

## Original Research

### Direct Pulp capping of Primary molars with calcium hydroxide or MTA

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#### ABSTRACT:

**Background:** To evaluate the effectiveness of direct Pulp capping of Primary molars with calcium hydroxide or MTA.

**Materials & methods:** A total of 40 subjects within the age group of 7 years or older were enrolled. During the course of treatment, if the dentist-investigator deemed that a direct pulp cap was the appropriate clinical procedure, he/she then performed the pulp cap using the assigned capping agent (MTA or CaOH). A resin-modified glass-ionomer liner was placed over the pulp-capping agent and extended peripherally beyond it. The materials were used according to the manufacturer's clinical directions. The teeth were restored as deemed appropriate by the dentist. Treated teeth were followed for up to 2 yrs or until the tooth required extraction or root canal therapy. At each appointment, the tooth was assessed for pulp vitality. All the results were recorded and analysed by SPSS software. **Results:** A total of 40 subjects were evaluated. They were divided into two study groups with 20 subjects in each group; MTA group and calcium hydroxide group. Both the study groups were comparable in terms of age and gender wise distribution of patients. At both the 6 months and 12 months follow-up, both the study groups showed 100 percent success rate both at clinical and radiographic evaluation. **Conclusion:** The clinical and radiographic findings of the current study showed a comparable successful outcome in direct pulp capping of primary molars using MTA and Calcium hydroxide.

**Key words:** Mineral trioxide aggregate, Calcium hydroxide

Received: 22 June, 2022

Accepted: 26 July, 2022

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**This article may be cited as:** Yaqoob A, Koul MV. Direct Pulp capping of Primary molars with calcium hydroxide or MTA. Int J Res Health Allied Sci 2022; 8(4):65-67.

#### INTRODUCTION

Prevention and treatment of dental caries have a pivotal role in oral health. In this scenario, preserving the vitality of primary teeth with conservative or minimally invasive treatment principles, such as interim therapeutic restoration approach, partial carious removal, or atraumatic restorative treatment is essential since pulp infection and the early loss of primary teeth may lead to malocclusion and the risk of esthetic, phonetic, or functional problems. Conservative treatments, such as direct pulp capping, may improve the longevity of primary teeth in the oral cavity until physiologic exfoliation. Direct pulp cap treatment of exposed pulp includes the application of a capping material over the perforation to maintain the pulpal health and vitality in an attempt to induce a calcified dentin bridge formation.<sup>1-3</sup>

Mineral trioxide aggregate is a relatively novel pulping capping agent. Many histological studies showed that MTA formed thicker hard tissue barrier compared with calcium hydroxide in animals or

human. However, these studies were relatively short term observations (less than 3 months), and the long term hard tissue formation capacity of both MTA and calcium hydroxide is unknown since both materials formed thicker and more complete dentin bridges with time increases. Moreover, the completeness and thickness of dentin barrier are not definitely positive correlated with clinical success. From a clinical point view, the most important outcome is long term pulp vitality and the absence of clinical symptoms.<sup>4-6</sup>Hence; the present study was conducted for evaluating the effectiveness of direct Pulp capping of Primary molars with calcium hydroxide or MTA.

#### MATERIALS & METHODS

The present study was conducted for evaluating the effectiveness of direct Pulp capping of Primary molars with calcium hydroxide or MTA. A total of 40 subjects within the age group of 7 years or older were enrolled. During the course of treatment, if the dentist-investigator deemed that a direct pulp cap was

the appropriate clinical procedure, he/she then performed the pulp cap using the assigned capping agent (MTA or CaOH). A radiograph was taken after the pulp-capping procedure if one within the preceding 6 mos was not available. Written informed consent was obtained after the appointment was complete. Patients had the right to decline enrollment and to opt out of the study at any time. The pulp-capping agent was applied by the dentist. A resin-modified glass-ionomer liner was placed over the pulp-capping agent and extended peripherally beyond it. The materials were used according to the manufacturer's clinical directions. The teeth were restored as deemed appropriate by the dentist. Treated teeth were followed for up to 2 yrs or until the tooth

required extraction or root canal therapy. At each appointment, the tooth was assessed for pulp vitality. All the results were recorded and analysed by SPSS software.

