

Evaluation of Zinc Oxide Eugenol and Vitapex for Carrying Out Endodontic Therapy of Necrotic Primary Teeth

Nishu Vakil^{1*}, Abhishek Singh², Virender K Chhoker³, Rajesh DR⁴, Sana Tafseer⁵, Shakir Ali⁶

¹Department of Periodontology, Indira Gandhi Government Dental College, Jammu and Kashmir 180012, India

²Department of Community Medicine, SHKM Government Medical College, Mewat, Nalhar, Haryana 122107, India

³Professor and Head, Department of Forensic Medicine, Santosh Medical College, Ghaziabad

⁴Department of Forensic Medicine, Indira Gandhi Medical College, Kathirkamam, Puducherry, 605009, India

⁵Department of Pharmacology, Al-Falah School of Medical Sciences, Al Falah university Campus, Dhauj, Haryana 121004, India

⁶Casualty Medical Officer, SHKM Government Medical College, Mewat, Nalhar, Haryana 122107, India

*Corresponding author: Dr. Nishu Vakil

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Abstract

Background: Various root canal filling materials for primary teeth have been used from time to time; the most commonly used and readily available materials are zinc oxide eugenol and Vitapex. **Aim:** We conducted this study with the aim of comparing the effect of Zinc oxide eugenol and Vitapex for carrying out endodontic therapy of necrotic primary teeth. **Methods:** Study was performed on 165 teeth. Clinical and radiographic assessment of the patients was done pre-operatively. In the zinc oxide eugenol group, paste was prepared and paper points covered with the material were used to coat the root canal walls. In the Vitapex group, the premixed paste was packaged in a syringe with a number of disposable tips. **Results:** On pre-operative clinical and radiographic assessment of 165 teeth, pain was found among 116 (70.3%), bone radiolucency 90 (54.5%), abnormal mobility 75 (45.5%) subjects. Swelling outside the oral cavity was seen in least 31 (18.8%) number of subjects. Among subjects in which Zinc oxide eugenol was used, 31 (18.8%) subjects showed short fillings while in cases where Vitapex was used, 9.7 percent showed short fillings. **Conclusion:** Premixed calcium hydroxide and iodoform paste (Vitapex) offered as a healthy choice as a filling material following pulpectomy in primary non-vital teeth as compared to zinc oxide eugenol.

Keywords: Zinc oxide eugenol, pain relief, Vitapex, primary teeth.

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INTRODUCTION

A key determinant of root canal treatment of the primary teeth depends upon the root canal material should resorb at the same rate as the physiologic resorption of the roots; the other factors are that the root canal material should be radiopaque, nontoxic to the periapical tissue and tooth germ, easy to insert, and non-shrinkable; it should also have disinfectant properties [1]. Endodontic treatment of primary teeth is more challenging than that of their permanent counterparts probably due to anatomical complexities of their root canal systems along with other factors [2].

Various root canal filling materials for primary teeth have been used from time to time; the most commonly used and readily available materials are zinc oxide eugenol and Vitapex. Zinc oxide eugenol has a slow rate of resorption and has a tendency to be retained even after tooth exfoliation; in some cases unresorbed material has been found to cause deflection of the succedaneous tooth [3, 4]. Another material being used is a premixed calcium hydroxide and iodoform paste

(Vitapex) and is claimed to be a nearly ideal root canal filling material for primary teeth. The combination of antibacterial, resorbable, and tissue compatible properties make it feasible for use in primary teeth [5, 6].

Zinc oxide and eugenol paste was the first root canal filling material to be recommended for primary teeth. Another material Vitapex is claimed to be a nearly ideal root canal filling material for primary teeth [7, 8]. Keeping above facts in mind, we conducted this study with the aim of comparing the effect of Zinc oxide eugenol and Vitapex for carrying out endodontic therapy of necrotic primary teeth.

METHODS

The study was conducted at a tertiary care teaching dental hospital of northern India. Study was performed on 165 teeth. Assessment of the patients was performed pre-operatively. The presence of soft-tissue abscesses or sinus tracts around the tooth; evidence of pathologic processes on the radiographs, ranging from slight thinning of the trabecular pattern to large areas of

radiolucency in the furcation and/or periapical region; or little or no pulp tissue remaining when the pulp chamber was entered were the inclusion criteria. Exclusion criteria were teeth not restorable, patients with significant medical problems.

Treatment for each of the teeth was planned to cover in two visits. At the first appointment, a complete pulpotomy was performed. Efforts were made to remove all necrotic tissue from the pulp chamber using a sharp spoon excavator before irrigation with normal saline. A formocresol-moistened cotton pledget was then placed in the pulp chamber and sealed with Zinc-Oxide BP as temporary restoration. At the second visit, which was usually 1-2 weeks later, and before entering to the root canals, the length of the tooth from the mesial or distal cusp to the apex of the root was measured on the radiograph.

All the cases were divided into two study groups. In the zinc oxide eugenol group, a homogenous and thin mix of zinc oxide eugenol paste was prepared and paper points covered with the material were used to coat the root canal walls. In the Vitapex group, the premixed paste was packaged in a syringe with a number of disposable tips. When the root canals were judged to be well filled, periapical radiographs were

taken to assess the adequacy of fillings. All the clinical and radiographic details at various time intervals of the follow-up were recorded.

Written and informed consent was obtained from study subjects. Permission of ethical committee was obtained from the Institutional Ethics Committee. All the questionnaires were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 21 (IBM, Chicago, USA). Chi square and one way ANOVA test was used for the assessment of level of significance. The results were expressed using appropriate statistical variables.

