

Original Research

Preference for vital pulp therapy vs conventional RCT among doctors of different specialities- A questionnaire based survey

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ABSTRACT:

Aim: The aim of this study was to investigate dentists' options of treatments (TO) and materials (MO) used to manage exposed pulps that occur during deep caries removal in asymptomatic permanent teeth, and how background characteristics of dentists influence these options. **Material and Methods:** A web-based questionnaire was constructed and distributed randomly. The questionnaire investigated background characteristics, TO (direct pulp capping [DPC], root canal treatment [RCT], and partial and full pulpotomies) and MO (calcium hydroxide, TheraCal, MTA, and Biodentine). **Results:** Gender was statistically significantly related to the preference of treatment options ($p = 0.04$), and no statistically significant difference was found between females and males ($p > 0.05$). Only FP was preferred by males (4.3%) significantly more than by females (0%) ($p = 0.0096$). **Conclusion:** Vital pulp therapy and the use of MTA or Biodentine to manage exposed pulps are not performed routinely by general dental practitioners, non-academician, females, and dentists with bachelor's degrees in dental surgery.

Keywords: root canal treatment, MTA, direct pulp capping, GDPs, exposed pulps

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INTRODUCTION

The treatment of deep dentin caries is a daily practice for most dentists worldwide. However, there is no consensus in the dental profession regarding the best practice protocol or materials in the event of pulp exposure during management of deep carious lesions (DCL). Pulp exposure may occur during excavation of deep carious tissue. There are several options to manage this event, such as pulpectomy, followed by root canal treatment (RCT), which is considered the possible treatment of choice for permanent teeth with a success rate of 86-93%.¹

Management of vital permanent teeth with carious pulp exposure is controversial. Traditionally, pulpectomy has been considered as a reliable treatment providing high successful outcomes.² However, the complete removal of vital pulp tissue causes the loss of the proprioception function resulting in the higher incidence of tooth and/or root fracture of endodontically treated teeth in comparison to vital teeth.³ Alternatively, vital pulp therapy,

namely direct pulp capping, partial pulpotomy, or full pulpotomy has been shown to provide successful outcomes in vital permanent teeth with carious pulp exposure.⁴

Similarly, in the management of DCL, pre-operative CBCT significantly identified a higher number of periapical radiolucency in teeth with symptoms of reversible pulpitis compared with periapical radiographs,⁵ indicating a high prevalence of periapical lesions. In addition, RCT weakens tooth structure and consumes efforts, equipment, time, and money.⁶ All these can be maintained by providing the vitality of the pulp, which ensures keeping a protective damping effect, proprioceptive function, and tooth sensitivity that is definitely lost after RCT.⁷ Vital pulp therapies (VPT) aim to maintain pulp vitality, including direct pulp capping (DPC), partial pulpotomy (PP), and full pulpotomy (FP). Outcomes of VPT reported by studies showed various figures, DPC (placement of a medicament directly over a small exposure) with calcium hydroxide had a 35%

success rate after one year and low pulp survival after 5-10 years ^{8,9}compared with another study showing high success rate of using MTA as a DPC agent.¹⁰ PP and FP, which involve either partial or full removal of inflamed coronal pulp tissue beneath the exposure before placement of medicament, maintained a high success rate of up to 99.4% and 99.3% after 3 years.¹¹ Therefore, the aim of this study was to investigate treatments and materials used to manage exposed pulps, and how the respondents' background characteristics (sex, years of experience, qualification, specialty, place of work, employment time, country of qualification, and working in academia) influence these choices. The null hypothesis stated that there is no difference in the preference of first VPT vs. RCT, secondly calcium silicate cements vs. calcium hydroxide in the management of exposed pulps after deep carious tissue excavation in asymptomatic teeth.

MATERIALS AND METHODS

A web-based questionnaire was designed and piloted through staff members.

The online questionnaire was constructed using Google form, and the questionnaire was composed of five sections, including:

- 1) A section constructed as a cover letter explaining the purpose of the questionnaire and emphasis on anonymity.
- 2) To investigate demographic, background data of participants, including sex, years of work experience (< 5 years, 5-10 years, 10-20 years, and > 20 years of experience), dental qualification (Bachelor of Dental Surgery [BDS], Master of Dental Surgery [MDS], and Doctor of Philosophy [PhD]), specialty (endodontist, general dental practitioner [GDP], and other specialties), place of work (private or public

sector), employment time (part-time or full-time), working in academia (yes or no), and country of qualification (Iraq or abroad).

