Orthodontic Bands for Preventing Post-Eruptive Breakdown in Molars Affected by Molar Incisor Hypomineralisation

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Abstract

Background First Permanent Molars affected by Molar Incisor Hypomineralisation (MIH-FPMs) are susceptible to post-eruptive breakdown (PEB) and caries.

Aim Evaluating the effectiveness of orthodontic bands luted with glass-ionomer cement (GIC) in preventing dental caries and PEB in extensively yellow-brown defective MIH-FPMs.

Study Design Records of 11 children, with 22 MIH-FPMs treated using GIC bands, and 22 controls with 22 MIH-FPMs treated through mineralisation protocols, were examined by two calibrated evaluators. Included FPMs were devoid of caries, breakdown to dentin (DB), and prior restorations. Kaplan-Meier analysis established survival probabilities at 18 months. The primary outcome was the absence of a restoration requirement due to caries or DB. Secondary outcomes encompassed PEB prevention and plaque index reduction.

Results At 18 months, study and control survival rates were 98% and 73%, respectively. The difference was significant ($p<0.001$; Log Rank test). The control group had a higher enamel breakdown frequency. The study group showed a reduced plaque index ($p= 0.010$; Friedman test). Two (9%) orthodontic bands lost retention, and the mean number of GIC reapplications per teeth was 1.9 ± 1.0.

Conclusions Orthodontic bands with GIC and stringent preventive measures can effectively maintain MIH-FPMs for at least 18 months, allowing the postponement of more comprehensive restorative approaches.

KEYWORDS MIH, post-eruptive breakdown, orthodontic bands, glass-ionomer cement, preventive dentistry.

Introduction

Molar Incisor Hypomineralisation (MIH) was first described in 2001 as a hypomineralisation of systemic origin, presenting as demarcated, qualitative defects of the enamel of one to four first permanent molars (FPMs) frequently associated with affected incisors [Weerheijm et al., 2001]. The exact aetiology of MIH has not yet been defined, but several hypotheses have emerged over time, including pre- or peri-natal medical problems, childhood illnesses, and environmental and genetic/epigenetic influences, suggesting a multifactorial aetiology [Bagattoni et al., 2022; Giuca et al., 2020]. A recent systematic review and meta-analysis [Garot et al., 2022] showed that peri- and post-natal aetiological factors appear to be more implicated than prenatal factors in the development of MIH. Perinatal factors such as hypoxia, cesarean section, and prematurity, along with postnatal factors including measles, urinary tract infections, bronchitis, otitis media, gastric disorders, kidney diseases, pneumonia, and asthma, were significantly associated with the aetiology of MIH. Fever and antibiotic use, which may be considered consequences of infant and childhood illnesses, were also associated with MIH [Garot et al., 2022]. Since it is not possible to prevent MIH, the efforts of clinicians are focused on reducing the functional, psychological, and social discomforts resulting from this condition. MIH can affect the tooth with different severity patterns, ranging from more or less demarcated asymmetric white-creamy opacities to yellow-brown defects with or without hypersensitivity [Weerheijm, 2003; Mastroberardino et al., 2012]. Teeth with yellow/brown opacities are more prone to dental caries and they are also more susceptible to early post-eruptive enamel breakdown. Neves et al. [2019] conducted a 12-month longitudinal study on the progression of PEB in MIH-related opacities. The study found that 16.3% of white-creamy and 41.8% of yellow-brown opacities progressed to breakdown. Among the opacities, 14% of white-creamy, 27.5% of yellow-brown, and 46.9% of those with existing enamel breakdown (EB) at baseline worsened to dentin breakdown (DB) or required restoration/extraction. FPMs with extensive defects often exhibit hypersensitivity, making oral hygiene maintenance difficult and heightening the risk of caries [Villani et al., 2023]. The porous structure, low mineral content, and loosely packed crystallites of hypomineralised enamel result in diminished strength and hardness, particularly under masticatory forces [Neves et al., 2019]. The treatment approach to severely compromised carious and fractured MIH-FPMs is challenging for clinicians, particularly due to the poor cooperation of the patient suffering from high hypersensitivity, to the refractoriness to anaesthesia, for which a preemptive analgesia with ibuprofen was proposed [Vicioni-Marques et al., 2022], and to the difficulties in achieving proper isolation during the early stage of tooth eruption, thus limiting the adhesive possibilities of restorative materials [Beretta et al., 2020; Elhussein and Jamal, 2020]. Consequently, a clinical effort to prevent dental caries and PEB from the early eruption stages becomes crucial to maintaining teeth in the oral cavity in the short-medium term, delaying complex definitive restorations or scheduled extractions until late mixed or permanent dentition. Despite the great interest that has been paid to the treatment of MIH-FPMs over time, little is known about the operative possibilities to preserve the defective tooth structure with extensive compromises at the early stage of eruption. Previous

