



Research Article

REGENERATIVE ENDODONTIC TREATMENT OF IMMATURE PERMANENT MAXILLARY CENTRAL INCISOR WITH APICAL PERIODONTITIS – A CASE REPORT

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ABSTRACT

Regenerative Endodontic Treatment (RET) can be used as an alternative to apexification treatment in immature permanent tooth having irreversible pulpitis and nonvital teeth with or without apical periodontitis. In this case report, RET was used to treat an immature permanent maxillary central incisor with apical periodontitis. Triple antibiotic paste (TAP) as intracanal medicament was placed in root canal for 4 weeks. Ethylenediaminetetraacetic acid (EDTA) was used as final irrigant. As a scaffold, Platelet-rich fibrin (PRF) was applied. Biodentine was applied upon PRF, and GIC and composite was placed to restore the teeth. Teeth showed no signs and symptoms of pain and gradual periapical healing was seen during three, six and twelve months follow-up periods, also dentinal thickening and reduced PLD widening was seen during six and twelve months follow-up periods; and pulp sensibility tests using electric pulp test showed no results.

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INTRODUCTION

Earlier tooth which is having poor prognosis was treated by extracting it and replacing it with prosthesis. But now a days, treatment options changed by preserving natural tooth structure than to replacing it. Tooth with poor prognosis can also be saved and can be made functioning for years with proper treatment plan and patient's support. But endodontically it is challenging to treat immature permanent teeth having necrotic pulp with apical periodontitis. Due to blunderbuss anatomy, it is difficult to perform proper preparation and obturation of apical portion of tooth. Multiple-session or one-step Apexification is suggested in such cases to avoid this problem by placing artificial barrier of MTA or Biodentine and closing the apex. But Apexification has many drawbacks. Repeated intracanal medicament placement with calcium hydroxide increases chances of reinfection, excessive instrumentation may cause thinning of dentine at apex which is already thin, also it doesn't promote root growth which may cause root to become fragile and can fracture easily.

Regenerative medicine holds promise for restoring tissues and organs damaged by disease, trauma, neoplasms, and congenital deformities. Regenerative endodontic therapy (RET) repairs the pulp dentine complex, which has been damaged by a variety of conditions like as caries, trauma, or anomalies. It does this by applying biological and engineering concepts. It has been recommended as the best line of action for young permanent teeth that have apical periodontitis and necrotic pulp[1]. This case report shows the result of one year

follow-up of immature permanent Maxillary central incisor having necrotic pulp with apical periodontitis having poor prognosis which is treated with REP.

Case presentation

A 20 year old female patient with chief complaint of occasional pus discharge from gumboil in upper front region of jaw since one month and discolored and fractured tooth which was not esthetically pleasing to the patient was reported to the Department of Conservative Dentistry and Endodontics. Patient gave history of trauma in upper front tooth region of jaw nine years back and since then the discoloration of the tooth gradually increased. Also, patient gave dental history of access opening with same tooth in private dental clinic two days back. The medical history was not contributory. Clinically, intra-oral examination of tooth# 21 showed crown fracture which was tender on percussion, had Grade I mobility, and no traceable sinus tract at that time was located. Electronic pulp test revealed vitality positive in all of the maxillary anterior teeth except tooth #21, indicating non-vital tooth. Radiographically, immature root apex of tooth #21 with a radiolucent periapical lesion was revealed, also PDL widening was seen with same tooth (Fig. 1).

The diagnosis of Ellis Class IV fracture with apical periodontitis and open apex was made. RET was considered to be the best suitable treatment option. Treatment plan was explained to the patient and consent was taken before starting the treatment.

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RET was planned in two appointments. In first appointment, 1.8 mL of 2% lidocaine with 1:80,000 epinephrine was locally infiltration and the area was anesthetized. Tooth was isolated



Fig. 1 Preoperative (A) radiographic and (B) intraoral clinical image

using rubber dam, access cavity prepared. Root canal was copiously and gently irrigated with 20ml of 1.5% Sodium hypochlorite (NaOCl) followed by saline irrigation. Working length determination was done with a large file placed in the canal and taking a periapical radiograph. Paper points were used to dry canal. Triple antibiotic paste in a 1:1:1 ratio of ciprofloxacin, metronidazole, and minocycline was used as an intracanal medicament for four weeks. (Fig. 2)

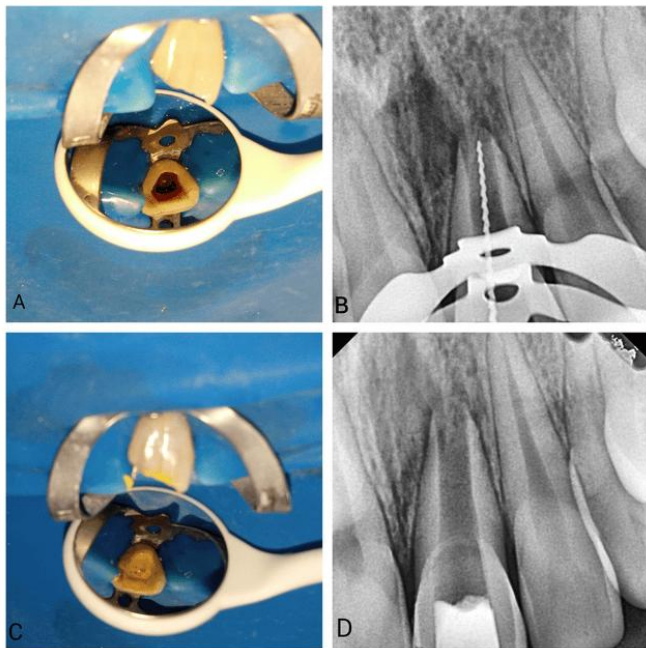


Fig. 2 A: Access opening done ; B: Working Length Determination ; C: Triple Antibiotic Paste(TAP) as intracanal medicament ; D: Intraoral periapical radiograph after 4 weeks of placing TAP as intracanal medicament