- 3) To investigate the choice of treatment for exposed pulps during excavation of deep carious tissue in asymptomatic teeth (RCT, DPC, PP, and FP, and treatment depending on the size of pulp exposure).
- 4) To investigate the material of choice for exposed pulps (calcium hydroxide – Ca(OH)₂, MTA, TheraCal, and Biodentine).
- 5) To examine reasons for not using MTA or Biodentine for VPT, which included none, difficult to handle, cost, lack of apparent advantage, deficiency in training, never come across, or time-consuming.

The questionnaire was sent electronically via social media with respondents completing the form anonymously.

The issue with respondents making more than one entry was excluded by using an IP-protection protocol. Respondents were asked to choose one suitable answer for each question. The questionnaire was available from May, 13th, 2019 to July, 13th, 2019. Responses in Google form were gathered and linked to an Excel sheet. The collected data were analyzed using statistical package SPSS v. 26 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were given as frequencies (n) and percentage (%). c² test and z test were applied to investigate the influence of background characteristics on the preferences of the treatment/ material options in management of exposed pulps. If Pearson c² value was significant, the background characteristic variable was chosen as an independent variable for binary multivariate logistic regression analysis.

Through this, odds ratios (OR) and their confidence intervals (CI) were calculated.

RESULTS

Table 1: Background characteristics of respondents in the study

Categories	N
Sex	
Males	150 (42.86%)
Females	200 (57.14%)
Years of experience	
<5 years	100 (28.57%)
5-10 years	90 (25.71%)
10-20 years	80 (22.85%)
>20 years	80 (22.85%)
Qualification	
BDS	200 (57.14%)
MDS	150 (42.86%)
Employment time	
Full time	250 (71.42%)
Part time	100 (28.58%)
Place of work	
Private	100 (28.58%)
Public	250 (71.42%)

Gender was statistically significantly related to the preference of treatment options ($p = 0.04$), and no statistically significant difference was found between females and males ($p > 0.05$). Only FP was preferred by males (4.3%) significantly more than by females (0%) ($p = 0.0096$). Years of experience of the respondents were statistically significantly associated with the preference of treatment options ($p < 0.001$).

RCT was preferred by respondents with < 5 years of experience ($n = 66$, 53.7%) more frequently than those with more than 20 years of experience ($n = 24$, 36.4%) ($p = 0.023$). Also, FP was preferred by respondents with more than 20 years of experience more frequently than those with < 5 years (0%), 5-10 years (0%), and 10-20 years (0%) of work experience ($p < 0.05$), respectively.

Table 2: Frequencies and percentage of responses for treatment/ material options used in the management of exposed pulps in asymptomatic teeth

Treatment options	N	Material type	N
Direct pulp capping	120	Ca(OH) ₂	120
Root canal treatment	100	TheraCal	100
Partial pulpotomy	40	MTA	70
Full pulpotomy	40	Biodentine	60
Depending on the size of pulp exposure	50	Total	350
Total	350		

DISCUSSION

Web-based questionnaire survey has been considered as an effective and economical tool to collect information from a large group of targeted participants.¹² One of the uncontrollable factors of the web-based survey is the response of the participants.

The decision-making process consists of three phases: diagnosis, decision about intervention and the selection of a treatment. All dentists may not make the same decision when faced with the same clinical situation, especially where there is uncertainty or disagreement concerning the most effective approaches for treatment.¹³

Logically, the accuracy of the diagnosis can be influenced by the clinical skills and knowledge of the clinicians. An understanding of the disease, knowledge of the current concept of treatment, and the clinical skills and the experiences including the attitude of the practitioners may all influence the selection of treatment procedures. This illustrates the complexity of influence factors on treatment decisions, which is difficult to simulate in a questionnaire.

Moreover, the provided data in the questionnaire is the one-way message from the researcher to the participants, which is different from two-way communication between clinicians and patients in clinical practices. To assure accurate diagnosis and proper treatment procedure in clinical practice, dentists can perform additional tests and discuss treatment options with patients. It is possible that treatment decisions from the survey questionnaires may not be identical to the clinical decisions. Therefore, interpretation of the survey data should be performed with caution. In this study, the rationale to divide responders into various groups was to classify responders into skillful, experienced, level of education and knowledge-updated groups. The selected range of numbers were based on the authors' assumption. Interpretation of the results should be based on this limitation.

