

Introduction

Molar incisor hypomineralization (MIH) is a qualitative developmental enamel defect of systemic origin affecting one or more first permanent molars (FPMs) with or without involvement of incisors<sup>1</sup>. By the age of nine, children with MIH require extensive dental treatment, as much as ten times more than unaffected children, due to pain, hypersensitivity or post-eruptive breakdown<sup>2</sup>.

Compromised MIH FPMs with post-eruptive breakdown are susceptible to rapid caries formation and progression due to soft and porous enamel<sup>3,7,8</sup>. Diagnosis of MIH can be difficult and treatment can be further complicated by the presence of widespread carious lesions<sup>9</sup>.

Usually, severely MIH-affected FPMs are extremely hypersensitive, making it increasingly difficult to obtain adequate local anesthesia<sup>2,10</sup>. Young children with severe MIH are more likely to have increased levels of dental fear and anxiety resulting from the pain and discomfort associated with repeated dental interventions<sup>2</sup>. Therefore, behavioral management in young children with MIH-affected FPMs can be challenging.

The management of MIH is challenging with a broad range of treatment modalities, including prevention of enamel breakdown or caries, management of hypersensitivity or pain, restorative treatments, and extraction with or without subsequent orthodontic intervention<sup>7,8,10</sup>. Choosing the most appropriate treatment depends on multiple factors such as the severity of the enamel defect, presence of dental caries, occlusion, dental age of patient, orthodontic considerations and patient compliance<sup>7</sup>.

The aim of this paper is to assess the knowledge of pediatric dentists regarding MIH conditions and to evaluate the preferred treatment modalities for MIH-affected FPMs.

Objective

- To assess the level of knowledge and perceptions of MIH among US pediatric dentists
- To investigate clinical experiences regarding diagnostic and treatment complications
- To identify the current management preferences and treatment modalities for different breakdown levels of MIH-affected permanent molars

Study Design and Methods

A nineteen-question survey was sent via SurveyMonkey to members of the American Academy of Pediatric Dentistry (AAPD) practicing in the United States. We inquired about practitioner demographics and MIH experience in their practices. The comfort level of MIH clinical management was compared with years of providers' practice experience using a Pearson's Chi-square test and a Fisher's exact test.

Results

The results are based on 316 active board members (5% response rate) who voluntarily completed the survey. Table 2 shows that there is a statistically significant p-value of 0.038. Providers with fewer years of experience ( $\leq 10$  years) reported 43.8% confidence in their ability to differentiate MIH from other enamel defects, while 32.5% of more experienced providers ( $>10$  years) felt confident. The study found that 79% of providers with  $\leq 10$  years experience and 81% of providers with  $>10$  years experience would never or rarely refer out MIH-affected patients, with a statistically significant p value of 0.05 (See Table 3).

When evaluating treatment times for MIH patients, 74.0% of those with more experience reported spending longer time with MIH-affected patients during a typical visit, while 85.8% of those with less experience reported longer treatment times, with a statistically significant p value of 0.009 (See Table 4).

Overall, 76.9% of dentists reported no difficulties in diagnosing MIH. 75.9% found that there were challenges in achieving adequate anesthesia and 67.4% experience challenges achieving patient comfort. 82.9% found issues with long-term treatment success, likely due to issues related to compromised enamel structure. 69.9% reported difficulty in determining margins of affected tooth structure and 68.4% reported difficulty in providing adequate restorative materials (See Table 5).

Results

Table 1. Overall Distribution

N (%)	
Years of Practicing	
$\leq 10$ years	162 (51%)
$> 10$ years	154 (49%)
Diagnosis Difficulty	
Yes	121 (38%)
No	195 (62%)
Longer Treatment Time	
Yes	128 (38.67%)
No	203 (61.33%)
Refer MIH Patients to Colleagues	
Always	3 (0.9%)
Usually	3 (0.9%)
Sometimes	57 (18%)
Rarely	158 (50%)
Never	95 (30%)
Diagnosis	
Yes (Challenging)	73 (23.1%)
No (No Issue)	243 (76.9%)
Achieve Adequate Local Anesthesia	
Yes (Challenging)	240 (75.9%)
No (No Issue)	76 (24.1%)
Determine the Margin	
Yes (Challenging)	221 (69.9%)
No (No Issue)	95 (30.1%)
Adequate Restoration	
Yes (Challenging)	216 (68.4%)
No (No Issue)	100 (31.6%)
Long-term Success	
Yes (Challenging)	262 (82.9%)
No (No Issue)	54 (17.1%)
Achieve Patient Comfort	
Yes (Challenging)	213 (67.4%)
No (No Issue)	103 (32.6%)
Total Response N = 316	

