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Enamel Hypoplasia Management With Direct Composite Resin

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Abstract

Introduction: Disturbances during teeth growth and development may lead to dental abnormalities. Disruption in the process of formation of the enamel matrix may result in a surface defect known as enamel hypoplasia. **Purpose**: This case report aimed to show a technique of direct composite resin for esthetic resolution in anterior teeth with enamel hypoplasia. **Case presentation**: A 20-year-old male patient presented at the YARSI Dental Hospital (Jakarta) with a complaint of chalky white spots on the maxillary anterior teeth. The clinical examination showed wet white spots on the labial surfaces of 13, 21, and 23 (FDI), also caries on the labial and mesial surfaces of 12, 11, and 22. The treatment plan were composite resin direct veneers on After 5 months follow-up, evaluation of patients's appearance showed that the affected teeth are maintained in good condition. **Conclusion:** Clinical success in the management of enamel hypoplasia depends on the severity of the lesion, the diagnosis, and the determination of a treatment plan.

Keywords: Composite resin filling; Direct composite veneer; Enamel hypoplasia;

Introduction

Tooth growth and development go through several stages: initiation, proliferation, histodifferentiation, morphodifferentiation, apposition, calcification, and eruption. Initiation stage (bud stage) is the beginning of the tooth germs formation from the oral epithelium. In the proliferative stage (cap stage), the mesenchymal cells in the inner layer proliferate, condense and vascularize to form dental papillae which then form dentin and pulp.[1] The enamel epithelial cells become increasingly elongated and cylindrical, called ameloblasts, which will differentiate into enamel. The peripheral cells of the dental papillae will become odontoblasts which will differentiate into dentin. This stage is called histodifferentiation (bell stage). Next is the morphodifferentiation stage, the cells forming the teeth are arranged in such a way and prepared to produce the shape and size of the tooth. In the apposition stage, the hard tooth matrix is formed on the enamel, dentin and cementum. The calcification stage is where the matrix and calcium salts are deposited. Calcification will begin in the matrix that has previously been deposited by means of precipitation from one part to another with the addition of layer by layer, then proceed to the stage of tooth eruption.[1]

Abnormalities can occur at each stage that causes anomalies in the number of teeth, tooth size, tooth shape, tooth structure, tooth color, and tooth eruption disorders. Tooth anomaly is a deviation from the normal shape due to disturbances in the stage of growth and development of teeth or can also be called abnormalities in the teeth.[1] Some growth and development disorders can damage ameloblasts in apposition stage, resulting in disruption of the laying of the enamel matrix and causing a surface defect known as enamel hypoplasia.

Enamel hypoplasia may be caused by systemic and local factors. Systemic factors include trauma, infection, nutritional disorders, metabolic diseases, and chemicals, while local factors include trauma or teeth infection. The clinical features of enamel hypoplasia include thin enamel, pits, and grooves on the enamel surface. This situation interferes with the function of the teeth to become sensitive and aesthetically unfavorable, this can occur in both primary and permanent teeth.[2]

The management of enamel hypoplasia should be focused on the improvement of appearance and function, and also to prevent further damage. Treatment depends on the severity of the problem, and selecting the proper restoration is crucial. Permanent restoration is carried out to improve the condition of the tooth both aesthetically and functionally.[2]

Case report

A 20-year-old male patient presented at the YARSI Dental Hospital (Jakarta) with a complaint of chalky white spots on the maxillary anterior teeth. During anamnesis, the patient reported that several of his siblings had the same dental condition. The patient had no history of systemic disease.

The clinical examination showed wet white spots on the labial surfaces of 13, 21, and 23 (FDI). There were also caries on the labial and mesial surfaces of 12, 11, and 22. All teeth are vital, percussion test negative, palpation test negative, and the gingiva was normal. The affected teeth were diagnosed as enamel hypoplasia (Fig 1.A and B).

Figure 1. A. Clinical photo of teeth 13, 12, 11 with enamel hypoplasia; **B.** Clinical photo of teeth 21, 22, 23 with enamel hypoplasia

The clinician proposed the following treatment plan, which was accepted by the patient: composite resin direct veneers on teeth 13, 12, 11, 21, 22, and 23. At the first visit, the operator carried out the salivary examination and filled in the patient's medical record. Then in the next visit, the veneer restorations were performed on each tooth. After the rubber dam installation, the defect on the enamel surfaces were removed using a round highspeed diamond bur (Mani Dia diamond bur) with water irrigation (Fig 2).

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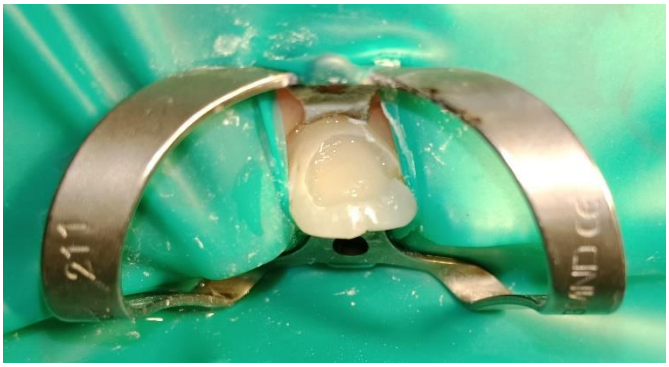
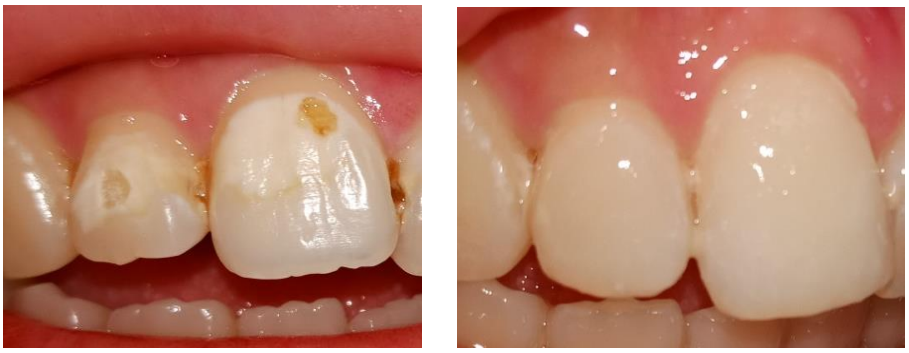


