

## A Review: Obturating Material Used in Primary Teeth

Anil Kohli<sup>1</sup>, Ashish Katiyar<sup>2</sup>, Karuna Panda<sup>3</sup>, Rahul Katayan<sup>4</sup>, Surabhi Kumari<sup>5</sup>

<sup>1</sup>Professor and HOD, Department of Paediatric and Preventive Dentistry, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh

<sup>2</sup>Professor, Department of Paediatric and Preventive Dentistry, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh

<sup>3,4</sup>Assistant Professor Department of Paediatric and Preventive Dentistry, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh;

<sup>5</sup>Post Graduate Student, Department of Paediatric and Preventive Dentistry, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh

### Abstract

To maintain arch length and function in order to provide proper guidance for the eruption of permanent teeth primary teeth should be preserved until their normal exfoliation time. Pulp is soft mesenchymal connective tissue that occupy within the center of the tooth. Pulpectomy is the procedure of complete removal of the radicular pulp tissue from the root canal and filling with restorable obturating material. The rate of success in endodontic therapy depends upon many factors like their formation and resorption pattern, obturating material as well as obturation method used that is capable of densely filling the entire root canal system and providing a fluid tight seal from the apical segment of the canal in order to prevent reinjection. The caries and pulpal pathologies persist but due to dental health education it considerably lowered. It eventually leads to development of malocclusion. This review article basically focuses on various obturating materials used in deciduous teeth with their modification as well as their advantages and disadvantages.

Keywords: Children, Deciduous Teeth, Pulpectomy, Obturating Materials

### Introduction

Deciduous teeth are the best natural space maintainers and hence should be preserved and retained as long as possible. Pulp therapy is widely used in the treatment of paediatric patients, while attempting to prevent the premature exfoliation of primary teeth. Pulpectomy is the procedure complete removal of necrotic pulp from the root canals of primary teeth and filling them with an inert resorbable material so as to maintain the tooth integrity. The main objective of pulpectomy is to maintain tooth free from infection, biomechanically cleanse, obturate the root canals, to promote physiologic root restoration and to hold the space for the erupting permanent tooth. There is basic recommendation is that if the infection has spread to radicular pulp and the tooth is showing signs of irreversible pulpitis then such teeth be termed as non vital. The recommended treatment for such cases is pulpectomy in primary teeth and RCT in permanent teeth.

The clinical indication of Pulpectomy

- 1) Teeth with necrotic pulps and minimum of root desorption
- 2) A tooth that shows uncontrolled pulpal hemorrhage
- 3) Presence of perapical pathology with sinus opening

- 4) Any primary tooth in absence of its permanent successor.
- 5) Raumatized primary incisors with pulp exposures or acute or chronic abscesses.

Contraindications of Pulpectomy are

- 1) Excessive tooth mobility
- 2) Communication between the roof of pulp chamber and the region of fraction
- 3) External root restoration
- 4) Radicular cyst, dentigerous cyst associated with the primary tooth.

The obturating materials should be biocompatible and eliminate these residual pathogens, it should neutralize their toxic products and prevent the canal reinjection to create favourable environment for the healing process to occur.

Ideal Requirements of Root –Filling Material for Primary Teeth: By Castagno a

- The material should resort as primary tooth root resorts
- It should not irrigates the per apical tissues
- It should have a stable disinfecting power
- It should be inert easily into root canal and also removed easily if necessary
- It should not soluble in water
- It should not discolour the tooth
- It should be radiopaque
- It should be harmless to the adjacent tooth germ

## Oturing Materials

### Zinc Oxide Eugenol

Most widely used materials for root canal filling of primary teeth is Zinc oxide Eugenol .Bonastre discovered Zinc oxide eugenol. By Chisholm in 1876 Eugenol was the first essential oil proved to be an important germicide when it added Zinc oxide to eugenol to make Zinc oxide eugenol or ZOE [4]. Composition of zinc oxide eugenol is: Zinc oxide – 69.0%, White resin – 29.3%, Zinc acetate – 1.0%, Zinc Stearate – 0.7%, Liquid (eugenol-85%, olive oil-15%). Advantages :-anti-inflammatory and analgesic properties, the greater zone of bacterial inhibition, ease of availability, radiopacity of material, cheaper/cost effective, good plasticity, insolubility in tissue fluids, easy to mix and good working time. Disadvantages of Zinc oxide eugenol is that it's alter the path of erupting teeth, irritation to the per apical tissues, necrosis of bone and cementum, slow resorption in comparison to root resorption. Since 1930's zinc oxide eugenol has been material of choice.

