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Two Different Sequelae of One Traumatic Injury in Adjacent Anterior Teeth - Calcific Metamorphosis and Open Apex: A Case Report

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Abstract

Dental trauma to the permanent dentition can lead to clinical complications and its management may considerably challenge a practitioner. The incidence of pulp canal obliteration following dental trauma has been reported to be approximately 3.8% – 24%. Attempting to locate canals following calcific metamorphosis and negotiating it to full working length may lead to iatrogenic errors such as fractured instrument and perforation. The process of forming mineralized tissue in the apical portion of an immature tooth with an infected necrotic pulp and an incompletely formed root is known as apexification. Although various materials and techniques for the endodontic treatment of such teeth have been employed for some time, selecting the appropriate material remains challenging due to limited literature.

Keywords: CM (Calcific metamorphosis), apexification

Introduction

These Case report presents management of Calcific metamorphosis and open apex in adjacent maxillary anterior teeth with history of trauma

Calcific metamorphosis (CM) teeth are a great challenge to the clinician. Its diagnosis and treatment procedures are of utmost importance in providing the best treatment.[1] Calcific Metamorphosis is defined by the American Association of Endodontists as "A pulpal response to trauma characterized by rapid deposition of hard tissue within the canal space."[2] Apexification is the process of forming mineralized tissue at the apical

portion of a tooth with an incompletely formed root. [11] Approximately 3.8% to 24% of traumatized teeth develop varying degrees of CM. Studies indicate that of these, approximately 1% to 16% will develop pulpal necrosis.[3] Most of the literature does not support endodontic intervention unless periradicular pathosis is detected or the involved tooth becomes symptomatic. It may be advisable to manage cases demonstrating CM through observation and periodic examination. [4]

A 44 year old male patient reported to the department of conservative dentistry and endodontics, HPGDC, Shimla with chief complaint of pain in upper front tooth region of jaw since one week. The medical history was not contributory. No significant family history was revealed. Patient gave history of trauma 25-30 yrs back in maxillary anterior tooth region.

Intraoral examination revealed discolored maxillary central and lateral incisor.

Radiographic Examination revealed -

Overextended obturation filling material wrt 11

Periapical radiolucency wrt 11, 12 and slight PDL space widening

Obliterated pulp canal space wrt 12

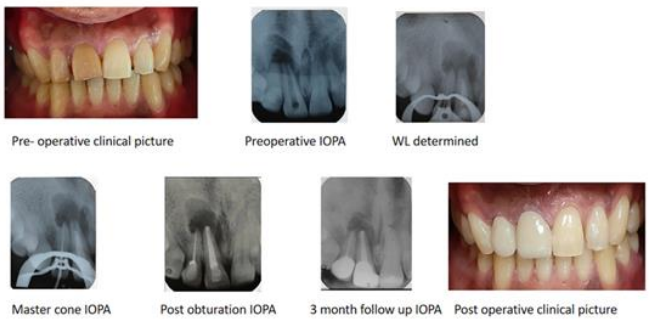
Case 1: (Calcific metamorphosis)

A diagnosis of symptomatic apical periodontitis with obliteration of the pulp canal was made, and a nonsurgical root canal treatment was advised to the patient. After obtaining consent, the patient was anesthetized, and a rubber dam was placed on the tooth. Access cavity was made till the level of CEJ using a round bur and caries was excavated. Scouting of the canal orifices was done using a DG 16 explorer. The canal was located and radiographically confirmed using a no 10 C plus file. Ultrasonic tips were used to trough the pulpal floor to uncover the canal orifice. Once the patency was obtained a no 10 C Plus file was used with 17% EDTA (RCT Prep Waldent) to reach till the apex. Working length was measured using an electronic apex locator and was confirmed radiographically. A glide path was made till the size of 2%20 using stainless steel K files. The root canals were irrigated thoroughly with 5.25% sodium hypochlorite (Prime dental products). An intra-canal medicament of calcium hydroxide was given and patient was recalled after one week. In the next appointment chemo mechanical preparation was completed using Hyflex rotary files till master apical size of 30-0.04. Master Cone fit radiograph was taken and root canals were obturated by lateral condensation technique.

