



Research Paper

Open Apex Management and Reinforcement using multiple post system — a case report

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ABSTRACT

Apexification with calcium hydroxide has shown to have several disadvantages such as longer treatment time, risk of tooth fracture and incomplete calcification of apical bridge. Mineral trioxide aggregate is an alternative material that can be used for apexification due to its non – toxic, non – cariogenic, non – genotoxic, biocompatible, insoluble in tissue fluids and dimensionally stable, good sealing & regenerative properties. To minimise the number of appointments prefabricated post was being used. The prefabricated post which are used does not adapt to the canal anatomy. To overcome this problem, the combination of prefabricated post are being used.

This case report demonstrates the use of MTA as apical seal and reinforcement of fractured anterior teeth along with aesthetics, through the preparation and adhesive cementation of a “combination of FRC and Everstick post” which was available prefabricated. The patient was recalled after 6 months and no complications were noted. The use of multiple post to adapt the canal anatomy for the reinforcement of open apex cases with wide canals and thin radicular dentin.

Keywords:- Apexification, MTA (Mineral Trioxide Aggregate) , Fibre reinforced composite post ,Everstick post, rehabilitation

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I. INTRODUCTION

Trauma is one among the common cause that results in necrosis or inflammation of pulp tissue and subsequent incomplete development of dentinal wall & Root Apices [1].

The Immature root with a necrotic pulp and apical periodontitis presents multiple challenges for the successful treatment outcome [2]. Soon after the disinfection of root canal, obturation is difficult as open apex has no barrier for stopping the root filling material.[2] Even After overcoming the challenge by providing barrier , the roots of the teeth are thin, fragile and highly susceptible to fracture.[2]

Earlier calcium Hydroxide was used to induce the formation of an hard tissue barrier at the apical region has been associated with few disadvantages which are incomplete calcification of bridge, delayed barrier formation which can last from 3-24 months , risks of re-infection resulting from the difficulty in creating long lasting seals, leading to more possibilities of root fracture because of the long exposure of calcium hydroxide and in case of thin dentin[3,4].

Thus MTA has gained popularity with apexification technique in single visit as an Osteoconductive barrier at the apex [4]. The ability of MTA is to induce mineralised barrier when used adjacent to the periradicular tissues [4]. MTA is relatively more biocompatible and stimulates Cementogenesis [4]. MTA is

comprised of tricalcium Silicate, tricalcium aluminate, tricalcium oxide, bismuth oxide, silicate oxide and with some other mineral oxides that are responsible for the chemical and physical properties of aggregate [4]. MTA is a ideal material because of its superior sealing property, biocompatibility and its ability to get set in the presence of blood [5].

Immature teeth that have lost enormous amount of crown structure and have wide root canals with weak root dentinal walls and thin radicular dentin are highly compromised and difficult to restore both esthetically & functionally. Nowadays, prefabricated posts are used commonly due to their ease of placement in a short clinical time [6]. When comes to wide canal the pre-fabricated post doesn't adapt the canal anatomy and fails to show the excellent adhesion.

In this article we explain a case report of Apexification treatment done with MTA apical plug and the clinical application of multiple pre-fabricated post for aesthetic rehabilitation of traumatized maxillary right central incisor with a wide root canal and thin intra-radicular dentin.

Case report - 1

A 21yr /male patient has reported to the department of Conservative Dentistry & Endodontics in with the chief complaint of fractured crown in the right upper front tooth region and the history reveals that the patient underwent root canal therapy previously and the crown was fractured. There was no significant changes noted during Extra-oral examination. Intra-oral periapical radiograph revealed presence of an open apex with a flared canal and having a thin dentinal walls. The patient was more concerned about aesthetics and wanted to complete his treatment in minimal visits, so it was decided to use artificial root–end barrier with MTA and pre-fabricated multiple post given followed by core and metal ceramic crown.

After application of rubber dam (Hygienic Dental Dam, Coltene Whaledent, Germany) and access cavity preparation was refined, followed by working length was determined. After the length has been confirmed radiographically, approximately 5mm filling was performed using White MTA Angelus (Londrina, PR, Brazil). After application of MTA, a wet cotton pellet was placed within the canal for at least 24hours and temporary coronal seal was established with IRM. The canal is dried with paper points and Intracanal medicament calcium hydroxide is placed in the canal. The Intracanal medicament was changed weekly and successively two appointments were completed.

At the following appointment for reinforcement of the tooth structure , combined post of FRC and Everstick post (Stick Tech Ltd, Finland) was given. this combined post was luted with the help of resin cement. Core was finished by flowable and bulkfil composite core build up material for proper adaptation and temporary crown was cemented followed by permanent crown given. Patient was clinically asymptomatic after follow – up period of 3 months and 6 months.

