

# Surgical management of a periapical lesion with platelet-rich fibrin - A case report

Aishwarya Ranganath, Iffat Nasim

Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha University, Chennai, Tamil Nadu, India

**Correspondence:** Iffat Nasim, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha University, No:162, Poonamalle High Road, Chennai – 600 077, Tamil Nadu, India. Phone: +91-9940063567. E-mail: nasimiffat@gmail.com

## ABSTRACT

Periapical inflammatory lesion is the response of bone around the apex of the tooth that occurs after the necrosis of the pulp tissue or due to some periradicular diseases. Regeneration is the reproduction of a lost or an injured part of the body in such a way that the architecture and function of the lost or injured tissues are completely restored. The aim of this case report is to emphasize the advantage of platelet-rich fibrin (PRF) in the treatment of a periapical lesion. A periapical endodontic surgery was performed on a 20-year-old male patient with mobility and lesion in the lower front teeth region which was detected radiographically. Root resection and retrograde filling of the tooth were done with mineral trioxide aggregate. The surgical defect was filled with PRF and sutured. Radiologically, there is adequate healing seen at the end of 6 months after the use of PRF. The use of PRF would have induced the rapid rate of bone formation.

**Keywords:** Periapical inflammatory lesion, platelet-rich fibrin, regeneration

## Introduction

Periapical pathology occurs as a sequelae of microbial insults from the root canal. When the infection within the canal remains, it progresses to the periapical region, leading into excessive osteoclastic bone resorption circumscribing the root.<sup>[1]</sup>This is evident radiographically, as a radiolucent lesion and determined histologically, as a cyst or granuloma.<sup>[2]</sup>The initial treatment for such pathology is root canal treatment. If the above-mentioned treatment fails to resolve the pathology, surgical intervention needs to be delivered. The apical surgical procedure removes the pathology and the granulation tissues surrounding the tooth. This procedure creates a surgical defect in the area. To accelerate the healing of the bony defect, platelet-rich fibrin (PRF)<sup>[3-5]</sup> has been used previously. This article discusses a case report of a periapical pathology which was treated by root canal treatment, apicectomy followed by filling osseous defect with PRF.

## Case Description

A 20-year-old male patient came to the department of endodontics, with a chief complaint of discolored teeth with mobility in the lower front teeth region teeth (41,42). The patient had no medical complications to dental treatment. Dental history revealed an incident of trauma to the lower front teeth region 10 years ago. Clinical examination revealed discolored tooth. The teeth were tender to percussion test. Grade II mobility was evident in 41, 42 tooth region. On radiographic examination, a large periapical defect was seen with complete loss of labial cortical plate Figure 1. The lesion measured 7 mm × 10 mm × 6 mm corresponding to the length, width, and depth of the lesion.

In 41, root canal treatment was initiated elsewhere also ledge and blockade were seen in it, also in 42 open apex was evident. The root canal treatment was performed using step back technique till an apical size of 40 K-file in relation to teeth 41, 42, respectively. 3% sodium hypochlorite solution was used to irrigate the canals during the canal preparation. The root canal treatment was performed in multiple visits and calcium hydroxide was used as the intracanal medicament. The root canals were obturated using gutta-percha (Dentsply) and AH plus sealer (Dentsply) by the lateral condensation technique in 41 and roll cone technique in 42 Figure 2.

A periapical endodontic surgery was planned as the patient was symptomatic after the root canal treatment. Under local anesthesia

### Access this article online

Website: [www.japer.in](http://www.japer.in)

E-ISSN: 2249-3379

**How to cite this article:** Ranganath A, Nasim I. Surgical management of a periapical lesion with platelet-rich fibrin - A case report. J Adv Pharm Edu Res 2017;7(3):354-356.

**Source of Support:** Nil, **Conflict of Interest:** None declared.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

