Comparison of MTA, Formocresol and Pressure Pulpotomies in Primary Molars With Or Without Antimicrobial Irrigation at a California Community Health Center Dental Clinic

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INTRODUCTION

- **Pulpotomies allow for preservation of vital radicular pulp and retaining a primary tooth in function until it exfoliates[1].**
- There have been many different medicaments used in pulpotomies. However, some practitioners choose to not use a medicament.
- **In 2016, there was an outbreak of osteomyelitis from pulpotomies performed in a California dental office. In response, California has mandated that a sterile or antimicrobial irrigant be used in procedures that expose the dental pulp[2].**
- There is limited published data on pressure only pulpotomies, but a recent paper shows that ZOE as the only capping agent may be have an acceptable success rate[1].

PURPOSE/ HYPOTHESIS

- This retrospective longitudinal study aims to determine if clinical success rates of pressure pulpotomies are similar to formocresol and MTA pulpotomies. It also aims to see if using antimicrobial irrigation in pulpotomies changes success rates.
- The primary null hypothesis of the study stated that there was no statistically significant difference in the clinical and radiographic success of primary molars treated with formocresol, MTA or pressure only.
- The secondary null hypothesis stated there is no statistically significant difference in the clinical and radiographic success of primary molars undergoing pulpotomies based on irrigant used.

METHOD

A retrospective chart study of pediatric patients treated for pulpotomies on primary teeth using the inclusion and exclusion criteria below.

- Subjects' health records were analyzed for clinical and radiographic outcomes by one examiner.
- For each pulp, it was noted the type of pulpotomy, if an irrigant was used, molar type, provider type (resident or board-certified pediatric dentist), gender and age of the patient. Radiographic and clinical success or failure was recorded along with time of months out from treatment.
- Descriptive statistics and logistic regression with significance set at p<.05 were completed.

INCLUSION CRITERIA
1. ASA I or mild ASA II
2. Dental procedure codes (D3220) on a deciduous molar
3. Procedure notes included medicament and irrigant
4. Record must have a clinical evaluation at least 6-months postoperatively

EXCLUSION CRITERIA:
1. ASA II (except those with mild to moderate asthma, ADHD, overweight, or obese), III, IV.
2. No clinical evaluation or clinical evaluation less than 6-months post operatively.
3. Pulpotomy completed with a medicament other than formocresol, MTA, sodium hypochlorite (SH), or chlorhexidine (CHX).
4. Tooth other than a primary molar.
5. Medicament or irrigant used was not documented.

REFERENCES

1. Gonzalez-Lara, Adriana, et al. "Zinc Oxide–Eugenol Pulpotomy in Primary Teeth: A 24-Month Follow-Up." *Journal of Clinical Pediatric Dentistry*, vol. 40, no. 2, 2016, pp. 107–112., doi:10.17796/1053-4628-40.2.107.
2. Foss C. New infection control standard for procedures that expose dental pulp. CDA. https://www.cda.org/Home/News-and-Events/COVID-19/Infection-Control/new-infection-control-standard-for-procedures-that-expose-dental-pulp. Published November 22, 2019. Accessed April 8, 2021.