RESULTS

On pre-operative clinical and radiographic assessment of 165 teeth, pain was found among 116 (70.3%), bone radiolucency 90 (54.5%), abnormal mobility 75 (45.5%) subjects. Swelling outside the oral cavity was seen in least 31 (18.8%) number of subjects. Intra oral swelling was seen among 50 (30.3%) subjects (Table-1).

Table-1: Pattern of clinical and radiographic findings pre-operatively among study subjects

Clinical Finding	N	%age
Pain	116	70.3
Bone radiolucency	90	54.5
Abnormal mobility	75	45.5
Fistula	63	38.2
Intra oral swelling	50	30.3
Swelling outside the oral cavity	31	18.8

Among subjects in which Zinc oxide eugenol was used, 31 (18.8%) subjects showed short fillings while in cases where Vitapex was used, 9.7 percent showed short fillings. Similarly among subjects in which

Zinc oxide eugenol was used, 24 (14.5%) subjects showed long fillings whereas in cases where Vitapex was used, 18.2 percent showed long fillings (Table-2).

Table-2: Group wise post-operative assessment of endodontic treatment among study subjects

Variable		Zinc oxide eugenol	Vitapex
Short filling	N	31	16
	%	18.8	9.7
Complete fill	N	42	37
	%	25.5	22.4
Long fill	N	24	30
	%	14.5	18.2

DISCUSSION

Zinc oxide and eugenol paste was the first root canal filling material to be recommended for primary teeth, as described by Sweet in 1930 [9]. Since then, several authors have reported moderate to high success rates in preserving chronically infected teeth using this

material. Zinc oxide eugenol has a slow rate of resorption and has a tendency to be retained even after tooth exfoliation; in some cases unresorbed material has been found to cause deflection of the succedaneous tooth [10].

Zinc oxide eugenol has also been used in combination with different fixative agents, viz, formaldehyde, formocresol, paraformaldehyde, and cresol, all of which have inherent cytotoxicity apart from other drawbacks. Calcium hydroxide, despite its antiseptic and osteoinductive properties, has a tendency to get depleted from the canals earlier than the physiologic is commercially available as KRI and contains iodoform, camphor, para-chlorophenol, and menthol. Iodoform paste in combination with Zinc oxide is available as Maisto's paste which, in addition to the above- mentioned constituents, also contains thymol and lanolin [11]. Iodoform paste in combination with calcium hydroxide has also been used; it is commercially available as Vitapex and Metapex. These iodoform-containing products resorb if inadvertently pushed beyond the apex, but the rate of resorption of the material from within the canals is faster than the rate of physiological root resorption [12].

Another root canal filling material - a mixture of iodoform, calcium hydroxide, and zinc oxide is commercially available as Endoflas; in addition, it has eugenol (triiodomethane, Zinc oxide, calcium hydroxide, barium sulphate, and iodine dibutylortho-cresol, with the liquid consisting of eugenol and paramonochlorophenol). It is reported to resorb when extruded beyond the apex but resists resorption intraradicularly [13].

Eugenol, one of its constituents, is known to cause periapical irritation. However, there is a questionable safety with the use of iodoform or its combinations because of reports of allergic reactions to iodine in some individuals. It also has the drawback of causing discoloration of the teeth. Moreover, a few studies have shown that iodoform is irritating to the periapical tissues and can cause cemental necrosis [14]. In addition, bismuth iodoform paste has been reported to cause encephalopathy when used as wound dressing following head and neck surgery. Besides these materials, various iodoform-based root canal filling materials are currently in use [15].

Another study [16] evaluated both clinically and radiographically, the efficacy of zinc oxide eugenol and Metapex as root canal filling material in primary teeth. Forty-two necrotic primary teeth in two groups of children in the age group of 4-7 years were obturated with Zinc oxide eugenol and Metapex and were followed up clinically and radiographically for a period of 6 months postoperatively. The overall success rates of Zinc oxide eugenol and Metapex were 85.71% and 90.48%, respectively. Both Zinc oxide eugenol and Metapex gave encouraging results; however, Metapex can be used more safely whenever there is a doubt about the patient's return for follow-up.

Pinto *et al.*, [17] compared clinically and radiographically the use of zinc oxide and eugenol

cement and a commercial calcium hydroxide and polyethylene glycol-based paste thickened with zinc oxide as root canal-filling materials for primary teeth with pulp necrosis secondary to trauma within 18months of follow up. Eighteen months after treatment, the teeth obturated with Zinc oxide eugenol and Calen(®)/ZO presented statistically similar success rates of 93.3% and 87.5%, respectively. Their results showed the clinical and radiographic outcomes for Calen /ZO to be equal to those for Zinc oxide eugenol after 18months, suggesting that both materials can be indicated for obturating primary teeth with pulp necrosis after trauma.

Another study by Chen *et al.*, [18], 160 primary molars from 155 children that met the inclusion criteria were allocated to one of the three materials via block randomization. A two-visit pulpectomy was performed by an investigator. The clinical and radiographic diagnoses were blindly assessed by other two investigators. At the end of 6 and 12 months, the Zinc oxide eugenol and MPRCF success rates were 100% both in clinical and radiographic evaluation. The Vitapex group showed the clinical success of 100% at the end of 6 months and 94.5% at the end of 12 months. Radiographic evaluation for the Vitapex group showed 80.4% success at the end of 6 months and 60.7% at the end of 12 months.

CONCLUSION

From the above results, it can be concluded that premixed calcium hydroxide and iodoform paste (Vitapex) offered as a healthy choice as a filling material following pulpectomy in primary non-vital teeth as compared to zinc oxide eugenol. Further studies are warranted to support our findings.

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