The present cross-sectional study found that the decision on the treatment option for pulp exposure in asymptomatic teeth was nearly comparable between DPC and RCT; therefore, the first null hypothesis was accepted. However, the frequency for choosing calcium silicate-based cement in comparison with Ca(OH)₂ was higher, thus the second hypothesis was rejected. All management options were defined in the e-questionnaire to reduce the chances of misinterpretation. A limitation of this study is that only dentists who felt confident to answer have participated. Also, access to the e-questionnaire was restricted to professionals who do not use social media. Dental professionals were targeted using social media platforms because of the wide use, and rapid and effective sharing of information that could be achieved.¹⁴

In addition, a recent systematic review concluded that FP is effective in managing DCL in teeth with signs and symptoms indicative of irreversible pulpitis, with clinical and radiographic success rated as 97.4% and 95.4%, respectively, after one-year follow-up.¹⁵

Dycal® Calcium Hydroxide Liner is a two-component, rigid-setting, self-curing material designed for use in direct and indirect pulp capping and as a protective liner under dental adhesives, varnishes, filling materials, cements, and other base materials. It will not inhibit the polymerization of acrylic and composite restorations.

It was reported that Dycal compared with Biodentine released a lower amount of calcium ions, and there was no calcium hydroxide formation during the hydration reaction.¹⁶ The clinical and radiographic outcomes of primary teeth with exposed pulps capped with Dycal versus MTA were comparable after 12 months.¹⁷ However, a study found that Dycal performed inferiorly to Biodentine and MTA in terms of clinical and histological outcomes, when used in a partial pulpotomy.¹⁸

Dycal is associated with incomplete dentin bridge formation over exposed pulp capped with it. MTA

and Biodentine have been proposed recently as the material of choice for VPT instead of Ca(OH)₂ because of superior clinical and radiographical performance in exposed pulps compared with Ca(OH)₂.¹⁹ It has been found that there is no difference in clinical success rate between MTA and Biodentine when used as pulp capping materials in DPC and PP after 3 years follow-up.²⁰ Although cost-effectiveness analysis reported that DPC with Ca(OH)₂ was cost-effective compared with DPC with MTA,²¹ the cost was the second main reason stated by 28.9% of respondents for not using MTA or Biodentine as a pulp capping material for exposed pulps in this study. MTA was chosen by 21% of respondents, which is a higher rate than that reported its' use in another survey study in Spain (8%).²²

CONCLUSIONS

There is no consensus on the best management of asymptomatic exposed pulps after deep caries excavation. In the present study, Dycal was the most preferred material for vital pulp therapies. Vital pulp therapies in the management of exposed pulps in asymptomatic permanent teeth are not common in clinical practice. There is no uniform treatment preference of vital permanent teeth with carious pulp exposure. Treatment decisions were influenced by clinical signs and symptoms, and the stage of root development. Various factors from dentists including age, gender, clinical experiences and postgraduate education affected their decision making. Clinical practice guidelines of vital immature teeth with carious pulp exposure is needed to assist dentist decisions about appropriate treatment.