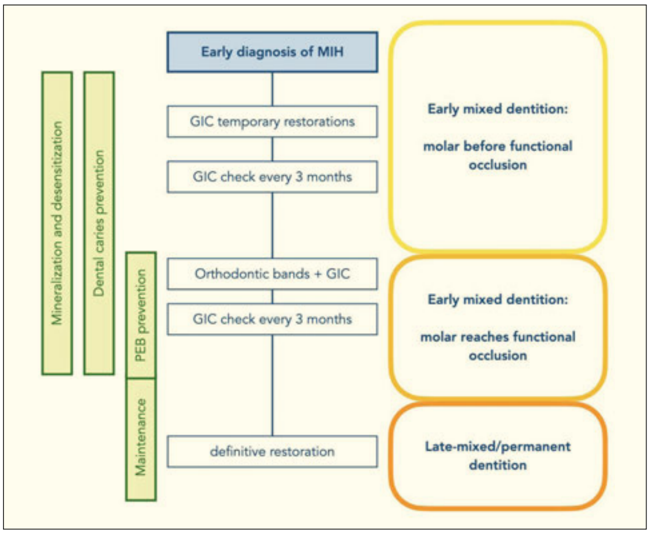

FIG. 1 Flowchart of clinical procedures performed in the study

literature has mentioned utilising orthodontic bands luted with glass ionomer cement (GIC) to retain teeth in the oral cavity, delaying definitive rehabilitations [Fayle 2003; Bekes et al., 2016; Steffen, 2011; Bekes, 2020]. The use of orthodontic bands luted with GIC offers a minimally invasive approach to protect these vulnerable teeth. Orthodontic bands provide mechanical reinforcement against masticatory forces, preventing further structural loss and enabling clinicians to delay more complex definitive rehabilitations, such as posterior indirect adhesive restorations, until patients are older and more cooperative. Additionally, the fluoride-releasing properties of GIC may contribute to enamel mineralisation, decreasing tooth sensitivity. This rationale builds on findings from a recent case report, which demonstrated the feasibility and clinical success of this technique when applied to severely MIH-affected FPMs during early eruption, successfully preventing dental structure loss, caries, and reducing sensitivity over 36 months [Bagattoni et al., 2021]. The flowchart in Figure 1 summarises the rationale behind this technique. This retrospective cohort study aims to assess the effectiveness of orthodontic bands luted with GIC compared to mineralisation protocols by evaluating its success at an 18-month follow-up after orthodontic band placement.

