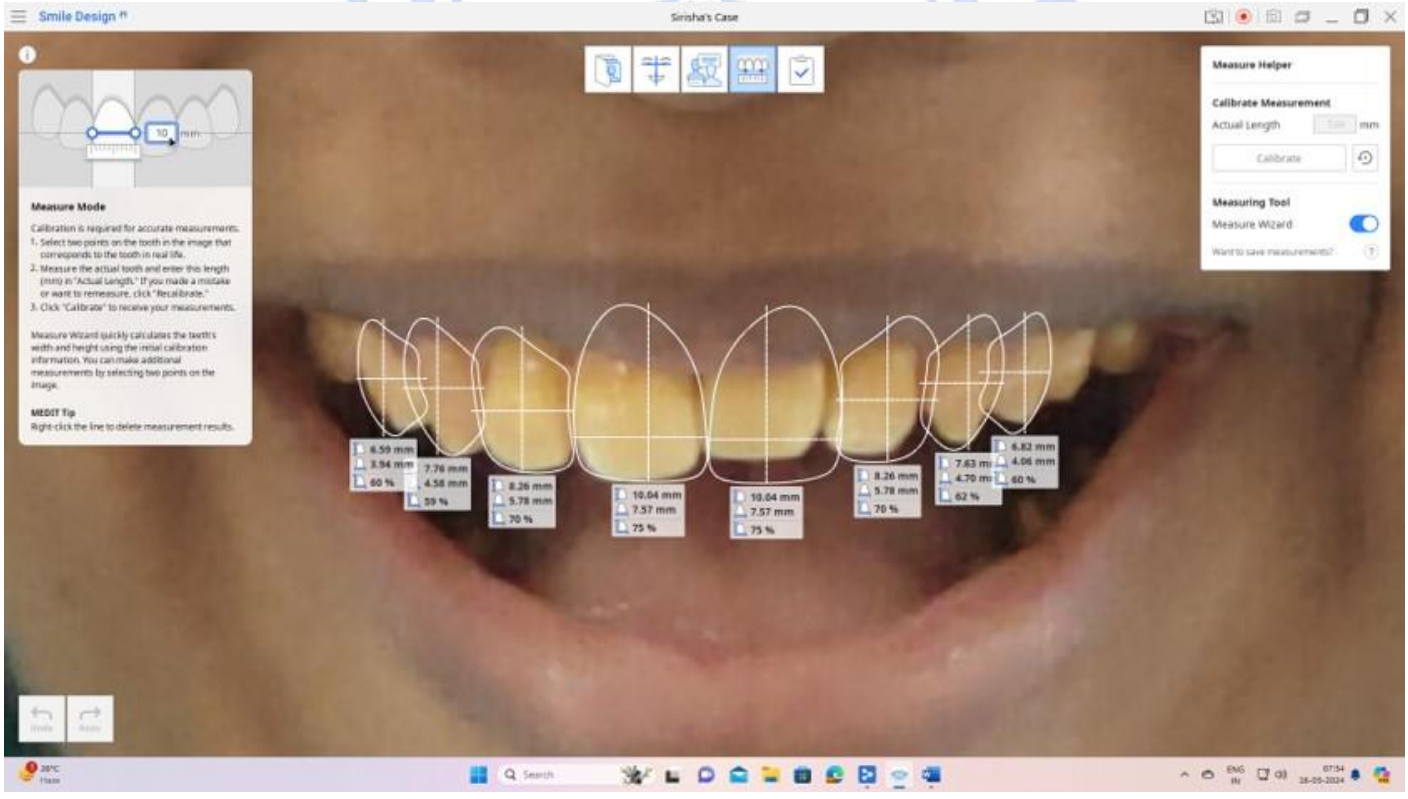

Figure 3.

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8