Case Report

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Retreatment of Badly Mutilated Tooth by Using MTA and Anatomic Fibre Post: A Case Report

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ABSTRACT

Background: Mineral trioxide aggregate (MTA) is a bioactive material that can be used for apexification of open apices due to its biocompatibility, non-mutagenicity, non-neurotoxicity, regenerative abilities, and good sealing properties. This case report demonstrates application of MTA apical plug and anatomic post and core for the reconstruction of maxillary central incisor. Crown lengthening was also performed to attain some tooth structure. Periapical radiographs demonstrated good adaptation of anatomical post and core to post space. This technique is advantageous in teeth which have open apex, root canals that are not round, wide canals and thin radicular dentin.

Keywords: Anatomical post, mta apexification, open apex, retreatment, crown lengthening.

INTRODUCTION

Trauma to the anterior teeth is a relatively common during childhood leading to concussion, luxation, fracture, or avulsion of the teeth. In more severe cases, to necrosis of the pulp tissue occurs in cases of infected pulps with open apex, we use a specific root canal dressing material to stimulate the apexification process by forming a mineralized apical barrier. Although calcium hydroxide has been successfully used for apical barrier formation in 74–100% of cases, yet there are several disadvantages as well.[1] The treatment requires multiple appointments over an extended period of 3-24 months, unpredictable outcome, incomplete calcification of bridge, increased risk of fracture after the long-term application of calcium hydroxide, esthetic concerns, and coronal microleakage.[2,3] Mineral trioxide aggregate (MTA) a calcium silicate based material. Hydration of the powder results in a fine crystalline gel which solidifies in approximately 3-4 hours. MTA has several advantages such as, it can be placed in single visit, is biocompatible, nonmutagenic, non-neurotoxic, can induce hard tissue formation and has good sealing properties. Thus, MTA has become the material of choice in artificial apical barrier procedures.

Teeth that have lost substantial amount of crown structure are usually restored by prefabricated posts due to their ease of placement and a short clinical application time. But in cases with wide root canals and weak root dentinal walls, a prefabricated post (metal or fiber) will not simulate the root canal anatomy. An improved option may be chair side fabrication of anatomic fiber post. As a result of its precise adaptation to the root canal space, the individualized post is surrounded by thin and uniform layer of resin cement, which creates ideal condition for post retention alongwith esthetics.[4]

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CASE REPORT

A 17 year old patient came to the Department with the chief complaint of dislodged restoration and fractured tooth in upper right front teeth region. Patient gave history of fracture due to trauma in the upper anteriors 5 years ago which were treated 3 years later. Clinically, dislodged crown wrt tooth no 11 was seen which was not tender to percussion. IOPA showed a dislodged post and core with MTA placed 2mm short of apex. Since the patient was concerned about esthetics, it was decided to retreat the tooth followed by apexification with MTA and anatomic fiber post and core for esthetic rehabilitation of the tooth. Patient was informed about the treatment and its outcome. Informed consent was obtained from the patient.

After access cavity preparation, upper 4mm of MTA was removed with a long shank bur and the rest with size 70 K-file. Working length was determined with a size 80 K-file. The canal was thoroughly cleaned using the 80 K-file by circumferential filing and 3% sodium hypochlorite and saline (0.9%). To obtain canal disinfection prior to MTA placement, canal was dried with paper points, calcium hydroxide was placed, and the access was closed with a sterile cotton pellet followed by a provisional restorative material IRM. Crown lengthening procedure was done for which 1 mm of gingiva was cut using no.12 blade alongwith removal of 1 mm of bone using a round bur with a micromotor. Patient was recalled after 1 week for suture removal and the tooth was re-accessed. Calcium hydroxide was removed a week later and the canal was irrigated with 3% NaOCl, 17% EDTA before obturation, to remove the smear layer. The canal was then dried with paper points.

