

APEXIFICATION USING PRF AS APICAL BARRIER ALONG WITH PHOTOACTIVATED DISINFECTION (PAD) AS DISINFECTION PROTOCOL

Dental Science

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An immature tooth with pulpal necrosis and periapical pathology becomes a challenge to the endodontist. Such teeth can be treated with conventional apexification procedure with and without apical barriers. These case reports demonstrates use of an apical matrix barrier in form of a platelet rich fibrin membrane for the purpose of stabilization of MTA in root end apexification procedure together with use of diode laser for root canal sterilization in the form of Photoactivated Disinfection.

KEYWORDS

Apexification , Apical matrix barrier, PRF , Photoactivated Disinfection

INTRODUCTION

Often Tooth may undergo trauma during its root development period that may result in incomplete root formation giving rise to open apex. MTA has been shown to be a very effective root filling material for sealing immature root canals with open apices¹. MTA has an ability to facilitate periradicular healing by inducing hard-tissue formation²

Adequate condensation of MTA is difficult to achieve in cases with wide open apex as the material may get extruded beyond the apex. Therefore ,it becomes difficult to limit the intracanal material. In such situations apical matrix can be used for the controlled placement of MTA to a desired level. Various biocompatible materials that have been tried and used as apical matrix in the past includes calcium sulfate or a combination of calcium sulfate and collagen in a powdered form.

Platelet-rich fibrin (PRF) developed in France by Choukroun and Dohan³ is a matrix of autologous fibrin, in which are embedded a large quantity of platelet and leukocyte cytokines during centrifugation. PRF membrane can be prepared and applied as apical barrier to serves as a matrix to accelerate the healing of wound edges. Maintaining the disinfection in such situation becomes a prime concern .PRF while being pushed through the root canal should be exposed to a sterile environment . Photochemical disinfection or sterilization was done using diode laser (810 nm) at 3 W for 10 secs with 3% NaOCl as Photosensitiser⁴

Therefore, present case reports highlight the nonsurgical management of symptomatic teeth with immature apices and large periapical radiolucencies using PRF membrane matrix and MTA to promote periapical healing together with use of Photoactivated Disinfection as Disinfection Protocol.

II CASE REPORTS**CASE 1:**

A 15-year-old male patient reported with a chief complaint of a broken tooth History revealed that the patient had suffered trauma at the age of 8 years. On radiographic examination showed tooth with a wide open apex (Fig 1) and a radiolucent area in proximity of the apex of the tooth Endodontic access opening (Fig 2) was done under local anesthesia, and a periapical radiograph was taken to determine the working length. 2 weeks dressing with calcium hydroxide was given. The root canal was lightly cleaned with a hand file under irrigation with 3% NaOCl followed by Photochemical disinfection or sterilization was done using diode laser (Fig3). PRF membrane was used in order to form artificial barrier. Patient's whole blood was drawn into 10 ml glass coated plastic tubes using PRF collection kit without anticoagulant and immediately centrifuged Three layers got formed in the tube (Fig. 4): a base of RBCs, at the bottom, acellular plasma on the surface, and PRF clot in the middle. The fibrin clot was then easily separated from the lower part of the centrifuged blood and PRF clot was gently pressed into a membrane with a sterile dry gauge⁵ (Fig. 5).



FIGURE -1



FIGURE -2



FIGURE-3

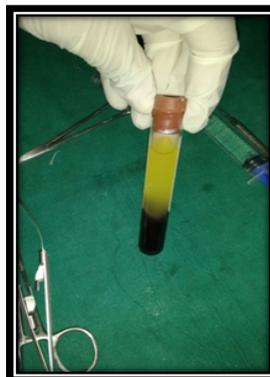


FIGURE -4



FIGURE -5

The membrane was packed against the bone and was pushed into the bony space formed as a result of lesion beyond the apex to form a matrix on which of MTA can be placed . A thick mixture of White Proroot MTA (Dentsply, Switzerland) was prepared and applied on to apical portion of the canal using a small plugger (Fig.6), Moistened gauze was placed in the remainder of the canal and the access cavity was sealed using glass ionomer cement .A radiograph was taken after the completion of the endodontic therapy(Fig.-7). A 3-month follow-up revealed complete periapical healing and bone formation (Fig. 8).



FIGURE -6

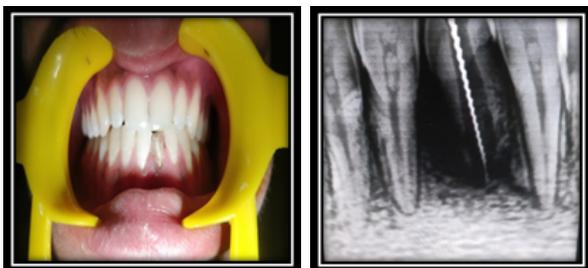
FIGURE -7



FIGURE -8

Case -2 :

A 15-year-old male patient reported with a chief complaint of discolored teeth.On clinical examination, retained deciduous incisor between the two lower central incisors. Patient was willing to save it and therefore, further measures were taken.On radiographic examination, an immature tooth with a wide open apex and lesion at apex was found. Endodontic access opening was done under local anesthesia , and a periapical radiograph was taken to determine the working length. Similar clinical procedures were performed as in above case using Photoactivated Disinfection followed by placement of PRF beyond apex and then the entire canal was obturated with MTA.



PRE-OP PHOTOGRAPH

WORKING LENGTH IOPA



POST-OP PHOTOGRAPH

IMMEDIATE IOPA



AFTER ONE MONTH RECALL

III DISCUSSION :

The major problem that arises in cases of immature apex is the need to limit the material, thus avoiding the extrusion of a large amount of material beyond apical end. Using a matrix helps to prevent the extrusion of the material into the periodontal tissues, reduces leakage in the sealing material and allows favorable response of the periodontal tissue afterwards.The apical barrier technique utilizing calcium sulfate or a combination of calcium sulfate and collagen in a powdered form has been performed in the past. Various materials have been used for formation of apical barrier during apexification, however the results had not been satisfactory. Before us Khetarpal et al⁴ used PRF barrier in the case report and concluded favorable results.The intrinsic incorporation of cytokines within the fibrin mesh allows for their progressive release over time (7-11 days), as the network of fibrin disintegrates⁵.The easily applied PRF membrane acts much like a fibrin bandage serving as a matrix to accelerate the healing of wound edges⁷According to Simonpieri et al⁸ the use of this platelet and immune concentrate offers the following 4 advantages: First, the fibrin clot plays an important mechanical role, with the PRF membrane maintaining and protecting the grafted biomaterials and PRF fragments serves as biological connectors among the bone particles. Second, the integration of this fibrin network into the regenerative site facilitates cellular migration, specifically for endothelial cells necessary for the neo-angiogenesis , vascularization contributes to survival of the graft. Third, the , IGF-1) are gradually platelet cytokines (PDGF, TGF- released as the fibrin matrix is resorbed, thus creating a perpetual process of healing . Lastly, the presence of leukocytes and cytokines in the fibrin network can play a significant role in the self-regulation of inflammatory and infectious phenomena within the grafted material.Use of proper sterilization of canal using Laser ensured no contamination of the PRF and allowed sterile product to passed through the canal.This non surgical management can prove to a potent non invasive approach in case s of open apex with lesions.

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