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Hypo-Plastic Amelogenesis Imperfecta of 14 years Old Libyan Boy: Case Report

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ABSTRACT

Amelogenesis imperfecta (AI) represents a group of developmental conditions, genomic in origin, which affect the structure and clinical appearance of enamel of all or nearly all the teeth in a more or less equal manner. Early detection of AI is ideal, but when this is not feasible, less intrusive procedures should be performed, and the case should be monitored. To make the right diagnosis, one must have a better understanding of AI. Therefore, this article aims to better clinicians' understanding of the clinical diagnosis and treatment needed for such a disorder and in the restoration of the dentition damaged by AI, this instance emphasizes the significance of prophylactic measures.

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Introduction

In the literature, there are several different reports of amelogenesis imperfecta (AI) prevalence. According to studies, the ratios in Turkey were 43:10,000, Sweden was 14:10,000, Argentina was 10:10,000, and Israel was (1.25:10,000.4), these numbers indicate that the average occurrence across the globe is 0.5% (or 1 in 200) [1]. A genetically based hereditary disease termed amelogenesis imperfecta (AI) exists, in 1945, the first classification was published, and then hypoplastic and hypocalcified groups of AI were split. This categorization was altered during the subsequent decades when new diagnostics, such gene sequencing, were developed. Witkop's classification further categorized the changes to enamel into four major categories [2]. In the initial step of enamel production, known as the enamel matrix deposition, a deficiency causes hypoplastic AI, from a clinical perspective the patient exhibits thin enamel with yellowish-brown, coarse or smooth, flat occlusal surfaces of the posterior teeth due to attrition, and regardless of grooves and/or pitting. Thin, well-mineralized, and unbreakable enamel will be present. Enamel that is on radiography thin will yet have a normal radiodensity, in the histology section, you'll see any defects in matrix formation that are accompanied by problems with ameloblast differentiation or vitality [3].

Hypoplastic, hypocalcified, or hypomaturation forms of enamel abnormalities can be recognized in AI patients and occasionally mixtures of these types [4]. However, the AI affects the structure and appearance of tooth enamel, often in conjunction with changes in other intra-oral and/or extra-oral tissues. In both primary and permanent dentition, nearly all teeth have dental enamel damaged in composition and diagnostic appearance. This dental enamel is defined by hypomineralization and/or hypoplasia, stains, sensitivity, fragility, and the enamel phenotypes in other syndromes are referred to as amelogenesis imperfecta [1, 5].

However, the alteration of the enamel, which can vary from diffuse opacity to hypoplasia and/or hypomineralization of enamel and dentin, is a defining feature of molar incisor hypomineralisation (MIH). Typically, the initial permanent molars and permanent canines are the most commonly suffering teeth [2]. Although dentin and/or enamel may be damaged by dental hard tissue mineralization defect, it depending on the nation's population and place of residence, the prevalence of diseases with few changed teeth which including MIH, ranges from 2.8 to 25%. Even though the precise cause of MIH is unidentified some specific diagnoses are frequently established, such as oxygen deprivation at birth or during the post-natal period, chronic pulmonary obstructive disease, an accumulation of dioxins or polychlorinated biphenyl (PCB) in the mother's milk, infectious diseases during early childhood, and a lack of mineral fixing [2].

In addition, dental fluorosis is the most frequent differential diagnosis, and careful exploration is necessary to differentiate the condition from AI due to the heterogeneity of this disorder, varying from minor white streak of the enamel to profoundly thick white coloration with inconsistent, disfiguring patches of staining and hypoplasia. The quantitative altering of enamel with locale-specific or widespread diminished thickness is recognized as hypoplastic type, in which the teeth have a rough surface with pits or greater area flaws and are yellow to light brown in hue [6]. However, the premolars or second permanent molars may be spared in cases of fluorosis and may display areas of horizontal white banding associated with times with greater fluoride intake (chronological distribution). In the latter scenario, the history can often reveal an excessive intake of fluoride, either as a result of a habit like consuming toothpaste as a child or a local water source. Chronological enamel hypoplasia is a distribution of findings that

may reflect a variety of origins during the period of tooth development [7].

