An investigation of primary molar vital pulp therapy

An investigation of the relative efficacy of Buckley's Formocresol and calcium hydroxide in primary molar vital pulp therapy P. J. Waterhouse, J. H. Nunn and J.M. Whitworth *Br Dent J* 2000; 188: 32-36

Objective

To compare the clinical and radiological outcomes following two different, single visit vital pulp therapy techniques, in cariously exposed primary molar teeth.

Setting

A paediatric dental clinic within the Dental Hospital, Newcastle upon Tyne, UK.

Subjects

Fifty two child patients were sequentially enrolled in the clinical investigation, 26 males and 26 females with an age range of 3.3–12.5 years. Primary molar teeth requiring vital pulp therapy were randomly allocated to either the formocresol group (F) or the calcium hydroxide group (C). The total number of teeth treated was 84.

Design

Recruitment was on the basis of strict inclusion criteria. Coronal pulp amputation was prescribed only in teeth with vital, cariously-exposed pulp tissue. Treatment was undertaken between October 1994 and December 1996. All cases were reviewed using predefined clinical and radiological criteria. The statistical tests used were logistic regression of a triple nested data structure, chi-squared analysis of equality of treatment and probability of success with relation to subject age.

Results

Eighty four cariously-exposed primary molars required vital pulp therapy. Forty six (55%) teeth were included in the F group and 38 (45%) allocated to the C group. Five teeth were lost to follow-up, leaving 79 teeth: forty four (56%) in group F and 35 (44%) in group C. Eighty four per cent (37/44) of teeth treated with

formocresol and 77% (27/35) treated with calcium hydroxide were classed as clinically and radiographically successful at the cut-off date, December 1997, after a mean clinical review of 22.5 months (range 6.1–38.5 months) and a mean radiographic review of 18.9 months (range 1.3–36.9 months).

Conclusion

This investigation confirms the clinical efficacy of a one-fifth dilution of Buckley's Formocresol as an agent in pulp treatment of cariously exposed, vital primary molar teeth. However, calcium hydroxide in its pure, powder form is a clinically acceptable alternative when combined with strict selection criteria for this method of restorative care. There was a statistically insignificant difference in successful clinical and radiological outcome between the two treatment groups. Success was unrelated to the duration of time taken to achieve haemostasis and the presence or absence of bleeding after placement of the medicament.

In brief

- Buckley's Formocresol (dilute solution) is presently advocated for primary vital pulp therapy.
- Alternatives to formocresol have been sought, because of its reported toxicity.
- In this study, calcium hydroxide powder (99% pure) appeared to be a suitable alternative to formocresol. However, the inclusion criteria used in this study were stringent.
- The authors recommend further comparative studies to consolidate the data.

Comment

The use of formocresol in paediatric dentistry has caused concern for many years. In 1980 Pashley *et al.* reported their findings that formocresol is absorbed and distributed rapidly and widely throughout the body within minutes of being placed on a pulpotomy site.¹ In 1981 Lewis and Chestner reported that formocresol was both mutagenic and carcinogenic.² Part of the conclusion of their paper read: 'There is a need to re-evaluate the rationale and use of formocresol in dentistry'. Many papers have been published on the subject since that time, yet the treatment continues to be taught and practised.

The authors of this paper are therefore to be congratulated for showing, in a carefully controlled experiment on 84 teeth in 52 children, that virtually the same success in pulpotomy treatment can be obtained by the careful use of calcium hydroxide. Eighty-four per cent of the formocresol group, and 77% of the calcium hydroxide group, were classed as clinically and radiographically successful at the end of

the research period.

Papers submitted to scientific journals are subject to peer review, a process which must remain confidential. Thus the reports of the reviewers, their comments, questions and concerns, are never seen by the journal reader. Providing a summary of a paper is slightly different. Not only does the writer have the opportunity to précis the paper for the busy clinician, but also to pose questions which may be considered by both the authors and the readers.

The essence of any pulp capping or pulpotomy procedure has to be the maintenance of a sterile field during and after treatment. Bacterial contamination, especially via saliva, will certainly compromise the prognosis. Yet again, as in so many aspects of restorative dentistry, the work of Kakehashi *et al.* is seminal.³ Thus there are two further aspects of the work reported in this paper that are of considerable interest. First, were the results in any way related to those cases where it was or was not possible to place a rubber

dam? And second, were they related to the provision of either an amalgam or a compomer restoration, given the known anti-bacterial properties and superior cavity sealing of the latter?

As an endodontist and a parent, I sincerely hope that this paper will be widely referred to, and will lead to the abandonment of an outdated technique which has been called into question for so long.

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- 1 Pashley B L, Myers D R, Pashley D H, Whitford G M. Systemic distribution of ¹⁴C formaldehyde from formocresol treated pulpotomy sites. *J Dent Res* 1980; 59: 602-607.
- 2 Lewis B B, Chestner S H. Formaldehyde in dentistry: a review of mutagenic and carcinogenic potential. *J Am Dent Assoc* 1981; 103: 429-434.
- 3 Kakehashi S, Stanley H R, Fitzgerald R J. The effects of surgical exposures of dental pulps in germ free and conventional laboratory rats. *Oral Surg, Oral Med, Oral Pathology* 1965; 20: 340-349.