

# Mineral Trioxide Aggregate (MTA) Apexification: Clinical Case of Open Apex with Periapical Abscess

Sofia Drouri<sup>1</sup>, Loubna Rhalimi<sup>2</sup>, Jalila Dakkaki<sup>3</sup>, Mouna Jabri<sup>4</sup>

School of Dentistry of Casablanca, Abou Al AlaaZahar Street 21100, Mers Sultan, Casablanca, Morocco

<sup>1</sup>Specialist, Department of Conservative Dentistry and Endodontics, school of dentistry of Casablanca, Morocco

<sup>2</sup>Resident doctor, Department of Conservative Dentistry and Endodontics, school of dentistry of Casablanca, Morocco

<sup>3</sup>Assistant Professor, Department of Conservative Dentistry and Endodontics, school of dentistry of Casablanca, Morocco

<sup>4</sup>Professor, Department of Conservative Dentistry and Endodontics, school of dentistry of Casablanca, Morocco

**Abstract:** *The treatment of immature teeth with necrotic pulp requires the choice of the good technic and the appropriate material. Several materials can be recommended to achieve the apical barrier's formation. The aim of this work is to discuss the management of necrotic tooth with open apice using MTA in a successful clinical case report.*

**Keywords:** MTA, open apex, apexification

## 1. Introduction

The treatment of immature permanent teeth with necrotic pulp is a challenging situation facing endodontists. [1] Proper preparation and obturation of these teeth are difficult to achieve because of the thin, fragile dentinal walls and the blunderbuss shape of the apex. [2]

To manage these teeth, apexification has long been the treatment of choice, enjoying considerable success in preserving damaged immature teeth. [3]

Numerous materials have been recommended to induce apexification in teeth with immature apices. [3] These materials are calcium hydroxide used in the long-lasting apexification, and artificial apical barriers placed at the blunt apex. [4]

Opposed to long-term calcium hydroxide apexification procedures, apical plug technique with use of these artificial barriers could be completed even in one visit. A biomaterial, such as MTA, Biodentine or CEM is placed apically in order to create an artificial seal that facilitates the compaction of gutta-percha on it. [4]

## 2. Case report

A 14 year old girl was referred to the Department of Conservative Dentistry and Endodontics, School of Dentistry of Casablanca, Morocco, with a chief complaint of pain of upper front teeth (Fig1).

History of trauma was revealed 6 months before reporting.

Six months prior the patient had suffered a dental trauma. The patient reported pain on mastication in the maxillary left incisor. Sensitivity tests (heat, cold, and electrical pulp testing) of the tooth gave no response.

There was no obvious mobility associated with the 21. A periapical radiograph revealed an open apex on the 21 with periapical pathology (Fig2).

The diagnostic was acute periapical abscess and the therapeutic decision was apexification with MTA.



**Figure 1:** Periapical abscess on 21



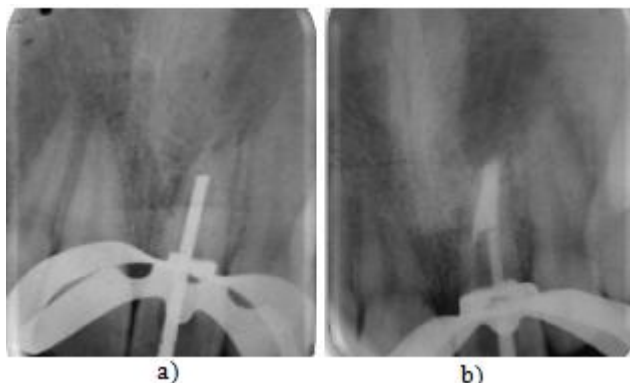
**Figure 2:** Pre-operative radiograph showing an incomplete root closure, open apex and a periapical lesion in the maxillary left incisor.

