



Re-generation with PRF (plasma rich fibrin) in immature permanent teeth with necrotic pulp: A case report

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ABSTRACT

In pulp regeneration, the endodontist uses nanofiber-based material along with stem cells obtained from your child's own pulp or bone marrow to build a foundation upon which the tooth can regenerate.¹ The platform also supports the regulated release of growth factors to promote pulp regeneration as well as the controlled delivery of antibiotics to aid in the elimination of infection.

Endodontic therapy is a form of treatment that entails removing contaminated tissue from teeth with necrotic pulp and replacing it with an inert substance. The predictability and dependability of this treatment have long been established.²

KEYWORDS

Pulp regeneration , PRF

INTRODUCTION

Regenerative procedures are those that entail the use of substances that promote healing and restoration of the pulp dentin complex after replacing the infected or damaged tooth tissue ¹. Dentists that practise regenerative therapy believe that this procedure has the power to revive a tooth that has reached the end of its useful life. Pulp implantation, revascularization, and postnatal stem cell therapy are only a few of the numerous methods that regenerative endodontics has developed. The practical application of revascularization has been successful in recent years, giving dentists astonishing outcomes ². The root can develop further as a result of this process. According to studies, even immature teeth that are thought to be "dead" can regenerate pulp-like structures that support root formation. Many people relate pulp regeneration to a root canal, but pulp regeneration replaces the live tissue in the pulp chamber rather than cleaning and filling the chamber with material after killing the bacteria. If the operation is successful, a root canal may not be necessary. In the 1960s, Ostby was the first to suggest using blood in the root canal to regenerate dental pulp tissue. ³

Two of the most common oral disorders, pulpal and periapical diseases, are often brought on by powerful and severe stimuli, such as dental caries, unintentional trauma, or iatrogenic causes, which cause the tooth pulp to become irreversibly damaged ^{4,5}. Dental pulp, a highly vascularized and innervated tissue found inside the stiff dentinal walls, serves a variety of purposes, including responding to outside signals, supplying nutrition, and reducing neuronal sensitivity by mineralizing the pulp ⁶. Decrease of this tissue therefore causes a decrease of tooth vitality and necessitates endodontic therapy.

A favourable outcome is complicated by young teeth with a necrotic pulp and apical periodontitis. ⁷ This matrix encourages migration, cell adhesion, and osteoblast proliferation, which results in bone formation ⁸. Platelet-rich fibrin can be utilised alone or in conjunction with bone graft to stimulate bone growth and vascularization. The PRF-released cytokines are crucial for the development of blood vessels and the activation of the immune system to combat invading infections ⁹. Endodontic treatment is necessary for a variety of disorders, including dental caries and pulpitis, which affect more than two thirds of the world's population ¹⁰. There

are several uses for platelet-rich fibrin (PRF) in regenerative endodontics. When combined with MTA, it was utilised by Bains et al. to treat iatrogenic pulpal floor perforation of the mandibular first molar ¹¹. Rudagi K. and B. Rugadi reported effective healing and apexification using MTA as an apical barrier and autologous platelet-rich fibrin membrane as an internal matrix ¹². Additionally, PRF enhanced dental pulp cell proliferation, upregulation in alkaline phosphatase activity, and increased osteoprotegerin expression in a time-dependent fashion ¹³.

CASE REPORT

An 8 year old patient went to the department of Pediatric and preventive dentistry with the history of trauma since 2 years ago while playing cricket and having the symptoms like sharp pain which increased at night and did not get relief even after taking medication. On clinical examination, crown fracture involving pulp and no abscess was present. No pathological tooth mobility was seen and the probing depth was within the normal range, on periodontal examination Radiographically, the crown fracture was present involving enamel, dentin and pulp. The nolla's stage with tooth number 11 was 8. The radiographic imaged showed no periapical radiolucency and open apices. The pulp testing gave a negative response indicated a non vital tooth, which was done with cold test. The regeneration treatment was opted after evaluating the therapeutic option.

Under local anathesia (2% adrenalin with lignocaine) and using the rubber dam, the tooth was cleaned with 2% chlorhexidine, the pulp chamber was accessed and the canal was irrigated with 5% NaOCl and 17% EDTA, working length was determined with K files, constant irrigation and minimal irrigation was done. Finally, the tripple antibiotic paste (metronidazole, ciprofloxacin, minocycline) was placed in the pulp clamber with equal proportion and sterile water. The tooth was sealed temporary with IRM and recalled after 14 days.

Around 20 mL of the blood was taken from the the patient. The blood was collected in the test tube and placed in the centrifugal machine for 20 mins. After 20 mins the blood get centrifuged into plasma and red blood cells. Thus the PRF was collected and placed in the test tube.

