

Molar-incisive hypomineralization syndrome and associated factors in three siblings**Síndrome hipomineralización molar-incisivo y factores asociados en tres hermanos**

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Abstract

Introduction: The Incisor-Molar Hypomineralization Syndrome is an enamel dysplasia due to a disorder that affects the maturation of ameloblasts during the secretion, mineralization, maturation, and amelogenic phases, according to the European Academy of Pediatric Dentistry (EAPD). Enamel affected by MIH is characterized by a reduction in the quantity and quality of minerals (reduced Ca and P content) and a reduced hardness and modulus of elasticity (including the transition zone). Furthermore, MIH affected enamel shows increased porosity, increased carbon and carbonate concentrations, and higher protein content than healthy enamel. Enamel crystals affected by MIH are less dense than healthy enamel crystals, with thicker prismatic sheaths and higher inter- and intra-prismatic concentrations of organic particles. Bekes K. (2020). **Case presentation:** A 5-year-old female patient came to the clinic due to a contusion on the upper lip with rupture of the maxillary frenulum, when practicing swimming, the periapical X-ray did not find no significant findings, resin was performed compound, in tooth No. 36, two years later the mother reported an opalescence in tooth No. 32, when it erupted, it manifested pain due to changes in temperature (cold), Duraphat was indicated every 3 days, a year after a grade fracture 2 (Andreasen) in the upper right incisor, it was restored with glass ionomer and a liner (Dycal), the following year the lingual face of the lower left first molar was fractured, it was restored with glass ionomer and a bioactive material (vitrebond), instructing on hygienic measures, at 6 months he was seen for an atypical fracture in the distal face of No. 36. **Conclusion:** Carrying out a timely diagnosis of MIH will avoid pulp damage or tooth loss.

Resumen

Introducción: El Síndrome de Hipomineralización Incisivo-Molar es una displasia del esmalte debido a un desorden que afecta a la maduración de ameloblastos durante las fases de secreción, mineralización, maduración, amelogénica, según la Academia Europea de Odontología pediátrica (EAPD). El esmalte afectado por MIH se caracteriza por una reducción en la cantidad y calidad de minerales (contenido reducido de Ca y P) y una dureza y módulo de elasticidad reducidos (incluida la zona de transición). Además, el esmalte afectado por MIH muestra un aumento de la porosidad, un aumento de las concentraciones de carbono y carbonato y un mayor contenido de proteínas que el esmalte sano. Los cristales de esmalte afectados por MIH son menos densos que los de esmalte sano, con vainas prismáticas más gruesas y concentraciones inter e intraprisimáticas más elevadas de partículas orgánicas. Bekes K. (2020). **Presentación del caso:** Paciente de sexo femenino de 5 años de edad, acudió a consulta debido a una contusión en el labio superior con ruptura del frenillo maxilar, al practicar natación, en la radiografía periapical no se encontraron sin hallazgos significativos, se le realizó resina compuesta, en el diente No. 36, dos años después la madre refiere una opalescencia en el diente No. 32, al erupcionar manifestó dolor a cambios de temperatura (frio), se indicó el Duraphat cada 3 días, al año acudió por fractura grado 2 (Andreasen) en el incisivo superior derecho, se restauró con ionómero de vidrio y un liner (Dycal), al siguiente año se fracturó la cara lingual del primer molar inferior izquierdo, se restauró con ionómero de vidrio y un material bioactivo (vitrebond), instruyendo sobre medidas higiénicas, a los 6 meses se acudió por una fractura atípica en cara distal del No 36. **Conclusión:** Realizar un diagnóstico oportuno de MIH, evitará un daño pulpar o pérdida del diente.

Hypomineralization, associated factors 3 siblings**Hipomineralización, factores asociados 3 hermanos.**

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Introduction

Incisor-Molar Hypomineralization Syndrome is an enamel dysplasia caused by a disorder that affects the maturation of ameloblasts during the early phase of amelogenic maturation, causing a qualitative enamel defect according to the European Academy of Pediatric Dentistry. (EAPD).