Specifications of hypoplastic AI are pitting, grooves, hard, translucent enamel, and reduced thickness from a flaw in the development of the normal matrix. By radiography, the enamel contrasted normally with dentine [1]. Small crowns with thin enamel or enamel with a normal thickness with pits and grooves are signs of hypoplastic AI [8]. Children with AI are frequently first seen by pediatric dentists, so it is crucial that treatment follow a complete overall plan that also includes a rough draft of future treatment requirements [9].

Case Report

A 14-year-old child from Benghazi city, Libya presented with aesthetic problems and very sensitive teeth was directed to the pediatric polyclinic. The mother thought that the other students at school had a significant impact on his social life. Neither parent had phenotypic dental structure anomalies, nor the family history revealed no abnormalities. Hypoplastic teeth were discovered during a clinical checkup. In addition to easily chipping enamel, reduced enamel thickness, a rough surface, and numerous structural loss extensions, the oral examination additionally demonstrated these types of issues. Pitted and grooved enamel was a sign of defects in enamel matrix formation, in particular in the maxillary front teeth and the upper and lower first permanent molars. The maxillary and mandibular fronts were also clearly separated from one another. Due to the patient's hypersensitivity and the tooth surface structure, their oral hygiene was subpar. A dental examination of the mixed dentition demonstrated that the teeth were primarily yellow in color and of normal size and form. Significant attrition, especially in the posterior teeth, suggests that the enamel is not very hard. In large part as a result of chipping, the enamel surfaces were rough and pitted. The coarse portions of the crowns were a yellowish than the surrounding sections, indicating a propensity for extrinsic staining as shown in Figure 1. The cervical regions, where wear had not yet cracked the outermost layers and the enamel hadn't discolored, displayed the most normal-looking enamel. At the cervical edges, where the enamel is weaker, and enamel erosion was seen on a panoramic radiograph (Figure 2).

Figure 1: Amelogenesis imperfecta hypoplastic type of 14 years Libyan boy (a, b) smile view, (c, d) frontal view, (e) mandibular view, (f) lateral view on left side, (g) lateral view on right side

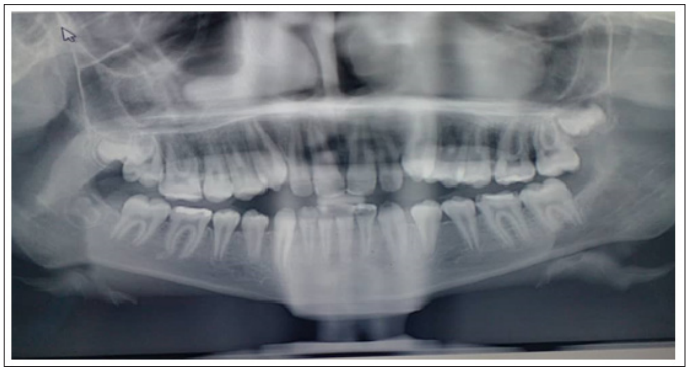

Figure 2: Panoramic Radiograph Shows Amelogenesis Imperfecta Hypoplastic Type of 14 Years Libyan Boy

Discussion

Patients with AI experience numerous negative effects on their quality of life, including social withdrawal, psychological issues, and time-consuming medical treatments. To avoid the further development of damaged tooth structures, it is crucial to handle these instances quickly. The patient's financial situation also has a big impact on how well the treatment plan works. This method is viewed as a semi-permanent option that assists in preventing further tooth damage until the patient is old enough to receive full-coverage composite or a metal-ceramic crown for overall oral rehabilitation [10].

It is advised that clinicians obtain a genetic consultation or enable admission of their AI patients into a genetics study due to the difficulty of the AI diagnosis and the potential for concealed systemic illnesses [11]. In conventional dental care, treatment should begin immediately as the patient is compliant. It may be necessary to use general anesthesia on very young patients. In order to reduce tooth sensitivity and restore enamel loss in primary teeth with hypoplastic or hypomineralized AI, stainless steel crowns have been suggested. All main teeth required composite restorations. Previous research on bonding to AI enamel was unsatisfactory and varied according to the type of AI [6].

