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Minimally Invasive Management of Enamel Hypoplaisa- A Case Report

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Abstract: Introduction: Enamel hypoplasia is a deviation in enamel development resulting from disruptions in the amelogenesis process. Manifesting clinically as either diminished enamel thickness or complete absence, this condition presents with a surface that may exhibit a white, yellow, or brownish hue, along with a textured appearance such as roughness or pitting. Bilaterally observed, it frequently occurs in the central third region of the crown, with the severity of the defect directly correlating with its size (both in depth and extent). The approach to manage enamel hypoplasia is determined by the extent of it's severity.

Objective: To delineate the characteristics and address the treatment of a case involving enamel hypoplasia leading to aesthetic concerns.

Case Report: A 21-year-old male presented to the Conservative Dentistry Department at Yenepoya Dental College, expressing dissatisfaction with the esthetics of his upper anterior jaw region. Clinical examination revealed brown lesions and irregularly formed enamel on the labial surface of the maxillary anterior teeth. The diagnosis established was enamel hypoplasia type III (as per Silberman et al.), and the proposed treatment plan involves restoration using a composite resin.

Conclusion: Enamel hypoplasia is amenable to a minimally invasive approach through direct restoration using composite resin. This procedure aims to restore the natural color and appearance of the affected teeth.

Keywords – *Enamel Hypoplasia, Minimally invasive ,Composite, Build up,Esthetics*

I. INTRODUCTION

The color and shape of teeth result from various factors, including lighting conditions, translucency, opacity, light transmission, and human perception. The determination of tooth color is influenced by the translucency of

both dentin and enamel. Tubules play a significant role in light transmission within dentin and enamel, with hydroxyapatite crystals contributing substantially to this phenomenon[2].

Enamel, constituting the outer structure and holding paramount importance both functionally and aesthetically, undergoes a distinctive biomineralization process involving the organized deposition and degradation of matrix proteins. Ameloblasts, originating from ectodermal cells, are responsible for the growth and development of enamel. These cells secrete enamel proteins essential for mineralization and maturation. Enamel formation is characterized by distinct phases, including the inductive phase, secretion, and maturation. In the inductive phase, enamel epithelium begins differentiation, while in later secretion stages, differentiated ameloblasts release proteins contributing to the enamel matrix.

The growth process of teeth can be adversely affected, leading to the occurrence of abnormalities. Dental abnormalities may result from environmental forces, hereditary factors, or idiopathic origins. Enamel is unique, and once formed, remodeling does not take place; thus, any abnormalities that occur during its formation become permanently etched on the tooth surface. Enamel defects arising from developmental and hereditary factors include conditions like amelogenesis imperfecta. Enamel defects associated with environmental conditions can be classified into (1) Hypoplasia, (2) diffuse opacities, and (3) demarcated opacities[3].

A dental anomaly involves an irregularity in the structure of tooth enamel, which can arise from disruptions during the formation of the enamel matrix, resulting in manifestations known as hypoplastic enamel[4].

Enamel hypoplasia denotes a disorder affecting the enamel due to interruptions in the amelogenesis process. Amelogenesis unfolds in two phases, encompassing the secretion of the matrix by ameloblasts and subsequent maturation.

Clinically, enamel hypoplasia manifests as the development of thin enamel, often exhibiting pit or groove formations horizontally or vertically on the tooth surface. This disorder typically presents bilaterally on both the labial and lingual surfaces, with a predilection for the middle third of the crown, followed by the cervical and incisal/occlusal areas. The extent (depth and breadth) of the defect correlates directly with the severity of the condition[4].

The incidence of disruptions during permanent dentition enamel development is notably high. Robles et al[5]. reported that approximately 52% of enamel defects are attributable to disorders in permanent tooth development, while Sandhu et al. suggest that defects in permanent teeth growth occur due to interference within a range of 12% to 69%[6].

The treatment approach for enamel hypoplasia varies based on the severity of the lesion. This case report explores the management of enamel hypoplasia through a minimally invasive approach using composite resin.