It affects the first permanent molars (one, two, three or four) with demineralization defects of the enamel and opacities in the incisors to different degrees. It is characterized by the alteration of the circumscribed, qualitative and quantitative calcification that is not necessarily symmetric. Without altering the primary dentition, the mineral concentration of the enamel of the affected teeth decreases from the amelodontal limit towards the subsurface zone of the enamel, the opposite situation to that found in normal enamel.

In 2000, Weerheij et al, proposed the name "Incisor-Molar Hypomineralization" to characterize the clinical pictures in which the mineralization of the first permanent and / or incisor molars is affected, with the appearance of white-opaque-yellow-brown spots. that sometimes leads to the progressive disintegration of enamel, differentiating them from other types of calcification disorders, such as hypoplasia and fluorosis and in an attempt to unify a varied terminology "Idiopathic Enamel Hypomineralization", "Hypomineralization of the first permanent molars", Cheese "Idiopathic opacities" Non-Fluorositic Hypomineralization", appeared in the literature accompanying the same picture. Boxwood, (2011).

Medical and / or economic importance

It is an entity of unknown origin and in families their work and leisure schedules are disrupted due to pain, destruction, impairment of function and aesthetics (quality of life, psychosocial, emotional, aesthetic). They are anxious patients with fear of dental treatment for permanent and temporary teeth. It is important to differentiate types of treatments and which are the best preventive and treatment strategies for each type of tooth with hypomineralization. Children are puzzled because they adequately perform their oral hygiene and do not consume sweets, they do not understand the reason for this pathological entity that occurs in their mouth.

They refuse to chew and brush their teeth due to the great sensitivity that occurs and therefore increases the presence of dental caries in these teeth affected by MIH.

Background

The first documented case of hypomineralization dates from the year 1970, it was not until 2003 that it was accepted as a pathological entity at the Meeting of the European Academy of Pediatric Dentistry in Athens. Also in 1987, the origins of this syndrome as configured at this time, when Koch et al, published the results of a study on the prevalence of hypomineralization defects in permanent teeth, the first allusion to a specific alteration of mineralization in an acute and idiopathic form that affected the quality of the calcification of the first permanent and incisor molars. They did not use the index of developmental defects of the enamel (DDE) previously usual in this type of study and described the defects in terms of color and surface alterations. Cameron, (2018).

This index was established in 1982, to unify the collection of data in epidemiological studies, however it soon became difficult to complete it and successive modifications were presented in 1989 and 1992 to improve its application (MDDE). Alalusua et al, (1996). published a study with data on the prevalence of mineralization defects in permanent first molars, in which they exclude hypoplasia and fluorosis and also present degrees of severity. MIH prevalence is higher in medically compromised children, genetic predisposition is likely.

Etiology and Pathogenesis

The etiology of hypomineralization is multifactorial and involves genetic and environmental factors. Dental development follows a genetic code, but this can be affected by environmental factors, enamel defects are excellent indicators of episodes of stress, adaptation, subsistence and health in childhood. (archaeological studies). Mature enamel is the most mineralized tissue in the body with 95% organic content. Genetic or hereditary factors and also environmental factors. Coelho L. S, (2010).

Prenatal Factors

Episodes of maternal fever, asthma, viral infections in the last month of pregnancy, Prematurity, low birth weight, prolonged labor.

Postnatal Factors

(During the first year of life) high fevers and respiratory problems, otitis, alterations in Calcium-Phosphate metabolism. Exposure to Diagnostics, due to prolonged breastfeeding, environmental pollutants in breast milk, gastrointestinal disturbances, prolonged use of medication, mainly amoxicillin, chickenpox, vitamin D deficiency. Heart problems. Urinary infections. More recently the influence of environmental pollutants or certain antibiotics has been suggested. Srivastava V.K. (2011).

