



Review Article

Treatment modalities of molar incisor hypomineralization - A review

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ABSTRACT

MIH is defined as a qualitative enamel defect from systemic origin. It affects one to four permanent first molars and can affected also the permanent incisors with variable severity.

Nowadays, the aetiology is unknown and there is a wide range of prevalence of MIH. Therefore, the early detection of the lesions offers to set up appropriate means of prevention as quickly as possible. Besides etiopathogenic investigations, this work is highlighting the therapeutic approach of MIH in children and adolescents. Preventive guidelines are invoked to extract sensibility and remedy either the high risk of caries or functional problems encountered most often.

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1. Introduction

Enamel defects are a growing issue in our dental practices, especially in children. Molar Incisor Hypomineralization is a specific condition of these enamel defects. The Swedish researchers were the first to investigate MIH as they noticed back in 1970 a growing number of children suffering from extensive and severe idiopathic Hypomineralization of the enamel of incisors and permanent first molars.¹

Different diagnostic terms such as ‘cheese molars’, ‘non-fluoride enamel opacities’, ‘idiopathic enamel opacities’, and ‘opaque spots’ have been used to define developmental enamel defects, according to a clinical characterization of enamel or their etiological factors.^{2,3}

That is why, the European Academy of Pediatric Dentistry in Helsinki in May 2009, scientist agreed that although the denomination of MIH can be confusing, it was safe to keep this term proposed and established by the EAPD criteria.⁴

Specifically, MIH is a particular form of developmental enamel defect affecting the first permanent molars, associated or not to permanent incisors, and is the

consequence of a disorder that occurs during pregnancy, at birth and in the first months of life. This causes damage to the enamel of the developing teeth during this period.⁵ Several factors have been implicated in the aetiology of MIH. In the literature MIH has been linked to environmental changes, and a variety of systematically acting medical factors have been described such as prenatal, perinatal and postnatal problems as well as respiratory diseases, high fever diseases (e.g. chickenpox), low birth weight or frequent use of antibiotics during early childhood.^{6,7} This study aim to describe the diagnosis, prevalence and the management of MIH.

2. Prevalence

The prevalence of MIH has been thoroughly investigated all around the world and it varies from 2.9% in China⁸ to 40.2% in Brazil⁹ This high prevalence is correlated with an ambiguous etiology. The aetiology of MIH is associated with several factors like prenatal or early childhood health factors, but it is difficult to settle for a clear cause of MIH. In fact, a recent systematic review¹⁰ assessed the strength of evidence linking etiological factors with MIH. This wide range could be because of difference in recording methods,

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indices used and different age or population investigated.¹¹

3. Diagnosis and Clinical presentation

Clinically, MIH may have different aspects: from the simple alteration of the translucidity of the enamel to dentin exposure. The severity of the MIH lesion may vary from white to yellow/ brownish demarcated opacities to structural loss under masticatory forces.⁸ This altered enamel tends to breakdown under masticatory forces revealing the dentin beneath it. This fact makes children affected with MIH prone to hypersensitivity, low hygiene and eventually psychological repercussions. This may result in atypical cavities or even complete coronal distortion, requiring extensive restorative treatment.^{12,13}

According to Mittal and al, there is a correlation between the severity of damage to the molars and incisors.¹⁴ Indeed, if a patient has opacities affecting the incisors only, the condition is not MIH.¹³ Table 1 summarizes the diagnostic criteria for MIH recommended by European Academy of Paediatric Dentistry.¹⁵

4. Management

Clinical management requires a real strategy to deal with several difficulties related to hypomineralization: sensitivity and rapid development of dental carie, difficulty during anaesthesia and the repeated marginal breakdown. William et al proposed six-step management approach for a child with MIH (Table 2).

5. Prevention

It is essential to apprehend children with MIH alongside with their parents, preferably from a young age. Adhesive restorations such as Fissure sealants seem to be suitable in MIH cases. In case of mild MIH, this therapy is suggested especially when teeth are fully erupted and when moisture control is adequate.¹⁶ Long-term frequent follow up is mandatory since chances of failure and replacement requirements are high.