Methods

This retrospective cohort study was carried out at the Unit of Dental Care for Special Needs Patients and Pediatric Dentistry of the University of Bologna, Italy and the Department of Surgical, Medical, Molecular Pathology and Critical Area, Dental and Oral Surgery Clinic, University of Pisa, Italy. The study received approval from the Ethical Committee of Sant'Orsola Malpighi Hospital, Bologna, Italy (PG. N 0019293 20/06/2014). Initiated in April 2022, the study involved analysing dental records of children (ASA status I, II) who had previously undergone preventive treatment with orthodontic bands. Inclusion criteria required MIH-FPMs to exhibit yellow or brown demarcated opacities affecting at least two-thirds of the tooth surface, classified as type 22 III according to Ghanim et al. [2018]. Molars with white opacities were excluded. Eligible molars had to be free from caries, enamel breakdown with dentin exposure (DB), and previous restorations. However, molars with EB characterised by defects without dentin exposure were included (Figure 2). In the control group, MIH-FPMs with the same type and severity of defects but treated solely with mineralisation protocols, were included. Selection of teeth for both groups was based on intraoral photographs obtained from the dental records. Dental records lacking complete information and/or necessary photos were excluded. In cases where multiple teeth were treated in a single patient, all the teeth were included in the analysis. The presence or absence of DB in one tooth did not influence the outcome of another tooth, as these were considered independent events. The patients were treated and underwent follow-up under the care of the same paediatric dentistry specialists. Written informed consent was obtained from all patients or their legal guardians. The inclusion of dental records into the study was determined by two calibrated evaluators.

FIG. 2 Example of molars with extensive yellow-brown defects [Ghanim et al., 2018] (type 22 III) included in both groups.

Sample size

From a statistical perspective, a conservative approach was adopted for sample size estimation. A cumulative survival rate obtained using GIC restoration was utilised, assuming that the survival rate with orthodontic bands could be at least equal. Bullio-Fragelli et al. [2015] assessed GIC restorations on 48 MIH-FPMs in 21 children aged 6–9 years, reporting a cumulative survival rate of 0.787. This rate guided sample size calculation. The research adopted a parallel-group retrospective cohort design, analysing survival rates for orthoband group and mineralisation group over 18 months, with evaluations every six months. Significance level adjusted to 0.05 to correct for multiple analyses. Peacock's formula, using survival rates of 0.787 (orthoband group) and 0.45 (mineralisation group), indicated a need for 21 teeth per group, corresponding to 8 patients (ranging from 5 to 11) each. Allocation ratio 1:2 led to 22 teeth in each group, with 11 patients (study) and 22 patients (control).

Calibration

Two evaluators, each with at least ten years of experience in paediatric dentistry, assessed 29 teeth using the twenty-nine images included in Module V of the Ghanim training manual [Ghanim et al., 2017]. The training manual assists researchers in planning epidemiological studies of MIH and HSPM and provides a guide for calibrating operators. The objective was to gauge both intra- and inter-operator reliability. All photographs were independently examined on separate occasions, under similar conditions. The assessment was repeated three times, with one-week intervals between each test. The sequence of standard scores was randomly altered during the second evaluation by each rater. To evaluate the overall agreement, reliability analysis was performed using Fleiss' multirater Kappa, and Crombach's α was also utilised.

Clinical procedure in the study group

The clinical procedure was conducted following the management approach proposed by Williams et al. [2006] and described in the previously published case report. MIH-affected FPMs were identified based on established diagnostic criteria

FIG. 3 MIH-FPMs treated in the study group

	Orthoband group	Mineralization group	p-value
Gender			
M: n (%)	4 (36%)	12 (55)	0.465†
F: n (%)	7 (64%)	10 (45)	
age: yr. (±sd)	7.2 (± 1.1)	6.6 (± 1.3)	0.243‡
dmft	1.0 (± 1.8)	0.9 (± 1.5)	0.962‡
DMFT	0.3 (± 0.6)	0.7 (± 0.7)	0.076‡
IP	1.7 (± 1.0)	1.2 (± 0.4)	0.029‡*
EB: n (%)	5 (22)	7 (31)	0.736†

*†Fisher; ††Fisher exact test; ‡U-Mann Whitney; *Statistically significant; M:Male; F: Female; dmft: decayed, missing and filled teeth (primary teeth); DMFT: Decayed, Missing and Filled teeth (permanent teeth).*

TABLE 1 Descriptive characteristics of the study (Orthoband) and the control (Mineralisation) group.

