

Efficacy of Primary Teeth Pulpotomy Treatment in Different Dental Settings

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PURPOSE

The aim of this project was to evaluate the efficacy of pulpotomy/pulpectomy treatment in primary teeth in a variety of dental settings. The goal of this project is to determine the success rate of pulpotomy- and pulpectomy-treated primary teeth from 2012 at UPMC Children's Hospital of Pittsburgh and to identify associated reasons for failure in different settings (operating room under GA and in clinic with IV or conscious sedation). This information could be helpful in future treatment planning for our clinic and determining an ideal setting for completed pulpotomies/pulpectomies.

INTRODUCTION

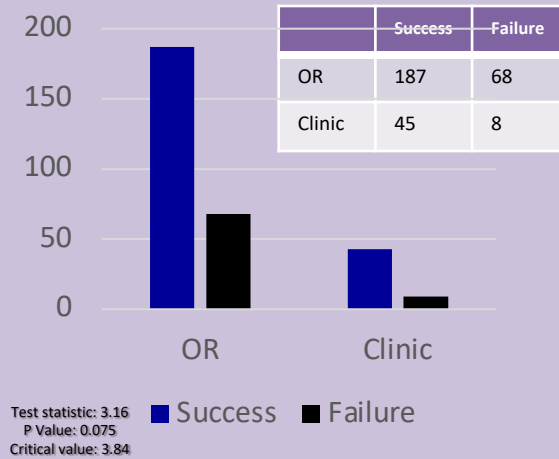
Dental decay in the interproximal region of primary posterior teeth is prevalent and a challenge to pediatric dentists when trying to preserve teeth and manage the developing occlusion. With rapid progression of caries and anatomical factors such as large pulp chambers, caries often encroaches upon the pulp by the time of diagnosis and/or leads to pulpal exposure when tooth preparation is being completed. A pulpotomy-treated primary molar, although not limited to this list, is often used: to stall until permanent first molars have erupted, to appease parental preference of avoiding extraction, or to allow for enough tooth reduction for zirconia crowns. Stainless steel crowns (SSCs) routinely show a high success rate due to sealing the tooth/any remaining dental decay and providing structural support to the tooth. The success of pulpotomy treated teeth is questionable due to factors such as: patient behavior, material choice, SSC placement, hemostasis control, age at time of restoration, home-care after treatment, and incorrectly diagnosed pulp status. The operating room eliminates patient behavior as a factor due to the environment being more controlled and under ideal conditions. However, pulpotomy treated teeth can still fail when placed in this setting (often due to irreversibly damaged pulp tissue prior to restoration).

Stainless steel crowns are standard of care for pediatric dental patients with posterior interproximal tooth decay, with or without pulpotomy treatment. Pulpotomies are already done regularly with patients in clinic (no GA) and under general anesthesia. While the majority of pulp-treated teeth are successful, there are still failures irrespective of the setting in which they are placed. The goal of this project is to determine the success rate of pulpotomy/SSC treated posterior teeth from 2012, and associated reasons for failure in different settings (operating room under GA, in clinic with child awake, etc.). This could be helpful in future treatment planning for our clinic and determining an ideal setting for completed pulpotomies.

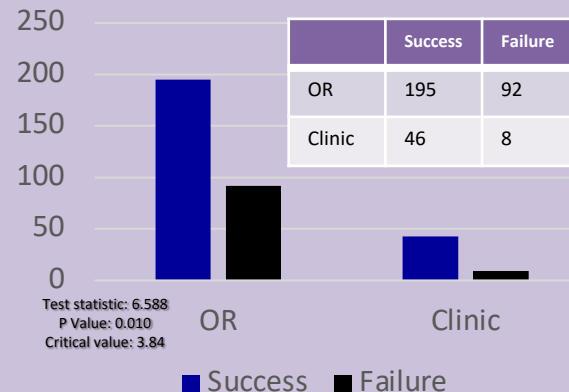
METHODS

- Charts were reviewed to evaluate all pulpotomies and pulpectomies completed in 2012 at UPMC Children's Hospital of Pittsburgh.
- Children had at least one carious primary tooth needing pulpotomy or pulpectomy treatment and were 1 to 10 years of age at time of restoration.
- Teeth were separated under the following categories:
 - Operating Room Pulpotomies,
 - Clinic Pulpotomies (No sedation, Nitrous alone, OCS – Versed, OCS - Demerol, IV sedation)
 - Pulpectomies (Operating Room and Clinic).
- Within the three categories, all teeth were assessed for date of service, age of placement (year), referral (yes/no), first molar vs second molar, specific tooth, follow-up (yes/no), failure (yes/no), if failure: how long until failure (# months), if failure: reason for failure, exfoliation (yes/no), if clinic: FRANKL score (1-4), if clinic: sedation modality (none, nitrous only, Versed, Demerol, IV). Failure was deemed extraction before natural exfoliation. Posterior teeth were restored with SSCs and anterior teeth were restored with resin crowns.
- Data was then extrapolated and descriptive statistics with chi squared were used.

