



Adult Pulpotomy: the Last Resort to Save the Pulp. A Case Report.

Mohamed Samir Yousef¹, Ashraf Samir Refai², Taher Medhat Eslam³

¹ MDS, Assistant lecturer of Endodontics, Department of Endodontics, Faculty of Dental Medicine, Al-Azhar University, Cairo (boys)

² PHD, Professor of Endodontics, Department of Endodontics, Faculty of Dental Medicine, Al-Azhar University, Cairo (boys)

³ PHD, Professor of Endodontics, Department of Endodontics, Faculty of Dental Medicine, Al-Azhar University, Cairo (boys)

Abstract: Most clinicians used to perform a total pulpectomy to the mature teeth exposed by caries as they believed that the pulp once inflamed, it must be extirpated. Adult pulpotomy has been introduced for the sake of removing only the degenerative and irreversibly inflamed part of the coronal pulp and leaving the healthy and vital pulp tissue. *Methods:* A 39-years old male patient with a carious lower right permanent molar with signs and symptoms of irreversible pulpitis was referred from the outpatient clinic of the Faculty of Dental Medicine, Al-Azhar University. After caries removal and access cavity preparation, excavation of all coronal pulp to the floor of the pulp chamber was done. Control of bleeding was achieved using pressure with a saline-soaked cotton pellet. MTA was prepared, applied to the floor of the pulp chamber with a wet cotton pellet was placed over it, and the tooth was temporized. Forty-eight hours later, the cotton pellet was removed, and the final filling was applied. The patient was followed up after 3,6,12, and 18 months and the tooth was still functioning and free of signs and symptoms.

Keywords: Irreversible pulpitis, Mature, MTA, Pulpotomy

I. Introduction

An adult pulpotomy is a biological approach to minimally invasive endodontics as an alternative to total pulpectomy in the management of pulpitis in mature permanent teeth [1]. This procedure maintains the remaining tooth structure thus reducing the propensity of tooth fracture and preserves the vitality of the remaining pulp tissue along with its defensive function [2]. Several previous studies evaluated adult pulpotomy for teeth with irreversible pulpitis and reported success rates ranging from 78.1 % and 98.4 % [2-6]. The preoperative state of the pulp can have a significant effect on the outcome of adult pulpotomy [7]. To determine the pulp state of teeth, sensibility testing including electric pulp tester is commonly used by clinicians to judge qualitatively the sensitivity of teeth. Yet, it has many limitations such as reliance on patients' responses and clinicians' interpretation. Moreover, the nerve fibers may remain functioning after degeneration of the pulp.

Other technologies such as laser doppler flowmetry and pulse oximetry have emerged as alternatives to overcome the shortcomings of pulp sensibility testing and to better judge the vitality of teeth.

The capping material can affect the success of adult pulpotomy based on its effect and seal on the remaining pulp stamp [8]. Calcium hydroxide (CH) was widely used for vital pulp therapy till the introduction of MTA which became the material of choice for vital pulp therapy [9]. One of the first published histologic studies on human permanent molars comparing MTA and CH as a capping material was done in 2003[10]. The study revealed that in all MTA samples, thicker bridges were formed, the presence of an odontoblastic layer was frequent, and few samples had hyperemia. On the contrary, CH tends to dissolve over time, does not adhere to dentine, lacks the ability to seal and tunnel defects in dentine bridges under CH can act as pathways for microleakage. Indeed, the results also showed that in CH samples; inflammation was seen more frequently with greater severity, no odontoblastic layer was formed, and necrosis was also more frequent. Eghbal et al. [11] evaluated histologically the success rate of MTA pulpotomy in permanent molars with irreversible pulpitis which were scheduled for extractions. The study revealed the formation of a complete dentinal bridge with the radicular pulp was vital and free of inflammation in all the samples. Taha and khazali [4] studied the outcome of partial pulpotomy using MTA compared with CH in mature cariously exposed permanent molars. They found a statistically significant difference between the two materials with success rates of 83% vs 55% at 1 year, 85% vs 43% at 2 years for MTA vs CH, respectively.

This case report describes the coronal pulpotomy procedure with MTA capping technique in carious mature molar with irreversible pulpitis.