**In the first appointment:** root canal therapy with apexification using mineral trioxide aggregate was planned for the upper incisor (21)

- The isolation for the tooth was obtained using a rubber dam.
- The access cavity was prepared and, the pulp chamber was cleaned and irrigated with 2.5% sodium hypochlorite.

#### In the second appointment

The working length was identified (fig 3a), and apical plug of MTA was put in the apical third of the canal. (fig 3b)



**In the second appointment:** Conventional obturation with gutta-percha one week later (fig 3c)

#### Follow up

Periodic appointments for clinical and radiographic evaluation were scheduled, 3 months and 10 months recalls (Fig 3d,e, ) were programmed. After treatment, the tooth was asymptomatic, and the color of the crown did not change, the continuity in the periodontal ligament space with absence of periapical radiolucency was observed.



Figure 3

- Identification of the working length.
- MTA plug in the apical third of the canal
- Conventional obturation with gutta-percha a week after.
- Post-operative radio three months after the obturation.
- Follow up: 10 months after the obturation.

### 3. Discussion

Apexification is defined as a method of inducing a calcified apical barrier or continued apical development of an incompletely formed root teeth with necrotic pulp. [5]

Several materials can be used to achieve this artificial apical barrier. [4-6]

The traditional apexification technique used calcium hydroxide, [4-6] which is an odourless, strongly basic, white powder frequently used as an intracanal medicament in non-surgical endodontic procedures, including the treatment of traumatic injuries. This compound demonstrates antimicrobial activity and inhibits inflammatory resorption. [7]

The technique of apexification by the use of calcium hydroxide was pioneered by Heithersay and Frank, give adequate apical healing due to the induction of an apical barrier and due to the agent's antibacterial capability caused by a high pH: 12. [8]

Despite the fact that this treatment give adequate apical healing, Ca(OH)<sub>2</sub> therapy has some inherent disadvantages, including variability of treatment time, unpredictability of apical closure, difficulty in patient follow-up [9] and the risk of root fractures because of the presence of thin walls. [10]

Since MTA was introduced by Torabinejad and co-workers for use in pulp capping, pulpotomy and sealing accidental perforations of the root canal, [11] it became the material of choice for apexification therapy because of excellent biocompatibility and sealing ability. [12]

This material presents better antibacterial properties, high marginal adaptation, short setting time (4 h) a pH of 12.5 and superior biocompatibility. [13]

The MTA has many advantages when compared to combination of calcium hydroxide-induced apical closure followed by compacted gutta-percha. These advantages are a reduction in treatment time, thereby facilitating the timely restoration of the tooth, the reduction of the risk of the tooth fracture and also the reduction of the number of visits of the dental office. [14]

According to E. David and al(ref) MTA obturation of canals with open apices is a viable alternative to the use of calcium hydroxide to induce apical closure. [14]

Systematic review and meta-analysis realized by Lin J-C revealed that both calcium hydroxide and MTA provide similar clinical success and radiographic success rates and apical barrier formation rates, MTA is associated with a significantly shorter time for apical barrier formation, thus shortening the treatment time. The shorter treatment time

with MTA may translate into higher overall success rates because of better patient compliance with treatment completion. [15]

This can be associated to the poor patient follow up in calcium hydroxide cases because of the extensive treatment time. [15]

MTA was beneficial in terms of immediate obturation of immature roots with wide open apices [16]

In another systematic review that was undertaken in order to develop guidelines for the European Academy of Paediatric Dentistry for the management of non-vital permanent anterior teeth with incomplete root development. It is proposed that the long term use of calcium hydroxide in the root canals of immature teeth should be avoided and apexification with calcium hydroxide is no longer advocated. The evidence related to the use of a Regenerative Endodontic Technique is currently extremely weak and therefore this technique should only be used in very limited situations where the prognosis with other techniques is deemed to be extremely poor. The current review supports the use of MTA followed by root canal obturation as the treatment of choice. [17]

#### 4. Conclusion

The results obtained in these clinical case report suggest that there are clear advantages in the apexification procedure using MTA.

#### Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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