Case Report

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# A NOVEL NON SURGICAL APPROACH FOR TREATING IMMATURE OPEN APEX BY USING MTA AS AN APICAL BARRIER AND AUTOLOGOUS PLATELET RICH FIBRIN MEMBRANE AS AN INTERNAL MATRIX: A CASE REPORT

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## ABSTRACT:

Endodontic management of non vital young permanent tooth with a wide-open blunder-buss apex has long presented a challenge. This case report presents the successful healing and apexification with combined use of Mineral Trioxide Aggregate as an apical barrier and autologus platelet rich fibrin membrane as an internal matrix.

**Keywords:** MTA, open apex, PRF

## INTRODUCTION

Endodontic management of non-vital young permanent tooth with a wide-open blunder- buss apex has long presented a challenge. Complete formation of root and closure of root apex continues for upto 3 years following eruption of the tooth. If the pulp of young permanent teeth is damaged before the apical closure, pulp disease may occur. In immature teeth, dentinal tubules are wide and allow the penetration of bacteria and their irritants. Hence root resorption may likely to occur after trauma in such teeth. Endodontic treatment should be planned immediately to inhibit root resorption. The biggest problem in endodontic treatment of these teeth is obtaining an apical seal. The purpose of the apexification therapy used in nonvital immature teeth is to induce the formation of hard tissue barrier at the root apex or the completion of apical development.[1,2]

In the past, techniques for the management of the open apex in nonvital teeth were confined to custom fitting the filling material with introduction of calcium hydroxide, was most commonly advocated therapy for immature teeth with nonvital pulp.[3] Whilst the advantages of calcium hydroxide lie in the fact that it has been widely studied and has shown success, the disadvantages are its prolonged treatment time, the need for multiple visits and radiographs.[4] In some cases, root resorption possibly caused by trauma and increased risk of root fracture due to dressing the root canal for an extended time with calcium hydroxide has been reported in teeth undergoing apexification.[5]

Treatment planning was root canal treatment with placement of MTA in

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apical third. The biggest problem in cases of a wide open apex is the need to limit MTA to the apex and to obtain an apical seal to avoid extrusion of material into periapex. Hence matrix of platelet rich fibrin was packed in periapical region for better periapical healing and also served as matrix for MTA placement in apical third.

Lemon[6] advocated the "Internal Matrix Concept" for treatment of perforation, when diameter is larger than 1mm to avoid extrusion of the filling material. He recommended the use of amalgam for sealing the perforation, which could be condensed against an external matrix of hydroxyapatite, carefully pushed through the perforation thus serving as an external barrier and matrix. The modified internal matrix concept was introduced by Bargohlz uses in contrast to other treatment concepts, collagen as a completely restorable barrier material and MTA for sealing of the perforation. Repair of perforations requires a matrix of control the repair material. The same concept holds true for placement of the apical barrier in immature tooth.

Platelet rich fibrin was first described by Choukran et al. in france, in 2001. PRF belongs to a new generation of platelet concentrates, which has been shown to have several advantages like ease of preparation, inexpensive, autologous, promotion of wound healing, bone growth, bone maturation and hemostatsis. PRF can be obtained in the form of a membrane by squeezing out the fluids in the fibrin clot.

This case report presents the successful healing and apical closure with combined use of MTA as an apical barrier and autologous platelet rich fibrin membrane as an internal matrix.

## CASE DETAIL

A 21 year old male patient reported to the department of conservative dentistry and endodontics with chief complaint of pain and discoloration in upper anterior region. Patient had experienced continuous dull pain since 5 days. Medical history was non-contributory. All vital signs were found to be within normal limits. Clinically maxillary left central incisor was discoloured. Radiographic examination showed an immature apex of maxillary left central incisor with big periapical radiolucency.

