



ORIGINAL RESEARCH PAPER

Dental Science

FACTORS TO CONSIDER IN ORTHODONTIC TREATMENTS OF PATIENTS WITH MOLAR INCISOR HYPOMINERALIZATION PATTERN

KEY WORDS:

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ABSTRACT

Molar incisor hypomineralization (MIH) is an alteration of the calcification, which affects one or more permanent first molars and one or more incisors, where are three levels of severity. The treatment of teeth with MIH is difficult to manage, since they have difficulty in anesthetizing them and subsequently have poor adhesion to dental materials such as composite resins.

The objective of this review is to know the factors and clinical implications of the MIH pattern in decision-making, to know the considerations in planning the treatment of patients who require orthodontics.

We proceeded to search the articles in the following databases: PUBMED, SCHOLAR GOOGLE and EPISTEMONIKOS.

The pattern of molar incisor hypomineralization plays a clinical challenge in orthodontic treatments, the ideal treatment for this is the one that is carried out individually for each patient, since there are factors that influence the clinical decision, but it is not applicable as standard.

INTRODUCTION

Molar incisor hypomineralization (MIH) is an alteration of circumscribed calcification, which affects one or more permanent first molars and one or more incisors.⁽¹⁾

It is manifested in the enamel with abnormal and delimited opacities that have a coloration that varies from creamy whitish to yellowish brown.⁽²⁾

As for the symptomatology is variable, the patient usually refers to sensitivity during brushing, chewing and even inspiring cold air⁽²⁾

On clinical examination, a typical feature of MIH is the presence of well-defined opacities in the enamel of white, yellow or brown coloration. They are located in the two occlusal / incisal thirds of the crown and in the permanent incisors they are evident in their vestibular surface⁽²⁾

Three levels of severity are defined: low: isolated and well-defined opacities in non-stress areas with absence of hard tissue loss. Moderate: opacities delimited in the occlusal / incisal third without fracture of the enamel after the eruption. Severe: fracture of the enamel after the emergence of the tooth, extensive caries associated with the defective enamel.

The differential diagnosis should be made with the following pathologies: Fluorosis, enamel hypoplasia, amylogenesis imperfecta and white spot lesion. (See table 1)

Pathology	Origin	Clinical sign	Pattern	Cariogenic risk
MIH	Systematic	Well defined opacities in enamel, initially of normal thickness and of white, yellow or brown coloration	It affects one or more first permanent molars and one or more incisors	High
Fluorosis	Fluoride during enamel development	Diffuse white opacities linear patched or confluent without a clear limit	Bilateral symmetric	Low
Enamel Hypoplasia	Hereditary	Edge lesions of hypoplastic enamel are regular and smooth	Asymmetric	High
Amylogenesis imperfecta	Genetic condition	Enamel that is hypoplastic hypomaduro or hypomineralized	They affect all teeth in both dentitions.	High
White spot lesions	First clinical sign of caries	White spot lesions	Asymmetric	High

The difficulty in anesthetizing molars with MIH is well documented in the literature.⁽²⁾ Hypomineralized enamel is a

poor isolation, therefore, the pulp is not well protected against external thermal stimuli and as a result, the tooth becomes hypersensitive to hot and cold temperatures, causing a chronic pulp inflammation state, which can evolve to an acute pulpitis or even pulp necrosis.

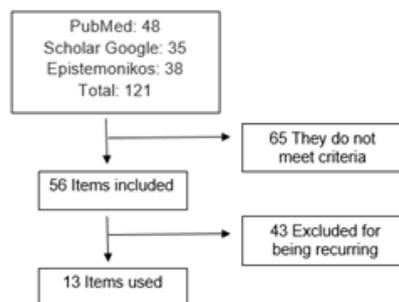
Being the MIH an alteration of diverse management and clinical history, the following objectives are proposed: to know the factors and clinical implications of the MIH pattern in decision making, to know the considerations in the planning of the treatment of patients who require orthodontics.

MATERIALS AND METHODS

The articles were searched in the following databases: PUBMED, SCHOLAR GOOGLE and EPISTEMONIKOS in the search strategy, Boolean combinations (AND, OR) of the following terms were used; ORTHODONTICS, HYPOMINERALIZATION, INCISOR, MOLAR.

The selection of the articles was made at first through reading abstracts discarding the redundant and subsequent reading of complete texts, thus selecting the definitive articles. (See image 1) b

Image 1. Methodology



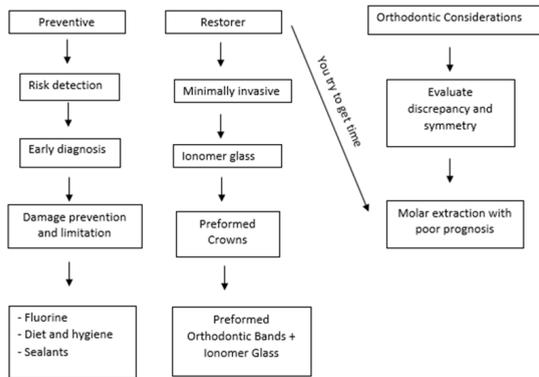
Inclusion criteria: articles related to clinical practice such as adhesion and/or restorations to hypomineralized enamel, orthodontics in MIH, caries in MIH, first molar endodontics in MIH, symptomatology in MIH

Exclusion criteria: other enamel conditions such as in amylogenesis imperfecta, enamel hypoplasias.