II. Case Report:

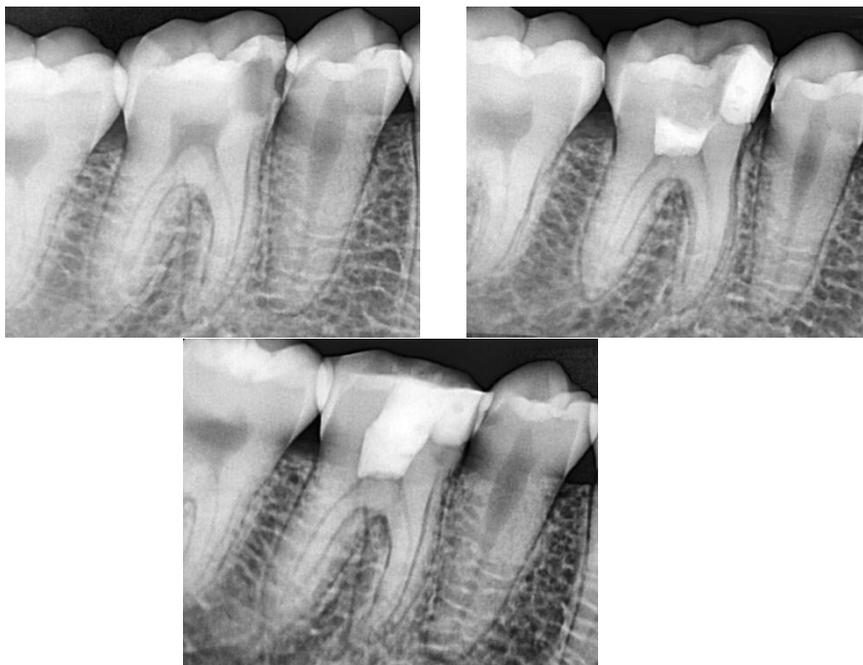
A healthy 39-years old male patient was referred from the outpatient clinic of the Faculty of Dental Medicine, Al-Azhar University with exposed carious lower right first permanent molar. After clinical and radiographic examination, the tentative diagnosis was irreversible pulpitis of carious exposed permanent lower right first molar.

Following initial examination and acceptance, written informed consent was taken from the patient after a detailed explanation of the procedure and the follow-up period with emphasis on the possible outcome. The initial state of the pulp was determined using cold testing, electric pulp testing, and pulse oximeter. The diagnosis was confirmed as irreversible pulpitis without apical periodontitis.

Local anesthesia was established using 1.8ml of 2% Mepivacaine HCl with levonordefrin 1:20.000. Following anesthesia and rubber dam isolation, removal of carious dentin was done using a size #3 carbide round bur (SS White Burs, Inc., New Jersey; USA) mounted in a high-speed contra-angle handpiece with coolant. Building up the missing parts of the tooth was achieved using a light-cured resin-modified glass ionomer capsule (RMGIC) (Riva Light Cure, SDI, Victoria, Australia). Access cavity was gained using a size #3 carbide round bur, while de-roofing and cavity refinement was done using an Endo-Z bur (Dentsply Maillefer, U.S.A).

After access cavity preparation and deroofting, pulp excavation to the level of the orifices was performed using a size #3 high-speed carbide round bur under water coolant and sharp spoon excavator (Premier, USA). The pulp chamber was flushed using saline solution and hemostasis was achieved by the application of a cotton pellet moistened with saline for 2 min. The MTA powder (MTA, Angelus, Londrina, Brazil) was dispensed into a dappen dish in which a drop of sterile water was then gradually incorporated into the powder in a ratio of 3:1 powder to liquid, and mixed with a spatula till full wetting of the powder particles was achieved. After MTA application, a moistened cotton pellet was placed directly over it and the tooth was then temporized with glass-ionomer filling (Ketac™ Molar Aplicap™ 3M/ ESPE, Seefeld, Germany). Forty-eight hours later, the glass ionomer filling and the cotton pellet were removed and the final restoration was placed. The final restoration was accomplished using RMGIC followed by resin-bonded composite (3M, ESPE, St. Paul, USA). The patient was evaluated clinically and radiographically after 3,6,12,18 months.

After 18-months follow-up, the tooth was functional and free of signs and symptoms with no detected definite abnormality in the postoperative radiographs. Moreover, no coronal discoloration was detected clinically.



Lower right first molar A) A preoperative radiograph showing deep mesial caries reaching the pulp. B) A radiograph showing the tooth after rebuilding and MTA application. C) A radiograph showing the tooth after final filling,



A) A clinical photograph showing the pulp chamber after excavation of the coronal pulp and hemostasis, B) A clinical photograph showing the pulp chamber after application of MTA.

III. Discussion:

During the last two decades, a better understanding of pulp biology, pulp regeneration, and vascularization with the development of hydraulic calcium silicate materials like MTA, coronal pulpotomy has been recommended as a definitive treatment in permanent teeth even with irreversible pulpitis [12,13].

In this case, achievement of hemostasis was done using mechanical pressure with a cotton pellet soaked in saline in concurrence with previous studies [14-16]. With regards to the bleeding time, in this case, 2 min. were needed to achieve hemostasis. Multiple studies reported that for successful management of pulpotomy cases, the time to achieve hemostasis should not extend more than 10 min. [2,3,17,18]. MTA is a hydraulic cement sets in the presence of moisture, with an excellent seal, bioactivity, and good physical characteristics [19]. Multiple previous studies reported a high success rate of MTA capping in adult pulpotomy [20-23].

With regards to the final filling, While RMGIC ensured a good seal with minimal marginal leakage, the layer of composite provided compressive and tensile strength and resistance to dissolution [24]. Within the follow-up period, the bonded composite restoration was efficient without a fixed crown over the treated tooth as minimal access cavity was done with preservation of the pericervical dentin and conservation of much of the tooth structure [25].

The patient was followed up after 3,6,12, and 18 months in harmony with Galani et al. [26]. Using the criteria of success and failure described by Galani et al. [26], this case was considered successful. Case selection is an important criterion for the success of adult pulpotomy so stringent methods for evaluating the preoperative state of the pulp and a new classification for different states of the pulp should be developed for better case selection.

IV. Conclusion:

It seems that adult pulpotomy is promising management for teeth with irreversible pulpitis.

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