Remineralization therapy can help in reducing sensitivity and aid mineralization of the hypocalcified surfaces. This treatment should be started as soon as the defective areas are accessible. It can be accomplished with fluoride or Casein Phosphopeptide-Amorphous Calcium Phosphate (CPP-ACP). Thanks to its ability to provide a super-saturated area of calcium and phosphate on the surface of enamel, this oral health product has been recommended in the form of toothpaste or sugar-free chewing gum for patients complaining of mild pain in response to external stimuli.^{17,18} Baroni and al investigated the effect of CPP-ACP and its efficiency as a preventive treatment in MIH.¹⁹

6. Conservative treatments

The choice of materials will depend on the defect severity, the age and cooperation of the child.²⁰ Restorative options include glass ionomer cements (GIC), resin composites (RC), amalgam, stainless steel crowns (SSCs), and indirect adhesive or crowns.

Following the recent growing interest in minimally invasive dentistry, researchers concentrated their efforts in investigating adhesive restorative materials such as GIC and their efficiency in treating MIH. However, there is no scientific substantiation for complete or premature removal of the affected areas. For dentin replacement or as an interim restoration, GIC provides placement ease, fluoride release and chemical bonding. In case of supragingival cavities and without cuspal involvement, the resin composites are material of choice.

Adhesive bonding to hypomineralized enamel may also be used. Various types of adhesive systems are available²¹ and self-etching adhesive has been suggested to enhance the adhesion strength of resin composites in hypomineralized enamel.²² However, the mineral deficiency in enamel structure of hypomineralized teeth is a huge obstacle for successful bonding.

It is recommended to remove the protein encasing the hydroxyapatite prior the etching by pretreating the enamel with 5% sodium hypochlorite.

7. Extractions

Extraction of permanent first molars severely affected by MIH with poor long-term prognosis must be considered. Preferably, the extractions should be planned in collaboration with an orthodontist, before the eruption of the second permanent molar. However extraction must be followed by occlusal guidance in very young children (to guide the second molar into the position of the first molar) or orthodontic correction of resultant malocclusion.

8. Conclusion

Molar incisor hypomineralization is developmental dental defect of permanent teeth causing the loss of tooth structure and leading in aesthetic and functional problems. The general dental practitioner should be aware that MIH is common and should be able to diagnose and manage at the early and appropriately.

9. Acknowledgement

Dear Editors

I am Emna Hidoussi, professor assistant in conservative dentistry and endodontic in dental clinic of Monastir, Tunisia. I work at faculty of dental medicine Tunisia.

I Am pleased to submit an original research case report entitled:

Table 1: The diagnostic criteria for MIH recommended by European Academy of Paediatric Dentistry.

Permanent first Molars and Incisor	This developmental enamel defect affecting the first permanent molars, associated or not to permanent incisors.
Democrated opacities	White or yellow-brown democrated opacities at the occlusal and buccal parts of the crown.
Enamel distintegration	Structure loss under masticatory forces. This Post eruptive breakdown (PEB) expose dentin and leading to rapid caries development
Atypical restorations	Atypical cavities of permanent first molars and incisors requiring extensive restorative treatment
Tooth sensitivity	Pain and sensitivity of affected teeth during tooth brush or breathing cold air.
Extracted teeth	Teeth extracted in cases of a confirmed diagnosis of MIH or the presence of democrated opacities on the other permanent first molar

Table 2: Management approach for a child with MIH.

Step 1 Risk identification	Step 2 Early diagnosis	Step 3 Remineralization	Step 4 Prevention of dental caries and post-eruptive enamel breakdown (PEB):	Step 5 Restorations or extractions:	Step 6 Maintenance
Assess medical history.	Examine all molars and monitor these teeth.	Apply localized topical fluoride or CPP ACP	Institute thorough oral hygiene home care program, reduce cariogenicity and erosivity of diet, and place pit and fissure sealants.	Coronal Restorations (resin composite)	Monitor margins of restorations for PEB. Consider full coronal coverage restorations in the long term.

Misdiagnosis of Cuataneous Dental Sinus Tract. This manuscript has not been published and is not under consideration for publication elsewhere.

Thank you for your consideration!

Sincerely,

Dr. Emna Hidoussi

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11. Conflict of Interest

The authors declare they have no conflict of interest.

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