The Use of the Hall Technique Among Pediatric Dentists Following the COVID-19 Pandemic

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Introduction and Background

The Hall Technique, first utilized in the 1990s by Dr. Norna Hall, was developed as a minimally invasive technique for sealing caries in primary molars. The technique requires no tooth preparation or local anesthesia and utilizes a correctly sized, preformed stainless-steel crown filled with glass ionomer cement that is placed over a carious tooth.[1,10] By doing so, it promotes compliance from pediatric patients, provider comfort and promotes a positive dental experience for children.[2]

Scientific evidence demonstrates that once the carious lesion(s) are completely sealed off from nutrients, caries propagation is inhibited as cariogenic bacteria and biofilm are altered and deprived of energy sources that allow for them to thrive, resulting in caries arrest.[11] Current data is supportive of the Hall Technique, as it has comparable results to conventionally prepared stainless-steel crowns, both clinically and radiographically making it a great alternative for treatment of carious primary molar teeth with multi surface lesions.[8,4,5]

As the SARS-CoV-2 pandemic has impacted dentistry and its use of aerosol generating procedures (AGP) on a global scale, alternative treatments that limit AGP have been sought after. Therefore, minimally invasive techniques such as Hall Crowns, Silver Diamine Fluoride (SDF), Fluoride Varnish and other atraumatic restorative techniques have been recommended as alternative to AGP and the use of handpieces and air/water syringes.[3,6,7] Minimally invasive dentistry has several advantages that have been significantly important during the COVID-19 pandemic as it exposes patients to low-risk aerosols, less need for local anesthesia and shorter treatment periods.[9]

Objectives

The primary goal of this study was to survey active members of the American Academy of Pediatric Dentistry (AAPD) to determine how the use of the Hall Technique has changed following the COVID-19 pandemic. The secondary objective of this study was to identify any trends amongst Hall Technique usage between practitioners.

Study Design and Methods

This was a cross-sectional study where data collection occurred over a one- month period (Feb- Mar 2024). A 20-question survey was sent out via email to active members of the American Academy of Pediatric Dentistry (AAPD), and answers were collected via the SurveyMonkey electronic platform. There were minimal risks associated with this research study. Study personnel collected the following data on those that completed the survey: AAPD regional district location, years since completing pediatric dental residency, and primary clinical setting. The survey questions included topics on what percentage providers used the Hall Technique (before, during, and after the COVID-19 pandemic), what influenced their decision to use the Hall Technique over the traditional method of preformed metal crown placement (PMC), and what age range practitioners used the Hall Technique for. The survey further examined what concerns practitioners had regarding the Hall Technique, and if other aerosol generating procedures were also utilized before, during or after the COVID-19 pandemic. Descriptive statistics, and frequency (%), was employed to summarize data. Proportions along with 95% confidence intervals (CI) are presented for level of usage of the Hall Technique relative to COVID-19 pandemic. An exploratory analysis was carried out to assess the association between current level of use of the Hall Technique with selected characteristics of practitioners using Chi-squared test, with resampling when appropriate.

Acknowledgements

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Survey Responses

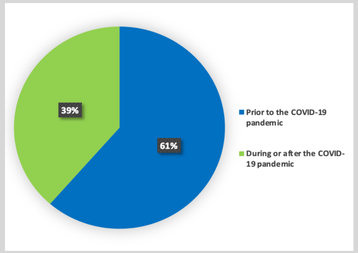


Figure 1: When did respondents start using the Hall Technique?

Figure 2 : Percentage of all PMC's placed using Hall Technique before, during, and after the COVID-19 pandemic (n=278)

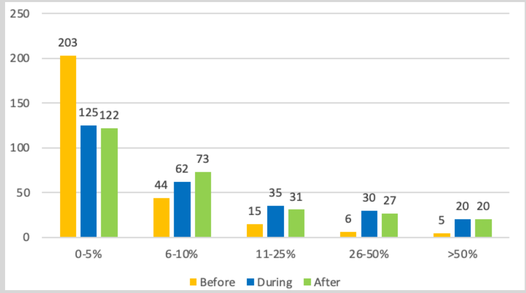
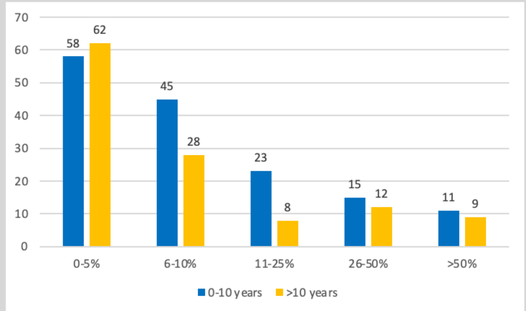


Figure 3: Percentage of all PMC's placed using the Hall Technique vs number of years since completing residency (n=278)



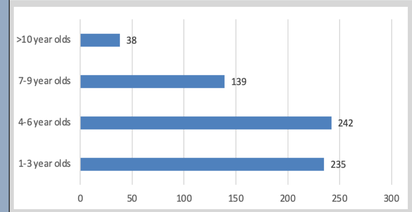


Figure 4: Currently, for what age range do you use the Hall Technique for? Check all the apply.

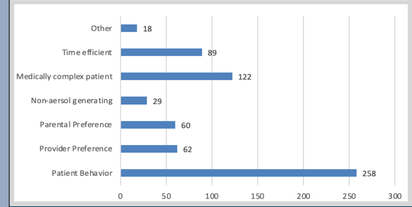


Figure 5: Why do you use the Hall Technique over traditional PMC preparation? Check all that apply.