Author and their observations on zinc oxide Eugenol

Author	Observations
Hashieh	The amount of eugenol liberate within the periapical zone immediately after placement was 10–4 and falls to 10-6 after 24 hrs, reaching zero after one month. eugenol with this concentration is said to have anti-inflammatory and analgesic properties that are very important after a pulpectomy.
Colla J (1985)	That zinc oxide may change the pathway of eruption of succedaneum permanent. Erasquin (1967) reported occurrence of necrosis of bone cementum, and inflammation of per apical tissue.
Robin L W	Zinc oxide eugenol unreserved was surrounded by several layers of condensed cellular tissues. This was composed of inner layer of tightly packed blood cells and outer layer of fibroblast with chronic inflammatory cells
Coll and Sadrian (1996)	Pulpectomy with ZOE where fragments are left reported anterior cross-bite, palatal eruption, and ectopic eruption of the permanent teeth following.

Zinc Oxide Eugenol after obturating with by different authors success rates were reported as follows – 82.3%- Barr et al. 82.5% - Gould 86.1% - Coll et al. standard being 83% Barr ES, Flaitz CM, Hicks JM . zinc oxide eugenol in combined with different components like form cresol, formaldehyde and par formaldehyde and cresol have been tried out, but the addition of these compounds neither made the material more resorbable nor increased the success rate as compared to zinc oxide eugenol alone . Zinc oxide powder and calcium hydroxide paste mix together to be used obturation of primary teeth has shown that the obturated material remained up to the apex of root canals till the beginning of physiologic root resorption. Materials resorb at the same rate as teeth.

### Calcium Hydroxide

Calcium Hydroxide introduced in dentistry by Hermann (1920, 1930), this medicament has been identified to promote healing in many clinical situations. Calcium hydroxide alone or in association with iodo form has been used as the root filling material for primary teeth. It is commercially available as Vitapex and Metapex. These products resorb if unintentionally pushed beyond the apex. The material has faster rate within the canals I than the physiologic rate of root resorption. Calcium hydroxide is widely used as a liner for deep restorations, a temporary intracranial dressing, and direct and indirect pulp capping and apexification procedures in permanent teeth. In the primary teeth calcium hydroxide is also recommended as a final obturation material for root canal therapy. Cal vital used calcium hydroxide -based paste as root canal filling material. Calcium hydroxide is initially bactericidal then bacteriostatic, promotes healing and repair, has high alkaline pH that stimulates fibroblasts, stops internal resorption, and is inexpensive and easy to use. Composition of calcium hydroxide is:-Acidic Paste-alkyl salicylate(iso-butyl salicylate),inert fillers –titanium oxide(12-14%),radiopacifer-barium sulphate(32-35%),calcium sulphate or calcium tungstate(14-15%),Basic Paste-calcium hydroxide 50-60%,zinc oxide10%,zinc stearate0.5%,ethylene toluene sulphonamides and paraffin oil39.5%.Mode of supply can be powder form mixed with distilled water or saline solution,two paste from one base paste and other catalyst paste and in single paste from(visible light) .Disadvantage:-Induces internal resorption in primary teeth causing resorption of dentin due to inducing odontoclast by stimulating of the undifferentiated mesenchymal cells , lack of adhesion to the hard tissue, leading to inadequate seal against micro leakage resulting in

bacterial access to pulp, resorbs earlier than the physiological resorption of the roots.

### **Iodo form**

It is derivative of iodine. Recommended as filling material for primary teeth as it fulfills most of the requirements they are: - cause no foreign body reaction, easily resorbed from the periapical area, and display potent germicidal properties. Iodoform, the rate of resorption is faster than the roots, so it can push beyond the apex. It is used either in combined with other materials or in pure form. It is a potent bactericidal, radiopaque, non-irritant, and has rate of resorption is faster than ZOE material. And well suited for a non-soluble paste and non-shrinking. It's ideal for deciduous teeth obturation because of resorbability and it does not set into harder mass so it can be removed easily in re-treatment. The rate of resorption of material within the canals is faster than the rate of physiological root resorption and causing yellowish-brown discoloration of the teeth are the disadvantages of iodoform. The Iodoform are available in different formulations such as KRI paste, Maisto paste, Guides-Pinto paste, Rifocort, Endoflas, Vitapex as root canal filling materials.

