

To Compare MTA with Biodentine as a Restorative Material in Deciduous Teeth

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ABSTRACT

Background: Several medicaments have been used in pulpotomy procedures of primary teeth. The present study was conducted to compare MTA with biodentine as a restorative material in deciduous teeth.

Materials & Methods: The present study was conducted in the department of Pedodontics. 20 ring molds of stainless steel having inner diameter of 2.1 cm and a height of 1.6 cm were manufactured. In group I specimens, the molds were filled to excess with MTA and in group II, with biodentine.

Results: Each group had 20 teeth sample. In group I, MTA was used and in group II, biodentine material was used. The mean solubility value of MTA at 1st day was 1.55, at 4th day was 1.64, at 12th day was 2.15, at 30th day was 2.57 and at 45th day was 2.60. Similarly in group II at 1st day was 1.89, at 4th day was 2.11, at 12th day was 2.80, at 30th day was 3.61 and at 45th day was 5.34. pH at 2 hours was 9.28 in group I and 8.98 in group II, at 12 hours was 9.26 in group I and 9.39 in group II, at 24 hours was 9.20 in group I and 9.64 in group II, at 7 days was 8.76 in group I and 8.27 in group II, at 28 days was 7.62 in group I and 7.78 in group II. The difference was significant ($P < 0.05$).

Conclusion: Authors found that both materials can be used in deciduous teeth. However, biodentine revealed higher solubility and pH as compared to MTA in deciduous teeth.

Keywords: Biodentine, Deciduous, MTA.

INTRODUCTION

The execution of an endodontic therapy of a primary tooth helps prevent avulsion, requiring, in some cases, the application of a space maintainer to prevent unwanted movement of the neighboring teeth and consequent loss of space in the arch. Moreover, premature tooth loss can lead to malocclusion with aesthetic, phonetic and functional problems that may be transient or permanent teeth.¹ Pulpotomy and pulpectomy are two major treatment modalities for deciduous teeth. A pulpotomy is performed on a tooth with deep

carious lesion, pulp exposure during the operatory process or after a traumatic pulp exposure.¹ Pulpotomy is a treatment procedure that may be performed in healthy radicular pulp tissue with healing potential after surgical removal of the infected or affected coronal pulp.² Pulpotomy therapy for the primary dentition can be classified according to various treatment objectives: devitalization (mummification, cauterization), preservation (minimal devitalization, non

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inductive), or regeneration (inductive, reparative). Pulpectomy is complete removal of dental pulp.³

Several medicaments have been used in pulpotomy procedures of primary teeth with the objective to maintain pulp vitality and promote healing of the pulp remnants and maintain the tooth until its natural exfoliation time. Among several materials, biodentine and MTA are widely used. Biodentine is composed of powder and liquid.⁴ The powder part includes tricalcium silicate, dicalcium silicate (3 CaO SiO₂ and 2 CaO SiO₂), and calcium carbonate (CaCO₃). Zirconium dioxide (ZrO₂) is present as a contrast substance and calcium chloride present as liquid (CaCl₂·2H₂O) to obtain rapid setting time and high strength. Mineral trioxide aggregate (MTA) has become more popular, as it has low solubility and good sealing ability.⁵ The present study was conducted to compare MTA with biodentine as a restorative material in deciduous teeth.

MATERIALS & METHODS

The present in vitro study was conducted in the department of Pedodontics. The study approval was obtained from institutional ethical committee before starting the study. Two groups were formed. In group I, MTA and in group II, biodentine material was used. 20 ring molds of stainless steel having inner diameter of 2.1 cm and a height of 1.6 cm were manufactured. Mixing of MTA and biodentine was done according to manufacturer's directions. In group I specimens, the molds were filled to excess with MTA and in group II, with biodentine. Following this, the molds were placed inside an incubator cabinet at 37°C.

The mass of dried glass bottles was measured. This procedure was repeated for 4, 12, 30, and 45 days. 20 polyethylene tubes 1 mm long were filled with MTA and biodentine and placed in lidded flasks containing 10 mL distilled water and were preserved in an oven at 37°C. After 2 h, the flasks were removed from hot air oven, and the water was assessed for pH. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I shows that each group had 20 teeth sample. In group I, MTA was used and in group II, biodentine material was used.

Table II, graph I shows that mean solubility value of MTA at 1st day was 1.55, at 4th day was 1.64, at 12th day was 2.15, at 30th day was 2.57 and at 45th day was 2.60. Similarly in group II at 1st day was 1.89, at 4th day was 2.11, at 12th day was 2.80, at 30th day was 3.61 and at 45th day was 5.34. The difference was significant (P< 0.05).

Table III, graph II shows that pH at 2 hours was 9.28 in group I and 8.98 in group II, at 12 hours was 9.26 in group I and 9.39 in group II, at 24 hours was 9.20 in group I and 9.64 in group II, at 7 days was 8.76 in group I and 8.27 in group II, at 28 days was 7.62 in group I and 7.78 in group II. The difference was significant (P< 0.05).

Table I: Distribution of teeth.

Groups	Group I (MTA)	Group II (Biodentine)
Teeth sample	20	20

Table II Assessment of mean solubility in both groups.