In the second visit, the patient was asymptomatic and the tooth mobility was reduced to normal and no pus discharge was noticed. Five ml of blood was taken from the patient's right forearm and PRF was extracted by centrifuging at 2700 rpm for 12 minutes (Fig. 3). Area was anesthetized by locally infiltrating with of 2% lidocaine without epinephrine to facilitate bleeding. Canal was copiously, gently irrigated with 20 ml of 17% ethylenediaminetetraacetic acid (EDTA) for five minutes to remove TAP and then canal was dried with paper points. Bleeding was induced in canal by inserting precurved

#15 K-file one millimeter beyond the apical foramen. PRF membrane strips was placed into the canal till CEJ by endodontic plugger. Canal was sealed with Biodentine



Fig. 3 PRF made by centrifuging the freshly extracted blood from patient

followed by GIC restoration (Fig. 4). After one week, final composite restoration was placed over a 2-3 mm layer of glass ionomer cement and composite veneering was done for esthetic purpose.

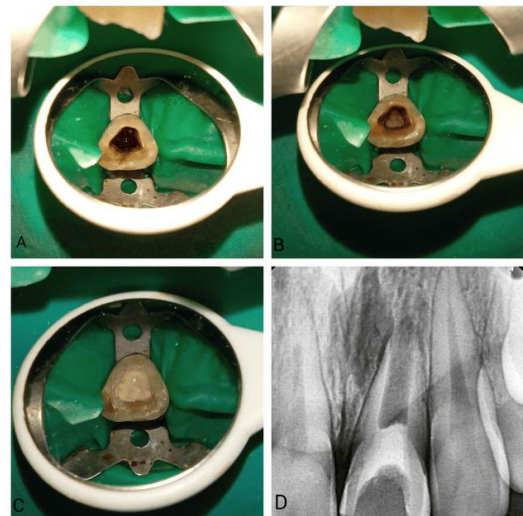


Fig. 4 A: Bleeding induced in canal; B: PRF membrane placed in canal till level of CEJ; C: Biodentine placed in canal leaving 3-4 mm space coronally; D: Periapical radiograph during second appointment



Fig. 5 Follow-up radiographs

A: 3 months; B: 6 months; C: 12 months

Patient was recalled after 3, 6 and 12 months for clinical and radiographic evaluation. Clinically, patient was asymptomatic, no pain to percussion or palpation, no mobility was seen. Tooth showed negative response to pulp sensibility test with electric pulp tester. Radiographically, gradual healing in periapical radiolucency was seen in 3, 6 and 12 months radiograph. Dentinal thickening is seen in 6 and 12 months radiograph. Reduction in PDL widening is seen in 6 and 12 months radiograph. No root elongation is seen. (Figure 5)

DISCUSSION

According to AAE Clinical Considerations for a Regenerative Procedure, the degree of effectiveness of Regenerative Endodontic Procedures is primarily determined by the ability to achieve primary, secondary, and tertiary goals. The primary goal is to eliminate the symptoms and show indications of bone repair. The secondary goal is to improve root wall thickness and/or root length (which is desired but may not be necessary); and the tertiary goal is to respond positively to vitality testing (which, if achieved, may imply a better organized vital pulp tissue)[2]. In our case report, we were able to achieve primary and secondary goals.

In our case report we used low concentration of TAP instead of Calcium hydroxide as intracanal medicament because it has antibacterial property, doesn't lowers the fracture resistance of the root dentin and disinfects the canal as needed for regenerative endodontic procedure [3].

Also low concentration of Sodium hypochlorite (NaOCl) was used and final irrigation was done with 17% ethylenediaminetetraacetic acid (EDTA) and 2% chlorhexidine was avoided in this case report. Studies have shown that NaOCl at half- or full strength concentrations (3% and 6%, respectively) is toxic to stem cells from the apical papilla (SCAP) and prevents them from adhering to dentin surfaces [4]. 17% EDTA significantly promotes the adherence of newly formed mineralized tissues to dentinal canal walls while also increasing the release of growth factors from root canal dentinal walls [5].

Platelet-rich fibrin regulates inflammatory responses while promoting growth and regeneration [1]. Biodentine is tooth-colored calcium silicate-based cement that exhibits bioactivity by increasing pulp cell proliferation and biomineralization. Therefore, it's been used for the purpose of dentin-pulp complex regeneration in this case report [6].

CONCLUSION

Regenerative Endodontic Treatment (RET) can be used as an alternative to apexification treatment in immature permanent tooth having irreversible pulpitis and nonvital teeth with or without apical periodontitis. As the apexification procedure has drawback of not inducing further root growth leading to fragile root dentin and risk of fracture, this shortcoming is overcome by RET which encourages dentinal wall thickening and healing of apical periodontitis.

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