

CASE REPORT

Direct Pulp Capping with Mineral Trioxide Aggregate -A Novel Material

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ABSTRACT

Introduction: Pulp capping in carious teeth has been considered unpredictable and therefore contraindicated. A recently developed material, mineral trioxide aggregate (MTA), resists bacterial leakage and may provide protection to the pulp, when used in combination with a sealed restoration. **Aim:** Aim of this case report was to determine the clinical and radiographic success rate of vital pulp therapy with mineral trioxide aggregate (MTA) in human mature permanent molar teeth. **Methods:** Carious pulpal exposure was treated by direct pulp capping with MTA. **Results:** After 9 months clinical and radiographic follow-up, it was found that the procedure had successful outcome. **Conclusion:** Although the results favoured the use of MTA in carious permanent teeth by vital pulp therapy but more studies with larger sample and a longer recall period are needed to justify the use of this novel material for treatment of reversible pulpitis in permanent teeth.

Keywords: Caries, Vital, Remineralization, Preservation

INTRODUCTION

Preservation and maintenance of pulpal vitality is one of the main objectives in Endodontics. Earlier, the placement of a medicament or material against a direct pulpal exposure during caries excavation has been considered controversial, and instead conventional endodontic therapy has been recommended.¹⁻⁵ A diagnosis of reversible pulpitis before treatment is necessary for a successful outcome, but a definitive pulpal diagnosis often is difficult to establish.⁶ Success rates with direct pulp capping in a carious tooth have varied depending on the technique and materials. In humans, success rates range from 30 to 85 percent in two- to 10-year retrospective studies.^{4,6-10}

MTA is a bioactive silicate cement that has been shown to be an effective pulp-capping material in canine models and in nonhuman primates.¹¹⁻¹³ The material is successful because of its small particle size, sealing ability, alkaline pH when set and

slow release of calcium ions.¹⁴ Investigators have reported that MTA induces pulpal cell proliferation¹⁵, cytokine release¹⁶, hard tissue formation¹⁷ and the synthesis of an interface with dentin that resembles hydroxyapatite in composition.¹⁴ The material is non-absorbable, sets in the presence of moisture, has a relatively high compressive strength and has a sustained high alkaline pH.¹⁸

CASE REPORT

The case concerned is a 15 years old female patient complaining of discomfort of tooth 36 upon contact with cold food, drinks and air. On examination, deep carious lesion was seen. The tooth tested vital to EPT and cold test (Endo-Frost, Roeko and Langeman, Germany) with no lingering pain and was negative on percussion. Radiograph showed evidence of deep caries in close proximity to the pulpal chamber with no evidence of thickened periodontal ligament (PDL) as shown in **Figure 1**.



Figure 1 Preoperative Radiograph

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Figure 2 Post operative radiograph 9 months follow up

DISCUSSION

Although there was only one case, the results of this study in which we used MTA as a direct pulp-capping agent when following the protocol described for a two-visit sequence show that this procedure can achieve a long-term favourable outcome. The physical characteristics and bioactive properties of MTA were a critical contributing factor to the success of this study.¹⁴⁻¹⁹ The cement is hygroscopic, and its ability to set is not affected by the presence of blood or serum fluids.²⁰

Furthermore, the release of calcium ions by MTA generates a reactionary interfacial layer of hydroxyapatite on its surface when it comes in contact with tissue fluids, and their presence also may contribute to reparative dentin formation.¹⁴ In our case we placed MTA over the exposure site and the entire floor or wall of the restoration preparation to allow a 1.5- to 3.0-mm thickness of the matter. The outcome shows that the human pulp has an innate healing capacity that can be enhanced using objective and conservative caries removal, a bioactive pulp-capping material and a sealed restoration. The high occurrence of pulpal repair and pulp-capping success appears to be more favorable in teeth of younger patients; success can be attributed to the presence of larger apical foramina and greater vascularization of the pulp, in which active immune cell surveillance may increase chances for repair and intensify vital pulpal maintenance.⁹

CONCLUSION

MTA promotes remineralization of dentine, preserves pulp vitality and promotes pulp healing. MTA has been identified as a revolutionary material which has the potential maintaining pulp vitality in patients judiciously selected for direct pulp capping. However further studies are required to extend the furtherscope of this material for clinical applications.

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