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ORIGINAL ARTICLE

Efficacy of two different pulpotomy agents in primary molars in a tertiary care hospital, Multan: A randomized control trial.

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ABSTRACT… Objective: Multifactorial chronic dental infection and degenerative condition, the dental caries is a major health issue. Initially formocresol was the gold standard treatment for the primary teeth pulpotomy but now multiple sealing agents are used. **Study Design:** Prospective Interventional study. **Setting:** Multan Medical and Dental College/Ibn-e-Sina Hospital. **Period:** 15th February to November 2022. **Material & Methods:** After informed consent, cavities in two primary teeth of equal size after clinical and radiological examination requiring pulpotomies were selected and a total of 40 pulpotomies were done. **Results:** Among 15 pairs of contralateral teeth, 9 pairs were clinically as well as radiographically successful for both MTA and CH pulpotomy during the follow up appointments at 0, 1 and 3 months appointment. One pair showed failure for both MTA and CH pulpotomy. Five pairs showed success with MTA pulpotomy but failure in CH pulpotomy cases. **Conclusion:** It can be concluded from the study that MTA is superior and more effective than CH in primary teeth pulpotomies.

Key words: Calcium Hydroxide, Caries, Cavity, MTA, Pulpotomy.

INTRODUCTION

Dental caries is a multifactorial chronic dental infection and degenerative condition. It is a major health issue nowadays. Despite all efforts to prevent caries, around 2.4 billion adults and 486 million children are affected by caries. Early diagnosis and management of caries may help prevent tooth loss. It is particularly important for primary teeth due to rapid progression of disease. The proposed treatment for preservation of pulp vitality is the vital pulp therapy (VPT) for teeth affected by caries with no radicular pathology, this includes direct pulp capping, indirect pulp capping and pulpotomy. Pulpotomy is the removal of infected pulp and the refilling with some medicement. Commonly used medicements are mineral trioxide aggregates (MTA), biodentine, formocresol, ferric sulphate and calcium hydroxide (CH).[1,2,3]

Initially Formocresol was the gold standard treatment for the primary teeth pulpotomy but its use is limited by potential side effects such as toxicity, mutagenicity and carcinogenic effect. CH is considered as a good treatment option in primary teeth pulpotomies, it has proven good efficacy in secondary teeth. But its success rate in primary teeth is not good compared to permanent teeth and it has been observed to reduce the pulp size due to high pH formulations. CH is prepared in either aqueous solution or thick viscous vehicle. Aqueous preparation when in contact with tissue rapidly dissolve in calcium and hydroxyl ions, so an easy target for macrophage and half life is reduced. Though viscous preparation is stable and have good half life and maintain the paste in cavity for long time.[4,5]

For the primary teeth pulpotomies, MTA is considered as the gold standard treatment. It is because of its good sealing ability, hydroxyapatite formation and favored biocompatibility. It induces

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hard tissue formation but its cost is a limiting factor.[4,6] MTA promotes calcium uptake in the tissue and helps in mineralizing the demineralized part, increasing the strength and homogeneity and setting time is reduced.[7]

Both clinical and radiological results are significantly better for MTA compared to formocresol and ferric sulphate even after two years follow up. Asgary et al have shown that in primary teeth pulpotomies MTA has shown good long-term efficacy compared to formocresol.[1,8] RCT meta analysis has shown superiority of MTA over CH in terms of radiographic improvement.[9]

So the aim of the current study was to compare the efficacy of MTA and CH in primary teeth pulpotomies to establish a preferred treatment agent among these two. As MTA has good sealing abilities and hard tissue formation, so with this we may be able to recommend it for treatment of primary teeth pulpotomy sealing agent.

MATERIAL & METHODS

This was prospective interventional study conducted in the pediatrics dental department Multan Medical and Dental College, Ibn-e-Sina Hospital between 15th February to 15th August 2022 and follow up 15th August to 15th November 2022 The ethical permission was taken from the hospital ethical committee with IRB number Publi/02/2022. The parents of the children were informed about the procedure and information about both sediments were given, written informed consent was obtained. During this period 20 children having cavities in two primary teeth of equal size after clinical and radiological examination requiring pulpotomies were selected and a total of 40 pulpotomies were done. Inclusion criteria was, Children between the age of 5 to 9 years having no systemic disease, fistula or swelling, spontaneous pain, radiological sign of periapical pathology and no root resorption of primary teeth. Children who were uncooperative, excessive mobility (near to fall down), tooth near to exfoliation or excessive bleeding from tooth during procedure were excluded from the study.