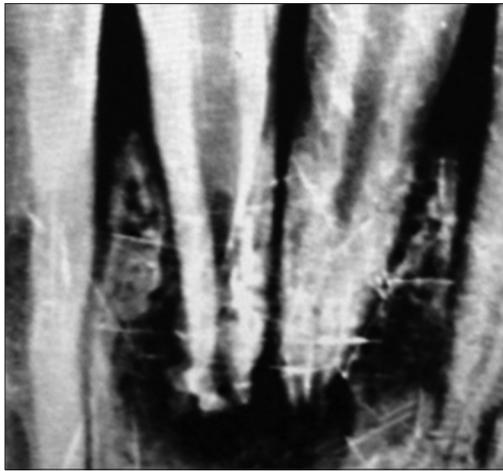


Figure 1: Pre-operative radiograph



Figure 4: Apicectomy and retrograde filling in 41, 42

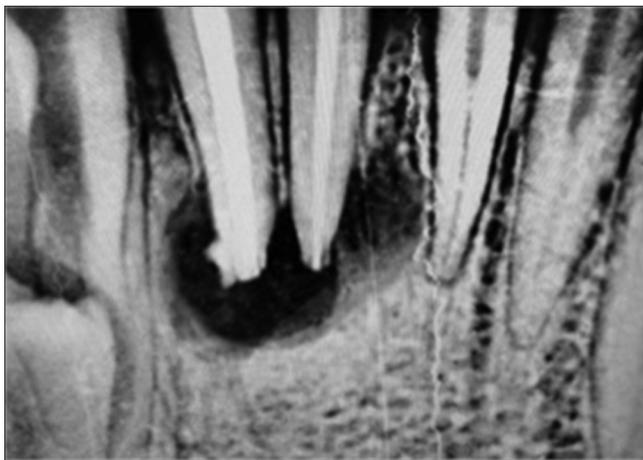


Figure 2: Postendodontic therapy



Figure 5: Placement of plasma-rich fibrin



Figure 3: Exposure of the defect



Figure 6: Post-operative radiograph after 6-month follow-up

(1:200,000 adrenaline, DJ Lab, India), a full-thickness mucoperiosteal flap was reflected by giving a two vertical incision starting from the distal of the tooth 31, to distal of the tooth 43 Figure 3.

Using #702 tapered fissure bur (SS White burs), root end resection was performed in teeth 41, 42. With a curette, tissue curettage was done at the defect site followed by thorough irrigation using sterile

saline solution and retrograde root end preparation was done up to 3 mm length, mineral trioxide aggregate (Angelus) was used as the root end filling material Figure 4.

10 ml of blood was drawn from the patient's antecubital vein and centrifuged for 10 min under 3000 revolutions per minute to obtain the PRF Figure 5.

Flap stabilization followed by suturing using 3-0 black silk suture material. The patient was kept under antibiotic coverage along with analgesic and 0.2% chlorhexidine gluconate solution as mouth rinse for 5 days. Suture removal was performed 1 week later and the healing was uneventful. The patient was reviewed at 3 months, 6 months during which there were no symptoms of pain, inflammation, or discomfort.

These follow-up visits included routine intraoral examinations and professional plaque control. Radiographically, the defective region was replaced with new bone at the end of 6 months Figure 6.

## Discussion

According to PASS principle primary wound closure, angiogenesis, the stability of the wound, and the source of undifferentiated mesenchymal cells are all critical factors that affect periapical surgery bone regeneration.<sup>[1,2]</sup> Bashutski *et al.* had showed that bone crystals with PRF, resulted in pocket depth reduction with significant improvement in attachment and defect fill.<sup>[3]</sup> Added to this, the use of blood clot that is the hosts own biological product is a space filler and helps tissue wound healing.<sup>[4]</sup> The combination of PRF in platelet gel form along with bone graft promoted wound healing, bone growth, maturation, graft stabilization, and hemostasis, leading to an overall improvement in the handling properties of graft materials.<sup>[6,7]</sup> PRF is a concentrated suspension of growth factors (GFs) found in platelets which are involved in wound healing and are known to be promoters of tissues regenerations.<sup>[5]</sup> Mogharehabet *et al.*, Agarwal *et al.*, and Mishra *et al.* had concluded that combination of GFs in PRF along with bone graft had increased the bone density in many clinical trials.<sup>[8-10]</sup> PRF is a rich source of platelet-derived GF, transforming GF (TGF), and IGF. TGF known to stimulate biosynthesis of Type-1 collagen induces deposition of bone matrix *in vitro*.<sup>[11-14]</sup> PDGF is known to increase bone regeneration in calvarial defect when used along with bioabsorbable membrane as carrier.<sup>[15]</sup> IGF-1 is synthesized and secreted by osteoblast; it stimulates bone formation by proliferation and differentiation, all these factors along with epidermal GF increase the GF of human osteoblast.<sup>[16,17]</sup> Gassling *et al.* in his study evaluated histologically that there was enhanced new bone formation, cementum regeneration, new connective tissue growth, and improved connective tissue growth and improved adhesion capacity with the decalcified freeze-dried bone grafted on the intrabony graft.<sup>[18]</sup> In this case report, the benefit of PRF being superior proliferation of human periosteal cells thereby enhancing bone regeneration. Progressive proliferation mode of PRF coagulation results in increased incorporation of circulating cytokines into the fibrin mesh which further augments wound healing.<sup>[19]</sup>

## Conclusion and Clinical Significance

PRF might have accelerated the resorptive defect and would have induced the rapid rate of bone formation. However, histologically, studies are required to examine the nature of the newly formed tissues in the defect and controlled long-term clinical trials will be required to know the effect of this material.