Discussion

Aetiology of PCO is unclear in literature and factors like trauma, aging, chronic irritation of the pulp due to deep caries and restorations have been implicated as the causative factors[6]. These teeth are generally asymptomatic and are often an incidental finding during routine clinical and radiographic examination. Most of these patients have the chief complaint of tooth discoloration when they report to the dental office.[7] There is considerable disagreement in literature regarding the decision to treat cases of pulpal obliteration. It is recommended that root canal treatment should be initiated in teeth with PCO which are tender to percussion, having a PAI scores ≥3 and a negative response to pulp sensibility testing.[8]In PCO up to 75% of teeth are symptom-free and require no treatment other than radiographic monitoring. If a tooth with PCO shows no signs of pain, swelling, or infection, and pulp sensitivity tests are only partially negative, treatment may be delayed. In our cases reported here, the teeth was tender on percussion and there were radiographic signs

of periapical radiolucency.[9] The localization and access of calcified root canals are a challenge in endodontic practice which may cause serious problems such as severe loss of dentine and iatrogenic perforation.[10] The knowledge of root canal anatomy is paramount for the clinical success. It has been established that if the access preparation remains well centred and aligned to the long axis of the tooth at the level of the cementum-enamel junction (CEJ), the root canal is normally easy to locate. In the cases herein described, low speed burs associated with ultrasonic tips were used to selectively remove the calcified dentin. A variety of 'path finding' instruments with different designs are available. C Plus files are ideal for initial instrumentation of calcified canals. Their reduced flute and greater shaft strength with active cutting tip make them more likely to penetrate highly calcified canals.



Case 2: (Apexification)

A diagnosis of symptomatic apical periodontitis with necrotic pulp was made and treatment plan was explained to the patient. After obtaining consent, patient was anesthetized, rubber dam was placed on the tooth, an endodontic access was established using Endo Access bur. After establishing the working length radiographically, root canal was chemo-mechanically debrided with circumferential filing with 80K file in conjunction with copious amount of 0.5% sodium hypochlorite (NaOCl) irrigation. A volume of 3 ml of 17% ethylene diaminetetraacetic acid (EDTA) solution was used for smear layer removal. Care was taken so that irrigant should not extrude through open apex. Calcium hydroxide medicament paste was placed in the root canal, and access cavity was restored with Temporary filling material. After one week root canal was again accessed, and copious amount of normal saline was used to remove any remnants of the calcium hydroxide medicament. After drying the canal with paper points, MTA was mixed as per manufacturer's instructions and was placed at the apical region to form the apical plug of 4mm.Moist cotton pellet was placed over MTA and patient recalled after 48hours. MTA was examined using a plugger to confirm its set and the canal was obturated with gutta percha. The access cavity was closed temporarily with glass ionomer cement. After 3 weeks, the glass ionomer was replaced by a bonded resin restoration and the patient was kept on follow up

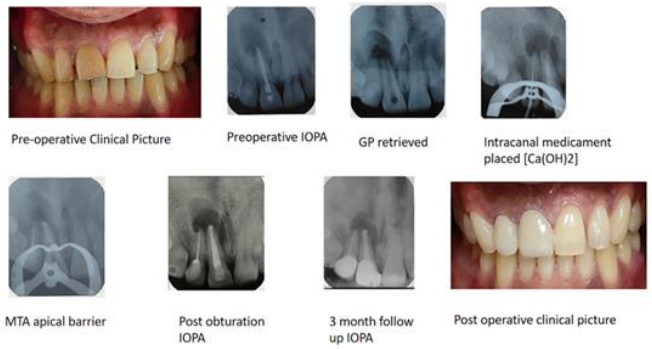
Discussion

Apexification treatment is supposed to create an environment to permit deposition of cementum, bone and periodontal ligament.[11] The goal of this treatment is to obtain an apical barrier to prevent the passage of toxins and bacteria into periapical tissues from root canal. Technically this barrier is necessary to allow compaction of root filling material.[12] Despite higher success rate of apical barrier formation using calcium hydroxide long term follow-up is essential. [13]

Previous studies have described the disadvantages of calcium hydroxide apexification such as failure to control infection, recurrence of infection and cervical fracture.[14] Mineral trioxide aggregate as an apexification material represents a primary monoblock. Apatite like interfacial deposits form during the maturation of MTA result in filling the gap induced during material

shrinkage phase and improves the frictional resistance of MTA to root canal walls.[15]

The formation of nonbonding and gap filing apatite crystals also accounts for seal of MTA.[16] MTA has superior bio-compatibility and it is less cytotoxic due to its alkaline pH and presence of calcium and phosphate ions in its formulation results in capacity to attract blastic cells and promote favorable environment for cementum deposition.[17] 5 mm barrier is significantly stronger and shows less leakage than 2 mm barrier. The novel approach of apexification using MTA lessens the patient's treatment time between first appointment and final restoration.[18]



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