

ORIGINAL RESEARCH

Comparison between MTA and Biodentine in Pulpotomy of Primary Mandibular Second Molars with Irreversible Pulpitis

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ABSTRACT:

Background: To compare MTA and biodentine in pulpotomy in irreversible pulpitis. **Materials & methods:** A total of 40 samples were included. They were divided into two groups and including 20 in each. In group A, the remaining pulp was covered with 2 mm MTA+ and in group B with 3 mm Biodentine. P- value less than 0.05 was considered significant. **Results:** The treatment failure rate was 20% (8 patients in both groups) and the treatment success rate was 80% (32 patients in both groups). **Conclusion:** Biodentine properties are similar to MTA, and both materials show high clinical and radiographic success rates.

Keywords: Biodentine, MTA, Pulpitis.

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INTRODUCTION

American Association of Endodontists (AAE) Consensus Conference Recommended Diagnostic Terminology defines irreversible pulpitis as a clinical diagnosis based on subjective and objective findings indicating that the vital inflamed pulp is incapable of healing. Additional descriptors include lingering thermal pain, spontaneous pain, referred pain, or no clinical symptoms but inflammation produced by caries, caries excavation, and trauma¹. Pulpitis can be managed with different treatment options such as direct pulp capping, pulpotomy, or root canal treatment.² Several variables such as medical history and age, whether it is a permanent or primary tooth, exposure of the pulp, contamination with saliva, and previous restorations affect treatment decisions.³

A few dental materials have been introduced to address some of these drawbacks. Mineral trioxide aggregate (MTA) cement, which has good sealing ability and boosts periradicular tissue regeneration, can be packed with a carrier, delivered into the apical third, injected as batches, and condensed vertically with a hand plunger to form apical plugs at the end of immature roots with or without periapical lesions.⁴ After setting the apical plugs, the remaining part of the canal is obturated with gutta-percha and a sealer.

This technique has multiple advantages, importantly a shorter treatment time and a good apical seal.⁵ However, MTA has numerous shortcomings, including poor handling features, long setting time (3–4 h), the potential to discolor teeth, and high cost.⁴ The extended setting time is a significant drawback of MTA use in children's teeth. The treatment is preferred to be completed in a single session in patients requiring pharmacologic behavior management techniques, such as sedation or general anesthesia.⁶ Biodentine was introduced in 2010 as bioactive calcium silicate-based cement and formulated using MTA-based cement technology, while claiming improvements of some of the MTA properties, such as physical qualities and handling. In addition, the setting time of Biodentine is about 12 min, providing a reasonable time for its application in a single-visit apexification procedure.^{7,8} Hence, this study was conducted to compare MTA and biodentine in pulpotomy in irreversible pulpitis.

MATERIALS & METHODS

A total of 40 samples were included. They were divided into two groups and including 20 in each. In group A, the remaining pulp was covered with 2 mm MTA+ and in group B with 3 mm Biodentine.

Participants were called for clinical evaluation every three months for 12 months (long-term follow-up). Radiographic evaluations in 6th and 12th months was done. Data was collected. The results were analysed using SPSS software. P- value less than 0.05 was considered significant.

RESULTS

A total of 40 samples were enrolled. Subjects were divided into 2 groups. The survival rate in both pulp treatment methods was similar in symptomatic teeth. The treatment failure rate was 20% (8 patients in both groups) and the treatment success rate was 80% (32 patients in both groups).

