

Molar-Incisor Hypomineralization: A Challenge in the Dental Practice

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Abstract

Molar-incisor hypomineralization is a relatively prevalent qualitative enamel defect worldwide. Some factors have been associated with this condition, but its etiology remains unknown. Due to the impact in dental treatment needs, the knowledge of this enamel defect characteristics and predictors, as the presence of hypomineralization in second primary molars, can lead to an early and effective diagnosis.

Keywords: Dental enamel; Hypoplasia; Tooth abnormalities; Children

Abbreviations: MIH: Molar-Incisor Hypomineralization; DMH: Deciduous Molar Hypomineralization; EAPD: European Academy of Paediatric Dentistry

Introduction

Tooth development occurs via cellular and biochemical mechanisms and this multi-level, tridimensional and progressive process are influenced by genetic and environmental factors [1]. Enamel formation can be divided into two distantly but simultaneous stages. Matrix proteins are secreted in the initial phase, and the secondary stage involves mineralization and maturation [2]. Different developmental defects of enamel are related to the disturbance moment and its duration. Quantity defects, as hypoplasia, are resulted from alterations in secretion phase, while changes during mineralization and maturation results in normal thickness but hypomineralized enamel, which is a qualitative defect [3,4].

In 2001, a qualitative enamel defect that affects one to all first permanent molars and can be frequently associated with affected incisors was defined as Molar-Incisor Hypomineralization (MIH) [5]. The main MIH clinical characteristics are demarcated opacities, post-eruptive breakdown and atypical restorations [5]. When these same characteristics are observed in second primary molars, the condition is named Deciduous Molar Hypomineralization (DMH) [6-8].

According to the European Academy of Paediatric Dentistry (EAPD) policy, MIH can be classified as mild and severe depending on how extensive is the defect and on the complexity of the treatment need [9]. Mild MIH comprises demarcated opacities without breakdown and occasional tooth sensitivity, while severe MIH include post-eruptive enamel or enamel and dentine breakdown, restorations with atypical shape and extension, or even extractions due to MIH [9].

This is a relatively common condition around the world and its prevalence can range from 10 to 25% [10-13], although some prevalence surveys have found higher values [14,15]. Even though there are few studies about DMH prevalence, an occurrence from 4.0 to 9.0% has been reported [7, 8].

Risk Factors and Predictors

Despite of MIH etiology being still unclear [6], some factors have been associated with this enamel defect. As genetic and environmental factors can modify tooth development and hard tissues quality [16], some pre-, peri- and post-natal conditions such as problems during pregnancy, low birth weight and antibiotics intake during the first 3 years of life [16,17] could be considered as possible etiological factors. Several agents can act synergistically and enhance the risk of MIH occurrence [9].

The second primary molars can play an important role in MIH prediction. As second primary molars formation occurs concomitantly to permanent incisors and primary molars [18], exposition to possible etiological factors for MIH could also result in deciduous hypomineralization [19]. Studies have shown that the presence of DMH increases in 4.4 times the chance of the occurrence of MIH [7,8]. Thus, as second primary molars erupt three to four years before the permanent molars, DMH might be a relevant predictor to MIH [8], contributing to an early diagnosis and enabling a better conduction and follow up. Figure 1A-E shows an eight year-old boy with DMH and MIH. Although DMH was mild, presenting only demarcated opacities in the lingual surface of tooth 55 (Figure 1B) and in the buccal and lingual surface of tooth 65 (Figure 1C), he presented severe MIH affecting the upper first permanent molars with demarcated opacities and the lower ones with enamel breakdown associated to clearly affected permanent incisors (Figure 1A-E).

Clinical Implications

Hypomineralized teeth often need restorative treatment due to post-eruptive breakdown and/or caries and children with MIH can present 10 times more dental requirement than others patients without this condition [20]. Dental treatment to MIH patients ranges from prophylactic strategies to high complexity procedures.

DMH and MIH are often associated with dental decay in second primary molars and first permanent molars, respectively [21]. The hypomineralized enamel, more porous and fragile, not only breaks but also seems to facilitate caries initiation and progression [22]. Whether by carious lesions or post eruptive breakdown, these teeth need restorative treatment and the choice of the restorative material depends on the extension and severity of the enamel defect [9].

Other relatively frequent condition in MIH patients is the presence of dental hypersensitivity [5], which can difficult obtaining an effective local anesthesia. Pain and discomfort during treatment often lead to behavior problems and dental anxiety in children with severe enamel hypomineralization [20].

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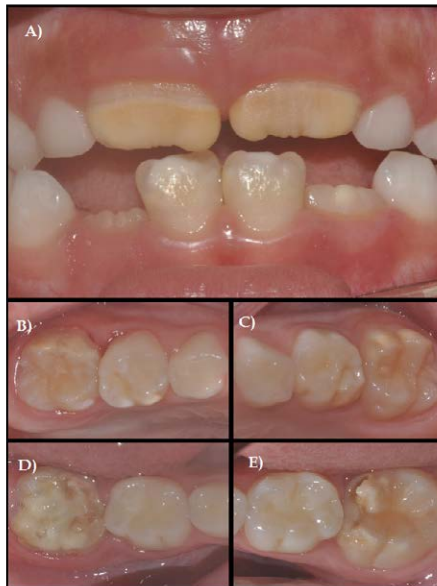


Figure 1: An eight years-old boy with DMH and MIH. Demarcated opacities are seen in the lingual surface of tooth 55* (1B) and in the buccal and lingual surface of tooth 65* (1C). Severe MIH affects the upper first permanent molars with demarcated opacities (B and C) and the lower ones with enamel breakdown (D and E). The upper permanent incisors are affected by yellowish opacities and the lower ones are affected by white opacities (A) (*FDI Dental Numbering System).

Conclusion

Given the impact on the dental treatment needs, MIH is considered a challenge in dental practice both for the dentist and the patient. Early diagnosis is important to prevent extensive enamel breakdown and severe complications due to MIH. As DMH has been considered a good predictor of MIH, dentists should see children with DMH more often during the stage of eruption of the first permanent molars be aware of the characteristics and clinical implications of MIH.

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