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Review Article

A literature review on various materials which can be used for obturation in primary teeth

Debadrita Ghosh^{1*}¹Dept. of Pedodontics and Preventive Dentistry, Buddha Institute of Dental Sciences & Hospital, Patna, Bihar, India

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ABSTRACT

Treatment of primary teeth or permanent teeth in children presents a challenge to the clinician. In today's time, dental caries found to be the most common oral disease affecting the oral cavity of the children's. And most of the cases of dental caries when not treated in the initial time leads to inflammation of the pulp and once the pulp got inflamed, patient presents with pain, at that time only option left for the dentist is removal of the inflamed pulp from the pulp chambers and then fill the root canals with obturating materials and form the apical seal, so that there will be no communication of the tooth with the external environment. Pulp pathologies when not treated on time, might leads to problem which is known as malocclusion of the teeth. Pulp treatment in children/or in primary teeth are different as compared to the permanent teeth, and simultaneously the obturating materials for the primary teeth are also different as compared to the obturating materials for the permanent teeth. It has been found that adequate cleaning of the canal and irrigation of the canal is quite difficult in primary teeth due to the complex anatomy of the root canal morphology. There are different materials which can be used as an obturating materials for the primary teeth for example zinc oxide eugenol material, has been into the use since long time as an obturating material of choice in the primary teeth, and also zinc oxide eugenol material can not considered as an ideal root canal filling material as this obturating material shows very much little anti-microbial action and this material also shows slower rate of resorption.

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1. Introduction

Dental pulp which is present in the primary teeth as well as in the permanent teeth is found to be highly vascularized tissue which is of mesenchymal origin. Treatment of the primary teeth or the permanent teeth, which are pulpally involved, represents a challenge in itself, as the root canal morphology of the primary teeth is found to be very complex in nature and treating the children also presents a challenge in itself. The main goal of obturating the primary or the permanent teeth of the children is to maintain the oral health of the patient pretty well, pain removal from the inflamed pulp, for esthetics, for phonetics, for preserving the

tooth to maintains its position in the arch to provide space for the permanent teeth in the arch to avoid development of any type of malocclusion as premature shedding of the primary teeth is found to be the main cause of development of malocclusion in the children. It has been found that early loss of some of the primary teeth as such canines and molars presents serious problem in terms of space loss, which might leads to some other problems like insufficient space for the eruption of the permanent molars, it might leads to ectopic eruptions as well as it might leads to impaction of premolars in the alveolar bone, it might lead to some other consequence like tipping of molars mesially to the primary molars, extrusion of opposing tooth, development of any cross bite, development of improper or abnormal position of the tongue. So to avoid all of the above or any of the

* Corresponding author.

E-mail address: debadrita.ghosh12@gmail.com (D. Ghosh).

above consequences preservation of the primary teeth is important.¹⁻⁹

According to Rifkin, properties of material to be considered as ideal root canal filling material are as follows:

1. Resorption of the root canal filling material should be same as the resorption rate of the tooth.
2. Material should be absorbed readily if crossed beyond the root.
3. Material should possess an anti-bacterial property in itself.
4. Material should possess antiseptic properties also.
5. Material should be non-irritating to the underlying tooth germ, so that it should not possess any harm to the underlying tooth germ.
6. Material should be radiopaque, so that the material can be seen in the radiograph.
7. Material should be easily inserted into the root canal of the tooth, along with material should be easily condensed into the canals of the tooth.
8. Material should possess adherent properties well so that it should be adhered to the walls of the root canals well.
9. Material should be easy to remove from the canal if required.
10. Material should be harmless in terms of color-discoloration, it should not discolor the tooth in which it has been used as an obturating material.

