Teeth affected by molar incisor hypomineralization (MIH) present micromorphologic changes and hypersensitivity, which increase the risk of developing caries lesions and affect bonding procedures. Considering that practitioners still misdiagnose teeth affected by MIH, there is an urge for more knowledge about this topic in order to propose a more adequate and conservative treatment. The purpose of this study was to report the clinical challenges regarding the restorative management of a patient with MIH. A 13-year-old girl sought dental treatment, complaining about hypersensitivity in posterior teeth. Under clinical exams, notable enamel alterations mainly affecting posterior teeth (including molars) presented particular characteristics frequently attributed to MIH, and visible stains on maxillary central incisors were present. Because the mineral and organic content of MIH-affected enamel differ from sound enamel, it may imply special care for bonding of a restorative material. Thus, in order to promote a minimally invasive approach, selective removal of carious tissue and restoration with microhybrid composite resin was conducted after application of a universal bonding system used as self-etching strategy. After a 2-year follow-up, the restorations presented good clinical performance and the patient had limited hypersensitivity discomfort, suggesting a promising performance.
This chemical bond has been reported to be effective despite the micromechanical retention, particularly in heterogeneous substrates such as dentin. However, despite bonding to sound enamel being considered safe and effective over time, clinical studies addressing the safety and effectiveness of bonding procedures on MIH-affected enamel are lacking, especially considering that these teeth present an altered surface, which could impair the bonding interaction.

Therefore, the present article describes a case in which a premolar and two permanent molars affected by MIH were treated using the self-etching mode of a universal bonding system with a 2-year follow-up, and some benefits of its use are discussed.

Case Report

A 13-year-old girl sought the dental clinics of the University of São Paulo, complaining about hypersensitivity in the mandibular right permanent second molar (Fig 1a), maxillary left second molar (Fig 1b), and maxillary right second premolar (Fig 1c). Also, mild white stains without any signs of structural compromise were noticed on the buccal surface of the maxillary central incisors (Fig 2). During the anamnesis, the parents reported that the patient had suffered from several upper respiratory tract infections and intense use of amoxicillin during the first 3 years of life.

Clinically, no erosive factors or parafunctional habits were observed. The patient had good oral hygiene habits, but radiographic examinations (Fig 3) attested caries lesions, which were also clinically observed on the occlusal surface of the maxillary right second premolar and left second molar. Therefore, as enamel breakdown and particular hypersensitivity upon air blast were also associated with the affected teeth, MIH was diagnosed.

Restorative Treatment

The treatment plan included preventive measures, selective removal
of carious tissue, and restoration of teeth affected by MIH. Diagnostic wax-ups (Fig 4) were performed in order to obtain acetate trays, which helped guide the restoration sculptures (Fig 5). Because the stains on the anterior teeth were not inconvenient for the patient, they were not included in the treatment plan.

After receiving consent from the patient and her parents, a tooth shade (A2) was selected, and restorations were performed using the self-etching mode of a universal bonding system (Adper Single Bond Universal, 3M ESPE), without selective etching on enamel. This strategy was selected because the MIH enamel is poorly composed by minerals. The restorative procedure was conducted with a microhybrid dental composite (Filtek Z250 XT, 3M ESPE).

For treatment of the maxillary right second premolar, carious tissue was selectively removed until leather-consistent
dentin was achieved, as described by Schwendicke et al.\textsuperscript{15} and Innes et al.\textsuperscript{16} After cleaning, due to the presence of sclerotic dentin and the depth of the cavity, a resin-modified glass-ionomer cement (Vitrebond, 3M ESPE) lining was placed. However, no liner was necessary on the maxillary and mandibular second molars because the cavity was still relatively shallow after selective carious tissue removal. It is worth mentioning that MIH-affected enamel was preserved because it was not softened by the caries lesion, so the restoration was placed on altered enamel.

The bonding agent was applied using a microbrush following the manufacturer’s instructions, then light cured for 10 seconds (DBD 686 and D700, Dabi Atlante).

Each restoration was conducted on one tooth at a time, under rubber dam isolation (Fig 6). A microhybrid dental composite (Filtek Z250 XT, shade A2, 3M ESPE) was used. During the restorative procedures, the composite resin increment (up to 2 mm) was applied inside the acetate tray, which was placed on top of the tooth. Then, the tray was carefully removed, the sculpture was adjusted, and the composite resin was polymerized with a light-curing unit for 40 seconds.

