

Rehabilitation of traumatized maxillary anterior tooth after long term calcium hydroxide dressing: use of MTA apical plug

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Abstract

Calcium hydroxide is associated with certain difficulties such as possibility of root fracture and incomplete bridge formation when it is used for apexification. Moreover the treatment requires high level of patient cooperation because of the long term treatment time. In spite of these, in the present case oil based calcium hydroxide proved itself without causing any detrimental effects when it was used as intracanal medicament for a long term of 5 years. Although calcium hydroxide callus bridge formed in apexification cases is porous, it still carries a success rate of 90%. To Increase the fracture resistance of thin dentinal walls and to ensure a fluid tight seal, after apexification, orthograde placement of MTA was done in the present case, in hope of attaining a more favorable long term prognosis. One step Apexification with MTA is the most likely accepted because of its predictable and immediate results.

Keywords: Calcium Hydroxide, Long term, Intracanal medicament, orthograde obturation

Introduction

The golden rule in the practice of Endodontology is to debride and obturate the canals as efficiently and three dimensionally as possible in an amount of time and appointments that are reasonable to the patient¹. Careful and properly achieved obturation will lead to the formation of *fluid tight seal* which is essential for the success of the endodontic treatment². Apical seal is one of important factor in determining the success of an Obturation. In 1966 the etiology of inflammatory resorption was clarified as the combined effect of periodontal injury and a simultaneous presence of an infected necrotic pulp inducing osteoclast resorption which can

be transient or progressive resulting in open apex in mature root³. It is important to induce the formation of an apical barrier or form an artificial barrier by an apical plug, against which filling material can be compacted. The introduction of apexification by use of calcium hydroxide was pioneered by Heithersay and Frank⁴.

This treatment gave adequate apical healing due to:

- Induction of an apical barrier
- The agents antibacterial capability caused by a high pH

Studies showed the long term use of Calcium hydroxide as a root canal dressing increased

the risk of root fracture. The mechanism of weakening of root dentin was explained by change in its organic matrix. Recently synthetic apical barriers with a variety of materials have been proposed as alternatives to the traditional apexification treatment. MTA is one of the most popular materials used for the purpose. With MTA as apical barrier there is less chance of root fracture in teeth with thin roots because the material immediately bonds with the roots and strengthens it (Kubasad and Ghivari, 2011). This paper presents a case of rehabilitation of maxillary anterior teeth after the long term calcium hydroxide intracanal medicament dressing with MTA apical plug followed by Thermoplasticized guttapercha obturation.

Case report

A 16 year old boy was referred to the Department of Conservative & Endodontics of AJ Institute of Dental Sciences from the Dept. of Prosthodontics for the Evaluation of Access Restoration of Maxillary Anterior teeth. Oral examination revealed Faulty access restoration and an un-esthetic Composite Build up done in 11, 21. There was no history of Pain or tenderness on Percussion nor discoloration.

Radiographic findings [Figure 1A] showed:-

- Aberrant canal anatomy in 11 and 21
- Radiopacity in the root canal of 11 with a closed apex and radiopacity in the root canal of 21 which is 2mm short of the apex.
- A coronal radiolucency in the Pulp Chamber.

Since the patient was asymptomatic and there was an absence of periapical radiolucency, a re-access restoration was planned. The Composite Access Restoration was removed which revealed the presence a cotton plug beneath the restoration in both tooth. A spreader was plugged-in to check the adequacy of the obturating material and it was found that the canal was filled with yellow

colored Iodoform oil based calcium hydroxide.

A through history of the previous treatment was then taken from the patient and it was found that Root canal treatment was initiated 5 years back following trauma. Exact treatment line could not be explained by the patient. It was understood that the radiopacity of the root canal in the radiograph was misinterpreted for an obturating material and Composite restoration was done a month back on the cotton plug beneath which the intracanal medicament was present ..

Calcium Hydroxide was flushed out of the canal using Chlorhexidine and Saline. The canals were dried using paper points. An Apical barrier was felt on using a #15 k file in both the canals Further an Intraoral periapical radiograph was taken which gave an evidence of an uneven barrier in 21 and a complete formation of barrier in 11 [Figure 1B].