### **Walkhoff Paste**

Devised by Walkhoff in 1928, it consists of 60 parts of iodoform, 40 parts of a solution containing 45% para-chlorophenol, 49% camphor and 6% menthol. Used in the Walk off method of treatment, the paste forced beyond the apex, irrespective of the state of the apex. Non-vital teeth associated with large periapical lesions it can be used as intracranial dressing in such cases.

### **KRI Paste**

KRI basically an Iodoform paste was introduced by Volkoff as a resorbable paste for root canal filling. It consists of Iodoform (80.8%), camphor (4.86%), para-chlorophenol (2.025%), Menthol (1.215%). It is a radiopaque endodontic root filling. To minimize coagulation with adjacent tissues camphor and menthol are mixed with the antimicrobial agent and para-chlorophenol. Fuks et al 2000 found that success rate of 84% with Kripaste group versus 65% with ZOE. Overfills more successful (Kri paste)

### **Maisto's Paste**

It was introduced in 1967. In primary teeth. Used as root canal filling material by Tagger et al. Its composition: -zinc oxide 14g, iodoform 42g, thymol 2g, chlorophenol camphor 3cc and lanolin 0.5g. To reduce the resorption rate of the paste from within the canals of endodontic ally treated primary teeth this

formulation change was made. Eliyahu Mass found that infected posterior primary teeth and had positive healing effect on periradicular tissue with Maisto paste.

### **Endoflas**

It is a restorable paste as well root canal sealer material. It prevents micro leakage. It contains power: -zinc oxide 56.5%, barium sulphate 1.63%, iodoform 40.6% calcium hydroxide 1.07%, liquid: -eugenol and pentachlorophenol. Observed that Endoflas resorbed when overextended periapically by Fuks et al. Endoflas shows its excellent healing capabilities and complete bone healing clinically and radiographically. The high pH stimulates periapical healing with an increase of alkaline phosphatase action ensures powerful antibacterial effects that reduce periapical inflammatory processes and periapical bone remineralisation.

### **Vitapex/Metapex**

Introduced by Kawakami et al., 1979. Vitapex has been published by Fuchino and Nishino (1980). It contains: -calcium hydroxide 30.3% iodoform 40.4% and silicon oil additives 22.4 it is available in a syringe-loaded viscous pre-mixed paste. A lot of research considered this mixture as nearly an ideal root canal filling material for primary tooth, owing to its excellent properties. The iodoform may be a known bactericide that's released from the sealer and suppresses any residual bacteria within the canal or periapical region. Calcium hydroxide induces mineralized tissue formation, activation of alkaline phosphatase and collagen synthesis and ability to produce hydrolysis of bacterial endotoxin due to its antibacterial activity. Its advantage is: - has no toxic effects on the permanent successor tooth. Adheres well to the canal walls. It does not set to a hard mass. Resorption occurs at a rather faster rate than the roots; complete resorption of the surplus paste is predicted within 2-8 weeks. Is radiopaque, so better radiographic visibility. Disadvantage is: - Iodoform-based material though resorbs if pushed beyond the apex however the rate of resorption is faster than the roots. Causes discoloration of the teeth. Vitapex appeared to resolve fraction pathology at a faster rate than zinc oxide-eugenol at 6 months, while at 12 months, by Trairatvorakul C (2008)

### **Guedes-Pinto Paste**

Guedes-Pinto Paste (GPP), a root filling material for primary teeth introduced by Guedes-Pinto in 1981. Rifocort - Prednisolone Acetate Corticosteroid 5mg (Anti-inflammatory) Rifamycin Sodium Salt (Antibiotic) Propylene glycol (Vehicle) Macrogol

(Polyethylene-glycol) - Vehicle Camphorated parachlorophenol - Proportion 3:7 30% Parachlorophenol 70% Camphor (Antimicrobial analgesic) Iodoform – Iodine (Antimicrobial). Paste mixed on a sterilized glass plate each component is made up of one equal part.

## Obturing Materials Recent Trials in Pulpectomy:

### Zinc oxide eugenol, calcium hydroxide and sodium fluoride

It is a mixture of Zinc oxide powder, Calcium hydroxide, and Sodium fluoride (10%) was used as an obturating material. Radiopacity to the root canal filling material added as a reaction product is Calcium fluoride. The rate of resorption similar to the resorption rate of the roots of the primary teeth by the addition of the fluoride component. To evaluate the resorption of the root canal filling different concentrations of sodium fluoride as liquid was added to the mixture of zinc oxide and calcium hydroxide. Using 8% sodium fluoride to the mixture showed good result.

