International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 4 Issue 5, May 2017

ISSN: 2394-4404

Regenerative Potential Of Platelet Rich Fibrin With MTA In Non-Vital Immature Apex: A Case Report

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IJIRAS

Abstract: ***Non-vital teeth with immature open apices with or without associated periapical pathology defy routine endodontic management. Formation of a calcified barrier at the root end using calcium hydroxide was favored treatment for such cases in the past. With the introduction of MTA, single visit Apexification using MTA has gained acceptance. Platelet Rich Fibrin is an autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines, which enhance healing by release of growth factors. This case report represents successful management of a case of an immature anterior tooth with PRF used as a scaffold and source of growth factor for the formation of a biologic seal while a physical barrier was achieved with MTA.***

Keywords: Platelet rich fibrin, MTA, apexification, apical barrier

I. INTRODUCTION

Treatment of a non vital tooth with necrotic pulp and immature apex is a great challenge to the clinician. In obturation for gutta-percha condensation, there should be an apical barrier to avoid extrusion of cements and gutta-percha into the apical area leading to periapical trauma. Apexification is a method which is used for treatment of such tooth with open apex. It is defined as "a method to induce a calcified barrier in a root with an open apex or the continued apical development of an incomplete root in teeth with necrotic pulp".

Recently, synthetic apical barriers with a variety of materials have been proposed as alternatives to the traditional apexification treatment method with calcium hydroxide. These include tricalcium phosphate, freeze dried bone, freeze-dried dentin, collagen calcium phosphate, proplast, polytetrafluor-ethylene and carbon felt-like porous material. Antibacterial pastes like metronidazole, ciprofloxacin, and cefactor have effectively encouraged apexification. Deliberate over-instrumentation of the periapical area to produce a blood clot that will induce apical closure has also been described. MTA has been suggested to create an apical plug at the root-end and helps to prevent the extrusion of the filling materials.[12],[13]

There was a paradigm shift in the treatment protocol of such teeth from apexification to regenerative procedures and as such several cases have been reported of use of platelet rich fibrin as apical matrix. [14, 15]

This case report presents the management of an immature tooth (with an open apex) with an apical barrier placement by PRF membrane and MTA as an internal matrix with an

ISSN: 2394-4404

objective to evaluate the healing potential of PRF plug combination with MTA.

Figure 1: Discoloration with 21

Figure 2: IOPA showing open apex

Figure 3: Working length Determination

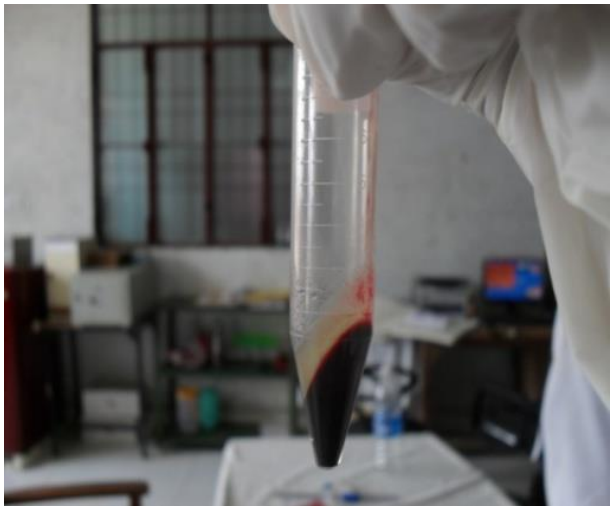

Figure 4: PRF in micro- pipette

Figure 5: PRF placed in canal

Figure 6: Apical plug using PRF and MTA

ISSN: 2394-4404

Figure 7: obturation using thermoplastisized Gutta Percha

Figure 8: Follow – up after 6 Months

II. CASE REPORT

A 16 year old male patient reported to the Department of Conservative Dentistry & Endodontics with chief complaint of pus discharge and discoloration of anterior tooth. History of present illness revealed recurrent episodes of swelling with pus discharge since 7-8 months and history of trauma 8 years back. Patient noticed progressive discoloration of tooth. Medical History and family history were noncontributory. Dental History revealed history of incomplete root canal treatment by dental surgeon. Clinical examination showed presence of discolored 21 and access opening on lingual surface of 21. (Figure 1) Tooth was tender on percussion and Vitality test for heat and cold were negative. Detailed examination of Intra- oral periapical radiograph of upper anterior region revealed the presence of a single root with a wide canal and immature apex. (Figure 2).

Endodontic treatment was initiated under rubber-dam isolation and local anesthesia. Approximate working length was established with both radiographic method and the apex locator (Root ZX, J Morita MFQ Corp., Kyoto, Japan). The root canal was lightly mechanically cleaned using Hedstroem files under irrigation with 2.5% sodium hypochlorite. (Figure 3) The root canal was then dried with sterile paper points. Informed consent was obtained from the patient after explaining the whole procedure. Patient's whole blood was drawn into 8 ml glass coated plastic tubes using PRF collection kit without anticoagulant and immediately centrifuged in table-top centrifuge (REMI Laboratories, India) at 3000rpm for 10 minutes. Three layers got formed in the tube: a base of Red Blood Corpuscles (RBCs), at the bottom, acellular plasma on the surface, and PRF clot in the middle. The fibrin clot was easily separated from the lower part of the centrifuged blood. (Figure 4) PRF clot recovered was placed in a sterile cup and cut into a plugs about 5mm in size. PRF was then placed in the apex using suitable instruments and the apical barrier created. (Figure 5) MTA was then mixed according to the manufacturer's instructions and placed at the apex. A moist cotton pellet was placed inside the canal before temporary restoration of access cavity. Patient was recalled after 24 hrs for thermoplastisized obturation using bee –fill (VDW) followed by glass ionomer cement for post endodontic restoration. (Figure 6) Follow up of the case was performed (Figure 7).

III. DISCUSSION

The main endodontic challenge in the cases of open apex is to limit the sealing material inside the canal. The apical matrix needs to be created to prevent the extrusion of the material beyond the apex. Several materials have been used as matrix [4-13]. In our study we have used platelet rich fibrin as the apical matrix. PRF is an autologus fibrin matrix in which platelet cytokines, growth factors and cells are trapped and may be released after a certain time and that can serve as a resorbable membrane. [16] PRF presents several advantages when used as a membrane. It acts as an apical barrier, against which the material can be condensed; PRF facilitates the migration of endothelial cells necessary for neo-angiogenesis, due to the gradual release of platelet cytokines, a healing process is created. It also helps to regulate inflammatory process due to the presence of leucocytes and cytokines [17]. The osteoblasts have also shown affinity to the PRF membrane which can result in osseous healing of the tissues [18] PRF consist of a fibrin matrix polymerized in a tetra molecular structure, the incorporation of platelets, leukocyte and cytokines, and the presence of circulating stem cells. [19]

MTA was used with PRF also has several advantages when used in apexification which includes minimal leakage of dye and bacteria in comparison with other restorative materials [20]. This bio-compatible material can be used to create a physical barrier which helps in formation of bone and

periodontium around its interface. [21] It also helps in the single visit apexification process and can set in the presence of moisture.

IV. CONCLUSION

Thus the combination of PRF and MTA can prove to be a promising option for the apexification of open apex cases due to its potential to induce healing and regeneration in the periapical region.

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