MTA-Angelus was then mixed with distilled water according to manufacturer's instructions and compacted at the apical level repeatedly until the thickness of MTA was 4 mm. The plug's position in canal was checked by radiographs. After application of MTA, a wet paper point was left within the canal for 24 hours, and temporary coronal seal was established with IRM. After 3 days, the patient was asymptomatic and the tooth was accessed as before. Peeso reamer no. 3 and 4 were used to prepare post space and to remove any undercut that may be present on canal walls. The root canal was dried

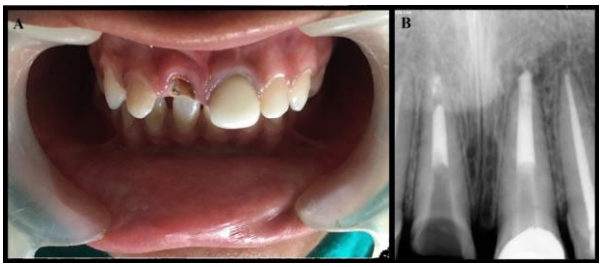

Fig 1: Pre – operative photograph of the maxillary right central incisor. B. Preoperative diagnostic radiograph showing MTA placed 2 mm short of apex.

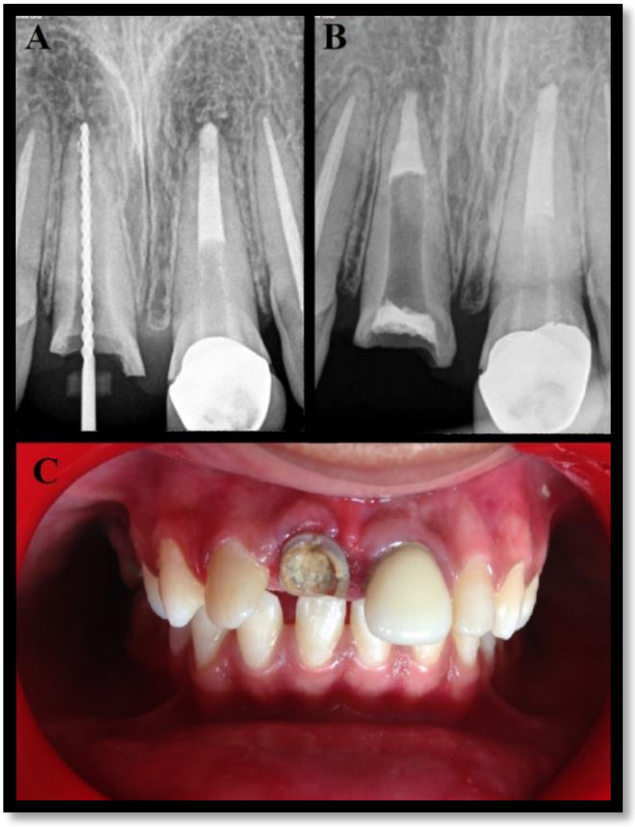

Fig 2: Working length determination after MTA removal. B. Radiographic view showing final MTA plug of 4 mm and temporary coronal seal established with IRM. C. Clinical photograph after crown lengthening wrt 11,21.

thoroughly and then lubricated with glycerin to act as separator. A translucent fiber post was selected and it was pretreated with 37% phosphoric acid for 2 minutes to facilitate the bonding between composite and fiber post material. Tetric Flow, was then coated over the post and inserted into the canal adapting it precisely to replicate the canal anatomy. It was light cured intraorally for 5 seconds

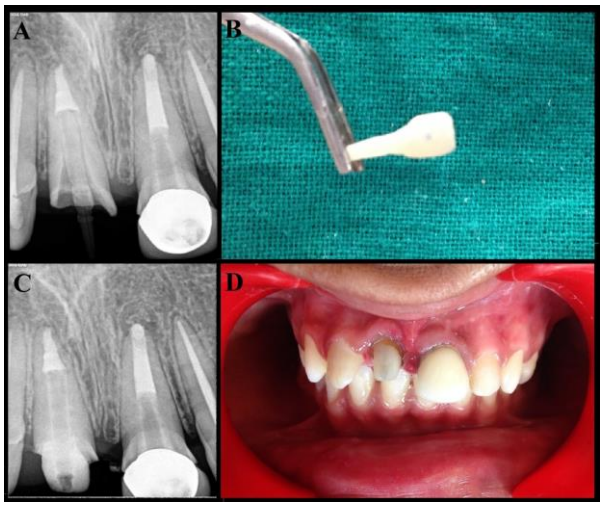

Fig 3: Radiograph showing inadequate adaptation of pre-fabricated fiber post to the post space. B. Aesthetic anatomic post and core assembly after custom fitting and extraoral curing. C. Radiographic view showing fit of anatomic post and core. D. Clinical photograph after post cementation.