[Weerheijm et al., 2001]. The treatment protocol involved two main stages:

1. Initial Management

Immediately after diagnosis, the affected molars were treated with a low-viscosity GIC (Fuji Triage, GC, Tokyo, Japan) as a temporary sealant to protect the enamel from further breakdown and reduce hypersensitivity. The GIC was applied to cover the entire occlusal surface, and a protective coating agent (Fuji Coat, GC, Tokyo, Japan) was added to prevent dehydration. Monthly follow-ups were conducted to reinforce dietary and oral hygiene recommendations, monitor GIC retention, and reapply the material if needed. Patients were instructed to use a fluoridated toothpaste containing 1,450 parts per million fluorine twice daily. Additionally, a 10% casein phosphopeptide-amorphous calcium phosphate paste plus 0.2% sodium fluoride (900 ppm fluorine) (MI Paste Plus, GC, Tokyo, Japan) was prescribed to reduce sensitivity and enhance the mineralisation process. Fluoride varnish (Duraphat varnish 5% sodium fluoride, Colgate-Palmolive, United States) was applied every 3 months.

2. Orthodontic Band Placement

As the molars reached a more advanced stage of eruption, orthodontic bands (without molar tubes) were luted with GIC (Fuji II, GC, Tokyo, Japan). Bands were selected to ensure the smallest size providing optimal fit and retention. For molars with higher sensitivity or significant gingival involvement due to incomplete eruption, the band placement was performed under local anaesthesia. After cementation, the occlusal surfaces were re-sealed with Fuji Triage to provide complete protection. Follow-up visits every three months included: assessment of band retention and GIC integrity; monitoring for the presence of PEB or caries; Plaque Index (PI) assessment using Silness and Löe's method. Any loss of GIC sealant was addressed to prevent potential caries development on the occlusal surface. This standardised protocol was consistently applied to all patients in the study group, ensuring reproducibility and comparability of results. Figure 3 shows molars treated with this approach.

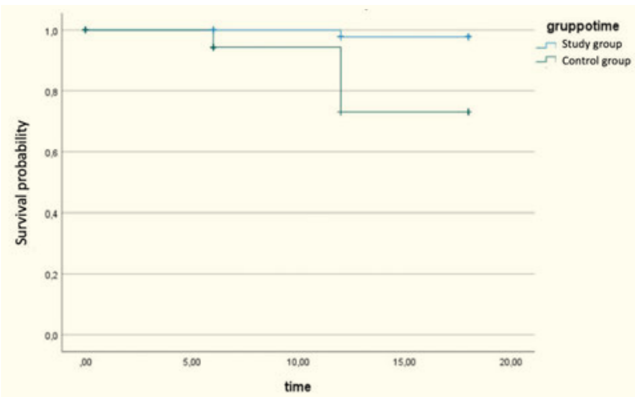

FIG. 4 The Kaplan-Meier survival plot illustrating the failure-free survival trend for both groups over the 18-month follow-up period.

Clinical procedure in the control group

MIH-FPMs included in the control group were treated with remineralisation and desensitization promptly administered upon diagnosis. Periodic follow-up appointments and professional hygiene recalls were scheduled, with ongoing reinforcement of oral hygiene counselling for both patients and parents. Patients and parents were provided with appropriate dietary recommendations to mitigate the cariogenic and erosive impacts of their diet. The use of a fluoridated toothpaste containing 1,450 parts per million fluorine was encouraged twice daily. To reduce sensitivity and enhance the mineralisation process, a 10% casein phosphopeptide-amorphous calcium phosphate paste plus 0.2% sodium fluoride (900 ppm fluorine) (MI Paste Plus, GC, Tokyo, Japan) was prescribed. Fluoride varnish (Duraphat varnish 5% sodium fluoride, Colgate-Palmolive, United States) was applied every 3 months. The teeth were checked every three months for the occurrence of dental caries, enamel breakdown (EB), dentin breakdown (DB), and the PI was assessed for each tooth.

