

Esthetic rehabilitation of posterior teeth with molar-incisor hypomineralization: a case report

Rehabilitacja estetyczna zębów bocznych z hipomineralizacją zębów trzonowo-siecznych: opis przypadku

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Summary

Molar-incisor hypomineralization is a qualitative deviation that compromises the enamel hardness, and thus predisposes the affected tooth to mechanical breakdown that may endamage the pulp and the longevity of the impacted teeth. Besides the functional and aesthetic problems brought on by the structural involvement of the enamel, there are also behavioural and psychological consequences for patients. Since their childhood, the patients' behaviour should be closely monitored to effectively manage the situation before it worsens.

Various potential approaches to treat MIH-

Streszczenie

Hipomineralizacja trzonowców i siekaczy jest jakościową zmianą, która upośledza twardość szkliwa, a tym samym predysponuje zmieniony chorobowo ząb do mechanicznego uszkodzenia, które może uszkadzać miążgę i skracać przeżywalność zatrzymanych zębów. Oprócz problemów funkcjonalnych i estetycznych spowodowanych przez strukturalną zmianę szkliwa, istnieją również behawioralne i psychologiczne konsekwencje dla pacjentów. Od dzieciństwa należy zwrócić szczególną uwagę na zachowanie pacjentów, aby skutecznie monitorować nieprawidłowości przed ich pogorszeniem.

affected teeth exist, few are yet supported by good-quality clinical research data. It has become increasingly apparent that the conservation of tooth structure is a significant factor in determining the long-term prognosis of any restorative procedure. Thanks to the progress in bonding techniques, porcelain aesthetics, and mechanical properties, different alternatives are now possible in order to treat affected teeth while being the least invasive. The present clinical case report shows an aesthetic rehabilitation of posterior teeth with molar-incisor hypomineralization using an overlay and a veneerlay.

Istnieją różne potencjalne podejścia do leczenia zębów dotkniętych MIH, ale jeszcze niewiele z nich jest popartych dobrą jakością danymi z badań klinicznych. Jest coraz bardziej oczywiste, że zachowanie struktury zęba jest istotnym czynnikiem determinującym długoterminowe rokowanie każdego zabiegu odbudowy. Dzięki postępowi w technikach łączenia, estetyce porcelany i właściwościach mechanicznych dostępne są obecnie różne opcje leczenia zmienionych chorobowo zębów przy jak najmniejszej inwazyjności. W niniejszym opisie przypadku klinicznego przedstawiono estetyczną odbudowę zębów bocznych z hipomineralizacją zębów trzonowo-siecznych z zastosowaniem nakładu i licówki.

Introduction

Molar-incisor hypomineralization (MIH) is a qualitative abnormality that can affect the enamel of both deciduous and permanent teeth. It is mostly found on the four permanent first molars and is frequently associated with permanent incisors.¹

Although the aetiology of this anomaly is still obscure and unknown, it is often attributed to systemic disorders and environmental disturbances during prenatal, perinatal and postnatal periods.^{2,3}

The ideal age for a proper diagnosis is approximately at the age of eight years, when all four first molars and some incisors are present.⁴ Patients with MIH usually suffer from dental sensitivity which adversely affects their life quality.⁵ Extra attention must be paid to the patients' behaviour since their childhood to effectively manage the situation before it becomes worse.

MIH severity ranges from mild when there are limited opacities without any enamel fracture and occasional sensitivity to external stimuli, to severe when there are demarcated spots with caries and spontaneous or persistent

hypersensitivity. It usually compromises the enamel hardness and, as a result, predisposes the affected tooth enamel to mechanical breakdown that may endamage the pulp and impact the longevity of the affected teeth.⁶

On permanent incisors, the defective enamel usually seems less severely disrupted and less prone to breakdown. Incisal enamel defects are, however, frequently quite widespread and most common on the buccal surfaces of the teeth, inducing aesthetic concerns.

Besides the functional and aesthetic problems brought on by the structural involvement of the enamel, there are also behavioural and psychological consequences for patients, such as loss of self-esteem which leads to self-consciousness or withdrawal.⁷ This is mainly due to the importance of aesthetics for one's personal behaviour and for the society, which influences people's lives.⁸

Case presentation

A 45-year-old female patient presented to the department of fixed prosthodontics with a chief complaint of poor aesthetics due to black holes-between her incisors and hypersensitivity



Fig. 1. Buccal view of the initial situation.



