

Knowledge and Practice of Pulp Therapy in Deciduous Teeth among General Dental Practitioners in Saudi Arabia

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Abstract

Background: It has been observed that the general dentists and pedodontists differ in their treatment recommendations for pulp therapy in deciduous teeth. **Aim:** To determine the knowledge and practice of pulp therapy in deciduous teeth by general dental practitioners (GDP) in two cities of southern Saudi Arabia. **Subjects and Methods:** Fifty GDP selected at random from government and private dental clinics were questioned about pulp therapy in deciduous teeth in Abha and Najran cities using a 10-item questionnaire. The data were analyzed using IBM SPSS software version 11.0 and descriptive statistics were obtained. **Results:** All 50 participants responded to the survey. Pulpotomy was suggested as the first line of treatment for pulp-exposed primary tooth by 32 respondents with 44 using Buckley's formocresol and 32 applying it on the pulp for 5 minutes. 43 respondents squeeze dried the cotton pellet before application on the pulp. In pulpectomy procedure 44 respondents preferred zinc oxide eugenol as obturation material with 22 using handheld reamers and 15 using slow-speed lentilspirals for obturation. 12 respondents used obturation techniques which had no scientific relevance. In order of preference Glass ionomer cement (GIC), silver amalgam, and stainless steel crowns were the materials of choice for final restoration of endodontically treated deciduous teeth. All 50 answered in the affirmative when asked if they would like to have additional information about pulp therapy in deciduous teeth. **Conclusion:** The study concluded that general dentists were regularly performing pulp therapy in deciduous teeth and therefore need to be frequently updated about these procedures.

Keywords: Saudi Arabia deciduous, General dentists, Pulp therapy

Introduction

The primary reason for pulp therapy in deciduous teeth is to maintain teeth in the dental arch. The clinical diagnosis depends upon the chief complaint, history of presenting complaint, past dental history and treatment taken, clinical examination, and use of radiographs. Any primary tooth with an exposed pulp has to undergo pulpotomy, pulpectomy, or extraction based on the vitality of the pulp, presence or absence of pathology, restorability, and the duration of time for normal

tooth exfoliation. The onus therefore lies on the clinician to decide the type of treatment to be done. Historically, extraction would be the least preferred treatment in a deciduous tooth where space management would be an issue.^[1] Preservation of an intact primary tooth until eruption of the permanent successors is very important in maintaining the integrity of the arch form. Pulp therapy (pulpotomy and pulpectomy) is widely used in the treatment of pediatric patients, while attempting to prevent premature exfoliation of the primary teeth. The main objective of endodontic treatment is total elimination of microorganisms from the root canal and the prevention of subsequent re-infection.^[2] The ultimate goal of endodontic obturation has remained the same for the past 50 years: To create a fluid-tight seal along the length of the root canal system, from the coronal opening to the apical termination.^[1] The clinician's main objective is to maintain the vitality of the pulp of a tooth affected by caries, traumatic injury, or other causes. The type of pulpal therapy primarily depends

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on whether the pulp is vital or non-vital, and the presence or absence of a radicular pathology.^[3]

Pulp therapy in deciduous teeth is different in the sense that the medicaments used and the obturation technique are to a large extent different from those of permanent teeth. The complex morphology of the root canal system in deciduous teeth makes it difficult to achieve proper cleansing by mechanical instrumentation and irrigation of the canals. This is achieved by careful cleaning and shaping followed by the complete obturation of the canal space. It has been observed that the general dentists and pedodontists differ in their treatment recommendations.^[4] Many a times the treatment done remains incomplete either due to the lack of knowledge of the dentist or due to non-cooperation on the part of the child. This has given rise to increased number of unnecessary extractions of deciduous teeth. Pulpotomy and pulpectomy are the two main endodontic procedures in deciduous teeth. It is therefore important that general dental practitioners (GDP) show interest in performing the two procedures, know when to refer, familiarize themselves with the pulp medicaments to be used, and do a proper final restoration.