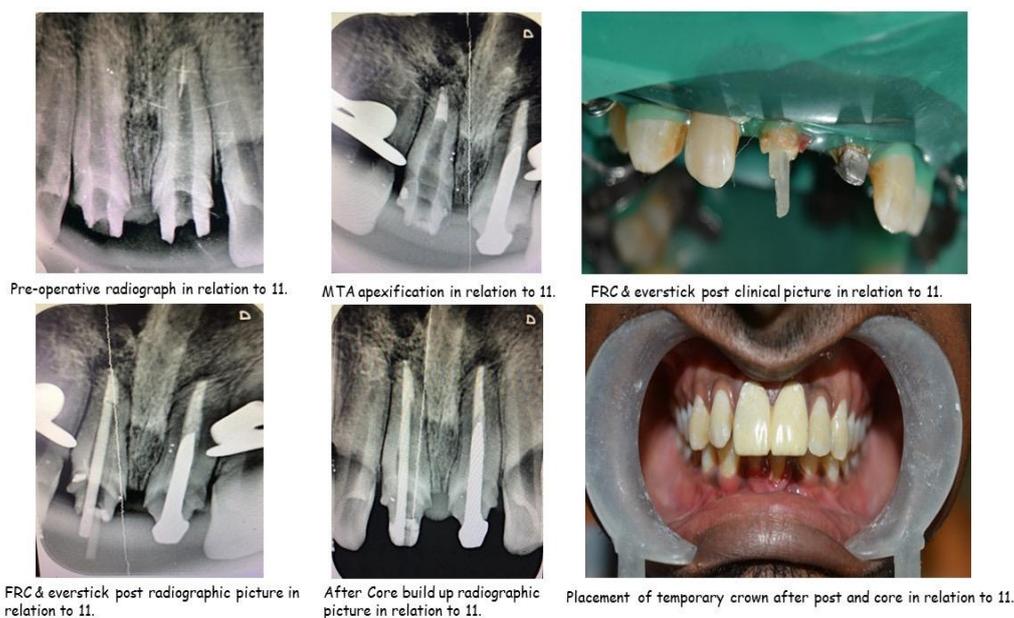


Fig : 1; Steps in management of open apex with MTA and reinforcement using multiple prefabricated post (fibre reinforced composite and everstick post).

II. DISCUSSION

Previous studies have shown that calcium hydroxide when used for Apexification procedure is done with multiple visits, unpredictable treatment outcome [2]. In contrary, MTA that is composed of tricalcium & dicalcium silicate with the addition of bismuth oxide is been popularly used. As dicalcium silicate hydration rate is slow when compared to tricalcium silicate, the compressive strength of MTA reaches maximum, several days after mixing. In addition, Interfacial deposits like appetite form during maturation of MTA results in gap filling induced during material shrinkage phase and improves frictional resistance of MTA to root canals. Therefore, MTA has become the material of choice for inducing a root end barrier in open apex [5].

The aesthetic and functional restoration of a fractured anterior tooth with flared canals, open apex and thin radicular dentin is quite challenging. As the remaining dentin thickness is much reduced in such cases using cast post would have a wedging effect resulting in root fracture [7]. Thus, it advisable to use a post which fit canal shape & a thin uniform layer of cement would increase retention [6].

Studies have showed that if posts and dentin possess similar elastic modulus proved to have a better biomechanical performance [8]. Dentin has a complex structure & modulus of elasticity 13- 18 GPa which varies in different locations and direction providing a mechanism which inhibits crack propagation [9].

In this case, the canal wall that is present is not as thicker so the reinforcement was done with the combination of FRC post and Everstick post. For multiple post system there are growing evidence.

In this case we have combined FRC post and Everstick post, the everstick post that is used is to adapt the canal anatomy. The reason for choosing the Everstick post along with the FRC post is that the canal in this tooth is not straight. The ideal material for conserving the strength of a pulpless immature tooth must be a material which has stiffness as close to dentinal tissue, recommending the use of composite materials based FRC posts [10,11,12]. Compared with metallic posts, the fracture resistance of FRC-posts- filled teeth was less prone to fracture [13, 14]. Testing flexural properties of FRC posts showed that individually formed FRC post proven to have excellent mechanical properties and an elastic modulus like dentine [18]. In this case, because of the wider canal and to adapt the canal anatomy, FRC post along with Everstick post is been used with minimal number of visits.

III. CONCLUSION

For apexification MTA can be considered to be an ideal filling. Multiple post systems i.e Combination of Everstick post and FRC post, helps us to provide an additional stability to the core along with the proper seal in radicular portion. As it results in good periapical seal in few visits & allows to use prefabricated multiple resin post for the rehabilitation of the weak tooth structure and hence the reinforcement is done and gives patient a satisfactory and successful treatment.

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