

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

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ABSTRACT

Due to some periradicular diseases or after the necrosis of the pulp tissue, the bone around the apex of the tooth produces particular response leading to periapical inflammatory lesion. Reproducing of a lost or an injured part of the body in order to restore the architecture and function of the tissues is called regeneration. 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.^[1]This is evident radiographically, as a radiolucent lesion and determined histologically, as a cyst or granuloma.^[2]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)^[3-5] 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

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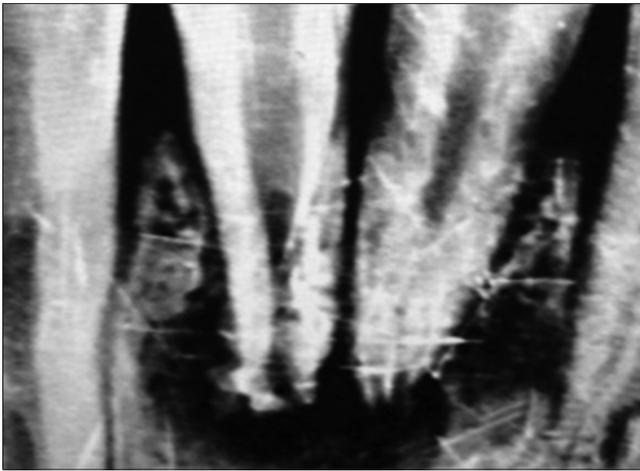


Figure 1: Pre-operative radiograph



Figure 4: Apicectomy and retrograde filling in 41, 42

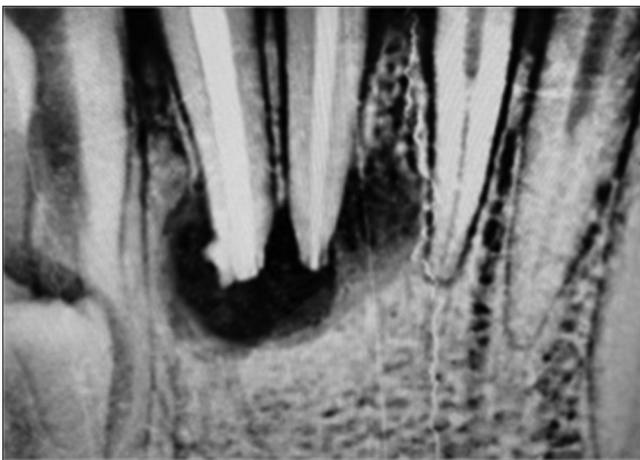


Figure 2: Postendodontic therapy



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.^[1,2] Bashutski *et al.* had showed that bone crystals with PRF, resulted in pocket depth reduction with significant improvement in attachment and defect fill.^[3] Added to this, the use of blood clot that is the hosts own biological product is a space filler and helps tissue wound healing.^[4] 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.^[6,7] 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.^[5] 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.^[8-10] 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*.^[11-14] PDGF is known to increase bone regeneration in calvarial defect when used along with bioabsorbable membrane as carrier.^[15] 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.^[16,17] 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.^[18] 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.^[19]

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.

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