



## NON-SURGICAL MANAGEMENT OF MAXILLARY CENTRAL INCISOR WITH OPEN APEX BY MTA APEXIFICATION – A CASE REPORT

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### ABSTRACT

The term apexification refers to a treatment aimed at inducing apical repair as a hard tissue barrier across an open apex. This case report describes the treatment of an immature maxillary central incisor with periapical radiolucency. This treatment approach involves disinfection of root canal space with calcium hydroxide medicament along with MTA apexification followed by root filling with gutta-percha and coronal restoration. At the end of one year significant reduction in periapical radiolucency was achieved.

**KEYWORDS** : Immature Tooth, Non Vital Tooth, Mta, Apexification.

### INTRODUCTION:

Apexification is a method to induce a calcified barrier in a root with an open apex in teeth with a necrotic pulp (1). Interruption of root development can be due to trauma. The nature of the injury depends on tooth location, energy of impact and direction of impact (3). Immature permanent teeth are subjected to traumatic injuries with destructive outcomes. Under favourable conditions, Hertwig's epithelial root sheath retains its vitality and continue to calcify a root (4).

Managing the immature root with necrotic pulp and apical periodontitis is a demanding task. Standard protocol cannot be employed for disinfecting the infected root canal space. Due to the lack of an apical barrier of root filling material, the obturation may be a difficult task. In such cases, apexification procedure is the treatment option, by which apical barrier may be established. For the induction of hard tissue barrier, Ca(OH)<sub>2</sub> has been widely used (5).

MTA was introduced by Torabinejad M endodontics for its applications in pulp capping, pulpotomy, and sealing accidental perforations of the root canal. It has been used in apexification therapy because of excellent biocompatibility and sealing ability (6). PDL fibroblasts displayed enhanced proliferation on MTA (7). The mechanism of MTA was based on its ability to release calcium ions that cause cell attachment and proliferation, and its high pH creates an antibacterial environment (8). Shabahang et al have reported that MTA produces apical hard tissue formation with significantly greater consistency than Ca(OH)<sub>2</sub> (9). Also Ca(OH)<sub>2</sub> apexification typically extends from 9 to 24 months (10). Therefore we have managed a patient with an open apex in maxillary central incisor with MTA in a single visit.

### CASE REPORT:

A 52 years old male patient presented at the outpatient ward in Department of Conservative Dentistry and Endodontics at Thai Moogambigai Dental College with a chief complaint of mild pain in upper front tooth region. Clinical examination revealed that maxillary right central incisor had pain on percussion and palpation. Pulp sensibility testing was done and negative response to cold test and electric pulp test was elicited in 11, while the adjacent teeth had a normal response.



**Figure 1: Pre-operative radiograph**

Radiographic examination showed open apex with periapical radiolucency in 11. (Figure 1) A diagnosis of symptomatic apical periodontitis in 11 was made. The patient was informed about the treatment options of revascularization and apexification in 11 and he opted for the latter.

In the first appointment, under local anaesthesia and rubber dam isolation, the access cavity preparation was done in 11. Working length was maintained 2mm short of the radiographic apex. Minimal instrumentation was done with K-type file and Irrigation was done with 2.5% NaOCl, using 30-gauge side vented needle. Next, intracanal medication of calcium hydroxide was placed using a lentulo-spiral. The access cavity was sealed with 2 mm thick Cavit as an inner layer and an outer layer of restorative glass ionomer cement (3 mm).



**Figure 2: MTA Apexification (4 mm)**

The patient was reviewed after one week. The patient was asymptomatic. Under rubber dam, access was re-gained and irrigation done with hypochlorite and saline. Mineral Trioxide Aggregate (ProRoot MTA, Dentsply) was placed in apical root canal region of 11 to a thickness of 4mm. (Figure 2) (11) The access cavity was sealed with a moist cotton pellet over the MTA and 2 mm thick Cavita as an inner layer and an outer layer of restorative glass ionomer cement (3 mm).



**Figure 3: Warm Vertical Compaction**

After 24 h, the GIC restoration and moist cotton pellet was removed, MTA set was verified, followed by obturation of the remaining radicular space with warm vertical obturation technique. Access cavity was sealed with GIC and light cure resin. (Figure 3)



**Figure 4: 1 year follow up**

The patient was reviewed at the end of 1, 3 and 12 months (Figure 4) and resolution of periapical lesion was seen radiographically and the patient was asymptomatic. Since the coronal aspect of the tooth was intact, post endodontic restoration was not done.

## DISCUSSION

Apexification is done to create an environment to permit deposition of cementum, bone and periodontal ligament in the apical root canal. The goal of apexification is to obtain an apical barrier to prevent the passage of toxins and bacteria into periapical tissues from root canal and to achieve a barrier for obturation (12).

## CASE SELECTION:

Case selection is important. Age of the patient is very critical in treatment plan. The alternative treatment plan for this patient is revascularization. However, revascularization is influenced by the presence of stem cells and growth factors and, hence, it is likely to be more successful in young individuals and compromised in older patients (13). Thus, MTA apexification was chosen.

## REVASCULARIZATION VS MTA APEXIFICATION:

Both MTA apexification and revascularization have been reported to show satisfactory outcomes in terms of resolution of the patient's clinical signs and symptoms and in reduction of periapical radiolucency. With apexification, the apical root maturation and thickening of dentinal wall are restricted (Huang 2009). However, the successful outcome of MTA apexification was reported to be 80.77% and while it was 76.47% for revascularization (14).

## DISINFECTION OF ROOT CANAL:

Elimination of infection from the canal space is an essential element in apexification. Use of calcium hydroxide Ca(OH)<sub>2</sub> as an intra canal medication for 1 week can be effective in reducing the pathogens and disinfection of the root canal (15).

## MTA BARRIER:

An apical plug of 4 to 5mm of MTA was placed in the apical third. All the excess MTA was removed from the canal walls with large paper points. Wet cotton pellet is placed in the canal to provide moisture for the setting reaction (11). Karla et al stated that Biodentine can be used as an alternative to MTA, with favourable clinical outcomes both clinically and radiographically. (16)

## CONCLUSION:

In this patient a successful outcome was achieved with MTA apexification. Orthograde compaction of MTA apical plug appears to be a promising treatment option for teeth with open apices. The presence of preoperative apical periodontitis may reduce the success rate (12). However, in this patient periapical radiolucency showed satisfactory reduction in 1 year.

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