The correct course of action should be planned depending on the kind of AI, its severity, and the patient's dental hygiene practices. There is still no established formula, current strategy, or guideline for successful therapy. Amalgam restorations typically fail due to breakage of the fragile enamel margins, with the exception of mildly damaged teeth. Comparatively speaking, amalgam restorations are less well preserved than adherent materials like glass ionomer cements and composite resins. Full covering is necessary in hypocalcified AI instances, however, where the enamel is extremely fragile and the restoration's bonding is in doubt. Crowns made of stainless-steel work well as restorations in the primary and early mixed dentition [3].

The AI present diagnostic and restorative treatment concerns for practitioners. The management of patients with AI was lacking a set standard of care, while a multidisciplinary approach might be helpful. It is imperative to have accumulated data on the effects on different restorations for each form of AI. With this information, doctors may make better treatment decisions for each individual AI patient while also enhancing their long-term prognosis and dental health [12]. Several strategies for treatment are described in order to avoid masticatory system disorders and an unkempt appearance. While restoring such structural defects in mixed or permanent dentition presents challenges due to shifting teeth and growing jaws, only temporary restoration is possible. For deciduous dentition, restoration with a composite in the anterior region and stainless-steel crowns in the posterior region would be beneficial [13]. AI-based smile restoration requires a lot of precision, perseverance, and skill in addition to close coordination with numerous dental treatment sectors. Restoration of function, aesthetics, and vertical dimension are all involved in the comprehensive approach to the planning of therapy [14]. If enamel deformation caused by amelogenesis is treated with ceramic crowns, there is a significant risk that the pulp will be exposed in young patients. The preferred conservative treatment would be composite restoration when good enamel bonding properties are obvious. For people with amelogenesis imperfecta, many publications have claimed success with different composite resin procedures [15].

Alternative full crowns should be considered for permanently weakened teeth. Metal, composite, and ceramic crowns are frequently used, depending on the patient's age. Composites are able to provide a temporary restoration while individual ceramic crowns are not recommended in teenagers due to jaw development. High-performance CAD/CAM composites, for instance, have recently been developed, allowing for the aesthetically pleasing restoration of patients' deformed permanent teeth [13].

A 16-year-old Caucasian girl in good health was sent to the dental clinic for care of her fragile, pigmented teeth. The primary teeth had also been impacted, although just a little, according to the patient's mother, according to the patient's needs in terms of finances, aesthetics, and functionality, direct and indirect restorations were recommended for restorative procedures. In order to restore the occlusal vertical dimension, the restorations on the back teeth were completed first. Because of the severe tooth damage, the indirect method was chosen [16]. A reported case of 11 years girl diagnosed with hypoplastic AI, with normal complement of teeth. On several teeth, the enamel was entirely broken off, exposing the dentin, and the thickness of the enamel had decreased. The teeth have uneven surfaces. The teeth had diffused pitting on the exposed tooth surfaces and a general yellowish-brown staining, which was more pronounced on the labial and buccal aspects. The timing and pattern of tooth emergence appeared to be within the typical range. There was no open bite. Chronic, widespread, marginal, and papillary gingivitis with calculus deposition and poor oral hygiene were found during a periodontium examination [17].

However, in 12 patients were studied; 5 boys and 7 girls, aged 4 to 17 (10.6 4.6 years) at the time of referral, and in every case, family history was accessible. In contrast, in 9 cases, it was discovered that family members had identical developing enamel abnormalities, it was determined that 8/12 individuals had hypoplastic AI, 2/12 had hypomaturation, and 2/12 had hypocalcified form. Dental discomfort and the inadequate aesthetics were the main complaints [9]. Teeth that were stained were the patient's main complaint when she was 26 years old. The medical past was irrelevant. Extraoral examination produced no interesting results, the dental issue wasn't shared by any other family members, and the surfaces of the clinically brief tooth crowns were yellow-brown in hue, and all teeth had tissue loss. There was a loss of tooth-to-tooth contact; the face's vertical dimension shrank as well. No anterior open bite existed [18].