### Herbal Obturants Aloe Vera (Aloe Barbadensis)

The chemical constituents present in them are a part of the physiological functions of living flora, and hence, they're believed to possess better compatibility with the physical body. Therapeutic as well as preventive purposes Aloe Vera can be used for various owing to its anti-inflammatory, antifungal, antibacterial, antiviral, moisturizing, and pain-relieving properties. Because of these properties that are useful in dentistry, burn plant gel is often also utilized in any obturating medium for therapeutic purposes.

### Zinc oxide eugenol and aloe vera

Zinc oxide powder, if mixed with aloe vera gel the following advantages: it does not set, easily retrievable nature, its ease of placement, etc. The study has conducted using zinc oxide powder with aloe vera gel to check the efficacy of this combination as an obturating material for primary teeth by Khairwa A et al in 2014. Using a mixture of zinc oxide powder and aloe vera gel in primary teeth for endodontic treatment has shown good clinical and radiographic success.

### Tulsi (Ocimum Sanctum)

Obturing materials used in primary teeth with the antimicrobial efficacy was evaluated against E.

Faecalis by Jaidka S et al in 2014. Tulsi extract with zinc oxide eugenol, zinc oxide material and zinc oxide with aloe vera as obturating materials. Amongst all the intergroup significant different comparison discloses except between zinc oxide eugenol and zinc oxide with tulsi extract. Higher zone of inhibition among all the groups significantly had Zinc oxide eugenol. The results obtained from the present study can be summarized as follows: Zinc oxide eugenol is better than Zinc oxide with tulsi extract than the Zinc oxide with aloe vera.

## Conclusion

The current obturating materials for primary teeth still need to be modified to providing satisfactory clinical results. Drawbacks of the combination Zinc oxide eugenol with several other materials have been investigated and various degree of success achieved but not complete. The current combination of calcium hydroxide and iodoform provide better success than the zinc oxide eugenol cement. However, several controlled studies and research is required to find the ideal obturating material for primary teeth.

## References

1. Praveen P, Anantharaj A, Karthik V, Pratibha R (2011) A review of the obturating material for primary teeth. SRM University Journal of Dental Science 1: 1-3.
2. Rajsheker S, Mallineni SK, Nuvvula S (2018) Obturating Materials Used for Pulpectomy in Primary Teeth- A Mini Review. J Dent Craniofac Res Vol.3 No.1: 3.
3. Rifkin A. The root canal treatment of abscessed primary teeth: A three to four year follow-up. J Dent Child. 1982; 49:428431.
4. Chonat A, Rajamani T, Ephraim R. Obturating materials in primary teeth- A review. Res Rev J Dent Sci 2018; 6(1): 20-25.
5. Manhas Swati et al., Obturating Materials in Paediatric Dentistry: Literature Review. IJCRR 11 (08), 20842–20853 (2020).
6. Clifton O, et al. Endodontic therapy for primary teeth. Ingles endodontics. 2006; 3:39; 1400-1430.
7. Dole V, et al. Zinc oxide eugenol - A multidisciplinary approach in dentistry. J Cont Med A Dent. 2013;1:
8. Markowitz K, et al. Biologic properties of eugenol and zinc oxide eugenol. Oral Surg Oral Med Oral Path. 1992;73:729-737
9. Garcia-Godoy F. Evaluation of an Iodoform paste in root canal therapy for infected primary teeth. J Dent Child. 1987; 54:3034.
10. Stallaert KM. A retrospective study of root canal therapy in non-vital primary molars. Department of Paediatric Dentistry, University of Toronto. 2011.
11. Al-Ostwani AO, Al-Monaqel BM, Al-Tinawi MK (2016) A clinical and radiographic study of four

- different root canal fillings in primary molars. *J Indian Soc Pedod Prev Dent* 34: 55-59.
12. Cerqueira DF, Mello-Moura AC, Santos EM, Guedes-Pinto AC (2008) Cytotoxicity, histopathological, microbiological and clinical aspects of an endodontic iodoform-based paste used in pediatric dentistry: A review. *J Clin Pediatr Dent* 32: 105-110.
  13. Ramar K, Murgara J. Clinical and radiographic evaluation of Pulpectomies using three root canal filling materials: An in-vivo study. *J Indian Soc Pedod Prevent Dent. (Jan/Mar 2010). 28(1): 25–9.*

To cite this article: A Review: Obturating Material Used in Primary Teeth: Anil Kohli , Ashish Katiyar , Rahul Katayan, Surabhi Kumari, Rama Univ. J. Dent. Sci. 2020 September; 7 (3): 19-23