Two investigators selected the tooth according to the inclusion criteria, one investigator performed the pulpotomy after giving local anesthesia. The pulp cavity was accessed with round carbide bur, full coronal pulp was removed and wound surface was irrigated to remove debris and also to achieve hemostasis. MTA and CH were prepared according to manufacturer instructions and applied to the selected tooth. The parents were explained about the precautions and were called for follow up 0, 1,3 month). Periapical or interproximal standard films were taken at 0, 1 and 3 months.

Clinical success was achieved if there is no pain, mobility, swelling or fistula and radiological success if there is no internal and external root resorption or furcation radiolucency. Data was entered and tested by using SPSS 20 and Chi-square test was used to test the difference in success rate between groups with the significance at $p \leq 0.05$.

RESULTS

Total pulpotomies of primary teeth 40(20 pairs) were done on 20 patients. Among these 20 patients, 15 came for follow up and follow up done at 1 and 3 months.

Among 15 pairs of contralateral teeth, 9 pairs were clinically as well as radiographically successful for both MTA and CH pulpotomy during the follow up appointments at 0, 1 and 3 months appointment. One pair showed failure for both MTA and CH pulpotomy. Five pairs showed success with MTA pulpotomy but failure in CH pulpotomy cases.

So the success rate for MTA was (14/15 93.33%) and for CH (9/15, 60%) and it was statistically significant with p value of 0.04, as shown below in Figure-1. In CH pulpotomies, all failed cases showed internal resorption as the cause, which was observed 3 months after pulpotomy. For one failed case in MTA pulpotomy, periapical radiolucency was observed at 2 months and 16 days.

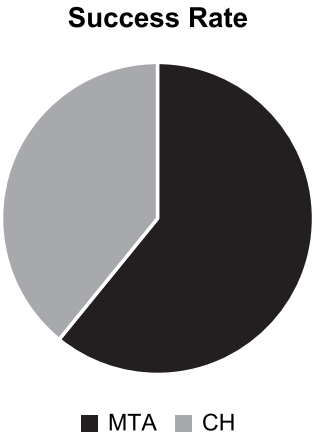

Figure-1. Success rate of MTA and CH pulpotomies.

DISCUSSION

The most important aim of each pulpotomy is to clear inflamed tissue while maintaining the arch length and mastication function.[10] The sealing agent must act as barrier and protective surface for the pulp tissue and also induce the formation of dentine like bridge between the pulp and lining material. It depends on several factors like: the type of material, inducing healing in the pulp and the affectivity in preventing infection.[11]

In the current study the success rate for MTA was observed 93.33% and in CH cases was 60% and the difference was significant. A study conducted by Liu H et al has shown a similar success rate to the current study and these were 94.1% for MTA and 64.7% for CH. They performed it on 17 pairs of pulpotomies which were very close to the present study too.[12] Studies have shown that MTA has very good natural healing ability and causes apatite precipitate formation by interacting with phosphate, though it has less potent antibacterial property compared to CH. Both of these agents have antimicrobial activity because of high pH which is above 10 where microbes cannot grow.[13] Lidiane Lucas Costa E Silva compared MTA with CH in saline and CH in polyethylene gel (Gel) and showed that at three months follow up MTA has 100% success both clinically and radiographically while CH in saline has success rate of 67% and CH in PEG (poly ethylene glycol) has 75% success rate at 3 months follow up. They found MTA has significant more success rate among groups as we noted in present study.[14]

One case in MTA showed failure and it showed periapical radiolucency while six cases in CH showed failure and all had internal resorption as cause of it. Celik et al compared MTA and CH and showed that CH has high failure rate, the failure was due to internal resorption.[15] Moretti et al showed 100% success rate in MTA and 64% in CH group and the cause of failure was internal resorption in CH group.[16] Internal resorption has been reported to be the most frequent cause of failure in CH pulpotomies, it is suggested that even after pulpotomy chronic inflammation persists and cause damage to pulp vitality due to activation of odontoclasts. Inappropriate operative techniques are also suggested among one of the causes of failure.[4]

CONCLUSION

So it can be concluded from the study that MTA is superior and more effective than CH in primary teeth pulpotomies. MTA has more favorable outcome and is less toxic to the tissues, is more dentinogenic and has good barrier function compared to the CH. So MTA should be preferred choice in primary teeth pulpotomies.

LIMITATION

It was a single center study, researcher was not blinded, and has small sample size were the main limitations of the study.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	M. Athar Khan	Statistical analysis, result interpretation manuscript writing and revising it critically for important intellectual content.	
3	Arham Chaudhry	Statistical analysis interpretation of results, reviewed and approved the manuscript.	
4	Rabiya Imdad	Data collection, Writing the manuscript, formulation of tables reviewed and approved.	
5	Basil Khalid	Result interpretation, manuscript writing and revising it critically for important intellectual content.	
6	Shamsher Ali	Manuscript writing and revising it critically for important intellectual content.	