A written informed consent of the patient was obtained. Access cavity was prepared and working length was established with radiographic method. In first appointment cleaning and shaping was done and canal was thoroughly irrigated with 3% sodium hypochlorite solution followed by saline and closed dressing was given. In second appointment again the canal was thoroughly irrigated with 3% sodium hypochlorite solution followed by saline and then the canals were dried with sterile paper points. 2% Chlorhexidine gel was placed as an intra canal medicament and then access cavity was temporary sealed with Cavit G. In third appointment it was planned to place PRF.

PRF membrane preparation was performed by using the procedure

described by Dohan D M et al [7]. 10 ml of blood was drawn by venipuncture of the anticubital vein. Blood was collected in a 10ml sterile test tube without anticoagulant and immediately centrifuged at 3000 revolutions per minute for 10 minutes. The resultant product consisted of three layers: topmost layer consisting of acellular platelet poor plasma, PRF clot in the middle and red blood cells at the bottom and red blood cells at the bottom. Then PRF clot was retrieved and fluids were squeezed out by using moistened gauze to obtain a PRF membrane.

PRF membrane was inserted through the canal and was allowed to be pushed beyond the apex into the periapical region. Then it was gently compacted by using hand pluggers, in order to achieve a matrix for the placement of MTA. Immediately after PRF placement, MTA was mixed according to manufacturer's instructions and was placed with MTA messing gun. For this case, 5mm thick MTA apical plug was placed. 4-5mm barrier is appropriate thickness for MTA, which can be condensed thoroughly to obtain perfect apical sealing. MTA was allowed to set and patient was recalled after a day.

## DISCUSSION

A number of methods have been recommended for artificial apical closure. For a long time, calcium hydroxide has been the first material for apexification but the unpredictable and often lengthy course of this treatment modality presents challenges, including the vulnerability of the temporary coronal restoration to reinfection. Moreover the treatment requires a high level of patient compliance.

Then newly introduced MTA by Torabinejad and colleagues at loma linda university shown to be effective in artificial root end closure [8,9]. MTA is a material which has less leakage, better antibacterial properties, high marginal adaptation, a pH of 12.5 and is more biocompatible [10,11]. A bioactive material MTA stimulates the production of interleukins and cytokine release. So it is capable of promoting the hard tissue formation [12,13,14].

The major problem in cases of a wide open apex is the need to limit MTA to the apex and to obtain an apical seal to avoid extrusion of material into periodontium. Using a matrix avoids the extrusion of the material into the periodontal tissues, reduces leakage in the sealing material and allows favourable response of the periodontal tissues.

PRF is an immune platelet concentrate, collecting on a single fibrin membrane all the constituents of a blood sample favourable to healing and immunity. Platelets are known to contain a variety of growth factors, including transforming growth factor β, vascular endothelial growth factor and platelet – derived growth factor. These growth factors are released from the platelets when they are activated, secreted or aggregated by collagen or epinephrine. PRF stimulates osteoblasts, gingival fibroblasts and periodontal ligament cells proliferation as

a mitogen [15]. PRF has been considered as a fibrin biomaterial. Its molecular structure with low thrombin concentration is an optimal matrix for migration of endothelial cells and fibroblasts. It permits a rapid angiogenesis and an easier remodelling of fibrin. Advantage of using PRF as a scaffold is that it has trimolecular or equilateral fibrin junction which makes its architecture flexible and can support cytokine enmeshment and cellular migration [16].

## CONCLUSION

This case report presents the successful healing and apexification with combined use of Mineral Trioxide Aggregate as an apical barrier and autologus platelet rich fibrin membrane as an internal matrix.