Excess restorative material was removed with a flame-shaped carbide finishing bur (KG Sorensen). Polishing procedures were performed using Jiffy Polisher Cups (Ultradent Products) followed by Diamond Flex felt discs (FGM) with Diamond Excel polishing paste (FGM). The postoperative aspects of the final restorations are shown in Fig 7. Due to the use of an acetate tray, and in spite of the presented benefits, the sculpture of the resin is

**Fig 5** Acetate trays favored the restoration sculptures and reduced the clinical time for the patient.

**Fig 6** Each restoration was conducted on one tooth at a time and under rubber dam isolation. (a) The glass-ionomer cement was removed from the mandibular right second molar before the resin composite restoration was placed. (b) The demineralized dentin was removed from the maxillary left second molar until leather-consistent dentin was reached. (c) Caries-affected tissue was also removed from the maxillary right second premolar before the resin composite was placed.
not as refined as it could have been if it was done manually with conventionally employed instruments, even after finishing and polishing. After 2 years, the restorations were adequate both clinically (Fig 8) and radiographically (Fig 9), and the patient reported no sensitivity upon air blast. The absence of hypersensitivity led to an improvement of the patient’s oral conditions once brushing stopped being painful. Also, the patient reported a change in her eating habits because the treatment allowed her to intake hot and cold drinks and food, improving her quality of life.

**Discussion**

When elevated levels of organic content are present in MIH-affected enamel, this enamel is clinically perceived as stained, porous, and weak, and it may break down upon exposure to chewing forces. This abnormal porosity often leads to hypersensitivity, which can affect tooth-brushing because it is often painful. Also, dentists must be aware that because the pulp receives external stimuli more easily, it is often in an inflammatory state, jeopardizing the anesthesia effect. This hypersensitivity, associated with the
enamel’s abnormal porosity, makes these teeth more prone to caries lesions.\(^1,^{10}\) In the present case, this statement is corroborated by the fact that caries lesions were only seen in teeth affected by MIH.

Alterations in the prismatic morphology of the MIH-affected enamel may hinder bonding procedures.\(^17\) For this reason, it is common for patients and clinicians to report loss of fillings. Jälevik and Klingberg\(^17\) presented survey results highlighting that children with MIH experienced dental treatment in permanent molars \(10 \times\) more often than children with normal teeth. As published by Fragelli et al,\(^18\) glass-ionomer–based materials correspond to an effective choice to restore MIH-affected teeth, with a survival rate of 78.7% after 12 months. Nevertheless, it is relevant to mention that regular glass-ionomer cements may not be the restorative material of choice in posterior teeth. Cements containing a highly reactive glass within the fillers of the material have been reported to have a good performance in stress-bearing areas,\(^19\) but despite having better cohesive strength, it is still lower than that of resin composites. Additionally, de Souza et al\(^20\) evidenced a similar survival rate for resin-based restorations after 12 months when a self-etch adhesive system was applied (73.7%), while the survival rate of restorations placed after a total-etch adhesive system was lower (59.1%).

MIH-affected enamel also presents abnormal etching patterns,\(^21,^{22}\) seemingly caused by the presence of the organic content. Thus, in an attempt to allow better infiltration of the bonding agent, some authors have conducted a deproteinization step using 5% NaOCl (sodium hypochlorite).\(^21,^{22}\) However, this would add another clinical step for the practitioner and could induce some level of hypersensitivity.\(^22\) Thus, it was not conducted in the present case report.

As was already investigated regarding eroded enamel and undermineralized enamel, the use of systems containing acidic functional monomers, especially 10-MDP (methacryloyloxy-decamethylene phosphoric acid), seems to be reasonable.\(^23–26\) Also, Krämer et al\(^27\) demonstrated that selective enamel etching could lead to a more porous structure, weakening the resin-enamel bond. Therefore, considering that the chemical bond occurs with hydroxyapatite crystals\(^14\) and that MIH-affected enamel is already undermineralized, acid etching was avoided, and the self-etching strategy was selected.

After 2 years, the patient reported no hypersensitivity, and an improvement in the patient’s hygiene habits was noted, preserving their oral health. Taking that into account, this approach seems to be efficient at managing MIH-affected enamel. However, long-term clinical investigations with robust evidence are needed to support the management of MIH-affected enamel, as no consensus is available yet.\(^28\)

**Conclusions**

Because MIH results in alterations on the mineral and organic content of enamel, it is important for the clinicians to know such alterations in order to promote effective and long-lasting bonding procedures. In such cases, the universal/multi-mode bonding system used in a self-etching mode may be a useful resource to functionally manage MIH and preserve dental structure. Also, this approach seems effective at reducing dental hypersensitivity, which is most often the main complaint of patients with MIH.

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**References**