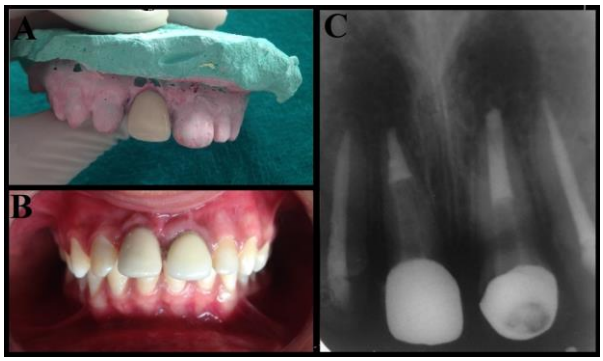

Fig 4: Figure 4: **A.** PFM crown fabricated wrt 11. **B.** Clinical photograph after crown luting wrt 11. **C.** post operative radiograph.

and subsequently was withdrawn and light cured extraorally for 40 seconds. This procedure was repeated until the post had a snug fit inside the canal. Following this, the core was prepared over the post and light curing was performed in order to completely polymerize the composite. A radiograph was taken to confirm the marginal fit of the anatomical post and core. The root canal walls were etched with 37% phosphoric acid for 15 seconds and then thoroughly rinsed with water and gently air-dried. The glycerin used as separator was removed at this stage. Bonding agent was applied into the root canal with a microbrush applicator and cured for 20 seconds. Finally, anatomical post and core cemented with dual cure resin cement G-Cem.

A final radiograph was taken to confirm the fit of anatomical post and core into the canal. Tooth preparation for porcelain fused to metal Crown was done. Crown was then luted by dual cure resin cement G-Cem.

DISCUSSION

MTA obturation of open-apex teeth overwhelms the defects of conventional apexification procedures. In addition, MTA induces a constant formation of cementum with a high integrity and inclusive periradicular structure. Superiorly, MTA stimulates the periradicular/periodontal tissues' repair.[5-7]

The success rate of apexification with calcium hydroxide is approximately 79-96%.[8] The unpredictable and often lengthy course of this treatment modality presents challenges, including the vulnerability of the temporary coronal restoration to re-infection. Moreover, the treatment requires a high level of patient compliance. For these reasons, one visit apexification has been suggested. MTA, a biocompatible material, can be used to create a physical barrier that also helps in formation of bone and periodontium around its interface. With the use of MTA, the potential for fractures of immature teeth with thin roots is reduced, because a bonded core can be placed immediately within the root canal. In human studies, MTA demonstrated healed rates of 81%-100%. In a retrospective study of open apex teeth obturated with MTA the 1-year success rate was 93.5% and 90.5% for one-visit and two-visit treatments.[9] Therefore, MTA has become the material of choice in artificial apical barrier procedures.

The present case was suitable for including anatomic post as it had a flared canal with thin radicular dentin and very less coronal structure. Introducing a conventional fiber post into the canal required either force to round off the canal walls or a thick layer of luting cement to fill up the spaces between the loosely fitting post and the canal walls. This would have subjected the restoration and tooth to adhesive failure and/or debonding of the post.[10] Thus using a post which fit canal shape and a thin uniform layer of cement would increase retention.[11]

Esthetic anatomic posts have advantages over the conventional cast metal posts; lower modulus of elasticity protects them from root fracture by reducing the forces that are transferred from the post to the root. A cast metal post would have a wedging effect resulting in root fracture.[12] The aesthetic anatomic post also bonds to the tooth structure forming a monobloc unlike a cast metal post. It can also be made in one visit without any laboratory procedures. The disadvantage of this technique is insufficient clinical data regarding the adhesion and endurance of the restoration.

CONCLUSION

Anatomic post can be used for reconstruction of an endodontically treated tooth when there is substantial loss of crown structure. MTA as an apical barrier can be considered as a good option for creating artificial periapical seal. However, controlled clinical trials are necessary to investigate the predictability of the outcome of this technique.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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