International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

# Non-Surgical Periapical Healing with Prf – Case Report

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**Abstract**

Platelet-rich fibrin (PRF) is an autologous blood concentrate obtained without anticoagulants by centrifugation of patients' peripheral venous blood. PRF is considered to enhance the formation of new bone.

The aim was to present a case reports of permanent teeth with closed apexes with periapical lesions, which was treated endodontically with the use of PRF. The root canals were mechanically cleaned and shaped with NiTi files and irrigated with sodium hypochlorite (NaOCl). Before the canal systems were obturated, PRF was used as a scaffold and was placed below the cementodentinal junction with hand pluggers. Cone beam computerized tomography (CBCT) was used to assess the resolutions of periapical radiolucency's. After 12 months, the measurements of both periapical lesions were significantly reduced. Although the performed root canal treatments (RCTs) can definitely be recognized as successful, it must be emphasized that mechanical shaping and cleaning of the root canals with special disinfecting solutions significantly affect the clinical efficacy of RCT.

Conclusion: It seems impossible to state that PRF played a leading role in the healing process of the presented periapical lesions. Further studies must be performed to assess whether RCT of mature teeth with an additional PRF application is superior to RCT performed alone.

## INTRODUCTION

Root canal treatment (RCT) is performed to eliminate pulpal infection, which may be the consequence of severe caries lesions or non-carious conditions, including traumas. The aim of RCT is to remove the inflamed or necrotic pulp, to chemo-mechanically debride the root canal system, and finally to hermetically fill the root canal system with biocompatible material [1]. Four conditions have been found that significantly improve the final outcome of primary RCT, including lack of the periapical radiolucency, homogenous filling of the root canal system, filling of the root canal system that extends to 2 mm within the radiographic apex, and well-sealing post-endodontic restoration [1]. Similar factors improve the final outcome of secondary RCT [2]. The major difficulty, which is related to secondary RCT, is the access to the apical infection. The final outcomes of primary and secondary RCT are similar when the access to the apical infection is restored [2]. RCT of teeth diagnosed with endodontic periapical lesions is associated with 49% lower odds of success compared with teeth without periapical lesions [2]. Therefore, it seems mandatory to search for new methods of treatment that may help the clinicians to achieve better outcomes

in complicated clinical conditions Regenerative endodontic procedures (REPs) are based on biology and aim to replace impaired dental tissues, including dentin, pulp–dentin complex, and root structures. The major domains that affect regenerative endodontics are growth factors; stem cells; tissue engineering materials; and cell, tissue, and organ culture [3]. Several different techniques have been invented for regenerative endodontics; namely, injectable scaffold delivery, stem cell therapy, root canal revascularization, pulp implantation, scaffold implantation, three-dimensional cell printing, and gene delivery [3]. Nowadays, REPs are mostly performed in pediatric dentistry to treat immature teeth diagnosed with pulpal necrosis [4]. Although REPs for adult patients have also been discussed in the literature, little is known about their efficacy [5]. There are three major types of biological scaffolds used in REPs: blood clot revascu larization (BCR), platelet-rich plasma (PRP), and platelet-rich fibrin (PRF) [6,7]. PRF is a second-generation platelet concentrate, which was developed by Choukroun in 2001 as a scaffold in maxillofacial surgery [8]. The fibrin in PRF has a structure of a three-dimensional network, which is a flexible, elastic, and makes a very strong core, in which platelets and leukocytes are suspended [8]. According to the available literature, PRF seems to be very effective in regenerative dentistry [9]. It is considered to enhance the formation of a new bone [10]. Therefore, it may be speculated that the application of PRF in the apical region, before final obturation of the root canal system, may accelerate the regeneration of periapical tissue. There is no evidence of data in the worldwide literature concerning the use of PRF in the endodontic treatment of mature permanent teeth with diagnosed chronic periapical periodontitis. The aim of this manuscript was to present two case reports of permanent teeth with closed apexes diagnosed with periapical lesions, treated endodontically with the use of PRF.

**Case Report**

Patient A: Pulp Necrosis with Symptomatic Apical Periodontitis

A 21-year-old male patient came to the Department of Conservative Dentistry and Endodontics with chief complaint of severe pain of tooth 11 and 21 (upper central incisors, according to the Federation Dentaire Internationale (FDI) dental numbering system). Extraoral and intraoral examinations were carried out. The gingiva above tooth 11,21 was found to be swollen, reddish, and painful to palpation. Examination of the periodontal pocket revealed the presence of exudation, which mostly consisted of pus. The pocket depth (PD) was PD max = 9 mm. Diagnostic examination of a pulp viability was performed with faradic current. Teeth 11 and 21 did not respond to electric stimuli, which is typical for nonvital teeth. The periapical tissue condition was additionally tested by the reaction to vertical and horizontal percussion. Both of the reactions were positive.

