ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 3, Issue – 1, February - 2020, Page No. : 430 - 435

A Comparitive Evaluation of MTA and Biodentine for Apexification in Young Permanent Central Incisors: A Case Report

[1]Dr. Vinay Thakur, Associate Professor, Department of Pediatric and Preventive Dentistry, Himachal Dental College Sundernagar

[2]Dr. Bisma Aziz, PG student, Department of Pediatric And Preventive Dentistry, Himachal Dental College Sundernagar

[3]Dr. Maria Manhas, Senior Lecturer, Department of Pediatric and Preventive Dentistry, Himachal Dental College, Sundernagar

[4]Dr. Azhar Hashmi, PG student, Department of Orthodontics And Dentofacial Orthopaedics, Himachal Dental College, Sundernagar

[5]Dr. Pallavi Mishra, House Surgeon, Himachal Dental College, Sundernagar

Corresponding Author: Dr. Vinay Thakur, Associate Professor, Department of Pediatric and Preventive Dentistry, Himachal Dental College Sundernagar

Citation of this Article: Dr. Vinay Thakur, Dr. Bisma Aziz, Dr. Maria Manhas, Dr. Azhar Hashmi, Dr. Pallavi Mishra, "A Comparitive Evaluation of MTA And Biodentine For Apexification In Young Permanent Central Incisors : A Case Report ", IJDSIR- February - 2020, Vol. – 3, Issue -1, P. No. 430 – 435.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

The aim of this case report is to report a successful treatment of traumatized immature young permanent central incisors. Apexification is a method to induce a calcific barrier in a root with an open apex or the continued apical development of teeth with incomplete roots and a necrotic pulp. Here, a case of traumatized upper anterior teeth 11 and 21 in a 7 year old girl is presented. On radiographic examination, open apices with blunderbuss canals were seen.The canals were cleaned using intracanal instruments and normal saline (0.9%)w/v.Further a slurry of triple antibiotic paste was temporized in the canal to obtain canal disinfection. In succeeding appointments ,a 4-5 mm apical plug was created with MTA and Biodentine and allowed to set. Subsequently, the root canals were obturated. The patient was asymptomatic after 1year of follow up.To manages a tooth with an open apex using materials like MTA and Biodentine has become a single visit procedure. Both materials have shown excellent biocompatibility and are a boon in effective management of teeth with open apex.It is a very feasible procedure and less time consuming and has shown excellent results in teeth with open apices. Therefore, a comparison is done using both the materials in this case.

Keywords: Mineral Trioxide Aggregate, Biodentine, Apexification, Open apex, Triple Antibiotic Paste.

Introduction

To manage an immature root with a necrotic pulp and apical periodontitis is a challenging task. The prevalence of dental traumatic injuries ranges from 13.8-15.1%.[1,2,3] .Open apices are most commonly seen in patients after traumatic injury. Because of the lack of an apical constriction, apexification or root end closure which is an alternative to standard root canal treatment has been advocated.(**Seltzer 1988**).

Root development is due to the continuous deposition of dentin and cementum by stimulation and differentiation of Hertwig's Epithelial Root Sheath and surrounding undifferentiated progenitor cells.[4] Interference in this development by trauma or infection can lead to incomplete root development and the presence of an open apex and a wide funnel shaped canal.[5] Hence, Apexification with various biocompatible materials is the best treatment option. Apexification can be defined as a method to induce a calcific barrier in a root with an open apex or the continued development of teeth with incomplete roots and a necrotic pulp.(**American Association of Endodontics 2003**)[6]

Introduction of newer materials are never ending especially in the field of dental science. The most commonly advocated medicament is calcium hydroxide.[7] Since the advent of MTA, it has been the material of choice for apexification.[8] Also, Biodentine is a novel material and can be a substitute for MTA with a composition similar to it.

The following case report compares the effect of use of MTA and biodentine to induce root end closure in a single patient with open apices in traumatised maxillary young permanent central incisors.

Case Report

A 7 yr old female patient accompanied by her parents reported to the Department of Pedodontics and Preventive Dentistry, Himachal Dental College, Sundernagar, Mandi, H.P with a chief complaint of history of fall 2 hrs prior to the visit. The medical history of patient was noncontributory. On clinical examination, pain tenderness and soft tissue bleeding was observed in relation to 11,21,22 with Ellis class 2 fracture and extrusion from the socket wrt to 21 and Ellis class 1 fracture wrt 11.(**Fig 1**).Radiographic findings showed break in lamina dura with incomplete root formation, periapical radiolucency and wide open apex in relation to 11 and 21.(**Fig 2**).On basis of clinical and Radiographical findings, a diagnosis of traumatized young permanent immature teeth was made wrt upper left and right central incisor. The available treatment options were discussed with the patients parents, consent was taken, root canal therapy and Apexification with MTA and Biodentine in each tooth was decided.

In the same visit, the area was cleaned using normal saline and homeostasis was achieved. As grade II mobility was assessed clinically hence it was decided to stabilize the tooth with composite splinting for 4-6 weeks.(**Fig 3**).On the second visit, composite splint was removed. It was observed that teeth 11 and 21 had become non vital-Ellis class IV and heat test on both showed negative results. Further, the tooth was anaesthetized with 1.8 ml of 2% lignocaine containing 1:200,000 adrenaline and rubber dam was applied. An endodontic access was established using Endo Access bur. Minimum instrumentation was performed and circumferential filing was done with 80 K file and pulp was extirpated. Copious irrigation was performed with 3% sodium hypochlorite and normal saline using side vented needle. After cleaning and shaping working length was established by radiograph.(**Fig.4**).The canals were dried with sterile