Our institution, being the major dental center in the southern region of Saudi Arabia, receives a number of patients in the Department of Pedodontics where patients are referred to us by GDP working in private or government clinics after incomplete or improper pulp treatment or for space management after unnecessary extraction. Therefore, a preliminary survey among a selected group of general dentists in Abha and Najran cities was conducted to assess their knowledge of pulp therapy in deciduous teeth.

Subjects and Methods

A total of 50 GDP selected from government and private dental clinics in Abha and Najran were questioned for the present study using a 10-item questionnaire [Table 1]. The participants were asked to choose from the answers provided in the questionnaire. The questionnaire was provided by hand and collected the next day. All the 50 participants responded to the survey. The data were analyzed using IBM SPSS software version 11.0 and descriptive statistics were obtained.

Results

The results are presented in Table 2. The results of the present study showed that in a deciduous pulp-exposed tooth, 32/50 (64%) respondents recommended pulpotomy as the first line of treatment, 15/50 (30%) recommended pulpectomy, and 3/50 (6%) referred such cases to Pedodontists. None of the 50 respondents recommended extraction as the first line of treatment. 36/50 (72%) cited elimination of pain as the primary reason for endodontic treatment in children, whereas 11/50 (22%) thought space management should be the primary reason and 3/50 (6%) performed pulp treatment to stop further progress

of the disease. During pulpotomy procedure, 44/50 (88%) respondents used Buckley's formocresol, while 4/50 (8%) used ferric sulfate and 2/50 (4%) used gluteraldehyde. 43/50 (86%) of the respondents squeeze dried the formocresol-dipped cotton pellet before placement on the vital pulp. The application time of formocresol during pulpotomy varied among practitioners. 32/50 (64%) applied it for 5 min, 6/50 (12%) of the respondents applied for 4 min, and 12/50 (24%) of the respondents applied for 1 min only. The most frequent obturation material used by GDP in pulpectomy was zinc oxide eugenol (ZOE) 44/50 (88%), followed by calcium hydroxide 5/50 (10%) and only 1/50 (2%) used commercially available obturation pastes. Availability was cited by 35/50 (70%) respondents as the main reason for selection of ZOE as obturation material. For obturation technique of primary canals after pulpectomy, 22/50 (44%) used handheld reamers, 15/50 (30%) used slow-speed lentilspirals, 1/50 (2%) used obturation paste syringes, and 12/50 (24%) used other techniques like injecting the material into the canal with a simple hypodermic syringe or applying pressure with cotton pellets. The final restoration preferred for endodontically treated primary tooth was glass ionomer cement 15/50 (30%), 13/50 (26%) used silver amalgam, 12/50 (24%) used stainless steel crown, and 10/50 (20%) used composites. All the respondents answered in the affirmative when asked if they would like to have additional information about pulp therapy in deciduous teeth.

Discussion

The indications, objectives, and type of pulpal therapy depend on whether the pulp is vital or non-vital, based on the clinical diagnosis of normal pulp (symptom free and normally responsive to vitality testing), reversible pulpitis (pulp is capable of healing), symptomatic or asymptomatic irreversible pulpitis (vital inflamed pulp is incapable of healing), or necrotic pulp.^[3] In the present study, when asked about the first line of treatment for a tooth with pulp exposure, 32/50 (64%) of the dental practitioners recommended pulpotomy, 15/50 (30%) recommended pulpectomy, and 3/50 (6%) referred such cases to pedodontists. None of the dentists recommended extraction as the first line of treatment, which is encouraging as it reflects the awareness of the GDP about maintaining the deciduous tooth in dental arch. Even while recommending pulp therapy, pulpotomy was the treatment of choice which, though indicates a conservative approach, may not necessarily be the right approach. A study conducted in USA reported that there was some lack of consensus on the selection and application of certain treatment modalities and techniques taught for primary tooth pulp therapy in pre-doctoral dental programs.^[5] This may be the reason for the GDP suggesting various treatment modalities for deciduous teeth. 36/50 (72%) GDP cited elimination of pain as the main reason for pulp therapy; however, 11/50 (22%) chose space management which *prima facie* reflects the importance GDP attribute to retention of deciduous teeth in the dental arch till normal exfoliation takes place.^[6] This observation by the general dentists is in agreement

