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*Professional paper*

# DIRECT PULP CAPPING WITH MINERAL TRIOXIDE AGGREGATE: CASE REPORT

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**Abstract**

This case report determines the role of mineral trioxide aggregates (MTA) in the direct pulp capping regarding the caries and accidental pulp exposure in a 14-year-old male patient. We have applied mineral trioxide aggregates (MTA) for direct pulp capping, and it is both clinical and radiological aspects MTA has demonstrated great outcomes. During ongoing visits and examinations for two years in a timely fashion, the tooth was asymptomatic; hence we confirmed the treatment to be a success. In this case report, the use of mineral trioxide aggregates (MTA) shows efficacy and ensures us that using this material during pulp capping results in saving the vitality of the pulp and the absence of apical pathologies. Even though our results were remarkable, there needs to be new studies in bigger group trials to determine the consistency and efficacy of MTA.

*Keywords:* mineral trioxide aggregates, pulp exposure, child patient, direct pulp capping

## 1. Introduction

Direct pulp capping is a dental procedure that consists of applying certain dental material directly into the exposed pulp area, which exposure came from traumatic or mechanical injury. The purpose of this process is to stimulate tissue reparation and regeneration from a process known as reparation dentinogenesis, in which process a new barrier is formed, which is the dentinal bridge. This type of procedure is indicated for treating pulp exposures that follow caries, trauma, or during a tooth preparation complication. Since usually there's no tissue inflammation in the case of accidental pulp exposures, when the exposure arises from caries or trauma, the severity of tissue inflammation is the key prognostic factor. (Berman & Hargreaves, 2020)

Direct pulp capping is recommended for asymptomatic teeth, specifically those that do not show clinical signs or symptoms of irreversible pulpitis. The pulp exposure should be minimal, less than 0.5 mm, hemorrhage control must be guaranteed, contamination of the exposure site should be hindered, and ultimately a restoration with an effective marginal seal ought to be applied. Outcome effectiveness rates are high in the direct pulp capping procedure when the exposures are minor, clean, and induced by mechanical action. (Torabinejad & Walton, 2009)

An ideal sealing material for direct pulp capping should inhibit inflammation, bond to dentin, avoid microleakage, be readily applied, and enhance the formation of a dentinal bridge. Calcium hydroxide is one of the most commonly used materials for direct pulp capping. Even though this material stimulates the formation of reparative dentin, it also results in the formation of a necrotic layer attributable to its high alkalinity. Types of materials such as Mineral Trioxide Aggregate (MTA) have gained attention as substitutes for calcium hydroxide. MTA has become acknowledged due to clinical bioactivity and is used for direct pulp capping, repairing perforations, apexification, and retrograde filling. It has produced more successful results in preserving pulp vitality, both clinically and histologically. (Akhavan, Arbabzadeh, Bouzari, Razavi, & Davoudi, 2017)

## 2. Case Presentation

This case involves a 14-year-old male patient who presented to our clinic for orthodontic treatment. During the examination, we observed the presence of caries on several teeth. Before starting the orthodontic treatment, we decided to focus on the affected teeth. Caries were noted on the lower left first molar, but the patient had no symptoms; both the palpation and cold tests were negative.

Initially, we administered anesthesia and began removing the caries using a round diamond bur. While in the process, we accidentally exposed the pulp. After the exposure, we carefully examined the rest of the pulpal wall and removed the remaining caries using a round steel bur. To stop the bleeding at the exposed site, we used a cotton pellet soaked in sodium hypochlorite and kept it in place for more than a minute until the bleeding ceased. Then, we prepared Mineral Trioxide Aggregate (MTA) and placed it in the exposed area using a plastic filling instrument and a cotton swab. Finally, we sealed the cavity with flowable composite without using acid etching or bonding.

After the procedure, patients were advised to contact the dentist without hesitation if pain occurs or significant discomfort post-treatment. We informed the patient about the next steps and advised him to return in one week if there were no issues. During the follow-up visit, one week later, the patient presented and reported that he had no problems. In this session, we sealed the cavity with a permanent composite restoration. Finally, we instructed the patient to return for periodic check-ups every 6 months. At the 6-month follow-up, we performed a retroalveolar radiograph to assess the condition of the tooth.

## 3. Discussion

Based on this case, MTA is an effective solution for direct pulp capping procedures. Postoperative radiographs at 6 months and 2 years (see Fig. 1 and Fig. 2) show no signs of pathology, and the absence of any symptoms further confirms the success of this procedure. The main advantage of MTA is its ease of application and the elimination of the need for endodontic treatment.

*Figure 1.* Radiograph taken 6 months post-treatment with MTA

*Figure 2.* Radiograph taken 2 years post-treatment with MTA.

George Bogen, DDS, and his colleagues, in their study lasting approximately nine years, followed 49 out of 53 teeth and found that 97.96% had favorable outcomes based on radiographs and clinical tests (Bogen, Kim, & Bakland, 2008)

Additionally, the study by Mente J et al. revealed that the success rate for direct pulp capping was 78% for the group treated with MTA, compared to 60% for those treated with calcium hydroxide. (Mostafa & Moussa, 2018)

Another study conducted by Zhaofei Li, MDS et al. showed that the patient groups treated with MTA exhibited a much higher success rate compared to those treated with calcium hydroxide (CH). Mineral Trioxide Aggregate (MTA) was distinguished from calcium hydroxide due to the absence of an inflammatory reaction and the formation of dentin bridges. (Li, Cao, Fan, & Xu, 2015)

## 4. Conclusion

Based on the results of our patient's case, MTA has demonstrated high efficacy in treatment. At the 2-year follow-up, the patient's spontaneous pain was not observed, and the pulp showed signs of vitality with no manifestation of periapical radiolucency. This attributes the MTA as a reliable and favorable solution for direct pulp capping in clinical practice. However, to confirm and deepen this finding, it is recommended that an additional study be performed on a larger group of patients to asses is the consistency and efficacy of this material under different clinical conditions.

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