absorbent paper points and intracanal dressing of Triple antibiotic paste(containing minocycline, ciprofloxacin and metronidazole(1:1:1)) with propylene glycol as the vehicle was placed for disinfection of root canals and the access cavity was temporized with Cavit.On recall visit,the triple antibiotic paste was cleaned from the canal by circumferential filing and copious irrigation with normal saline.The shaping of the canal was done using modified crown down technique with nickel titanium rotary files-Pro Taper Gold.The orifices and the coronal part were prepared with Sx files and shaping of coronal and middle third of the canals were done with shaping files S1 and S2 and the apical portion of canals were prepared with F1and F2 files.In between rinsing was done with solution of 5.23% NaOCL in combination with 17% EDTA.After finishing the preparation and drying the canal with size 80 absorbent paper point,suitable pluggers were selected to condense MTA and Biodentine.MTA(MTA ProRoot, Dentsply, Tulsa, OK, USA)was mixed with distilled water to a consistency of wet sand and placed in increments in the apical region of canal in tooth 11 using a MTA carrier.MTA was condensed with light pressure using prefitted hand pluggers until entire apical portion of the canal was filled with MTA.Wet sterile cotton was placed in the canal above MTA.The tooth was then given a temporary restoration with cavit.Biodentine(Septodont,St.Maur-des-Fosses,France)capsule was tapped on a hard surface to diffuse the powder.After this,five drops of manufacturer's supplied liquid was dispensed into the capsule.The capsule was then placed in triturator for 30 sec.After mixing, biodentine was placed in the apical region of 21 using a MTA carrier.(**Fig 5**).The material was then condensed with suitable prefitted plugger until the apical portion of the canal was filled with biodentine,obturation was done using F2 gutta percha cone and the tooth was given a temporary restoration with cavit.The patient was recalled next day and obturation of 11 was done by lateral condensation technique using F2 gutta-percha cone followed by composite build-up of 11 as well as 21.(**Fig 6 & 7**).The patient was kept on 1 year follow-up.

Fig.1: Pre Operative

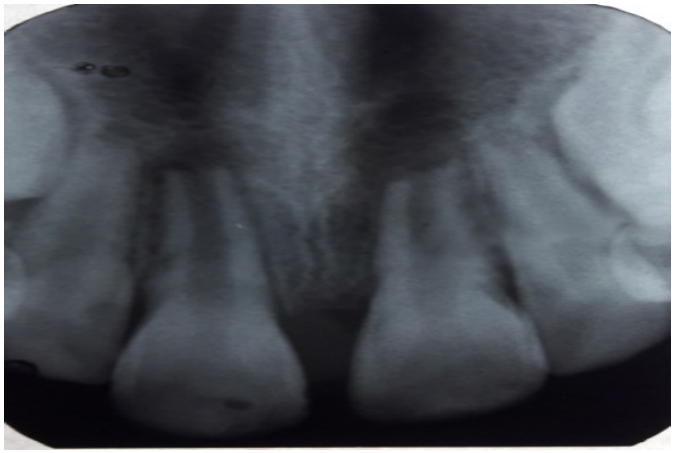

Fig.2: Pre Operative IOPAR

Fig.3: Splinting

Fig.4: Working Length

Fig.5: MTA and Biodentine plug

Fig.6: Obturation

Fig.7 Post Operative

Discussion

Children between 6 and 9 years of age are prone to dental injuries.The treatment of pulpal injury at the time of completion of root development and closure of the apex provides a significant challenge for the clinician.The success in endodontics is dependent on obtaining a perfect seal in the apical portion.[9] Depending on the vitality of the pulp after trauma,the treatment option varies either Apexogenesis or Apexification.Apexification is a procedure performed to induce a calcific barrier in a root with an open apex[10] and is supposed to create an environment to permit deposition of periodontal tissues to continue root development. The rationale behind this case report is the comparison of MTA and Biodentine in the same patient so that the host's ability to withstand or to resist an infection is same.Hence, the biological activity of both the materials can be compared.A variety of materials have been used for inducing the apical barrier.[8]With the discovery of MTA by Torabinejad et al,[11]it has become the material of choice for apexification.MTA forms a seal between the material and the tooth and provides a favorable environment for the cementum deposition because of the presence of calcium and phosphorus ion which induces osteoblastic or cementoblastic activity.In a prospective study,apexification treatment with MTA showed a high prevalence of healing and apical closure.[12] MTA has a range of advantages such as

biocompatibility,[13,14,15,16]hard tissue formation,sealing ability,[11]antibacterial property.[17] **Kusgoz et al**. stated that necrotic pulp in teeth with open apices in which MTA as a filling material is effective with shorter treatment time and better sealing ability.[18] However,there are few concerns regarding MTA such as its long setting time i.e 3 hours,poor handling characteristics,low resistance to compression,low flow capacity,limited resistance to washout before setting,possibility of staining of tooth structure,presence and release of arsenic and high cost.[19,20] These disadvantages necessitate more ideal restorative material.Biodentine is a novel material that was introduced by Septodent.The setting time of biodentine is 9-12 min,does not require two-step obturation and the treatment can be rendered in a single appointment.[8]Biodentine like MTA has an ability to initiate and continue the mineralization process.[21] Biodentine has a limitation that it cannot be used in the presence of moisture unlike MTA.[8] Based on the results of this case,the nonsurgical management of teeth with necrotic pulps and incomplete apex formation with MTA and Biodentine was successful.

Conclusion

MTA and Biodentine being bioactive dental materials can be successfully used for root end closure of open apices.The primary advantages of this material as an apical barrier include development of proper apical seal and excellent biocompatibility.The host response was same in both the teeth.Hence,it was concluded that biodentine showed better initial healing while MTA had better long term effect.

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