Table 1: Questionnaire

Questions	Pulpotomy	Pulpectomy	Refer to pedodontist	Extraction
First line of treatment for a deciduous tooth with pulp exposure				
Reason for performing endodontic treatment in deciduous tooth	Pain elimination	Space management	Prevent progress of disease	Other reasons
Materials used for pulp fixation during a pulpotomy procedure	Buckley's formocresol	Ferric sulfate	Gluteraldehyde	Other materials
How many minutes formocresol is retained on the pulp during a pulpotomy procedure?	5 min	4 min	1 min	Other times
Squeeze cotton pellet dry before placing it on the vital pulp	Yes	No		
Material used for obturation of deciduous teeth after pulpectomy	Zinc oxide eugenol	Calcium hydroxide paste	Commercially available obturation pastes	Other materials
Reason for selecting your material of choice for obturation	Availability	Ease of use	Other reasons	
Technique used for obturation of deciduous canals	Handheld reamers	Slow-speed lentulospirals	Obturation paste syringes	Other techniques
Final restoration for endodontically treated deciduous tooth	GIC	Silver amalgam	Stainless steel crown	Composites
Would you like to have additional information about pulp therapy in deciduous teeth?	Yes	No		

Table 2: Results of the study

Questions	Total no. of dentists: 50			
First line of treatment for a deciduous tooth with pulp exposure	Pulpotomy 32 (64%)	Pulpectomy 15 (30%)	Refer to pedodontist 03 (6%)	Extraction 0 (0%)
Reason for performing endodontic treatment in deciduous tooth	Pain elimination 36 (72%)	Space management 11 (22%)	Prevent progress of disease 03 (6%)	Other reasons -
Materials used for pulp fixation during a pulpotomy procedure	Buckley's formocresol 44 (88%)	Ferric sulfate 4 (8%)	Gluteraldehyde 02 (4%)	Other materials
How many minutes formocresol is retained on the pulp during a pulpotomy procedure?	5 min 32 (64%)	4 min 06 (12%)	1 min 12 (24%)	Other times
Squeeze cotton pellet dry before placing it on the vital pulp	Yes 43 (86%)	No 07 (14%)		
Material used for obturation of deciduous teeth after pulpectomy	Zinc oxide eugenol 44 (88%)	Calcium hydroxide paste 05 (10%)	Commercially available obturation pastes 01 (2%)	Other materials -
Reason for selecting your material of choice for obturation	Availability 35 (70%)	Ease of use 15 (30%)	Other reasons 0 (0%)	
Technique used for obturation of deciduous canals	Handheld reamers 22 (44%)	Slow-speed lentulospirals 15 (30%)	Obturation paste syringes 01 (2%)	Other techniques 12 (24%)
Final restoration for endodontically treated deciduous tooth	GIC 15 (30%)	Silver amalgam 13 (26%)	Stainless steel crown 12 (24%)	Composites 10 (20%)
Would you like to have additional information about pulp therapy in deciduous teeth?	Yes 50 (100%)	No 0 (0%)		

with Guidelines of American Academy of Pediatric Dentistry on management of the developing dentition and occlusion in pediatric dentistry.^[3]