## References

1. Naik B, Karunakar P, Jayadev M, Marshal VR. Role of platelet rich fibrin in wound healing: A critical review. *J Conserv Dent* 2013;16:284-93.
2. Boyapati L, Wang HL. The role of stress in periodontal disease and wound healing. *Periodontol* 2000;44:195-210.
3. Bashutski JD, Wang HL. Periodontal and endodontic regeneration. *J Endod* 2009;35:321-8.
4. Chung CP, Kim DK, ParkYJ, Nam KH, Lee SJ. Biological effects of drug-loaded biodegradable membranes for guided bone regeneration. *J Periodontol Res* 1997;32:172-5.
5. Sunitha Raja V, Munirathnam Naidu E. Platelet-rich fibrin: Evolution of a second-generation platelet concentrate. *Indian J Dent Res* 2008;19:42-6.
6. Thomson DF, Letassy NA, Thomson GD. Fibrin glue: A review of its preparation, efficacy, and adverse effects as a topical haemostat. *Drug Intell Clin Pharm* 1988;22:946-52.
7. Toffler M, Toscano N, Holtzclaw D, Corso MD, Ehrenfest DD. Introducing choukrou's platelet rich fibrin (PRF) to the reconstructive surgery milieu. *Implant Dent* 2009;1:21-30.
8. Mogharehabet A, Birang R, Torabinia N, Nasiri S, Behfarnia P. Socket preservation using demineralized freeze dried bone allograft with and without plasma rich in growth factor: A canine study. *Dent Res J (Isfahan)* 2014;11:460-8.
9. Agarwal A, Agarwal A, Mehrotra S. Management of infrabony defect with decalcified freeze dried bone allograft. *J Dent Sci Oral Rehabil* 2012;9:554-60.
10. Mishra S, Singh RK, Mohammad S, Pradhan R, Pal US. A comparative evaluation of decalcified freeze dried bone allograft, hydroxyapatite and their combination in osseous defects of the jaws. *J Maxillofac Oral Surg* 2010;9:236-40.
11. Hargreaves KM, Diogenes A, Teixeira FB. Treatment options: Biological basis of regenerative endodontic procedures. *J Endod* 2013;39 3 Suppl:S30-43.
12. Marx RE, Carlson ER, Eichstaedt RM, Schimmele SR, Strauss JE, Georgeff KR. Platelet-rich plasma: Growth factor enhancement for bone grafts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;85:638-46.
13. Anitua E. The use of plasma-rich growth factors (PRGF) in oral surgery. *Pract Proced Aesthet Dent* 2001;13:487-93.
14. Geeta IB, Galagali G, Kulkarni S, Suran P, Noushin F. A natural meliorate: Revolutionary tissue engineering in endodontics. *J Clin Diagn Res* 2013;7:2644-6.
15. Arnaud E, Morieux C, Wybier M, Vernejoul MC. Potentiation of transforming growth factor (TGF-beta 1) by natural coral and fibrin in a rabbit cranioplasty model. *Calcif Tissue Int* 1994;54:493-8.
16. Pfeilschifter J, Oechsner M, Naumann A, Gronwald RG, Minne HW, Ziegler R. Stimulation of bone matrix apposition *in vitro* by local growth factors: A comparison between insulin-like growth factor I, platelet-derived growth factor, and transforming growth factor beta. *Endocrinology* 1990;127:69-75.
17. Hock JM, Centrella M, Canalis E. Insulin-like growth factor I has independent effects on bone matrix formation and cell replication. *Endocrinology* 1988;122:254-60.
18. Gassling V, Douglas T, Warnke PH, Açil Y, Wiltfang J, Becker ST. Platelet-rich fibrin membranes as scaffolds for periosteal tissue engineering. *Clin Oral Implants Res* 2010;21:543-9.
19. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, *et al.* Platelet-rich 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.