Fig. 2. Occlusal view of the maxillary teeth.

affecting her molars. On the clinical examination, the patient demonstrated good hygiene although aesthetically she was affected by anterior black holes, an open-bite and a reversed incisal curve. Brownish stains and a severe substance loss exposing the dentine were detected on the occlusal and buccal surfaces of her upper right first molar and dentine exposure limited to the occlusal surface was observed on the upper left molar. (Fig. 1, 2)

A diagnosis of MIH was made. The upper left molar was prepared to receive an overlay, and so the preparation was only limited to the occlusal surface. However, on the upper

right molar, the preparation concerned both the buccal and occlusal surface in order to receive a veneerlay. All areas of dentine exposure were ground with a coarse diamond rotary instrument at low speed. An average occlusal reduction of 0.4 to 0.6 mm (central groove) to 1.0 to 1.3 mm (cusp tips) was obtained for the occlusal veneers. The facial surface was prepared with a light chamfer just at the gingival margin. An overall reduction of 0.8 was performed.

The prepared teeth were then scanned and sent to the laboratory technician. The restorations were designed using the design tools of the software (3shape) (Fig. 3, 4).

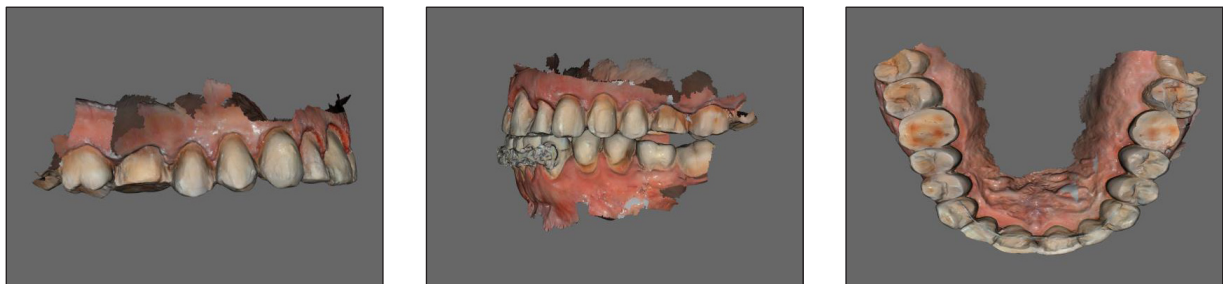


Fig 3. Optic impression.

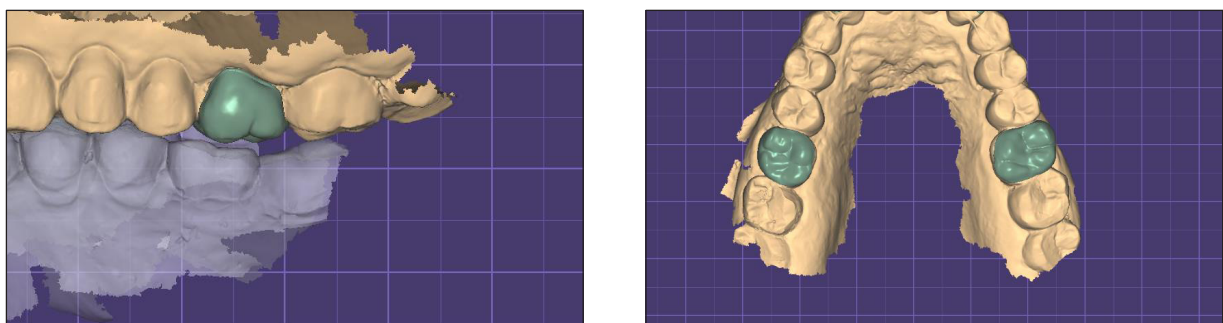


Fig. 4. Computer-aided design.



Fig. 5. Manufactured overlay and veneerlay.



Fig. 6. Luted overlay and veneerlay.

material was removed. Light curing was then done in accordance with the resin luting manufacturer's recommendations. The occlusion was checked and the patient was informed to maintain adequate oral hygiene (Fig. 6).

Upon checkup a year later, the restorations were intact and firm. The patient was satisfied with the function and aesthetics.



Once the treatment concept was confirmed, they were manufactured using the CAD/CAM technology (IPS E-max) (Fig. 5).

The restorations were evaluated for marginal fit and general occlusal contact. They were then rinsed and prepared for luting.

The porcelain surfaces were etched with hydrofluoric acid. Silane coupling agent was then applied for 60 seconds.

When it comes to conditioning teeth surfaces, the preparations were first cleaned using chlorhexidine. Second, they were etched for 15 s using 37% phosphoric acid, rinsed off and then coated with a thin layer of bonding agent and polymerized for 15 seconds.