A pulpotomy is performed in a carious primary tooth with

radicular pathology when caries removal results in a carious or mechanical pulp exposure.^[3] The coronal pulp is amputated and the remaining vital radicular pulp tissue surface is treated with a long-term clinically successful medicament such as Buckley's solution of formocresol or ferric sulfate with

significant success rate.^[7-10] Gluteraldehyde and calcium hydroxide have been used, but with less long-term success.^[11] Mineral Trioxide Aggregate is a more recent material used for pulpotomy with a high rate of success.^[12] In our study, during the pulpotomy procedure, 44/50 (88%) practitioners used Buckley's formocresol, while 4/50 (8%) used ferric sulfate and 2/50 (4%) used gluteraldehyde. Formocresol does seem to be the most popular among the dentists for pulp fixation. Numerous studies have tested the effectiveness of formocresol as a fixating agent and the consensus is in favor of using formocresol.^[11] The standard time to be applied on the pulp is 5 min though studies have also indicated that a 1-min application may be sufficient.^[12] In the present study, 64% of the dentists applied it for 5 min, but 24% applied it for 1 min only. This may indicate that general dentists do read the updated literature concerning this procedure. Significantly, we found that 86% of the dental practitioners did squeeze dry formocresol-dipped cotton pellet before placement on the vital pulp. Formocresol in low doses in pulpotomy is minimally significant in humans; however, studies have reported that long-term direct contact between formaldehyde and susceptible tissues leads to occurrence of cancer.^[13] Toxic effects of formocresol-paraformaldehyde containing agents have been clearly demonstrated.^[14-17] Excess amount of formocresol along with the inflammatory fluid may dissipate to local regional vascular vessels, resulting in systemic distribution of formaldehyde.^[18,19] Therefore, the fact that majority of GDP squeeze dry the cotton pellet before application on the pulp is a very significant finding.

Pulpectomy is a root canal procedure for pulp tissue that is irreversibly infected or necrotic due to caries or trauma. The root canals are debrided and shaped with hand or rotary files. After proper irrigation, the canals are obturated using a resorbable material such as non-reinforced ZOE, iodoform-based paste, and commercially available obturation pastes.^[2] Then, the tooth is restored with a restoration that seals the tooth from coronal leakage. In the present study, we were only interested in knowing the obturation material and the technique that dentists favored for deciduous teeth. The most frequent obturation material used by the dental practitioners in pulpectomy was ZOE 44/50 (88%), followed by calcium hydroxide paste 5/50 (10%), 1/50 (2%) used commercially available obturation pastes. ZOE may be the most popular, but success rate with the material is not very good.^[20] Other studies have suggested no advantages of alternate materials over ZOE.^[3] However, the dentists cited ease of availability as the main reason for the selection of ZOE. Therefore, the use of ZOE may be acceptable, but the use of commercially available pastes like Metapex and Vitapex should be encouraged as both show higher success rates in the long run.^[11] The most frequently used obturation technique was the use of handheld reamers, while slow-speed lentulospirals also seemed to be well used. However, commercially available obturation syringes were used by very few dentists. As far as the quality of obturation and success rate of the treatment done is concerned, a review of literature shows no significant difference between the use

of lentulospirals with slow-speed handpiece and the handheld technique.^[20] Surprisingly, some dentists used hypodermic syringes and pressure by cotton pellets to obturate deciduous canals. This can be attributed either to deficient equipment or to lack of expertise. The role of the final restoration of pulp-treated primary molars as a contributing factor to failure of the endodontic treatment gained only little attention in the dental literature. Stainless steel crowns may be the best choice for restoration of endodontically treated deciduous teeth.^[21] In our study, the final restoration preferred for endodontically treated primary tooth was reinforced GIC 15/50 (30%), silver amalgam 13/50 (26%), stainless steel crown 12/50 (24%) and composite resin 10/50 (20%). The relatively minimal use of stainless steel crowns may be due to lack of expertise among general dentists. GIC may have been used due to ease of use and easy availability.

Conclusion

It can be concluded from the study that most of the GDP were regularly performing pulp therapy in deciduous teeth. The GDP, however, need to understand that pulp therapy treatment of deciduous teeth has to be based on the chief complaint, history of presenting complaint, past dental history and treatment taken, clinical examination, and use of radiographs. The use of formocresol as a fixation agent has to be done judiciously and use of commercially available obturation pastes has to be encouraged. The GDP need regular updates on pulp therapy in deciduous teeth.