## REFERENCES


1. Morse DR, O'LarnicvJ & Yesilsoy C. Apexification: Review of literature. Quintessence Int 1990; 21: 589-98.
2. Rafter M. Apexification: A Review. Dent Traumatol 2005; 21: 1-8.
3. Ghose LJ, Baghdady VS & Hikmat BY. Apexification of immature apices of pulpless permanent anterior teeth with calcium hydroxide. J Endod 1987; 13: 285-90.
4. Pradhan DP,Chawla,Gauba K & Goyal A. Comparative evaluation of endodontic management of teeth with unformed apices with mineral trioxide aggregate and calcium hydroxide. J Dent child 2006; 73(2): 79-85.
5. Andreasen Jo, Farik B and Munksgaard EC et al. Long term calcium hydroxide as a root canal dressing may increase risk of root fracture. Dental Traumatology 2002; 18: 134-7.
6. Lemon RR. Nonsurgical repair of perforation defects. Internal Matrix Concept. Dent Clin North Am 1992;36: 439-57.
7. Choukroun J, Diss A, Simonpieri A, Girard MO,Schoeffler C & Dohan SL et al. Platelet rich fibrin: A second generation platelet concentrate, part IV: Clinical effects on tissue healing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006; 101; 56-60.
8. Bogen G & Kuttler S. Mineral trioxide aggregate obturation: a review and case series. J Endod 2009; 35: 777-790.
9. Felippe WT, Felippe MC & Rocha MJ. The effect of mineral trioxide aggregate on the apexification and periapical healing of teeth with incomplete root formation. Int Endod 2006; 39: 2-9.
10. Torabinejad M & Watson TF Sealing ability of mineral trioxide aggregate when used as a root end filling material. J Endod 1993; 19: 591-3.
11. Ribeiro DA, Matsumoto MA, Duarte MA, Marques ME & Salvadori DM. Ex vivo biocompatibility tests of regular and white forms of mineral trioxide aggregate. Int Endod J. 2006; 39: 26-30.
12. Matt GDel al. Comparative study of white and gray mineral trioxide aggregate simulating a one – or two step apical barrier technique. J Endod 2004; 30: 876-879.
13. Hachmeister DR, Schindler WG, Walker WA III & Thomas DD. The sealing ability and retention characteristics of mineral trioxide aggregate in a model of apexification. J Endod 2002;28: 386-90.
14. Main C, Mirzayan N, Shabahalang S & Torabinejad M. Repair of root perforations using mineral trioxide aggregate: a long –term study. J Endod 2004; 30: 80-3.

15. Torabinejad M, Hong CU, McDonald F & Pitt Ford TR. Physical and chemical properties of a new root-end filling material. J Endod 1995;21:349-53.
16. Tsai CH, Shen SY, Zhao JH & Chang YC. Platelet – rich fibrin modulates cell proliferation of human periodontally related cells in vitro . J Dent Sci 2009; 4: 130-5.

## FIGURES:

Fig:1 Preoperative radiograph showing an immature open apex of maxillary left central incisor.

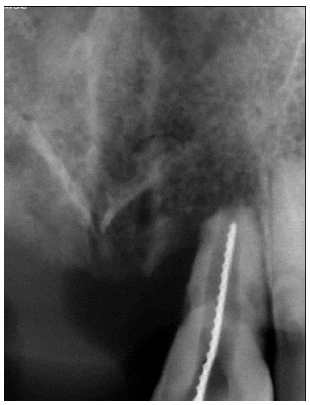

Fig:2 Working length was established with radiographic method.

Fig: 3 MTA was placed in apical third

Fig: 4 MTA was placed in apical third and remaining obturation was done with combination of lateral and vertical condensation with gutta percha.

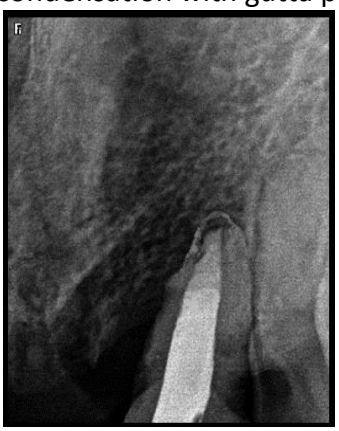

Fig: 5 Follow up at 1 year radiograph showing complete closure of the apex.