II. CASE REPORT

A 21-year-old male presented to the Conservative Dentistry Department at Yenepoya Dental College, expressing dissatisfaction with the esthetics of his upper anterior jaw region. Patient also gives history of fall at the age of 2 years old, which may have been the contributory cause of defect.
The patient's medical history indicated the absence of any systemic diseases and dental history reveled no prior dental treatment was done

Clinical examination revealed brown lesions and irregularly formed enamel on the labial surface of the maxillary with respect to 11 and 21.
The diagnosis established was enamel hypoplasia type III (as per Silberman et al.)[7]

III. CASE MANAGEMENT

At the 1st visit complete history and clinical examination was done.

At 2nd visit pre treatment clinical photograph, shade selection, restoration, finishing and polishing and post treatment photographs were taken.

The choice of shade was established prior to isolation using the Vita classic shade guide, and the selected shade was identified as A2. The teeth were isolated using rubber dam (Coltene Whaledent, Switzerland), followed by the application of a rubber cup with pumice paste on the labial surface to facilitate the removal of debris and plaque. Subsequently, a minimal starburst preparation was made on the teeth, followed by a 15-second etching of the teeth using 37% phosphoric acid (Ivoclar Eco-Etch, Ivoclar, Zurich, Switzerland), after which the teeth were washed and dried. In the subsequent phase, a bonding agent (Tetric N-Bond Universal Adhesive, Ivoclar, Zurich, Switzerland) was applied on the surface of the teeth, followed by a 20-second curing process. The restoration procedure involved the utilization of nanohybrid composite resin (Tetric N-Ceram, Ivoclar, Zurich, Switzerland). A palatal shelf was constructed using an A2 shade, followed by the application of a dentine shade B2 over the palatal shelf. Subsequently, a layer of enamel A2 shade was applied, topped with a translucent shade (Tetric N-Ceram, Ivoclar, Zurich, Switzerland). These composite resin layers were applied using GDC composite instruments and Shofu Uni brushes (Shofu, Kyoto, Japan). Each layer underwent curing with a light-emitting diode (LED) unit for 20 seconds. Finishing and polishing were executed using yellow and red band burs (Mani, Tokyo, Japan), followed by a sequential application of the snap kit polishing discs (Shofu, Kyoto, Japan). The final polishing was accomplished using Sof-Lex polishing spirals (Sof-Lex Spirals, 3M, ESPE, St. Paul, MN, USA).