2. Different materials which can be used as obturating materials are as follows

2.1. Zinc oxide eugenol

It was first used in dentistry in the year of 1876. When this material is used as an obturating material it provides anti-inflammatory and analgesics properties, this material is found to be insoluble in the tissue fluids, readily available, very much cost effective and easy to mix and carry. Literature recorded overall success rate of zinc oxide eugenol material was 87% with a follow up time of 12 months. Along with the advantages, some disadvantages of the material are also exist like sometimes it alters the path of eruption of the succedaneous tooth, which can lead to the formation of malocclusion, sometime it results in some of the ectopic eruptions of the succedaneous teeth, might lead to necrosis of cementum or sometime of alveolar bone, sometimes lead to formation of defects in the enamel of the succedaneous tooth and the most common disadvantage of this material is there is difference in the resorption rate of the zinc oxide eugenol material (ZOE , resorbs slowly as compared to the root of the primary teeth).^{5-7,9-12}

2.2. Calcium hydroxide

Most commonly calcium hydroxide has been used as liner deep restorations, it can also be used as material of choice in intra-canal dressing, along within apexification procedures. Now-a-days, calcium hydroxide can also be used as a final obturating material in the deciduous teeth. Calcium hydroxide perform both functions, i.e. it is bactericidal and as well as bacteriostatic in nature. Calcium hydroxide has high alkaline pH, which results in stimulation of fibroblasts, and it also helps in stopping internal resorption, and ultimately helps in promoting healing and repairing. Calcium hydroxide is inexpensive and is easy to handle and use. Some of the disadvantages of this material are, this material start resorbing earlier as compared to the normal physiological process of resorption of the root, this drawback creates a hollow tube effect. This material do dissolve in tissue fluid not good enough for making adequate seal against the microorganisms, and this material also possess weak anti-microbial properties.⁶⁻¹¹

2.3. Iodoform

Iodoform paste has been advocated for use as a root canal filling material, this material possess no foreign body reaction with the peri-apical tissue, resorb very much easily from the periapical area, shows effective germicidal properties, it shows no side effects on the succedaneous teeth, very easy to handle, easily pushed into the canals as well as into the accessory canals, some studies stated that this material resorb at the same time as the roots of the primary teeth resorbs. This material is resorb totally if pushed beyond the apex and does not cause any harm in the periapical tissue area. The only disadvantage of the material is that the rate of resorption of the material may faster as compared to the physiological rate of resorption of the roots of the primary teeth, along with this, iodoform paste sometimes cause yellowish discoloration of the tooth.¹⁻⁵

2.4. KRI paste

It is basically an iodoform paste, which is constituted by iodoform, camphor, menthol, para chlorophenol. This material provide strong bactericidal properties, very much effective in maintaining the canal site free from the microorganisms, forms adequate periapical seal, resorbs easily and at the same time when the physiological root resorption is about to happen. This material shows overall success rate of 84%.²⁻⁷

2.5. Maisto's paste

This paste was introduced by tagger et al in the year of 1967, it is made up of zinc oxide iodoform, thymol, chlorophenol camphor, and lanolin. This pastes shows and fulfills all the requirements to be an ideal root canal filling material in the

primary teeth and shows promising good results.^{5–9}

2.6. Endoflas

It is a resorbable paste, which is used as an obturating material in the roots of the primary teeth. Powder contains triiodomethane and iodine dibutylorthocresol (40.6%), zinc oxide (56.5%), calcium hydroxide (1.07%), barium sulfate (1.63%) and with a liquid consisting of eugenol and paramonochlorophenol. This material shows 70% success rate when used as an obturating material in the roots of the primary teeth, this material resorbs easily when extruded from the peri apical area, and on the other hand this material does not resorb easily intra radicularly. It helps in decreasing the periapical radiolucency by 100%. It helps in promoting healing in the peri apical area, as it shows good antibacterial effects and shows promising anti-inflammatory action in the periapical area. The only disadvantage of using this material is as it contains eugenol, may result in periapical irritation and sometime may lead to discoloration of the tooth.^{9–11}

2.7. Vitapex

This material was introduced in dentistry in the year of 1979 by kawakami et al. it constitutes of iodoform, calcium hydroxide along with oil of silicone. It is a pre-mixed paste, which is syringe loaded. Literature revealed that this material does not cause any foreign body reaction if or when extruded periapically, it shows strong bacteriostatic action, helps in promoting healing in the peri-apical area, the rate of resorption of the material is faster than the physiological rate of resorption of the root of the primary teeth. It is a radiopaque material, which is very easy to handle and come with an easy delivery system.^{11–15}

3. Conclusion

There are so many materials available in the market to be used as a root canal obturating materials in the primary teeth. One should have a thorough knowledge of all the material before using them as a canal filling material in the primary teeth.