Cone-beam computed tomography (CBCT) was performed. The periapical lesion was measured with the use of CS 3D Imaging v3.5.18. The measured dimensions of the lesion were 14mm x 22.1mm x 14.7mm. The CBCT images of the periapical lesion are presented in Figure 1. The patient was diagnosed with pulp necrosis with symptomatic apical periodontitis of tooth 11 and 21 and qualified for an endodontic treatment. Patient informed consent to perform root canal treatment was obtained.

Tooth isolation with rubber dam was done under local anaesthesia and access opening was done. After that, necrosed pulp tissue was removed and the working length was determined using an electronic apex locator. Canal preparation was performed using Ni–Ti rotary instruments with 2.5% sodium hypochlorite irrigation.

After completing shaping procedure, a final enhanced irrigation procedure was performed alternating the use of 2.5% sodium hypochlorite and 17% EDTA with sonic activation. A calcium hydroxide (CH)

medication was placed, and the patient was given a second appointment 3 weeks later.
The patient's blood was drawn from a median cubital vein and collected in glass tubes (10 mL). Next, the patient's blood was centrifugated at 1200 rpm for 8 min to obtain platelet-rich fibrin (PRF).
Using sterile tweezers, the fibrin clot was squeezed between two gauze pieces to create an autologous fibrin membrane. After the root canal was dried with paper cones, the freshly prepared PRF membrane was placed into the apex and collaplug was placed over it using hand pluggers—size 1/2 Niti (red) and 3/4 (grey). MTA was mixed and placed over collaplug and patient was called after 1 week.
In next appointment tooth no 11 and 21 was obturated with gutta percha and orifice was sealed with composite restoration. Follow up was done for the period of 18 months.