Figure 2. Preparation result on 12

Afterwards, the enamel was etched for 30 seconds using 37% phosphoric acid (Any-etch etching gel), followed by the application of dentin bonding agent (Adper Scotchbond Multi-Purpose) for 15 seconds and then light cured with LED light curing unit (3M™ Elipar™ DeepCure-S Curing Light) according to manufacturer's instructions.

Direct veneer restorations on the affected teeth was made using nanohybrid composite resin (3M™ ESPE™ Filtek™ Z-350 XT (3M™, St. Paul, MN, USA), with celluloid strip placed on proximal

to prevent composite from adhering onto adjacent tooth. The composite is contoured to restore the tooth to its original anatomical shape. Finishing and polishing procedures were performed using Enhance Finishing System (Dentsply-Caulk, Milford, Del.) to achieve the desired esthetic anatomic contour and natural looking finish (Fig. 3 and 4).



(A) **(B)**

Figure 3. A Before treatment; B. After direct composite placement on 13.12.11.

(A) **(B)**

Figure 4. A Before treatment; B. After direct composite placement on 21,22,23.

After treatment completion, the white spots and defects on enamel surfaces are no longer visible, the clinical appearance had improved and the patient was satisfied with the result (Fig 5). Figure 6 represents the 5month follow-up of the procedures. The restorations are still intact and no complaint from the patient.

Figure. 5 Final result of treatment

Figure 6. Clinical aspects 5 months after treatment

Discussion

The present clinical case report describes the patient with chief complaint of cavities in his upper front teeth and a chalky white color which greatly interfered with his appearance. The anamnesis revealed that several of his siblings had the same dental condition. Enamel hypoplasia is a hereditary disorder because it may be inherited by a simple autosomal dominant pattern, regardless of gender.[1] In addition, other causes of enamel hypoplasia are local and systemic factors. Any disturbance such as illness during the enamel maturation phase of amelogenesis may negatively affect the function of ameloblast leading to surface defect of the enamel.

Clinical examination in this current case showed white spots on teeth 13 to 23, and some brownish-yellow spots with a clinical appearance similar to caries. In enamel hypoplasia, the enamel is thinner, but the quality remains the same. The affected tooth may have an irregular shape, with pits and grooves and sometimes missing enamel. Localised hypoplastic defects can be caused by trauma or infection in the primary tooth. Systemic, environmental, and genetic factors may lead to generalized hypoplastic defects.[3]

The restorative treatment of a tooth with enamel hypoplasia is challenging due to reduced thickness of the enamel layer, which may interfere with the adhesion between the restorative material and the hard tissues. Previous study showed that the bond strength between sound enamel and composite resin is significantly higher than enamel with surface defects, regardless of the adhesive system used. The etching on teeth with damaged enamel produces an abnormal microporosity pattern, leading to a weak bond between resin and enamel.[4] However, a literature review revealed that anterior teeth can be restored with direct composite restoration without interference in the resin bonding and hard tooth tissue.[3]

There are several treatment options for the management of cases of enamel hypoplasia. Previous studies reported the success of minimally invasive treatments such as vital bleaching, microabrasion, and resin infiltration in cases of enamel hypoplasia.[5] However, such treatment cannot be performed in this case, considering the depth of enamel defects.

This clinical case presented direct veneer composite to mask the enamel defects. Martos et al. reported the use of a nanohybrid composite resin to restore an upper anterior tooth with a soft form of enamel hypoplasia. The position and pattern of enamel defects on the affected teeth were not possible to restore without the involvement of restoration.[6] Tomer et al. performed direct veneer using nanohybrid composite to makeover a patient with enamel hypoplasia on the labial surfaces of all teeth, particularly maxillary central incisors. Nanohybrid composites contain certain compositions that allow better polishing and finishing of the composite.[7] Korkut suggested a technique of shade selection using flat composite button samples in different shades applied on the labial surfaces of affected teeth, and then photographed with cross-polarization technique. In this manner, the shade of composite resin used for restoration will be more accurate.[8] In addition to composite resin, direct veneers can also be made using porcelain, but resin composites are preferred in this present case, because they are more conservative and less tooth preparation.

Recent developments of adhesive and restorative dentistry cause direct veneer composite to be one of the most frequently performed treatments in dental clinics. When correctly used, modern composites can achieve esthetics and surface texture comparable to ceramics in many cases. Fahl and Ritter discuss a combination of direct and indirect techniques for composite veneers that offer advantages over the directly placed composite veneers, not only from the material standpoint but also from the operator standpoint.[9] Like other procedures, this approach certainly has its limitations. Hence, a clinician must have broad knowledge and insight to choose the treatment procedure in each case.

Conclusion

Developmental defects of enamel are not uncommon, both in the primary and permanent dentitions. It can cause discomfort to the patient and even lower self-confidence so that it requires treatment and

comprehension of the properties of the abnormalities and treatment options to improve the restoration outcomes. Minimally invasive restorative techniques are treatment options that should be chosen whenever possible.

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