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5. Conflict of Interest

None

References

1. Mohammadi Z, Dummer PM. Properties and applications of calcium hydroxide in endodontics and dental traumatology. *Int Endod J*. 2011;44(8):697–730.
2. Estrela C, Holland R. Calcium hydroxide: study based on scientific evidences. *J Appl Oral Sci*. 2003;11(4):269–82.
3. Goldman M, Pearson AH. A preliminary investigation of the "Hollow Tube" theory in endodontics: Studies with neo-tetrazolium. *J Oral Ther Pharmacol*. 1965;1:618–26.
4. Chawla HS, Mathur VP, Gauba K, Goyal A. A mixture of calcium hydroxide paste and zinc oxide powder as a root canal filling material for primary teeth: a preliminary study. *J Indian Soc Pedo Prev Dent*. 2001;19(3):107–9.
5. Chawla HS. Evaluation of a mixture of zinc oxide, calcium hydroxide and sodium fluoride as a new root canal filling material for primary teeth. *J Indian Soc Pedo Prev Dent*. 2008;26:53–8.
6. Nelson FP, Silva LA, Leonardo MR, Utrilla LS, Figueiredo F. Connective tissue response to calcium hydroxide based root canal medicaments. *Int Endod J*. 1999;32(4):303–11.
7. Stallert KM, Sigal MJ, Titley KC, Andrews PB. A retrospective study of root canal therapy in non-vital primary molars. *Eur J Paediatr Dent*. 2016;17(4):295–300.
8. Castagnola L, Orlay H. Treatment of gangrene of the pulp by the Walkhoff method. *Br Dent J*. 1952;93:93–102.
9. Barja-Fidalgo F, Moutinho-Ribeiro M, Oliveira MA, de Oliveira B. A systematic review of root canal filling materials for deciduous teeth: Is there an alternative for zinc oxide-eugenol? *ISRN Dentistry*. 2011;367318:24.
10. Prasanna P, Anantharaj A, Venkataraghavan K, Prathibha S, Jaya R. A review of the obturating material for primary teeth. *SRM University J Dent Sci*. 2011;1(3).
11. Nurko C, Garcia-Godoy F. Evaluation of a calcium hydroxide/iodoform paste (Vitapex) in root canal therapy for primary teeth. *J Clin Pediatr Dent*. 1999;23(4):289–94.
12. Mortazavi M, Mesbahi M. Comparison of oxide and eugenol, and vitapex for root canal treatment of necrotic primary teeth. *Int J Pediatr Dent*. 2004;14(6):417–24.
13. Pabla T, Gulati M, Mohan U. Evaluation of antimicrobial efficacy of various root canal filling materials for primary teeth. *J Indian Soc Pedod Prev Dent*. 1997;15(4):134–40.
14. Jeeva PP, Retnakumari N. In-vitro comparison of cytotoxicity and anti-microbial activity of three pulpectomy medicaments- Zinc oxide euginol, Metapex and Chitra HAP - Fill. *IOSR J Dent Med Sci*. 2014;13(2):40–7.
15. Chandra SP, Chandrasekhar R, Uloopi KS, Vinay C, Kumar NM. Success of root fillings with zinc oxide-ozonated oil in primary molars: preliminary results. *Eur Arch Paediatr Dent*. 2014;15(3):191–5.

Author biography

Debadrita Ghosh, PG Student

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