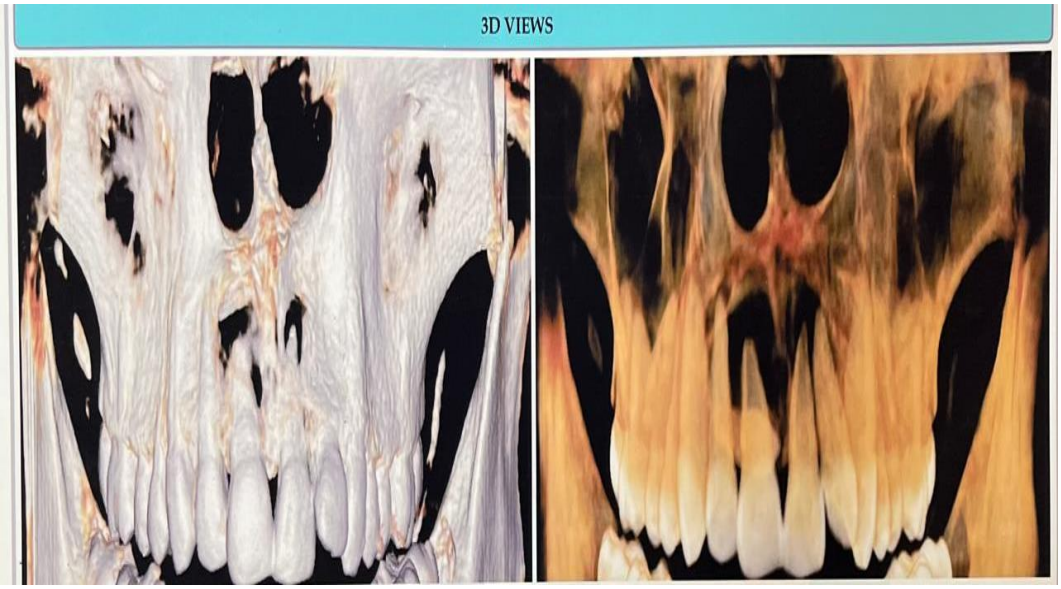


**Figure 1 (a)**

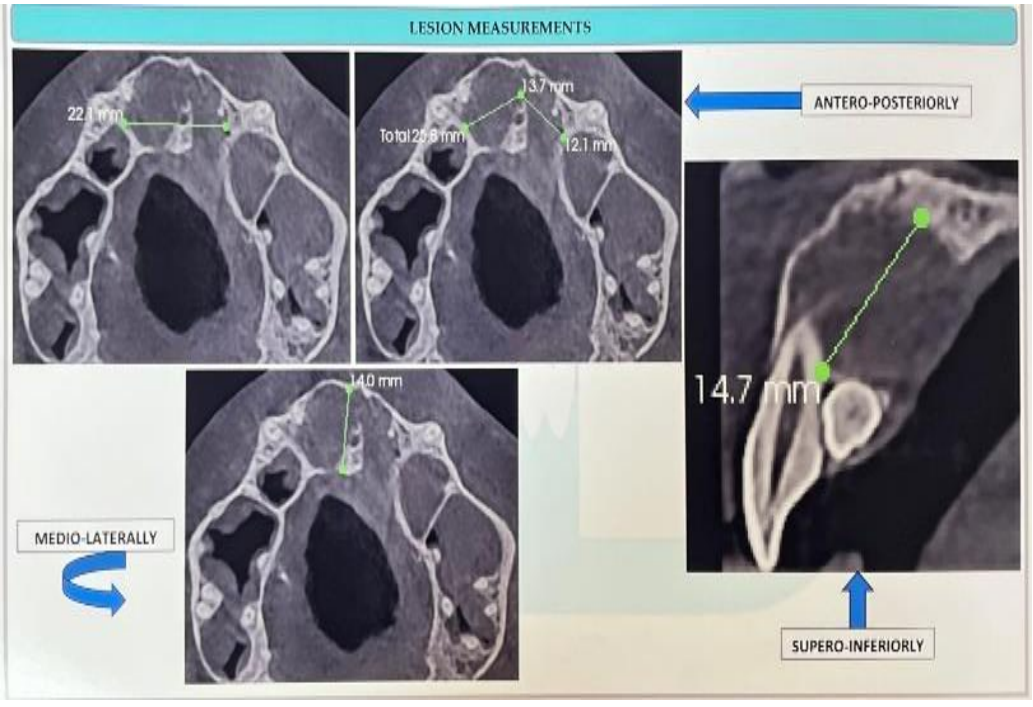


**Figure 1(b)**

**Figure 1 a and b showing Pre operative CBCT images**

**Figure 2. Preoperative and working length IOPA Radiograph**

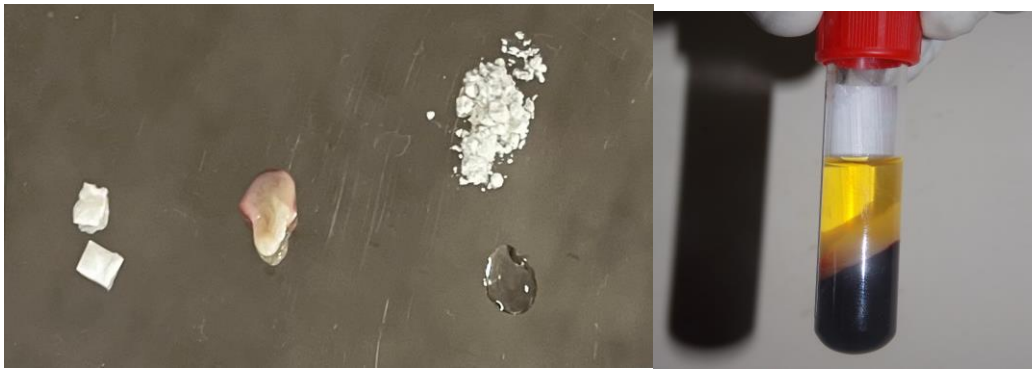

**Figure 3. Colla pluge, PRF, MTA**

1 month follow up radiograph

3 month follow-up radiograph

6 month follow-up radiograph

1 year follow-up radiograph

16 month follow up radiograph

Post operative photograph

**Figure 4 showing follow up radiograph**

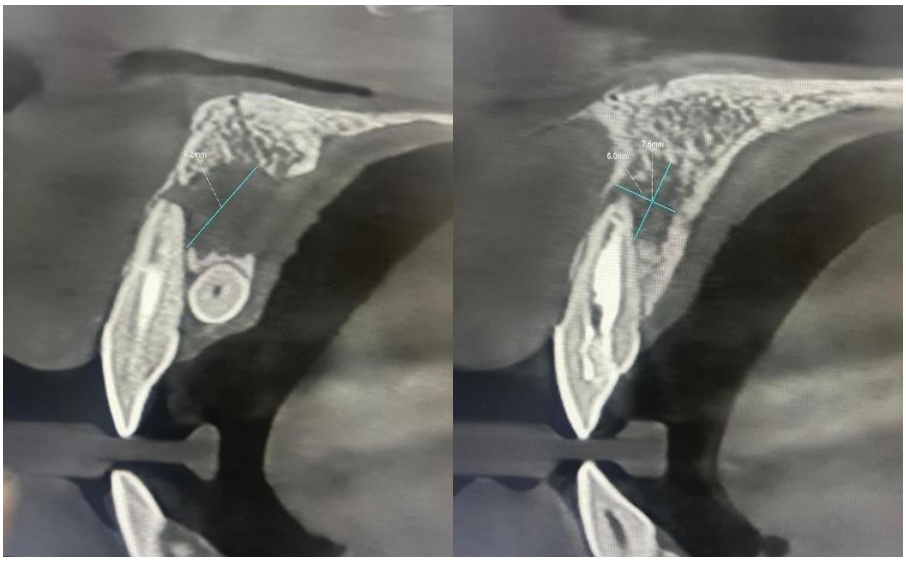

**Figure 5(a) and (b)**

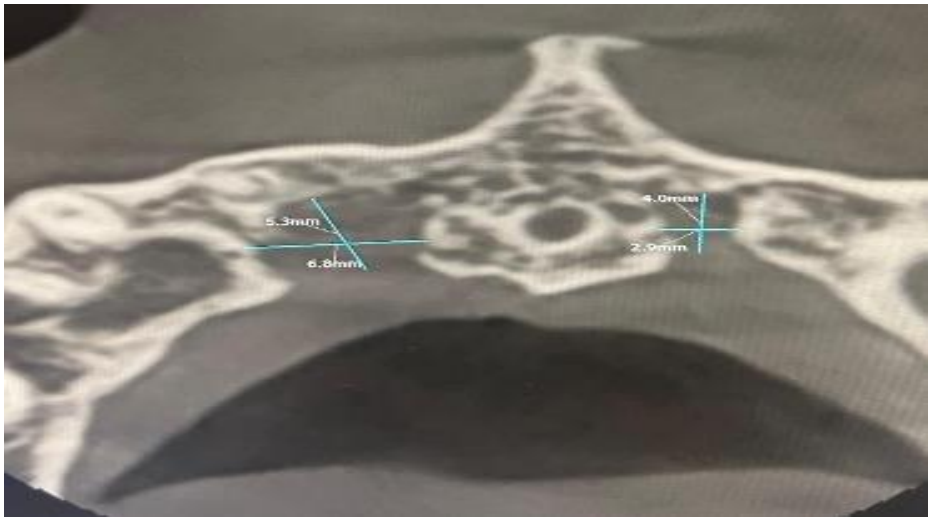


**Fig 5(c)**

**Figure5 a,b,c showing post operative healing of periapical lesion in 11 and 21.**

After a year Cone-beam computed tomography (CBCT) was performed. The periapical lesion was measured with the use of CS 3D Imaging v3.5.18 Software. The measured dimensions of the lesion were 5.3mm x 6.8mm x 9.2mm in 11 and 4mm x 2.9mm in 21.

**Discussion**

Within this article, clinical cases diagnosed with periapical lesions is presented. the cases was treated with conventional RCT (with the principles of the American Association of Endodontists and the European Society of Endodontology) with an additional PRF application by the apical foramen to the periapical area. One year after the end of the performed endodontic treatment, healing of the periapical lesions was noticed. Despite the fact that the performed endodontic treatments can definitely be recognized as successful, it must be emphasized that mechanical shaping and cleaning of the root canals with special disinfecting solutions significantly affect the clinical efficacy of the endodontic treatment. These