REFERENCES

1. Ng YL, Mann V, Gulabivala K. Tooth survival following non-surgical root canal treatment: a systematic review of the literature. *International endodontic journal*. 2010 Mar;43(3):171-89.
2. Caplan DJ, Cai J, Yin G, White BA. Root canal filled versus non-root canal filled teeth: a retrospective comparison of survival times. *J Public Health Dent* 2005;65(2):90-6.
3. Aguilar P, Linsuwanont P. Vital pulp therapy in vital permanent teeth with cariously exposed pulp: a systematic review. *J Endod* 2011;37(5):581-7.
4. Glickman GN. AAE consensus conference on diagnostic terminology: background and perspectives. *J Endod* 2009;35(12):1619-20.
5. Ali AH, Koller G, Foschi F, Andiappan M, Bruce KD, Banerjee A, Mannocci F. Self-limiting versus conventional caries removal: a randomized clinical trial. *Journal of dental research*. 2018 Oct;97(11):1207-13.
6. Zelic K, Vukicevic A, Jovicic G, Aleksandrovic S, Filipovic N, Djuric M. Mechanical weakening of devitalized teeth: three-dimensional Finite Element Analysis and prediction of tooth fracture. *International Endodontic Journal*. 2015 Sep;48(9):850-63.
7. Ou KL, Chang CC, Chang WJ, Lin CT, Chang KJ, Huang HM. Effect of damping properties on fracture resistance of root filled premolar teeth: a dynamic finite element analysis. *International endodontic journal*. 2009 Aug;42(8):694-704.
8. Barthel CR, Rosenkranz B, Leuenberg A, Roulet JF. Pulp capping of carious exposures: treatment outcome after 5 and 10 years: a retrospective study. *Journal of Endodontics*. 2000 Sep 1;26(9):525-8.
9. Bjørndal L, Reit C, Bruun G, Markvart M, Kjældgaard M, Näsman P, Thordrup M, Dige I, Nyvad B, Fransson H, Lager A. Treatment of deep caries lesions in adults: randomized clinical trials comparing stepwise vs. direct complete excavation, and direct pulp capping vs. partial pulpotomy. *European journal of oral sciences*. 2010 Jun;118(3):290-7.
10. Bogen G, Kim JS, Bakland LK. Direct pulp capping with mineral trioxide aggregate: an observational study. *The Journal of the American Dental Association*. 2008 Mar 1;139(3):305-15.
11. Aguilar P, Linsuwanont P. Vital pulp therapy in vital permanent teeth with cariously exposed pulp: a systematic review. *Journal of endodontics*. 2011 May 1;37(5):581-7.
12. Hardigan PC, Succar CT, Fleisher JM. An analysis of responder rate and economic costs between mail and web-based surveys among practicing dentists: a randomized trial. *J Community Health* 2012;37(2):383-94.
13. Bader JD, Shugars DA. Variation in dentists' clinical decisions. *J Public Health Dent* 1995;55(3):181-8.
14. Boyd DM, Ellison NB. Social network sites: Definition, history, and scholarship. *Journal of computer-mediated Communication*. 2007 Oct;13(1):210-30.
15. Cushley S, Duncan HF, Lappin MJ, Tomson PL, Lundy FT, Cooper P, Clarke M, El Karim IA. Pulpotomy for mature carious teeth with symptoms of irreversible pulpitis: a systematic review. *Journal of Dentistry*. 2019 Sep 1;88:103158.
16. Camilleri J. Hydration characteristics of Biodentine and TheraCal used as pulp capping materials. *Dental Materials*. 2014 Jul 1;30(7):709-15.
17. Erfanparast L, Iranparvar P, Vafaei A. Direct pulp capping in primary molars using a resin-modified Portland cement-based material (TheraCal) compared to MTA with 12-month follow-up: a randomized clinical trial. *European Archives of Paediatric Dentistry*. 2018 Jun;19(3):197-203.
18. Bakhtiar H, Nekoofar MH, Aminishakib P, Abedi F, Moosavi FN, Esnaashari E, Azizi A, Esmailian S, Ellini MR, Mesgarzadeh V, Sezavar M. Human pulp responses to partial pulpotomy treatment with TheraCal as compared with Biodentine and ProRoot MTA: a clinical trial. *Journal of endodontics*. 2017 Nov 1;43(11):1786-91.
19. Hilton TJ, Ferracane JL, Mancl L. Northwest Practice-based Research Collaborative in Evidence-based Dentistry (NWP). Comparison of CaOH with MTA for direct pulp capping: a PBRN randomized clinical trial. *Journal of dental research*. 2013 Jul;92(7_suppl):S16-22.
20. Awawdeh L, Al-Qudah A, Hamouri H, Chakra RJ. Outcomes of vital pulp therapy using mineral trioxide aggregate or biodentine: a prospective randomized clinical trial. *Journal of endodontics*. 2018 Nov 1;44(11):1603-9.
21. Schwendicke F, Brouwer F, Stolpe M. Calcium hydroxide versus mineral trioxide aggregate for direct

- pulp capping: a cost-effectiveness analysis. *Journal of endodontics*. 2015 Dec 1;41(12):1969-74.
22. Crespo-Gallardo I, Hay-Levytska O, Martín-González J, Jiménez-Sánchez MC, Sánchez-Domínguez B, Segura-Egea JJ. Criteria and treatment decisions in the management of deep caries lesions: Is there endodontic overtreatment?. *Journal of Clinical and Experimental Dentistry*. 2018 Aug;10(8):e751.