Table 1: Comparison of the frequency distribution of success and failure between the two groups

Groups	Group 1 MTA	Group 2 Biodentine	Total
Frequency of success	16 (80%)	16 (80%)	32 (80%)
Frequency of failure	4 (20%)	4 (20%)	8 (20%)

DISCUSSION

Pulp exposure can be due to trauma, mechanical reasons, or caries. Direct pulp capping (DPC) may be required as one of the treatment options to prevent the dental pulp from necrosis.⁹ Ideal pulp capping material should maintain pulpal vitality and stimulate reparative dentin formation.¹⁰ These materials should possess certain properties such as radio opacity, insolubility, dimensional stability, biocompatibility, bioactivity, and adequate adhesive ability to both the dentin and to the restorative materials.¹¹ It should also release fluoride, provide bacterial seal, prevent secondary caries, should have bactericidal or bacteriostatic activity against the causative pathogens, and promote the formation of mineralized tissue.¹² Hence, this study was conducted to compare MTA and biodentine in pulpotomy in irreversible pulpitis.

In the present study, a total of 40 samples were enrolled. Subjects were divided into 2 groups. The survival rate in both pulp treatment methods was similar in symptomatic teeth. A study by Eshghi A et al, was conducted as a randomized double-blind clinical trial. Participants were selected according to inclusion criteria and 52 samples were randomly selected using random numbers table in group A. Then, patients in the next group B were matched with the first group in terms of age range and sex. In group A, the remaining pulp was covered with 2 mm MTA+ and in group B with 3 mm Biodentine. Participants were called for clinical evaluation every three months for 12 months (long-term follow-up). Fischer's exact test showed that there was no significant difference between MTA and Biodentine in terms of clinical and radiographic success rates (P value = 1). According to the results of the Kaplan–Meier test, the survival rate in both pulp treatment methods was similar in symptomatic teeth. Biodentine properties are similar to MTA, and both materials show high clinical and radiographic success rates in long-term follow-up.¹³

In the present study, the treatment failure rate was 20% (8 patients in both groups) and the treatment success rate was 80% (32 patients in both groups). Another study by Tolibah YA et al, thirty immature roots of 24 permanent lower first molars with apical lesions were randomly divided into two groups: group 1 (15 roots) treated with MTA apical plugs and group 2 (15 roots) treated with Biodentine apical plugs. Treatment radiological outcomes were assessed using

the periapical index (PAI) scale after 6 and 12 months of treatment. The presence or absence of apical calcified barrier (ACB) was assessed after 12 months of treatment. There were no statistically significant differences in the PAI between the two groups at 6 and 12 months postoperatively. After 12 months, four cases in the Biodentine group showed ACB formation, whereas ACB was not found in any case treated with MTA. The VAS scores were statistically lower in the MTA group on the first day after treatment. Nevertheless, these scores were not statistically significantly different after 3, 7, and 14 days of treatment between the two groups. Biodentine can be used as an apical plug to treat immature permanent molars with apical lesions in a single visit in children. Biodentine showed favorable outcomes in apical lesions healing, which was comparable to MTA but with a decreased treatment time associated with its use.¹⁴ Juneja P et al, studied forty-five teeth were available for follow up at the end of 18 months. All of the available teeth for mineral trioxide aggregate and Biodentine® were clinically successful, as were 73.3% of the FC group. Radiographic success rate for the formocresol group at 18 months follow up was 73.3, 100% for mineral trioxide aggregate and 86.6% for Biodentine® group. Conclusion Mineral Trioxide aggregate and Biodentine® showed more favourable results than formocresol.¹⁵ The findings of a 2019 study by Çelik et al.¹⁶, which treated the mandibular primary pulp using MTA and Biodentine, showed that in the long-term follow-up of 24 months, the clinical and radiographic results of MTA were 100%, and that of Biodentine is 89.4%. As a result, both materials can be used to treat primary molars that take a long time to exfoliate normally. On the other hand, the results of the clinical study of Uesrichai et al.¹⁷ in 2019, which examined the effects of two bioactive materials PRO ROOT MTA and Biodentine in the treatment of permanent teeth with symptoms and irreversible pulpitis with 36-month follow-up. In this way, Biodentine has no lower clinical and radiographic success than PRO ROOT MTA, which is a standard gold material, and the effects of both materials are similar to each other.

CONCLUSION

Biodentine properties are similar to MTA, and both materials show high clinical and radiographic success rates.

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