## RESULTS

A total of 40 subjects were evaluated. They were divided into two study groups with 20 subjects in each group; MTA group and calcium hydroxide group. Both the study groups were comparable in terms of age and gender wise distribution of patients. At both the 6 months and 12 months follow-up, both the study groups showed 100 percent success rate both at clinical and radiographic evaluation.

**Table 1: Clinical and radiographic findings**

Variable	6 months follow-up		12 months follow-up	
	MTA	Calcium hydroxide	MTA	Calcium hydroxide
Clinical success	20	20	20	20
Radiographic success	20	20	20	20

## DISCUSSION

Direct pulp cap treatment of exposed pulp includes the application of a capping material over the perforation to maintain the pulpal health and vitality in an attempt to induce a calcified dentin bridge formation. The successful outcome of direct pulp capping both in primary teeth and the permanent dentition have been reported. Calcium hydroxide-based materials have been used for many decades as the first choice for direct pulp capping. However, the solubility, gradual disintegration, low mechanical properties, and tunnel-like defects in the majority of the induced tertiary dentinal bridges compromise the long-term outcome of direct pulp capping. Use of calcium silicate cement such as mineral trioxide aggregate (MTA) has been discussed as alternative pulp capping materials to overcome the drawbacks of calcium hydroxide-based materials. Calcium silicate cement is able to set in the presence of humidity with release of calcium hydroxide as a hydration byproduct during cement setting.<sup>6-10</sup> Hence; the present study was conducted for evaluating the effectiveness of direct Pulp capping of Primary molars with calcium hydroxide or MTA.

A total of 40 subjects were evaluated. They were divided into two study groups with 20 subjects in each group; MTA group and calcium hydroxide group. Both the study groups were comparable in terms of age and gender wise distribution of patients. At both the 6 months and 12 months follow-up, both the study groups showed 100 percent success rate both at clinical and radiographic evaluation. Fallahinejad Ghajari M et al compared the radiographic and clinical success rates of direct pulp capping (DPC) using ProRoot mineral trioxide aggregate (MTA) or calcium enriched mixture (CEM). A total of 42 symptom-free carious vital primary molars (21 pairs) were selected in this split mouth trial and randomly

pulpotomized in two experimental groups. Nineteen patients were available for 20-month follow-up; only one failed tooth was extracted in the CEM group. All available teeth were symptom-free, however, the final evaluated success rate was 89% in CEM (CI 95%: 0.82-0.96) and 95% in MTA (CI 95%: 0.85-1) groups without statistical difference (P=0.360). Worst case scenario was applied for missing value analysis; assuming that the 2 lost cases in CEM group had failed and the only lost case in MTA group was due to treatment success, as a result the success of CEM and MTA were 81% (CI 95%: 0.72-0.90) and 95% (CI 95%: 0.85-1), respectively, with no statistical difference (P=0.078). In the reverse scenario, the success of MTA and CEM were 86% (CI 95%: 0.78-0.94) and 90% (CI 95%: 0.82-0.98), respectively; again with no statistical difference (P=0.479). Effectiveness of MTA and CEM biomaterials for primary molars' DPC was similar; CEM can be a suitable alternative for MTA.<sup>11</sup> Hilton TJet et al compared the success of direct pulp capping in permanent teeth with MTA (mineral trioxide aggregate) or CaOH (calcium hydroxide). Thirty-five practices in Northwest PRECEDENT were randomized to perform direct pulp caps with either CaOH (16 practices) or MTA (19 practices). Three hundred seventy-six individuals received a direct pulp cap with CaOH (n = 181) or MTA (n = 195). They were followed for up to 2 yrs at regular recall appointments, or as dictated by tooth symptoms. The primary outcomes were the need for extraction or root canal therapy. Teeth were also evaluated for pulp vitality, and radiographs were taken at the dentist's discretion. The probability of failure at 24 mos was 31.5% for CaOH vs. 19.7% for MTA (permutation log-rank test, p = .046). This large randomized clinical trial provided confirmatory evidence for a superior performance with MTA as a direct pulp-

capping agent as compared with CaOH when evaluated in a practice-based research network for up to 2 yrs.<sup>12</sup>

### CONCLUSION

The clinical and radiographic findings of the current study showed a comparable successful outcome in direct pulp capping of primary molars using MTA and Calcium hydroxide.

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