Primary Outcome

The primary outcome of the study was the absence of the need for restorative interventions due to dental caries or DB in the included molars over the 18-month follow-up period. For the experimental group, molars covered with orthodontic bands and GIC were evaluated for caries progression through a visual and clinical examination: regular monitoring for visible signs of caries progression or marginal discoloration around the band margins was performed during follow-up visits. Probing of the occlusal surface was also conducted to assess for caries. In the

	Orthoband group n (%)	Mineralisation group n (%)	p-value
Molar §			
16	8 (36)	7 (32)	0.700¶
26	5 (23)	5 (23)	
36	4 (18)	2 (9)	
46	5 (23)	8 (36)	

§ International Nomenclature; ¶ chi-square test

TABLE 2 The distribution of FPMs included in both groups.

study group, molars were not routinely debanded to avoid compromising the protective effect of the bands and GIC. However, any clinical suspicion or signs of caries led to a detailed assessment, including removal of the band if necessary. Any loss of band retention triggered further clinical assessment, including careful cleaning and re-cementation, to ensure no underlying caries was present.

Secondary outcomes

Enamel Breakdown (EB): the prevention of EB was assessed through clinical examination of areas not covered by the band and comparison with the control group.

Plaque Index (PI): Plaque levels were evaluated using the Silness and Löe system (1964), with assessments conducted at each follow-up to monitor the impact of both interventions on oral hygiene. Retention of Orthodontic Bands (Study Group): The stability and integrity of orthodontic bands were evaluated, and the frequency of GIC reapplications recorded.

Statistical analysis

Statistical analysis employed Software Package for the Social Sciences (SPSS for Windows, version 27.0). Categorical variables were presented through frequency and percentage, quantitative variables by means and standard deviation. Between study and control groups, Fisher's exact test, chi-square test, and Mann-Whitney U-test were used for comparison. Mann-Whitney U-test verified non-normal distribution (validated by Kolmogorov-Smirnov test, p=0.008). Kaplan-Meier calculated survival probabilities at 6 months, 1 year, and 18 months with standard errors (S.E.). Log-rank test compared survival probabilities. Cox regression analysed PI's effect on failure probabilities, accounting for baseline differences. The Friedman test assessed PI change over time in both groups. The significance level (alpha) was preset at 0.05.

Results

Calibration

A very good intra- and inter-rater agreement was observed. The intra-rater Kappa statistic with 95% CI was 0.949 (0.879-1.019) for Operator 1 and 0.948 (0.876-1.020) for Operator 2. The inter-rater Kappa was 0.949 (0.878-1.019) for the first lecture and 0.923 (0.852-0.923) for the second lecture. In terms of average reliability, Cronbach's α was calculated to be 1, given that the operators consistently assigned the correct scores as outlined in the training manual.

Sample

Eleven children were included in the study group, 22 in the control group. Descriptive characteristics according to gender, age, dmft/DMFT, PI and EB presence were described in Table 1. No significant differences were identified between the two groups, except for the variable of PI. A total of 22 teeth were included in each group. The distribution of FPMs included was presented in Table 2. No statistically significant differences were observed between groups.

Primary outcome

At the 6-month follow-up, 3 teeth in the control group required restoration (2 due to dental caries with DB; 1 due to dental caries). No failures were present in the study group. At 12 months, an additional seven teeth in the control group required restoration: four due to dental caries and DB, and three due to dental caries alone. In contrast, only one tooth in the study group needed restoration. At the 18-month follow-up, no further teeth required restoration in either group. At the 12-month follow-up, the frequencies of caries lesions and DB

		Orthoband group n (%)	Mineralisation group n (%)	p-value
6-month follow-up	Need for restoration	0	3	
	DB	0	2 (9%)	0.488
	Dental caries	0	3 (14)	0.233
	EB	1 (5)	8 (36)	0.021†*
12-month follow-up	Need for restoration	1	7	
	DB	0	4 (18)	0.038†*
	Dental caries	1	7 (32)	0.016†*
	EB	2 (9)	8 (36)	0.026†*
18-month follow-up	Need for restoration	0	0	
	DB	0	0	
	Dental caries	0	0	
	EB	0	3 (14)	0.037†*

† Fisher exact test
**Statistically significant difference (Fisher exact test)*

TABLE 3 Primary (need of restoration due to dental caries and/or DB) and secondary outcome (EB) during each follow-up point.