Pulpotomies – With F/U



Pulpotomies + Pulpectomies – With F/U



RESULTS

	Number of teeth with follow up	Success rate with follow up	Success rate without follow up	Failure at 24 months	Average failure time
Clinic Pulpotomy	52	82.70%	92%	7.70%	23.87 months
OR Pulpotomy	255	73%	90%	5.60%	36 months
Pulpectomy	32	25%	40.70%	50%	21.83 months

This study included a total of 838 teeth treated by either pulpotomy or pulpectomy in the setting of OR and dental clinic in the year of 2012. OR and clinic pulpotomies combined for a success rate of 74.9%. When considering both pulpotomies and pulpectomies, the location of treatment may have become statistically significant due to the number of failures of pulpectomies (p=0.010). The average Frankl score for teeth treated in the dental clinic was 3.6/4. The three most common reasons for pulpotomy failure were PAP (42), Abscess (28), and lost SSC/Defective SSC (16). The three most common reasons for pulpectomy failure were nonrestorable caries (9), PAP (8), and lost restoration (5). The sedation modalities and their respective usage were: none (3), nitrous oxide (11), Versed (13), Demerol (71), IV sedation (9). The average age of treatment was: 4.29 yo for OR pulpotomy, 5.77 yo for clinic pulpotomy, and 2.5 yo for pulpectomy. 539 of 838 teeth (64%) that were treated came from patients that were referred for treatment. Pulpotomy-treated teeth varied by first molar (434 teeth) and second molar (350 teeth).

DISCUSSION

According to The Reference Manual of Pediatric Dentistry, pulpotomies and pulpectomies have a success rate of 82.6% at 12 months and 89% at 12+ months (when no root resorption present pre-treatment), respectively. The definition of "success," the materials/methods used, and length of follow-up varies from study to study. To simplify our data, success was deemed as no extraction necessary, with natural exfoliation of the primary tooth. However, success to some would be to preserve arch space for the developing dentition and to allow for the eruption of permanent first molars. With the average patient age of 5.03 years at the time of pulpotomy treatment and average failure time of 29.94 months (2 years), there is a chance that many of these teeth survived until the eruption of permanent first molars, where at time of extraction, band and loops or TPA/LLHA could be placed. Often, teeth with poor long-term prognosis are pulp-treated to preserve space with the awareness that they will likely need extracted at a later date. This treatment decision making process is often not stated in explicit detail in patient charts. It is important to consider that our data is retrospective in nature with multiple treatment providers. Additionally, of the 838 teeth treated, only 309 had continued follow-up to the time of natural exfoliation or extraction. The other patients were either never seen for follow-up or were lost to follow-up before definitive outcome could be determined. Given the hospital setting with many referral-based patients, it is possible to assume that if we were not contacted to extract previously pulp-treated teeth, that these teeth remained asymptomatic until natural exfoliation, or until an age where the child's cooperation allowed for extraction by the referring dentist, both of which would be considered a success by most. We would expect failures to return to CHP based on the patient population described.

CONCLUSIONS

In the year of 2012 at UPMC Children's Hospital of Pittsburgh, clinical success rates for pulpotomy-treated teeth were not dependent on the location of treatment; OR vs clinic. Continuation of this study is recommended as data is limited to one year of treatment and due to limited sample size of pulpectomy-treated teeth. Further statistical analysis of the data bank can give greater insight into pulpotomy/pulpectomy success rate due to confounding variables such as specific teeth, age of placement of restoration, sedation modality, and Frankl score in the clinic.

REFERENCES

- Pediatric Dentistry - 2017 / V 39/ NO 5/ P. E146-E159. Erratum in Pediatr Dent 2020;42(1):12-15
- Pediatric Dentistry - 2020/ V 42/ NO 5/ P. 337-359