Finally, resin luting agent was applied to the restorations and preparations. The restorations were seated and excess luting

Discussion

Affixing minerals in sound teeth increases from the cemento-enamel junction (CEJ) to the cusp/incisal tip, while in MIH teeth, mineral density lessens from the CEJ to the occlusal surface. The degree of discoloration is a reflection of the severity of the mineral deficit, and it has been suggested that the higher the protein content, the higher the risk for Post Eruptive Breakdown.⁵

Diagnosing MIH can be difficult, and clinicians tend to confuse MIH with other enamel developmental defects such as fluorosis or amelogenesis imperfecta. There are hundreds of environmental and genetic conditions that are known to affect enamel formation, and so making a definitive diagnosis can be challenging. The diagnosis of MIH can

be further complicated if the tooth begins to decay while erupting, thereby destroying the affected crown structure.⁸

It is, however, important to accurately identify MIH so that different treatment approaches can be implemented accordingly to achieve optimal outcomes.

Clinical evaluation of the presence of MIH ideally involves examining the four permanent first molars and the eight permanent incisors.⁸

They are examined to check the presence of demarcated changes in enamel colour or even enamel loss that most often occurs in the affected molars.

A severity scale has been developed to classify MIH as mild, moderate, or severe at the tooth level. To put it more clearly, one tooth may be mildly affected, and another severely in the same patient. Enamel colour variations originate from the enamel composition and structure changes. Yellow-brown enamel manifested less minerals compared to white opacities and it is more likely to succumb to enamel loss. These yellow-brown areas tend to lack the shiny aspect of normal enamel and have a rather ground glass and slightly rough appearance indicating a decreased mineral content.⁸

Restoration of MIH molars is considered to be a significant challenge due to the poor mechanical and physical properties of the affected enamel. Different treatment modalities are primarily intended to restore dental anatomy, function, occlusion, and aesthetics.⁷

Currently, all procedures are shifting towards being the least invasive possible. Treatment options involve microabrasion, bleaching with carbamide peroxide, and in severe cases composite or porcelain restorations are used to improve the aesthetics of MIH-affected teeth.^{3,9}

Different parameters such as structure, chemical and mechanical properties of enamel and dentine as well as the extent of the lesion in MIH-affected teeth, need to be taken into

consideration while deciding which restorative technique shall be used.

In fact, bioceramics properties of biocompatibility and their ability to integrate with periodontal tissues made them a better option than composite for partial restoration in posterior teeth where access to hygiene is difficult.¹⁰

According to the study of *Ghazal M et al.*, composite resin teeth showed more wear than ceramic teeth. Thus, choosing ceramic for posterior teeth with important occlusal forces is highly recommended.¹¹

Furthermore, ceramic has better optical properties and unlike resin restoration, it is not prone to discoloration, which provides better colour stability and aesthetic satisfaction.¹²

In severe cases, resin composite restorations are proven to be inefficient, and so porcelain restorations are indicated in such cases.³ High success rates were reported when indirect laboratory-made restorations were used. They are considered a better long-term option.¹³

It is known that hypomineralized enamel has higher levels of porosity and a drop in hardness and elasticity modulus when compared to healthy enamel.¹⁴⁻¹⁶ Thus, if we are using a less invasive approach and leaving some MIH-affected enamel, adhesion risks to be poorer, with reduced bond strengths.^{3,16} However, recent developments in bonding techniques, such as the suggestion of rinsing MIH-affected enamel with sodium hypochlorite after etching and before placing a composite resin restoration, are likely to help increase bond strengths for these teeth.^{3,15,17,18}

In the present case, IPS e.max Press was chosen for the overlay and veneerlay fabrication. This material consists of lithium disilicate with a high crystalline content in a glass matrix that was introduced in 2005 to replace the IPS empress II.¹⁹ It was selected because of its optical properties, such as multiple translucencies and opacities that allow

the laboratory technician to easily mimic the properties of the natural teeth. Furthermore, this ceramic type presents slower crack propagation, a high flexural strength of up to 360-400 MPa, and better fracture resistance.²⁰

This combination of mechanical and aesthetic characteristics delivers the results that both the patient and clinician are striving for.

Conclusion

MIH is still considered to be a challenge for most practitioners. Whilst many potential approaches to treat MIH-affected teeth exist, few are yet supported by good quality clinical research data. It has become increasingly apparent that the conservation of tooth structure is a major factor in determining the long-term prognosis of any restorative procedure. When they are cautiously used, porcelain veneers offer a predictable and successful treatment modality that preserves a maximum volume of sound tooth structure along with excellent aesthetics due to the lifelike appearance of porcelain and the scattering effect of the luting cement.

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