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Apexification with MTA and intraradicular rehabilitation with fiber post in an incompletely formed tooth

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Abstract

Traumatic injuries are more frequently occur in maxillary central incisor. The highest incidence of dental traumatic injuries is seen in the early childhood. Esthetics as well as fully functional sound tooth is desirable in the treatment. The fracture of maxillary central incisor tooth in young individuals seeks rehabilitation of the affected tooth. This article includes a clinical case of an 22 year-old patient with fractured maxillary central incisor with an open apex, which was treated by apexification using Mineral trioxide aggregate (MTA), and intraradicular rehabilitation done using light transmitting fiber post and flowable composite and porcelain fused metal crown restoration.

Keywords: MTA apexification, MTA, intraradicular rehabilitation, fiber post

Introduction

Trauma is most commonly affects maxillary central incisor. In accordance to prevent reinfection, our aim is

to fill completely the root canal system. Incomplete root end formation has several causes like Trauma, caries, pulpal pathosis, iatrogenic, idiopathic. The absence of natural constriction at the end of root canal makes difficulty in filling of root canal system completely. To rule out this, Apexification or root end closure has been advocated.^[1]

In young permanent tooth when the pulp necrosed, development of the root end ceases. Endodontic procedure is challenging due to divergent apical anatomy, insufficiency of sound radicular structure and weak root dentin. It is very important to retain these weakened teeth in young patients.^[2]

MTA has been shown to be a very effective root end closure material for sealing blunderbuss canal or canal with open apex.^[3]

The main benefit of fiber post is that it uniform ally distributes the forces in root so as less catastrophic failure occur than in metal post.^[4]

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Composite resin can distribute forces and stresses in a more uniform manner in comparison with metals, increases resistance against fracture, hence providing improved prognosis. An adhesive bonding system along with micromechanical retention shows an added benefit for weakened root^[5]

This case report describes apexification with MTA and intraradicular rehabilitation with fiber post and dual cure composite and metal ceramic restoration.

Case report

A 22-year male patient complained of fractured tooth. Patient gave history of trauma 10-11 years back. Clinical examination revealed discolored and fractured maxillary right central incisor. Intra oral periapical radiograph showed incompletely formed apex and periapical radiolucency around central and lateral incisor (Fig.1). Both teeth elicited negative response on electric pulp testing. So, diagnosis was made upon finding was Ellis class IV fracture resulting pulpal necrosis. Root canal treatment was started initially on first visit, Acess cavity was made under rubber dam (Fig.2). Working length was determined by using radiograph (Fig.3). Cleaning and shaping was done with circumferential filing up to #70 K file and calcium hydroxide intracanal dressing was placed for disinfection of root canal for 1 week in central incisor. On second visit the calcium hydroxide was removed. An apical barrier of 3-4 mm was made using MTA.A moist cotton pellet was put over the MTA and access cavity was sealed with IRM of central incisor and root canal treatment of lateral incisor was completed (Fig.4). Then Patient was recalled the next day. On third visit after checking and confirming the setting of MTA by finger plugger. The canal was etched with 37% phosphoric acid (Dentsply, Ultra-Etch, South Jordan, UT, USA) for 15 s, thoroughly rinsed with water, and gently air dried. A dual-cure adhesive was applied

(Prime and bond NT mixed with self-cure activator, Dentsply) and light cured for 20 s. A dualcured flowable composite resin (Para core, Coltene/Whale dent Products, Cuyahoga Falls, Ohio, USA) was placed into the canal. The plastic light transmitting post was centered, and the resin was cured for 40 s. The post was removed. An identical diameter fiber post was coated with a silane coupling agent followed by cementation into the canal with dual cure resin cement, which was cured for another 40 s. Core build-up was done using hybrid composite resin (3M ESPE, Z100 Restorative, Toronto, Ontario, Canada) in an incremental pattern(Fig.5).In next visit tooth had been prepared to receive porcelain fused metal crown(Fig.6).shade selection was done and impression was made with vinyl polysiloxane impression material and temporary crown was given. Patient was then recalled after 5 days to fix permanent crown (Fig.7). Post operative radiograph was taken (Fig.8)

Figure Legends



Fig.1: Preoperative radiograph showing open apex in relation to central incisor.



Fig.2: Access preparation under rubber dam



Fig.3: working length radiograph



Fig.4: placement of apical plug with MTA



Fig.5: Post obturation radiograph with fiber post cementation and root canal treatment of lateral incisor



Fig.6 Crown preparation done labial view



Fig.7: Crown cementation done in relation to central incisor

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Fig.8: Postoperative radiograph

Discussion

Traumic injuries are most commonly affects maxillary incisor both primary or permanent dentition. Ellis class IV fracture is described as the traumatized teeth that become non-vital with or without loss of crown structure. As a sequel of traumatic injury, bacterial load increases that reaches to the dentinal tubules therefore inflammation of pulp occurs.^[1]

MTA is the best material to enhance periapical healing of root canal with open apex. Now a days MTA apexification has taken place of older technique of calcium hydroxide apexification which has a drawback of susceptibility to reinfection and root fracture during treatment. MTA has many advantages like continuing cementum formation, good marginal adaptation, biocompatibility, ability of periodontal tissue repair and sealing ability.^[6]

In this case report fiber post was chosen to retain the core and restoration because it gives esthetic as well as modulus of elasticity similar to dentin. Teeth with larger canal are hard to restore with metal post and those teeth Undergone wedging effect with custom cast post which would ultimately lead to vertical root fracture.^[7]

Intraradicular composite resin restoration is very effective. Many studies have been shown that these teeth are 50% more resistance to fracture.^[8] composite resin has Modulus of elasticity near to that of dentin. So, the

strengthening of radicular dentin through composite resin which is more compatible with dentin than the morphologic dowel, that has modulus of elasticity higher so has higher ability to transfer stresses to surrounding weakened root structure.^[9]

In 1987, Lui et al introduced composite resin as a lining of root canal dentin surface to reinforce the weakened canal walls. It transfers stresses to the surrounding root structure reducing the stress on the root and prevents weakened fracture of the root.^[10,11]

Conclusion

The management of weakened root by conservative approach through reinforcement with flowable composite resin and light transmitting post is a simple and an efficient procedure for the treatment of traumatized immature anterior teeth with excellent functional and esthetic results.

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