Working length was determined in 11, 21 as 20.5 mm and 21mm respectively. Circumferential cleaning and shaping was done with #40 k file [Figure 1C]. To ensure a fluid tight apical seal placement of 4mm of MTA apical plug followed by Thermoplasticized obturation was planned in the following visit.

MTA Apical plug

MTA was mixed according to manufacturer's protocol and carried to the apical area with an amalgam carrier and plugged using hand pluggers till thickness of 4mm. A moist cotton pellet was placed and access cavity was sealed with Zinc Oxide Eugenol [Figure 1D]. After a week, Zinc oxide Eugenol and Cotton pellet were removed and the setting of MTA was confirmed. The rest of the canal was obturated with Thermoplasticized guttapercha using i-fill gun [Figure 2A] after the application of sealer. An access restoration was done by Glass Ionomer cement. The clinical follow up at the end of 3 months, 6 months and 9 months showed the absence of any symptoms.



Figure 1: A) Intraoral periapical radiograph showing aberrant canal anatomy irt 11 & 21, Radiopacity in the root canal of 11 with a closed apex and radiopacity in the root canal of 21 which is 2mm short of the apex. and coronal radiolucency in the Pulp Chamber.. B) IOPA taken after the removal of the intracanal medicament C) Working length determination. D) Intraoral periapical radiograph showing the MTA apical plug of 4 mm.



Figure 2: A] Thermoplasticized guttapercha obturation gun (i-fill) and guttapercha pellets. B] IOPA taken after Thermoplasticized guttapercha obturation. C] IOPA taken after Glass-Ionomer Cement access restoration.

Discussion

Calcium hydroxide was the gold standard material routinely used as the intra canal medicament ⁶. Calcium hydroxide is associated with certain difficulties such as possibility of root fracture and incomplete bridge formation. Moreover the treatment requires high level of patient cooperation because of the long term treatment time. In spite of these in the present case oil based

calcium hydroxide proved itself without causing any detrimental effects. Although Calcium hydroxide callus-bridge is formed in apexification cases is porous, it still carries a success rate of 90% ⁷. When calcium hydroxide comes in contact with periapical tissue it create a zone of necrosis, altering the physio- chemical state of intercellular substance which, through rupture of

glycoprotein cause protein denaturation, leading to the formation of callus bridge.

The use of calcium hydroxide was always a matter of controversy. Porkaew et al. (1998) suggested that remnants of calcium hydroxide on the canal walls may react to form calcium carbonate, and interfere with the seal produced. On the contrary, Hachmeister et al. (2002) showed that remnants of calcium hydroxide that remain on the canal walls had no significant effect on MTA leakage or displacement resistance. In the present work, complete removal of calcium hydroxide from the canal walls was accomplished by irrigation. However, studies by Hachmeister in the later years suggested that the combination of MTA and calcium hydroxide in apexification procedures may favourably influence the regeneration of the periodontium.

In the present case MTA plug of 4mm thickness was used to create an artificial barrier to condense the subsequent root canal filling material. An Important factor for successful endodontic treatment is the sealing ability of apical plug⁸. The orthograde use of MTA provided an adequate seal against bacterial infiltration regardless of the thickness of apical plug¹⁰. To Increase the fracture resistance of thin dentinal walls and to ensure a fluid tight seal, after apexification, orthograde placement of MTA was done, in hope of attaining a more favorable long term prognosis. Apexification with a novel biocompatible material like MTA is a new boon in effective management of teeth with open apex⁵. MTA appeared to show good sealing ability, good marginal, adaptation and excellent biocompatibility. One step Apexification with MTA is the most likely accepted because of its predictable and immediate results.

Conclusion

Restoring & caring the dental structures reinforces the smile of an individual. Teeth with rhizogenesis, pose a special challenge to

the endodontist all over because of large open apex, divergent root walls, thin dentin, all walls that are susceptible to fracture and frequent periapical lesions. This group requires a specially tailored treatment plan.

Here we are in the new era of materials of superior quality that gives hope to even the hopeless teeth to survive in the oral cavity without any further complications making us remembered throughout the patient's life through our competent work done on the patient tooth.

Conflict of interest: None

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