Table 2. Differentiating MIH Ability by Years of Practicing

Years of Practicing			
	$\leq 10$ years	$> 10$ years	Total
Confidence in Differentiating			
Yes	71	50	121
No	91	104	195
Total	162	154	316

Pearson's Chi-squared test, p=0.038

Table 3. Referral of MIH Patients to Colleagues by Years of Practicing

Years of Practicing			
	$\leq 10$ years	$> 10$ years	Total
Referral			
Always	3	0	3
Usually	2	1	3
Sometimes	29	28	57
Rarely	83	75	158
Never	45	50	95
Total	162	154	316

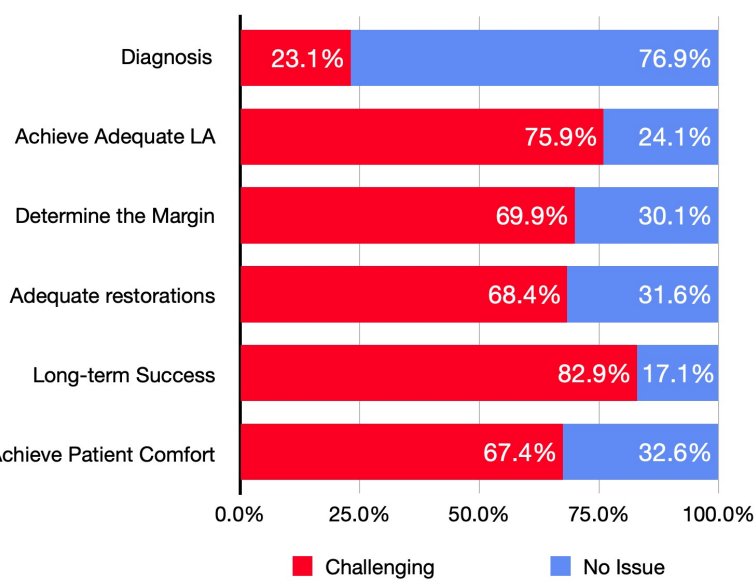
Fisher's exact test, p=0.5

Table 4. Longer Treatment Time by Years of Practicing

Years of Practicing			
	$\leq 10$ years	$> 10$ years	Total
Longer Treatment Time			
Yes	139	114	253
No	23	40	63
Total	162	154	316

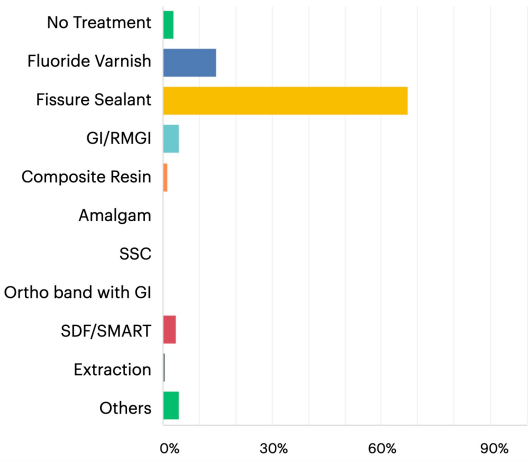
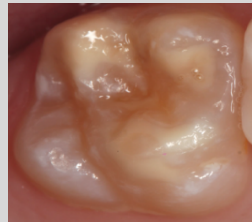
Pearson's Chi-squared test, p=0.009