procedures lead to elimination of the pathogens from the root canals [13–15]. Sabeti et al. [16] emphasized that healing of the periapical tissues strongly depends on the proper decontamination of root canal systems, host immune response, and good coronal seal, which may be obtained with the properly prepared crown restoration. Moreover, it is known that apical papilla stem cells (SCAPs) are able to survive at apical periodontitis and may even further develop after an endodontic infection [17,18]. SCAPs promote the growth of new tissues [18,19]. They present osteogenic potential and increase angiogenesis [18]. On the basis of the presented cases, it seems impossible to state if and how PRF affected SCAPs' activity, as well as what exactly the role of SCAPs was in the healing process of the periapical lesions. Therefore, although the presented cases look very promising, it seems impossible to state that PRF played the leading role in the healing process of the presented periapical lesions. Further studies, especially randomized, double-blind controlled trials, must be performed to assess if the endodontic treatment of permanent, mature teeth with peri apical lesions with an additional PRF application is superior to the endodontic treatment performed alone. According to the guidelines of the European Society of Endodontology, periapical lesions should be observed for a minimum of four years. If the area of radiolucency remained the same size or the size changes are indiscernible, the endodontic treatment is recognized as a failure and an additional treatment is required, including endodontic surgery, or even tooth extraction [11]. Zhang et al. [20] radiographically analysed the size of the periapical lesions for two years after RCT had been completed. The authors noticed that 92% of the examined teeth presented reduced areas of radiolucency 1 year after RCT. Two years after RCT, in 63% of cases, further reduction of the periapical lesions was observed; in 33% of cases, the periapical lesions remained unchanged; and in 3% of the analysed cases, the volume of periapical lesions increased. Zhang et al. [20] concluded that healing of periapical lesions is a dynamic, long-lasting process. Autologous platelet concentrates have been widely used in regenerative endodontics for the treatment of immature teeth. It has been proven that platelet concentrates are able to stimulate apical closure [21]. Although the impact of PRF on healing of the periapical lesions in immature necrotic teeth has been discussed by many researchers, the results are not unequivocal [22,23]. PRF may be considered as an ideal bio scaffold to increase proliferation and differentiation of cells that take part in the process of tissue repair [24]. Moreover, it has been found that reduction of the relative centrifugal force improves the regenerative potential of the PRF-based matrices [25]. So far, there have not been any manuscripts published analysing the clinical effects of conventional RCT with supplementary PRF application in the treatment of periapical lesions in mature teeth. Only few case reports have been presented of permanent mature teeth with periapical lesions treated with RCT combined with surgical procedures, including curettage of the defect and sometimes apical resection [27–38]. The defects were filled with either platelet concentrate alone or platelet concentrate mixed with bone substitutes [27–38].
Parikh et al. [38] presented an interesting case of a patient with exacerbated chronic periodontitis in relation to nonvital teeth 11 and 21, treated with RCT and curettage of the defect. PRP gel was placed only at the site of the larger defect (left side). The authors observed that the side with PRP healed better compared with the other side. [5]. Conclusions RCT combined with an additional application of PRF (by the apical foramen to the periapical area), performed in permanent, mature teeth diagnosed with periapical lesions, led to a significant decrease in the periapical lesions' size within 1 year. However, these observations do not explain the exact role of the PRF in the process of healing.

**References**

1. Burry JC, Stover S, Eichmiller F, Bhagavatula P. Outcomes of primary endodontic therapy provided by endodontic specialists compared with other providers. J Endod 2016;42:702–5.
2. Meschi N, Fieuws S, Vanhoenacker A, Strijbos O, Van der Veken D, Politis C, et al. Root-end surgery with leucocyte- and platelet-rich fibrin and an occlusive membrane:A randomized controlled clinical trial on patients'quality of life. Clin Oral Investig 2018;22:2401–11.
3. Lin L, Skribner J, Shovlin F, Langeland K. Periapical surgery of mandibular posterior teeth:Anatomical and surgical considerations. J Endod 1983;9:496–501.
4. von Arx T. Apical surgery:A review of current techniques and outcome. Saudi Dent J 2011;23:9–15.
5. Alghamdi F, Alhaddad AJ, Abuzinadah S. Healing of periapical lesions after surgical endodontic retreatment:A systematic review. Cureus 2020;12:e6916.
6. Thanikasalam M, Ahamed S, Narayana SS, Bhavani S, Rajaraman G. Evaluation of healing after periapical surgery using platelet-rich fibrin and nanocrystalline hydroxyapatite with collagen in combination with platelet-rich fibrin. Endodontology 2018;30:25 Available from: https://www.endodontologyonweb.org/article.asp?issn=0970-7212;year=2018volume=30;issue=1;spage=25;epage=31;aulast=Thanikasalam Last accessed on 2022 Feb 18.
7. Huang FM, Yang SF, Zhao JH, Chang YC. Platelet-rich fibrin increases proliferation and differentiation of human dental pulp cells. J Endod 2010;36:1628–32.
8. Choukroun J, Diss A, Simonpieri A, et al. Plateletrich fibrin (PRF):a second-generation platelet concentrate, part V- histologic evaluations of PRF effects on bone allograft maturation in sinus lift. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:299–303.
9. Monga Prashant, Grover Ruma, Mahajan Pardeep, Keshav Vanita, Singh, Navkesh, Singh Gurbant. A comparative clinical study to evaluate the healing of large periapical lesions using platelet-rich fibrin and hydroxyapatite. Endodontology 2016;28:27–31.
10. Miron RJ, Fujioka-Kobayashi M, Bishara M, Zhang Y, Hernandez M, Choukroun J. Platelet-rich fibrin and soft tissue wound healing:A systematic review. Tissue Eng Part B Rev 2017;23:83–99.