Time	Group I	Group II	P value
1 day	1.55	1.89	0.01
4 days	1.64	2.11	
12 days	2.15	2.80	
30 days	2.57	3.61	
45 days	2.60	5.34	

Graph I Assessment of mean solubility in both groups

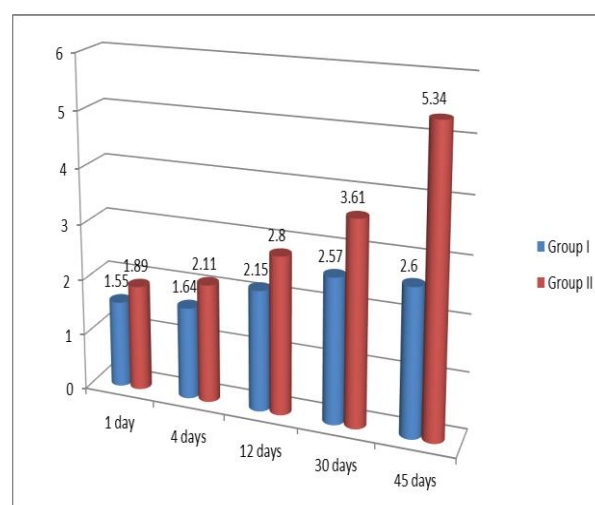
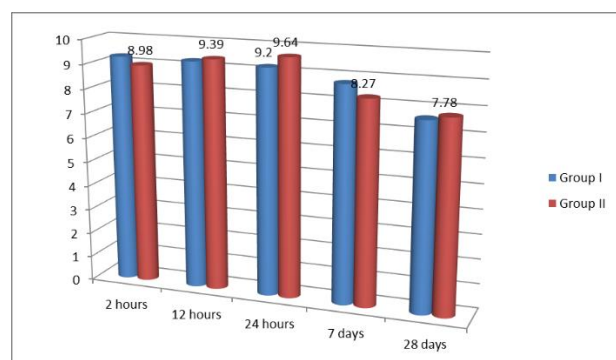


Table III Assessment of pH in both groups.

Time	Group I	Group II	P value
2 hours	9.28	8.98	0.01
12 hours	9.26	9.39	
24 hours	9.20	9.64	
7 days	8.76	8.27	
28 days	7.62	7.78	

Graph II Assessment of pH in both groups.



DISCUSSION

MTA and biodentine have become materials of choice in deciduous teeth. The two main components of MTA are calcium oxide and silicon dioxide. When these raw materials are blended, they produce tricalcium silicate, dicalcium silicate, tricalcium aluminate, tetracalcium aluminoferrite, and other mineral oxides.⁶ Bismuth oxide was added so that the material can be detected on radiographs. On addition of water, the cement hydrates, form silicate hydrate gel. Gray MTA was the original formulation to be introduced, and white MTA was developed later as this version improved esthetics.⁷

Disadvantages of MTA are that it is highly soluble and has a prolonged setting more than 2 h. Meanwhile, Biodentine is a two components material; the powder component consists of tricalcium silicate, dicalcium silicate as a second core material, calcium carbonate, oxide as filler, iron oxide shade, and zirconium oxide as a radio-opacifier. The liquid, on the other hand, contains calcium chloride as a setting accelerator and a water reducing agent. There is ample evidence for positive effects of Biodentine on vital pulp cells, for stimulating tertiary dentin formation, and early formation of reparative dentin.⁸ The present study

was conducted to compare MTA with biodentine as a restorative material in deciduous teeth.

In present study, we divided teeth into 2 groups. In group I, MTA was used and in group II, biodentine material was used. Carti et al⁹ conducted a study in which a total of 25 children with 50 human primary molar teeth aged between 5 and 9 years were selected. The patients were divided into 2 groups. Group I patients received MTA and group II patients received Biodentine. All pulpotomized teeth were restored with stainless steel crowns and evaluated clinically and radiologically at 1, 3, 6 and 12 months. There was clinical and radiological success rates of 96 and 80% in group I and 96 and 60% in Group II, respectively. There were no significant differences between the groups ($P > 0.05$). The radiographic success rates decreased in the controls, but there were no significant differences.

We found that mean solubility value of MTA at 1st day was 1.55, at 4th day was 1.64, at 12th day was 2.15, at 30th day was 2.57 and at 45th day was 2.60. Similarly in group II at 1st day was 1.89, at 4th day was 2.11, at 12th day was 2.80, at 30th day was 3.61 and at 45th day was 5.34. Zaror et al¹⁰ did a study in which 7 pulpotomies were performed with MTA and 6 with ferric sulphate (FS) in deciduous teeth. Authors found that radiographic success was 85.71% for the MTA and 83.33% for SF. Similar results were found in a randomized clinical trial (RCT) comparing MTA and FC in pulpotomies of 64 molars that were pulpotomized equally and randomly with MTA and Formocresol.

We found that pH at 2 hours was 9.28 in group I and 8.98 in group II, at 12 hours was 9.26 in group I and 9.39 in group II, at 24 hours was 9.20 in group I and 9.64 in group II, at 7 days was 8.76 in group I and 8.27 in group II, at 28 days was 7.62 in group I and 7.78 in group II.

CONCLUSION

Authors found that both materials can be used in deciduous teeth. However, biodentine revealed higher solubility and pH as compared to MTA in deciduous teeth.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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