Figure 1: Mean Length of Success in Months

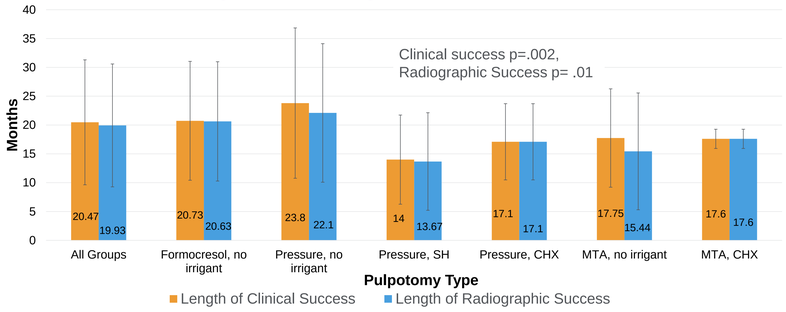

Figure 2: Clinical Survival Based on Medicament

Survival analysis of pulpotomy types for clinical success

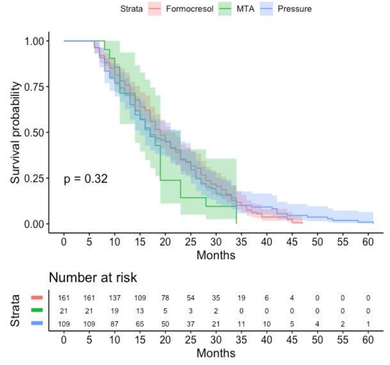

Figure 3: Clinical Survival Based on Irrigant

Survival analysis of irrigation types for clinical success

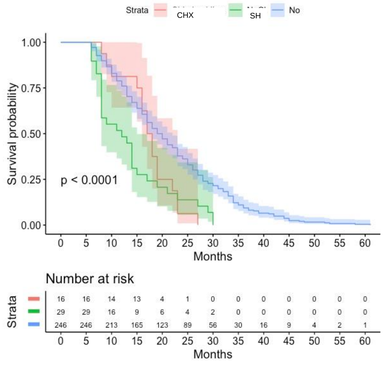

Table 1: Mean Length of Clinical and Radiographic Success (months) by Medicament Type and Irrigant

	Formocresol	Pressure	MTA	p. value	No Irrigant	SH Irrigant	CHX	p. value
Mean Length of Clinical Success (SD)	20.72 (10.28)	20.64 (12.15)	17.71 (7.42)	0.482	21.41 (11.14)	14.00 (7.74)	17.31 (5.20)	0.001
Mean Length of Radiographic Success (SD)	20.62 (10.32)	19.79 (11.39)	15.91 (8.98)	0.140	20.66 (10.91)	13.67 (8.48)	17.31 (5.20)	0.009

RESULTS

- A total of 300 pulpotomies were included. The average age of all subjects was 6.24 years. One hundred forty-seven (49%) of patients were male, 163 (54%) pulpotomies were completed on primary second molars and 153 (51%) pulpotomies were completed by pediatric dental residents. There were 163 formocresol pulpotomies (all with no irrigant), 112 pressure pulpotomies (72 no irrigant, 30 with SH and 19 with CHX) and 24 MTA pulpotomies (19 with no irrigant and 5 with CHX). Overall, there were 254 pulpotomies with no irrigant, 37 with SH and 24 with CHX.

CLINICAL SUCCESS

- There was a significant difference in the mean length of time for clinical success (CS) between all categories of pulpotomies with "pressure, no irrigant" having the greatest mean length of CS (p= .002). There was no significant findings of time to failure. **Figure 1.**
- There was no significant difference of clinical survival probability over time among different pulpotomy medicaments (formocresol, MTA, pressure; p= .32). **Figure 2.**
- There was a significant difference of clinical survival probability over time among different pulpotomy irrigants (no irrigant, SH, CHX; p= <.0001), with SH having the lowest survival probability. **Figure 3.**
- There was no significant difference of mean length of CS when looking at pulpotomy medicaments alone (formocresol, MTA, none; p= .482). **Chart 1.**
- There was a significant difference of mean length of CS when looking at irrigants alone, with no irrigant have the longest mean length of time and SH having the lowest (no irrigant, SH, CHX; p = .001). **Chart 1.**

RADIOGRAPHIC SUCCESS

- There was a significant difference in the mean length of time for radiographic success (RS) between all categories of pulpotomies, with "pressure, no irrigant" having the greatest mean length of RS (p= .01). There was no significant findings of time to failure. **Figure 1.**
- There was no significant difference of radiographic survival probability over time among different pulpotomy medicaments (formocresol, MTA, none; p= .15).
- There was a significant difference of radiographic survival probability over time among different pulpotomy irrigants (no irrigant, SH, CHX; p= .0011), with SH having the lowest.
- There was no significant difference of mean length of RS when looking at pulpotomy medicaments alone (formocresol, MTA, none; p= .140). **Table 1.**
- There was a significant difference of mean length of RS when looking at irrigants alone, with no irrigant have the longest mean length of time and SH having the shortest (no irrigant, SH, CHX; p= .009). **Chart 1.**

CONCLUSIONS

- Medicament used (formocresol/ MTA/ none) does not influence the mean length of time of clinical success or radiographic success.
- Irrigant influences the length of clinical success and radiographic success with sodium hypochlorite showing the shortest mean length of time of success.

Limitations:

- Small sample size of chlorhexidine as an irrigant and MTA as a medicament.
- Large number of patients lost to follow up.