RESULTS

The universe of treatments of patients with MIH is so wide and heterogeneous, so a filter was made of the factors to be considered in decision making through the following protocol. (See flowchart 1).

Flowchart 1. Preventive Protocol - Restorative - Orthodontic.



The protocol will be divided into preventive, restorative and orthodontic actions.

The MIH pattern cannot be prevented from appearing, damage can be prevented through early diagnosis together with the detection of the level of risk and clinical actions such as sealants and application of fluoride are recommended.

The restorative element is critical in this protocol, as it is well known that the enamel surface does not have good adhesion, so that traditional restorative materials are not successful, you should try to be minimally invasive.

According to the most used materials, the ionomer glass is presented as a gold standard. When the damage is extensive it can be accompanied by orthodontic metal bands or even making a preformed metal crown would be the ideal solution.

The decisions in Orthodontics will depend on the prognosis of the factors exposed above, when the affected teeth is too damaged, it is decided to perform the extraction, however when they are incisors this is not an option.

The optimal extraction time is based on the data published by Thilander and Skagius (1970), where they describe that it is "when there is radiographic evidence of early calcification in the dentin of the root bifurcation of the definitive second molar" (3), which normally it occurs at the chronological age between 8-10 years (4) and is equivalent to the stage of development of Demirjian E.

In the study of Teo et al. (5) defined the Demirjian states: D crown developed, E early or initial bifurcation, F late bifurcation, G almost complete root development.

Mainly influential factors in the decision making of orthodontic treatments are divided into: Severity of MIH: as mentioned above there are three levels of severity, so that the more severe the more complex the treatment.

Extraction of the 1 molar: if the extractions is performed within the appropriate age (9.5 years average) during the second molar's developmental stage, it can achieve favorable results such as a closure of spontaneous space Need for rehabilitation of affected teeth: it is shown that ionomer glass materials behave better in teeth with MIH compared to those of composite resin, since the need for the adhesive protocol is

compromised, in cases of severe MIH, where there is great loss of substance and dental exposure; the use of prefabricated metal crowns or even metal orthodontic bands together with ionomer glass materials is recommended.

Pulp symptomatology in teeth with MIH: Pulp sensitivity should be evaluated after rehabilitative treatment, if necessary endodontic treatment should be performed. (3,4,5)

DISCUSSION

The treatments are usually difficult because they are painful, the morphology of the porous enamel is altered making the adhesive protocol and subsequent rehabilitation difficult. (6)

There is pain with chewing and brushing, which generates poor oral hygiene favoring the retention of biofilm, promoting the rapid development of caries lesions. (7)

As a result of repeated painful treatments, children with severe MIH have reported showing more behavioral problems such as fear and anxiety (3)

Thilander and Skagius have reported that the best results were found when the extractions were performed during the 8-10 years of age, producing a spontaneous closure of the space after the extraction of the first permanent molars. Crowding in the corresponding quadrant and the presence of the third molar are considered favorable factors. (3)

There are a number of factors in the patient that influence the decision making process, for orthodontic treatment, such as orthodontic diagnosis, skeletal class, number of extraction to be performed on the patient, among others.

Professionals are directly faced with the dilemma of extracting or preserving, a dental piece affected with MIH due to the large number of clinical problems they cause and difficulty in treatment, it is considered that when destruction is important, there is pulp affection, the therapeutic extraction will surely be considered.

In the affected enamel there is an increase in the abrasion, erosion and retention of the bacterial plaque, increasing the risk of fracture and the development of atypical extensive caries that are difficult to restore (8)

One of the most recommended adhesive materials for the intermediate treatment of molars affected by MIH is the Ionomer glass, mainly due to its favorable chemical adhesion and fluoride release properties. (9)

The need to achieve aesthetics should be based on the patient's requirements and always opt for the least invasive and/or combine therapeutic strategies to obtain the best possible result. (9)

The severity of MIH not only varies between patients but also within the same oral cavity, being able to observe a severely affected tooth and a healthy contralateral homologous tooth or with slight alterations (da Costa-Silva et al.).

When the rupture and loss of the post eruption enamel occurs, a porous surface remains and there may even be exposed dentin, resulting in sensitivity to thermal stimuli, chewing and brushing pain, which results in poor oral hygiene favoring biofilm retention, promoting rapid development of caries lesions (6)

CONCLUSION

In cases of molars affected by severe MIH with uncertain prognosis, their extraction is a therapeutic option. The ideal time to carry it out varies depending on the case and its characteristics and the different exposed factors must be taken into account.

Extraction performed in a timely manner will facilitate and simplify subsequent orthodontic treatment.

The pattern of molar incisive hypomineralization plays a clinical challenge in orthodontic treatments, the ideal treatment for this, is that which is carried out individually for each patient, as there are factors that influence the clinical decision, but it is not applicable as standard. It should not be forgotten that extraction will be the treatment of choice in cases of extensive destruction of the molar crown, frequent repeated treatments or when there are serious pulpal problems.

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