were significantly higher in the control group when compared to the study group (Table 3). The Kaplan-Meier survival plot (Figure 4) effectively illustrates the failure-free survival trend for both groups over the 18-month follow-up period. Estimated cumulative survival rates for study and control group were 100% vs. 94% (95% CI: 94%-1.00) at the 6-month follow-up and 98% (95% CI: 94%-1.00) vs 73% (95% CI: 58%-88%) at both the 12- and 18-month follow-ups. The disparity in cumulative survival rates between the two groups was found to be statistically significant (Log Rank test; p<0.001). The PI at baseline did not have a statistically significant impact on the occurrence of DB (Cox regression: HR=1.249, 95% CI :0.867-1.799) nor did it significantly influence the presence of dental caries (Cox regression: HR=2.778, 95% CI: 0.303-25.452) at each evaluation point.

Secondary outcomes

EB frequency was significantly higher in the control group compared to the study group in each period of observation (Table 3). At the 6, 12, and 18-month follow-up points, the mean plaque index (PI) values with standard deviation were 1.4 ± 0.7 and 1.4 ± 0.4, 1.2 ± 0.8 and 1.2 ± 0.4, and 1.1 ± 0.7 and 1 ± 0.0 for the study group and control group, respectively. No significant differences were observed between the two groups (p=0.703; Mann-Whitney U test). In the study group, a statistically significant reduction in mean PI values was observed from baseline throughout the observation period (p: 0.010; Friedman test). However, a similar trend was not observed in the control group. In the study group, two (9%) orthodontic bands in two different molars of the same patient lost retention and were re-bonded. In the study group, the mean number of GIC reapplications per teeth with standard deviation was 1.9 ± 1.0.