Results

	AFTER COVID-19					
	0-5% N = 122 (45%)[1]	6-10% N = 73 (27%)[1]	11-25% N = 31 (11%)	26-50% N = 27 (9.9%)	>50% N = 20 (7.3%)	p-value[2]
REGION						0.07141
Northeastern	27 (39%)	17 (24%)	12 (17%)	9 (13%)	5 (7.1%)	
Southeastern	19 (46%)	8 (20%)	6 (15%)	6 (15%)	2 (4.9%)	
Northcentral	21 (43%)	12 (24%)	3 (6.1%)	5 (10%)	8 (16%)	
Southwestern	25 (45%)	23 (42%)	4 (7.3%)	3 (5.5%)	0 (0%)	
Western	29 (52%)	13 (23%)	6 (11%)	4 (7.1%)	4 (7.1%)	

[1]n (%)
[2]Monte-Carlo (~10000)

Table 1 Association between practice region and use of the HT after the COVID-19 pandemic

	AFTER COVID-19					
	0-5% N = 122 (45%)[1]	6-10% N = 73 (27%)	11-25% N = 31 (11%)	26-50% N = 27 (9.9%)	>50% N = 20 (7.3%)	p-value
SETTING						0.7767[2]
Private practice	98 (45%)	60 (28%)	22 (10%)	22 (10%)	14 (6.5%)	
Community Health Center	4 (33%)	4 (33%)	2 (17%)	0 (0%)	2 (17%)	
University/ Academic Setting	11 (52%)	4 (19%)	2 (9.5%)	2 (9.5%)	2 (9.5%)	
Hospital Setting	6 (35%)	3 (18%)	4 (24%)	3 (18%)	1 (5.9%)	
Other	1 (25%)	2 (50%)	1 (25%)	0 (0%)	0 (0%)	

[1]n (%)
[2]Monte-Carlo (~10000)

Table 2 Association between clinical setting and use of the HT after the COVID-19 pandemic

	AFTER COVID-19					
	0-5% N = 122 (45%)[1]	6-10% N = 73 (27%)	11-25% N = 31 (11%)	26-50% N = 27 (9.9%)	>50% N = 20 (7.3%)	p-value[2]
YEARS						0.092
0-10 years	58 (38%)	45 (30%)	23 (15%)	15 (9.9%)	11 (7.2%)	
10+ years	62 (52%)	28 (24%)	8 (6.7%)	12 (10%)	9 (7.6%)	

[1]n (%)
[2]Pearson's Chi-squared test

Table 3 Association between years since residency and use of the HT after the COVID-19 pandemic

Results

A total of 278 U.S. and Canadian pediatric dentists in active clinical practice completed the survey. Respondents hailed from all regions: 71 (26%) from the Northeast district, 42 (15%) from the Southeastern district, 49 (18%) from the Northcentral district, 55 (20%) from the Southwestern district, 57 (21%) from the Western district, and 4 from unknown locations. The majority of respondents stated that their primary clinical setting was private practice (219, 80%), followed by university/academic institutions (21, 7.7%), hospital/medical centers (17, 6.2%), community health centers (12, 4.4%), and other settings including the U.S. military, corporate practices, or unknown 9 (3.2%). One hundred fifty-two (55%) respondents completed their pediatric dentistry residency less than 10 years ago, while 122 (45%) completed their pediatric dentistry residency over 10 years ago, and 4 respondents remained unanswered. Regarding the use of the Hall Technique (HT) to place preformed metal crowns, the majority of practitioners first began utilizing the HT prior to the COVID-19 pandemic rather than during or after (61% vs. 39%). *Figure 1.* Practitioners utilized the HT for all age groups, with 4-6 year old patients being the most common, followed by 1–3 year old patients. Practitioners cited patient behavior as being the most common reason for the use of the HT, followed by medical complexity, and time efficiency. *Figures 4, 5.* When asked to quantify the percentage of preformed metal crowns that they placed using the HT, practitioner responses revealed that most used the HT less frequently than the traditional technique, however, it was noted that there was a modest increase in the frequency of use of the HT during and after the COVID-19 pandemic. The number of practitioners who use the HT least frequently (0-5%) decreased in the time period from before to during and after the pandemic (203 before, 125 during, 122 after). Correspondingly, the number of providers who use the HT most frequently (>50%) increased in the same time period (5, 20, and 20 respectively). *Figure 2.*

Discussion

The Pearson Chi-Squared test via Monte Carlo simulation with resampling was used to ascertain any associations between practitioner characteristics and the use of the HT after the COVID-19 pandemic. In all analyses, statistical significance is claimed at a computed p-value ≤ 0.05. With respect to practice region, primary clinical setting, and years since completing residency, there were no statistically significant associations regarding HT usage (p=.0.07141, p=0.7767 and p=0.092 respectively). *Tables 1, 2, 3.* It was noted that providers who completed their residencies ≤ 10 years ago tended to use the HT more frequently than those who completed their residencies >10 years ago. Of the providers who used the HT least (0-5%), more were in the > 10-year group, and of the providers who used the HT most (>50%), more were in the ≤ 10-year group. *Figure 3.* However, because of sparse data, the result did not achieve statistical significance. It is surmised by this author that providers who completed their residencies ≤10 years ago were more likely to have learned of the HT in dental school or residency, and therefore be more likely to utilize it in practice. All analysis in this study regarding associations of HT usage and provider characteristics are exploratory and must be interpreted cautiously. Future studies with larger sample sizes are necessary to arrive at more definitive conclusions.

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