Suggested Treatments

It involves specific clinical problems such as: Sensitivity, from slight to very intense to thermal and mechanical stimuli, even when there is no loss of enamel. Even brushing causes intense pain, and avoiding it leads to an accumulation of bacterial plaque, especially when there is post-eruptive enamel rupture, it favors the appearance of cavities, whose progression is rapid and sometimes masks the defect.

Difficult analgesia occurs due to the presence of pulp inflammation and accumulation of immune cells even in the absence of caries in hypomineralized molars. (Behavioral problems due to not achieving adequate anesthesia, with a simple exploration, when introducing air, water or percussion with the explorer, it is not possible to seal the damaged piece). The rapid progression of caries, local risk factors due to sensitivity, caries occurs, the alteration in mineralization favors its very rapid progression. Srivastava V.K. (2011).

Determining how much tissue to remove is not always easy since the color of the opacity does not reliably indicate the intensity of the damage and often if all the visibly discolored enamel is removed the viability of the restoration is compromised and if required to limit the extension to Sometimes margin placement has to be intuitive. Choose the right material, adhesive materials are preferred because of the atypicality of the resulting cavities.

The working conditions limit the possibility of using adhesive techniques, since they are molars that have not completed their eruption, difficult to access and isolate, even with transiently subgingival margins.

The use of desensitizers, papain gel, is recommended, in case of hypersensitivity, the remineralization of the enamel is indicated through fluorotherapy and the use of toothpastes with CPP-ACP (casein phosphopeptide-amorphous calcium phosphate). In specific cases, rinses with 0.12% chlorhexidine digluconate aqueous solution are indicated for one week. Ionomeric sealants are indicated, which should be replaced by resinous sealants at the end of the eruption. Infiltrating resins (Icon-DMG, Germany) are used in the affected enamel, to improve adhesion and eliminate organic tissue, the use of sodium hypochlorite for 60 seconds at 5.25% is recommended. Use papain gel and follow normal adhesion protocols Srivastava VK (2011).

Presentation of the Case (identity card)

A 4-year-old female patient attends a private office, apparently generally healthy, with a ceo index of 1, oral hygiene index of 1, Class I Anterior Occlusion, Class I Molar, with a history of dental trauma (contusion in upper lip, frenulum rupture), at age 4, when swimming, at oral inspection: anterior diastema low insertion. canine class I right and left. anterior diastema and labial frenulum of low insertion, thick, interferes with aesthetics, causing an upper and lower diastema. When the tooth erupts, no. 41 there was a slight opalescence, with cold pain and chewing with hard food.



Figure 1 - 2 Girl 4 years. Maxillary frenulum frontal view. Upper and lower diasthema



Figure 3-4 Interim restoration with glass ionomer tooth No. 22. Marked mancha: 22, 42 and 43.



Figure 5 Demarcated cervical stain on the buccal side of tooth No. 36



Figure 6 Atypical caries tooth No. 36.