Discussion

The available literature provides limited information on the treatment possibilities for severely MIH-compromised molars in the early stages of eruption. Early remineralisation strategies are strongly advocated by existing literature to manage MIH-affected teeth and to create a more favorable oral environment with reduced caries risk [Gatón-Hernandéz et al., 2020; Campus et al., 2024]. However, there is no evidence that preventive measures, such as topical application of fluoride, CPP-ACP, or even the placement of fissure sealants reduce the chance of the occurrence of PEB. The management of severely MIH-affected PFMs is clinically challenging and to date there is no unilateral consensus on which is the best treatment. Fragelli et al. [2015] evaluated the survival rates of 48 MIH-affected teeth with structural loss, with/without tooth decay, restored with GIC under absolute isolation (Ketac Molar Easymix, 3M ESPE, São Paulo, Brazil). The study reported a 78% likelihood of a restored tooth remaining unchanged at the end of 12 months. In the study of Grossi et al. [2018], 60 FPMs with carious dentin lesions were restored with a glass hybrid restorative system (Equia Forte, GC, Tokyo, Japan). A success rate of 98.3% after 6 and 12 months was observed. The only failure occurred in a restoration involving three or more surfaces presenting the breakdown of all cusps. As suggested by Fayle [2003], resin composites are materials of choice in MIH where defective enamel is well-demarcated and limited to 1 or 2 surfaces with supragingival margins and without cuspal involvement. In a study by Feltrin de-Souza et al. [2017], composite restorations (CRs) performed with self-etch or total-etch adhesives showed a cumulative survival rate of 68% and 54% respectively after an 18-month follow-up. When dealing with particularly compromised teeth (especially with cusp involvement), the use of preformed metal crowns (PMCs) may prevent further tooth loss and control sensitivity. PMCs have a very long history of use in primary molars with a well-established evidenced-based support, but only limited data exist for permanent teeth. Kostanos et al. [2005] reported a 100% success rate at 52-month follow-up for PMCs and 74.6% for CRs. A recent retrospective study compared the survival rate of 54 PMCs and 61 CRs in MIH-FPMs [de Farias et al., 2022]. At 24 months, results showed a higher survival rate in PMCs' group (94.4%) than CR. A minimally invasive approach was adopted, with tooth preparation limited to unsupported hypomineralised structure and carious tissue. However, the use of PMCs without tooth preparation in FPMs lacks sufficient clinical evidence. Given the complexity of managing teeth in need of restoration, effective strategies for preventing both caries and PEB from the early stages of eruption are crucial, especially for molars with extensive hypomineralisation defects. In the present study, only FPMs with extensive yellow-brown defects involving cusps, but free from dental caries and DB, were included. Aiming to prevent dental caries and PEB during the very early stage of the eruption, the application of low-viscous GIC as sealants was proposed, thanks to its fluoride release and its ability to seal pits, fissures, and rough surfaces. Considering the likelihood of premature failures of GIC sealants and the high risk of PEB, during the later stages of eruption, orthodontic bands were cemented to PFMs to prevent PEB. No tooth preparation was required in any case. The results of the study revealed a 98% survival rate at the 18-month follow-up, with only one tooth requiring restoration due to caries and without DB. In contrast, the control group had a 73% restoration rate. The study group also demonstrated lower EB occurrence/progression (14%) compared to the control group (72%). The study and control groups exhibited similarity in terms of gender, age, dmft/DMFT, and EB, except for the PI at baseline. However, subsequent statistical analysis using Cox regression revealed no significant impact on DB and the presence of dental caries during each evaluation. The PI value significantly decreased in the study group over the follow-up period. The fluoride release from GIC and the protective barrier of the bands likely contributed to reduced sensitivity and improved oral hygiene. The results of this study highlight that the use of orthodontic bands in conjunction with GIC application is more effective in preventing dental caries, EB, and DB than remineralisation protocols alone. Orthodontic bands with GIC, combined with stringent preventive measures, can effectively maintain MIH-FPMs for at least 18 months. This period may allow postponement of more comprehensive restorative approaches. Notably, orthodontic bands do not necessitate any tooth preparation, making them a more suitable option for children who might have difficulty cooperating during the treatment process. Furthermore, this technique's reversibility is particularly advantageous during mixed dentition stages. For instance, if orthopaedic interventions such as maxillary expansion are required, the orthodontic bands can be easily removed to facilitate the placement of fixed appliances. In such cases, the bands from the appliance can maintain the same preventive effect established by the initial orthodontic band application. PMCs have been proposed as a long-term interim solution for MIH molars with significant cuspal involvement. However, this option cannot be adopted in all clinical scenarios. PMCs require a certain amount of enamel preparation of the proximal and occlusal surfaces, adequate pain control, and good patient cooperation. These requirements are not always met, and for this reason, the use of bands represents a simple and non-traumatic alternative for the patient. From an aesthetic standpoint, it would be worthwhile to investigate the possibility of higher parental acceptance of orthodontic bands in comparison to PMCs. This aspect could play a significant role in decision-making, especially when considering the psychological impact on both the child and their parents. However, the success of the proposed approach hinges on regular follow-up visits. These visits are crucial to maintaining the retention of the orthodontic bands and the integrity of the applied GIC sealants. These aspects are pivotal for ensuring the long-term effectiveness of the technique in preventing post-eruptive enamel breakdown and maintaining dental health. The current study has several limitations that should be acknowledged. Firstly, the control group consisted solely of FPMs treated with mineralisation protocols, potentially introducing a bias. The inclusion of fissure sealant placement in the control group might have influenced the failure rate differently. However, it is noteworthy that the inclusion criteria for the control group did not substantially impact the survival rate observed in the study group, which remained close to 100% at the 18-month follow-up. Another limitation concerns the duration of the follow-up period. Extending the follow-up duration could provide more comprehensive insights into the long-term effectiveness and sustainability of the proposed approach. Further studies with extended follow-up periods could shed light on the durability of the preventive measures and any potential changes in outcomes over time. Despite these limitations, the study's findings provide valuable information regarding the utilization of orthodontic bands with GIC sealants as a preventive strategy for managing MIH-affected teeth with extensive defects. Further research efforts could explore these limitations and refine the approach, ultimately contributing to a more comprehensive understanding of effective treatments for this condition.

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