The temporary cement was removed and the copious irrigation was done with normal saline. The canal was made dry was using paper points. Then the PRF was introduced into the canal by using the MTA pluggers. The PRF was pushed 3 to 4 mm apically. After that MTA was placed in the canal for about 4mm coronally. The post obturation was done wit GIC and the composite build up was done.



fig no :-1 pre operative IOPA , Elli's class IV fracture with 11, open apex



fig no 2 irrigating the canal with side vent needle

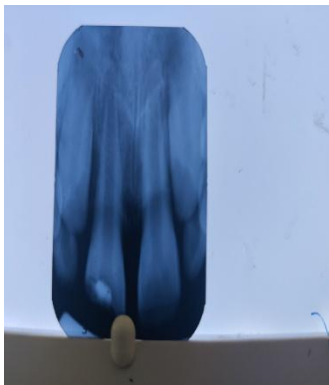


fig no 3 placement of triple antibiotic paste in the canal for 14 days



fig no 4 blood after centrifugation

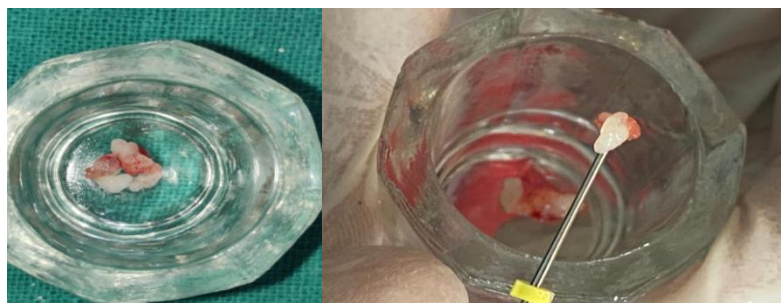


fig no 5, 6:- PRF



fig No7:- IOPA showing placement of MTA in the canal followed by GIC post obturation

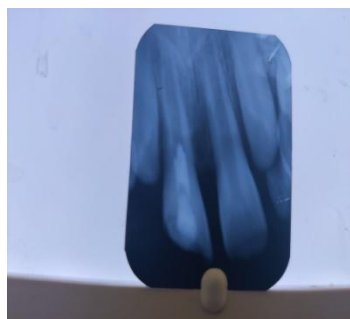


fig no 8 :- IOPA with 11 after 6 months follow up .

DISCUSSION

Regenerative therapy in dentistry has been defined as the replacement or regeneration of oral tissues lost as a result of disease or injury¹. The healing of the apical periodontitis is the primary goal of the pulp regeneration. The increase in root wall thickness and root length is the secondary goal. To regain the positive pulp response is the tertiary goal.²

The naturally occurring PRF contains white blood cells, 97 % platelets, high density fibrin which are mostly solid gels or dense gels and cannot be injected and inflammatory cells such as leucocytes (lymphocytes, macrophages) and stem cells. As compared to PRP and PGRF, the PRF has a high number of leukocytes². These leukocytes play a vital role in healing due to immune regulation via secretions of immune cytokines such as interleukins and alpha tumor necrosis factor. Kobayashi *et al* stated that the PRF released more amount of growth factor as compared to PRP over a period of 10 days.²

PRF is an autologous blood concentrate system and does not require the use of external anti-coagulants for the preparation. According to Choukron's *et al*, the blood should be collected into the test tubes. The specific glass surface allows the activation of the coagulation cascade during the centrifugation process so as to produce a solid fibrin clot, which also requires a high relative centrifugal force (RCF) which is about 708g.³

In regenerative endodontic treatment, root canal disinfection is the most challenging because in teeth with an immature apex, the root canal is blunderbuss i.e. root canal size is large thus allowing easy permeation of anti-microbial agents into the root canal system and towards the periapical region.

Trivino *et al* concluded that 17% EDTA promotes SCAP survival and allows them to attach to the root canal dentinal wall. Thus EDTA can be used as an irrigation protocol in regeneration cases.³

Bose et al founded that the tripple antibiotic paste(TAB) causes apical closure and increase root length as compared with the different medication. Thus a mixture of ciprofloxacin, metronidazole and minocycline showed a satisfactory results for disinfecting the canals and the healing of the periapical lesions.⁴

The time period necessary for the bacterial disinfection of the canals leaving the TAB in until they are clean, varies between one to four week. Ding et al proposed for 1 week and some author recommend for 4 week.⁴

As MTA has osteo-inductive capacity the formation of cementum bridges may be seen. The presence of calcification in the canal may prejudice the esthetics, as well as create difficulties for any futher endodontic treatment.⁴

Conclusion

1. For immature necrotic teeth, regeneration is a desirable alternative to apexification, as it shows both good and long term prognosis.
2. At the end of an year , a positive pulp response can be seen
3. 17% EDTA favours SCAP survival rates
4. Future more study is needed so as to improve the results og regenerative endodontic treatment

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