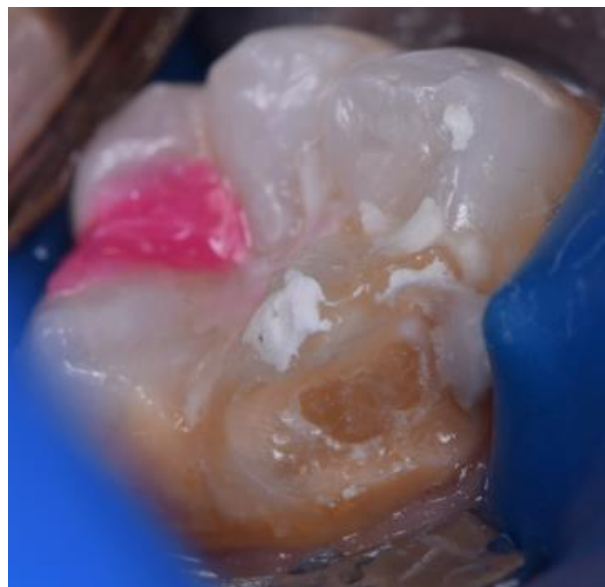


Figure 7 Cavity Preparation

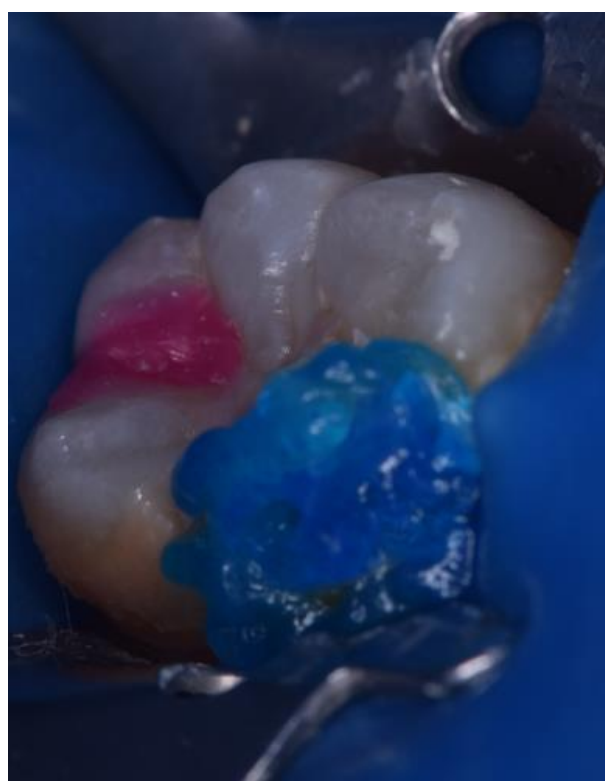


Figure 8 Total acid etching of tooth No. 36 with hypomineralization



Figure 9 Appearance of the cavity after full etching. (White chalk cavity regular edges)



Figure 10 Final Restoration with Molar Composite Resin with Hypomineralization



Figure 11 Panoramic X-ray of the Patient.

Diagnosis

Incisor-Molar hypomineralization following dental organs: upper right lateral incisor, lower right molar No. 36 radiographic diagnosis (orthopantomography). It was classified based on the criteria of Mathu-Muju, year 2006, * A differential diagnosis was made with dental fluorosis, hypoplasia, imperfect amelogenesis, dental caries, nature, color, brightness, shape, limits, structural integrity, location, distribution, family history, amelogenesis phase.

Treatment

The child's cooperation was achieved through effective pain control inferior regional anesthesia, to determine how feasible it would be to place a provisional or permanent restoration to remineralize the enamel, and preserve vitality, taking into account dental age through radiography (proximity of the mineralization fracture), the immaturity of the affected tooth, the occlusal relationships and the collaboration of the parents in the future, among others, were also taken into account. Extraction was ruled out and it was decided to preserve the tooth, it was determined how much tissue should be removed, if the TRAC (Atraumatic Restoration) technique is used before restoring, an ionoseal liner was chosen, and vitrebond, this material is more compatible with the resulting preparation and verified that the necessary working conditions can be achieved (absolute isolation), and a good result was achieved. The sensitivity was previously treated with Durephat. For 4 weeks every 3rd day. From tooth No. 41.

Preventive treatment

Remineralized and desensitized with professional application of fluoride monthly or quarterly depending on the risk and daily use of mouthwashes and products with casein phosphopeptide and amorphous calcium phosphate (Recaldent), which provide calcium and phosphate ions to promote remineralization. However, the usefulness of these procedures in hypomineralized molars must be observed with caution, since it is not a question of replacing a lost mineral but rather a mineral that the molar has never had. Prevention of caries and postuptive ruptures, establishing good daily hygiene as soon as possible, reducing the cariogenic and acidogenic potential of the diet and sealing fissures and retentive areas as soon as possible as long as it can be done effectively.

In order to reduce sensitivity, a soft brush and desensitizing toothpastes were recommended, while a remineralization program was established to achieve correct plaque removal on a daily basis as soon as possible. Occasionally, retentive areas, grooves and some small enamel breaks were covered with a glass ionomer until the molar can be isolated and another protection or restoration procedure can be undertaken with better moisture control conditions.

