

Surgical Management of A Large Periapical Lesion With Prf And Xenograft –A Case Report

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Abstract

Aim: The aim of this case report is to show the combined use of platelet rich fibrin (PRF) and xenograft (DFDB) in the treatment of large periapical lesion.

Background: Periapical inflammatory lesion is the response of bone around the apex of 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.

Case Description: A periapical endodontic surgery was performed on a 37 year old male patient with a swelling in the upper right and left front teeth region and a large bony defect radiologically. Root resection and retrograde filling of the tooth was done with MTA. The surgical defect was filled with a combination of PRF and bone graft crystals and sutured.

Conclusion: Clinical examination revealed uneventful healing. Radiologically the xenograft crystals have been completely replaced by new bone at the end of 6 months.

Clinical Significance: The use of PRF in conjunction with bone crystals might have accelerated the resorption of the graft crystals and would have induced the rapid rate of bone formation.

Keywords: periapical inflammatory lesion, platelet rich fibrin, xenograft, regeneration

I. Introduction

Periapical pathology occurs as a sequelae of microbial insults entering from the root canal. If the infection within the canal is contained, it will progress to the periapical region leading into excessive osteoclastic bone resorption circumscribing the root.⁽¹⁾ This is evident radiographically, that shows a radiolucent lesion and determined histologically, as a cyst or granuloma.⁽²⁾ The initial treatment for such a pathology is root canal treatment. If the aforementioned 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, PRF⁽³⁾ and bone grafts⁽⁵⁾ have been documented. Here a case with failed root canal pathology was treated by apicectomy followed by filling osseous defect with Platelet Rich Fibrin and bone graft.

II. Case Description

A 37-years-old male patient came to the Department of Endodontics, KMCT Dental college with a chief complaint of swelling in the upper front teeth region teeth (12,11,21). The patient had no medical contraindication to dental treatment. Dental history revealed an incident of trauma to the upper front teeth region 20 years ago. Clinical examination revealed discolored tooth. The teeth were non tender to percussion test. Upon radiographic examination a large periapical defect was seen with complete loss of labial cortical plate. The lesion measured 7 mm × 10 mm × 6 mm corresponding to the length, width, and depth of the lesion.

The root canal treatment was performed using step back technique till an apical size of 40 K-file in relation to teeth 12,11,21 respectively. 5.25% sodium hypochlorite solution (Novo Dental Product Pvt Ltd, Mumbai, India) was used to irrigate the canals during the canal preparation. The root canal treatment was performed in three visits and calcium hydroxide was used as the intracanal medicament. The root canals were obturated using gutta percha (Dentsply maillefer Ballaigues) and AH 26 (Dentsply DeTrey GmbH, Philadelphia, USA) by the lateral condensation technique. A periapical endodontic surgery was planned as the lesion was non healing since a month. Pre medical evaluation was done before surgery. Under local anesthesia (1:200000 adrenaline, DJ Lab, India), a full thickness mucoperiosteal flap was reflected by giving a two vertical incision starting from the distal of the tooth 12, to distal of the tooth 21. Using #702 tapered fissure bur (SS White burs), root end resection was performed in teeth 12,11,21. 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 upto 3mm length using ultrasonics, Grey mineral trioxide aggregate (MTA) (ProRoot MTA; Dentsply, Tulsa, OK,

USA) was used as the root end filling material. 20 ml of blood was drawn from the patient's antecubital vein and centrifuged (REMI centrifuge machine Model R-8c with 12 × 15 ml swing out head) for 10 min under 3000 revolutions (approximately 400 g) per minute to obtain the PRF (figure-1). Commercially available DFDB (demineralized freeze dried bone graft), Osseograft crystals were sprinkled over the PRF gel and together the mixture was placed into defect site (figure-2). Flap stabilization was done followed by suturing using 3-0 black silk suture material (Sutures India Pvt. Ltd, Karnataka, India). Patient was kept under antibiotic (amoxicillin 500mg 1-1-1) coverage along with analgesic (paracetamol 650mg SOS) and 0.2% chlorhexidine gluconate solution as mouth rinse for a period of 5 days. Suture removal was done 1 week later and the healing was uneventful.

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, HA particles have been almost resorbed and replaced with new bone at the end of 6 months years (figure-3).

III. 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 effect 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⁾. A combination of PRF and DFDB maintained both the space for tissue regenerations and exerted an osteoconductive effect in the bony defect. Added to this the use of blood clot that is the host's own biological product is a better space filler and helps tissue wound healing.^(4,5) 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. PRF is a concentrated suspension of growth factors found in platelets which are involved in wound healing and are known to be promoters of tissue regenerations.⁽⁵⁾

Ahmad et al, Ashish et al, Sonal et al had concluded that combination of growth factors in PRF along with bone graft had increased the bone density in many clinical trials^(6,7,8). PRF is a rich source of PDGF, TGF and IGF. TGF known to stimulate biosynthesis of type-1 collagen, which induces deposition of bone matrix in vitro. PDGF is known to increase bone regeneration in calvarial defect when used along with bioabsorbable membrane as carrier.⁽⁹⁾ IGF-1 is synthesized and secreted by osteoblast, it stimulates bone formation by proliferation and differentiation, all these factors along with epidermal growth factor, increase the growth factor of human osteoblast.^(10,11,12)

DFDB is believed to act as an osteoconductive and osteoinductive material and also as a bone growth promoter.⁽⁶⁾ DFDB remains a viable treatment modality for attempts to regenerate the periodontal attachment apparatus.⁽⁷⁾ The DFDB was used in this study because the bone morphogenetic proteins (BMPs) present in it are osteoinductive that is, they induce differentiation of mesenchymal cells into cartilage and bone.⁽⁸⁾ Deug 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 graft on the intrabony graft.⁽¹⁴⁾

In this case report the role of both PRF and DFDB was placed in the bony defect, the benefit being superior proliferation of human periosteal cells thereby enhancing bone regeneration.⁽¹⁵⁾ Progressive proliferation mode of PRF coagulation results in increased incorporation of circulating cytokines into the fibrin mesh which further augments wound healing.⁽¹⁵⁾

IV. Conclusion And Clinical Significance

To conclude the use of bone crystals along with PRF might have accelerated the resorption of graft 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 combination.

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Figure-1
PRF and BONE GRAFT



Figure-2 placement of the mixture into the surgical defect



Figure -3 radiographic picture before surgery and after 6months of surgery