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References

1. Garcia-Godoy F. Evaluation of an iodoform paste in root canal therapy for infected primary teeth. *ASDC J Dent Child* 1987;54:30-4.
2. Praveen P, Anantharaj A, Venkataraghavan K, Rani P, Sudhir R, Jaya AR. A review of obturating materials for primary tooth. *Streamdent* 2011;2:42-4.
3. Guideline on Pulp Therapy for Primary and Immature Permanent Teeth. *AAPD Reference Manual* 2011-12;33:212-9.
4. Hanes CM, Myers DR, Dushku JC, Barenei JT. A comparison of general dentists' and pediatric dentists' treatment recommendations for primary teeth. *Pediatr Dent* 1991;13:344-8.
5. Primosch RE, Glomb TA, Jerrell RG. Primary tooth pulp therapy as taught in pre-doctoral pediatric dental programs in the United States. *Pediatr Dent* 1997;19:118-22.
6. Breakspear EK. Sequelae of early loss of deciduous molars. *Dent Rec (London)* 1951;71:127-34.
7. Smith NL, Seale NS, Nunn ME. Ferric sulfate pulpotomy in primary molars: A retrospective study. *Pediatr Dent* 2000;22:192-9.
8. Ibrićević H, Al-Jame Q. Ferric sulphate pulpotomy in primary molars: Long term follow-up study. *Eur J Paediatr Dent* 2003;4:28-32.

9. Loh A, O'Hoy P, Tran X, Charles R, Hughes A, Kubo K, *et al.* Evidence-Based assessment: Evaluation of the formocresol versus ferric sulphate primary molar pulpotomy. *Pediatr Dent* 2004;26:401-9.
10. Markovic D, Zivojinovic V, Vucetic M. Evaluation of three pulpotomy medicaments in primary teeth. *Eur J Paediatr Dent* 2005;6:133-8.
11. Huth KC, Paschos E, Hajek-Al-Khatat N, Hollweck R, Crispin A, Hickel R, *et al.* Effectiveness of 4 pulpotomy techniques- Randomized controlled trial. *J Dent Res* 2005;84:1144-8.
12. Naik S, Hegde AH. Mineral trioxide aggregate as a pulpotomy agent in primary molars: An *in vivo* study. *J Indian Soc Pedod Prev Dent* 2005;23:13-6.
13. Cogliano VJ, *et al.* Meeting Report: Summary of IARC Monographs on Formaldehyde, 2-Butoxyethanol, and 1-tert-Butoxy-2-Propanol. *Environ Health Perspect.* 2005 ; 113:1205-8.
14. Antrim DD. Evaluation of the cyto toxicity of root canal sealing agents on tissue culture cells *in vitro*: Grossman's sealer, N2 (permanent), Rickert's sealer and cavit. *J Endod* 1976;2:111-6.
15. Arzt AH. The sargenti N2 Root canal Treatment. *Clin Prev Dent* 1981;3:27.
16. Garcia-Godoy F. Penetration and pulpal response by two concentration of formocresol using two methods of application. *J Pedod* 1981;5:102-35.
17. Ranly DM, Garcia-Godoy F. Reviewing Pulp Treatment for Primary Teeth. *J Am Dent Assoc* 1991;122:83-5.
18. Block RM, Lewis RD, Coffey J, Hirsch J, Langeland K. Histopathologic and Systemic Distribution of 14-C Paraformaldehyde incorporated within formocresol following pulpotomies in dogs. *J Endod* 1983;9:176-89.
19. Myers DR, Pashley DH, Whitford GM, McKinney RV. Tissue changes induced by the absorption of formocresol following pulpotomy sites in dogs. *Pedia Dent* 1983;5:6-8.
20. Bawazir OA, Salama FS. Clinical evaluation of root canal obturation methods in Primary Teeth. *Pediatr Dent* 2006;28:39-47.
21. Holan G, Fuks AB, Ketzl N. Success rate of formocresol pulpotomy in primary molars restored with Stainless Steel vs Amalgam. *Pediatr Dent* 2002;24:212-6.

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