Discussion

The number of studies on the prevalence of MIH and associated factors has increased in the last ten years. Not all studies use the same criteria or interpret the criteria in the same way. In this case, the age at which this syndrome was detected was 8 years old according to the EAPD, the most conducive age to diagnose this syndrome is between 8 to 10 years, when the first molars and incisors were already erupted and possibly not are still severely affected by caries, previously it was believed that it was only a dysplasia in permanent dentition, but recent studies show that there is a positive correlation of hypomineralization in the second primary molar it is very likely that in permanent dentition it is present, allowing a correct diagnosis of the condition. McDonald and A. (2018).

In this case, the literature consulted is consistent with the association of MIH with the need for treatment and the average number of teeth with experience of caries, decayed teeth, and missing teeth ($P < 0.05$), individuals with MIH have 2.1 to 4.6 more experience caries in permanent dentition than these without MIH. In this case it was compared with the caries experience of his two brothers with 0-1 DMFT.

According to studies, although the majority of affected teeth present a medium degree of MIH, these with moderate and severe degrees have a more complex treatment due to the development of the pulp. Because the enamel exposure is porous with a large interprismatic space which allows the penetration of bacteria into dentin, resulting in chronic inflammation of the pulp and difficulty in obtaining adequate local anesthesia. Thus children may be more anxious about treatment, which will require better behavioral management techniques. The treatment modality available for MIH is broad, including prevention for MIH, restoration and extraction. The decision of which treatment to use is complex and depends above all on the severe factors and severity of the condition, the age of the patient and the social expectations of the family. Bezerra da Silva. (2018).

MIH teeth cause pain to the patient and affect individual life on a daily basis. Which coincides with this reported case.

According to the etiological factors explored in this study, the number of variables analyzed in the prenatal period, fever during pregnancy had a significant association with MIH. These data coincide with the literature. This study shows that fever has a negative effect on amelogenesis.

In this case, other possible factors were presented, such as the period when the birth occurs (According to, before or after the probable date of delivery), cesarean delivery, prolonged labor.

None of these variables was however associated with MIH. The variables analyzed during the postnatal years of life were diarrhea / dehydration, chickenpox, bronchitis, sinusitis, rhinitis, high fever, malnutrition, and use of antibiotics. They were not associated with MIH. Which agrees with the reported studies. Vinay Kumar Srivastava (2011).

Prematurity is also reported as a predisposing factor because children are more susceptible to some alteration during amelogenesis. Nutritional conditions, such as low vitamin D levels, are reported as another factor, as this participates in the amelogenesis process. In this case, it is believed that it is related to these nutritional conditions.

The clinical history was investigated for environmental factors that the mother recalled perinatal factors such as birth, delivery route, gestational age, early detection of the disease at the time of tooth organ No. 32 eruption, contributed to avoiding its progression, decreasing tooth sensitivity and the risk of cavities. The two siblings of the patient presented mild to moderate incisor-molar hypomineralization.

Conclusions

- Take a comprehensive medical history about prenatal history, such as nutrition, anemia, medications, stress, smoking, alcohol, and perinatals such as preterm birth, low birth weight, complications at birth (hypoxia, cesarean), and postnatal: nutrition, breastfeeding prolonged asthma, respiratory infections, childhood illnesses, otitis media, hyperpyrexia, antibiotics, environmental pollutants. In order to relate some risk factor for inciso-molar hypomineralization.

- Rule out if there are any other relatives (siblings-parents) with the presence of HMI. In this case, if two brothers had mild to moderate hypomineralization, the sister only in one tooth No. 26 and the brother demarcated areas No. 13 and 14 in cusps.
- Use bioactive materials to mineralize affected dental tissues such as enamel and dentin. In order to avoid the loss of the dental organ with all the future implications that the loss of a permanent molar may entail.

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