In 82 individuals with AI, 40 boys and 42 girls, aged 6 to 25, and a control group that was age, gender, and residential area matched were included in the study. Therefore, the need for long-lasting restorative treatments for patients with AI, as evidenced by the AI group's score of 2.9 1.7 against 1.9 1.2 in the control

group (p 0.001) and It also demonstrated how crucial it is to develop an early permanent rehabilitation plan for these patients in order to reduce the need for repeated dental visits [19]. In a group of 75 patients with follow-ups lasting up to 12 years and ages 3 to 15, 34 had a family history of AI, 63% of the patients received restorative care, 33% received stainless steel crowns, 17% received endodontic care, 8% had prosthetic therapies, and 24% required retreatment. Dens invaginatus, taurodontism, ectopic eruption, delayed eruption, hypodontia, and pulpal calcification were concomitant dental abnormalities [20]. A studied conducted on 115 amelogenesis imperfecta (AI) index cases (71 females and 44 males) and 106 relatives from 111 families made up the genetic results for 221 people. 73% of index patients had non-syndromic AI identified, while 27% had syndromic AI. According to Witkop's classification of clinical phenotype, Type I hypoplastic AI (61 case, or 53%), Type II hypomature AI (31 case, or 27%), Type III hypomineralized AI (18 case, or 16%), and Type IV hypoplastic-hypomature with taurodontism AI (5 case, or 4%), are the most prevalent phenotypes [5].

Children with AI may have substantial dental demands and may pose a variety of dental difficulties. Collaboration, persistence, the ability to control behavior, and sedation are helpful tools for assisting children to keep their teeth. Young children must be pain-free at all times. However, the child and family are likely just as enthusiastic about cosmetic improvements. Additionally, it should be a top goal to prevent severe wear so that there is enough dentition for restoration in adulthood [21]. Additionally, children and teenagers with AI expressed concerns about form and function, patients also showed a great deal of worry over remarks made by others and the associated self-consciousness. A small percentage of AI patients discussed how their dental professions and general health affected their personal lives [8]. Therefore, amelogenesis imperfecta diagnosis can be complicated for both patients and doctors. Due to collaboration issues and a child's continually evolving dentition, this can become more complicated for that child [21]. Wherever possible, it is crucial to treat AI patients with a multidisciplinary team that may include a pediatric dentist, orthodontist, periodontist, restorative dentist, and perhaps a geneticist [8]. AI is a major issue that can lower quality of life in relation to oral health and result in some physiological issues. From this perspective, those who have AI require intensive care. The patient's age, socioeconomic status, and the type and severity of the condition should all be taken into account while establishing the course of treatment. Additionally, though uncommon, some dental malformations may coexist with AI instances [18]. Currently, it is believed that AI is not only an oral symptom of some systemic disorders but also not a dental condition. It merits additional consideration from other medical specialties because of this [22].

Conclusion

A categorization system for amelogenesis imperfecta has been proposed by several researchers and is based on phenotype, pedigree, scanning electron microscopic analysis, biochemical techniques, and molecular genetics. In order to offer early intervention and balance the decision between early intervention and the long-term life of the restorations, the dentist must diagnose the issue as early as feasible. Dental professionals should take into account the social repercussions for these patients and seek to end their misery. Therefore, early preventative strategies and a suitable restorative therapy may prevent iatrogenic treatments, which are occasionally seen in AI patients. In order to better understand the clinical behavior of these materials in AI patients, more instances involving new materials and patient follow-up must be recorded. Early management includes medical advice and preventive dental care, such as dietary advice, oral hygiene instructions, and topical fluoride application. Early diagnosis can prevent the majority of problems brought on by enamel fractures and wear and inappropriate invasive interventions.

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