Table 5. Possible complications during MIH treatment

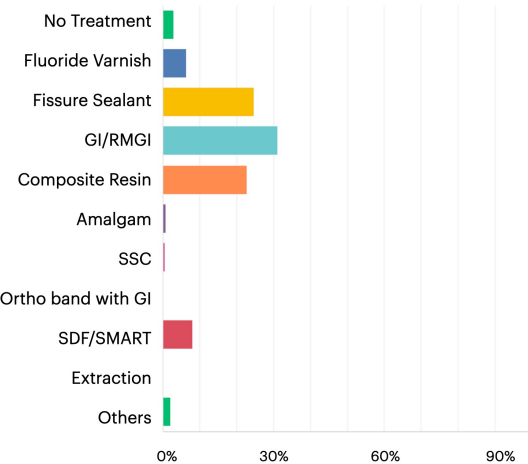


Material of Choice From Clinical Scenario Responses

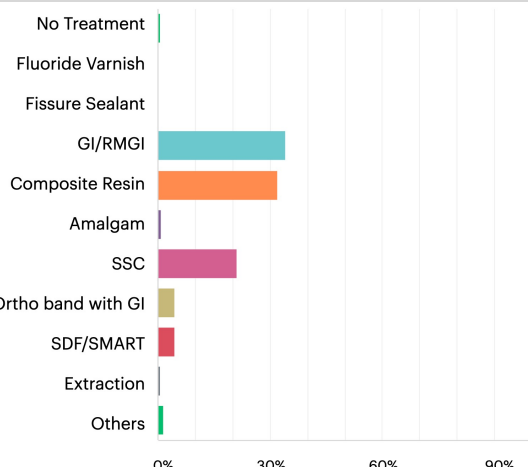
1. No enamel breakdown



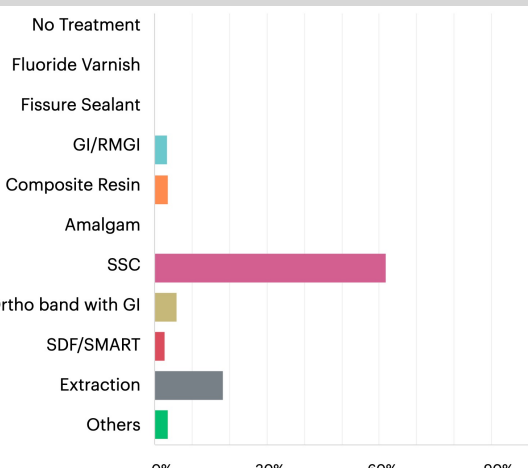
2. Mild enamel breakdown without caries



3. Moderate breakdown with caries



4. Severe breakdown with caries



Results (continued)

The most common treatment provided when managing MIH permanent molars with no enamel breakdown was fissure sealants, with 67.5% of respondents selecting this option, followed by 14.8% opting for fluoride varnish. For MIH FPMs with mild enamel breakdown and no caries detected, 31.0% of respondents reported using GI or RMGI restoration, 24.7% reported using fissure sealants, 22.9% selected for composite resin restoration, and 8.1% selected SDF or SMART treatment. For MIH FPMs with moderate structural breakdown with caries, 34.0% of respondents reported GI or RMGI restoration, 31.9% reported composite resin restoration, and 21.1% reported stainless steel crown as the preferred treatment choice.

For MIH FPMs with severe structural breakdown, 61.8% reported using SSCs, 18.4% reported extraction with future orthodontic treatment or molar substitution, and 6.0% reported orthodontic banding with GI.

Discussion

- More participants with fewer years of experience ( $\leq 10$  years) reported confidence in differentiating MIH from other enamel defects, such as enamel hypoplasia, fluorosis and amelogenesis imperfecta ( $p = 0.038$ ). Surprisingly, more experienced dentists ( $> 10$  years) felt less confident in differentiating MIH from other enamel defects. The data suggests that newer graduates of pediatric dental training programs may feel more confident in the diagnosis and treatment of MIH since they may be more familiar with recent literature and guidelines.
- Alternatively, there is no statistically significant association between years of experience and the percentage of providers referring MIH patients to other colleagues ( $p = 0.5$ ).
- As expected, a greater percentage of those with less experience ( $\leq 10$  years) reported longer treatment times for MIH patients ( $p=0.009$ ).
- Moreover, the most challenging complications providers encountered were long term success of restorations and achieving adequate local anesthesia, which is why MIH can be particularly difficult to treat.
- Preventative sealants were preferred for MIH with no enamel breakdown, GI/RMGI was favored for mild to moderate breakdown and SSCs were favored as the severity of defects progress.

Conclusion

- More experienced dentists ( $> 10$  years) felt less confident in differentiating MIH from other enamel defects. From the results of this study, it can be hypothesized that recent graduates feel more confident since they may be more familiar with recent literature and guidelines.
- Those with fewer years of experience ( $\leq 10$  years) report significantly longer time managing MIH during treatment.
- Based on the result of this study, there is no statistical relationship between the years of experience and the type of restorative materials.

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