IV. PROCEDURE PHOTOGRAPHS

PRE- TREATMENT PHOTOGRAPH

RUBBER DAM ISOLATION

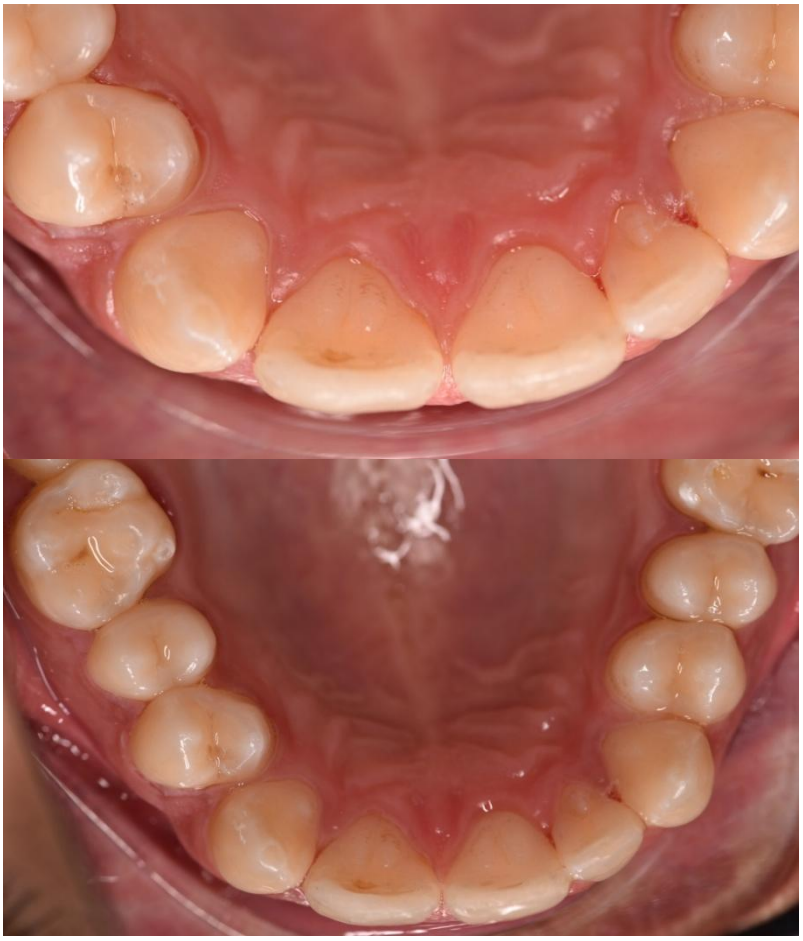
AFTER BEVELING

AFTER ETCHING

BONDING

GROSS BUILD UP

AFTER POLISHING ANTERIOR VIEW



AFTER POLISHING OCCLUSAL VIEW

PATIENTS SMILE AFTER COMPLETION OF THE TREATMENT

BEFORE AND AFTER SMILE

ARMAMENTARIUM USED

V. DISCUSSION

Developmental anomalies encompass a spectrum, ranging from subtle alterations in enamel mineralization leading to simple yellow-brown discoloration to more complex conditions such as crown dilaceration, root dilacerations, odontome-like malformations, partial or complete arrest of root formation, sequestration of the permanent tooth germ, or disruptions in the eruption of permanent teeth. The nature and severity of these anomalies depend on factors such as the stage of development of permanent teeth at the time of injury, the relationship between permanent teeth and the roots of primary teeth, and the direction and magnitude of force applied[8,9].

Enamel defects, irrespective of their duration, are considered indicative of severe stress, resulting from cellular disruptions during tooth development, which may occur during histodifferentiation, apposition, or mineralization stages. Ameloblasts, highly sensitive cells, may yield reduced thickness or quantitative defects (hypoplasia) if disturbed during the secretory phase, whereas hypomineralization, opacities, or qualitative

defects indicate disruptions in the later mineralization or maturation phase of amelogenesis[10,11,12]. The rhythmic sequence of cellular activity interspersed with resting phases during enamel formation, coupled with its high calcium content, necessitates a substantial number of calcium ions for proper mineralization. A deficiency in calcium ions may severely disturb ameloblasts during certain developmental stages of enamel [13].

Hypoplasia, as categorized by Silbermann et al.[7], includes several types:

1. Hypoplasia Type I: Enamel discoloration-induced hypoplasia.

2. Hypoplasia Type II: Abnormal coalescence-induced hypoplasia.

3. Hypoplasia Type III: Partial absence of enamels causing hypoplasia.

4. Hypoplasia Type IV: A combination of three types of hypoplasia (circular enamel hypoplasia)[7].

In the present case, only the enamel was affected, possibly due to trauma occurring at an early age, as reported by the patient, which could have damaged the tooth bud, thereby influencing the amelogenesis process. Diminishing enamel luster, and dental surfaces eroded with cavitations and irregular wear are indicative signs of hypoplastic lesions, resulting from the loss of microanatomy, affecting the color, morphology, and texture of teeth.

Various treatment protocols may be employed based on the extent of involvement and the severity of lesions. Typically, these approaches encompass enamel microabrasion, esthetic conservative restorations, and dental whitening[14,15]. Composite resin restorations are adept at replicating the appearance of a natural tooth, yielding highly esthetic outcomes. Most enamel defects are primarily cosmetic rather than functional[16]. In the case of enamel hypoplasia, the primary goal is to restore anatomical harmony concerning occlusion, function, and esthetics, aiming to enhance patient self-esteem while fostering social and psychological benefits.

VI. CONCLUSION

Enamel hypoplasia poses a significant challenge, leading to potential compromise of oral health and inducing both physiological and psychological disturbances. Timely intervention seeks to alleviate pain and, to a lesser extent, enhance aesthetic concerns. Numerous treatment alternatives exist for addressing hypoplastic teeth, cases depicting the treatment of hypoplasia will assist clinicians in comprehending the available options for each specific case. Evaluating the advantages and constraints of each technique enables clinicians to make informed decisions and determine the optimal treatment plan.

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