Introduction

Periapical pathology occurs as sequelae of microbial activity from within 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. Long-standing lesions eventually form well defined radiolucent area around the root apex of the involved tooth. This is evident radiographically as a radiolucent lesion and can be determined histologically as a cyst or granuloma. The initial treatment for such pathology is root canal treatment. This is followed by the apical surgical procedure which removes the pathology, cystic lining, 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) and bone grafts have been documented. Here, a case with failed root canal pathology was treated by apicectomy followed by filling the osseous defect with PRF and bone graft.

ABSTRACT

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. Bone graft allows faster regeneration and remodeling of osseous defects. Platelet-rich fibrin (PRF), on the other hand, is a 2nd generation platelet-rich growth factor that acts both as a scaffold and as center for release of various growth factors that further improves bone healing. This case report shows the bone regeneration ability of combined use of PRF and bioresorbable demineralized bone matrix – osseograft in the treatment of a large periapical lesion.

Case Report

A 25-year-old female patient came to the department with a chief complaint of swelling in the upper front teeth region teeth. The patient had no medical contraindication to dental treatment. Dental history revealed an incident of trauma to the upper front teeth region 12 years ago. Clinical examination revealed discolored tooth. The teeth were nontender to percussion test. On radiographic examination, a large periapical defect involving root apices of 21 and 22, and lateral border of 23 was seen with complete loss of labial cortical plate. Cone beam computed tomography revealed its close proximation to the nasal floor. About 5.25% sodium hypochlorite was used to irrigate the canals during the canal preparation. Calcium hydroxide was used an intracanal medicament for two sittings before completing the root canal treatment. The root canals were obturated using gutta-percha (Dentsply Maillefer, Ballaigues) and AH 26 sealer (Dentsply DeTrey GmbH, Philadelphia, USA) by the lateral condensation technique. Due to the presence of immature apex, roll cone technique of obturation was done in 22.

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Premedical evaluation was done before surgery. Under local anesthesia (1:200,000 adrenaline, DJ Lab, India), a full-thickness mucoperiosteal flap was reflected and root end resection was performed in teeth 12, 11, and 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 up to 3 mm length using...
ultrasonics, mineral trioxide aggregate (MTA) (ProRoot MTA; Dentsply, Tulsa) was used as the root end filling material. Before the surgery, 20 ml of blood was drawn from the patient’s antecubital vein and centrifuged for 10 min under 3000 revolutions per min to obtain the PRF. Commercially available bioresorbable demineralized bone matrix (DMBM) - osseograft was mixed with PRF gel and the mixture was placed inside the defect. The reflected flap was stabilized followed by suturing using 3–0 black silk suture material (Sutures India Pvt., Ltd., Karnataka, India) [Figures 7-13]. The patient was kept under antibiotic (amoxicillin 500 mg 1-1-1) coverage along with analgesic (Paracetamol 650 mg SOS) and 0.2% chlorhexidine gluconate solution as mouth rinse for 5 days. The pathological tissue was sent for histopathological evaluation which revealed to be radicular cyst (Figure 14) suture removal was done 1 week later. The patient was reviewed at 3 months and 6 months during which there were no symptoms of pain, inflammation, or discomfort. Radiographically, hydroxyapatite particles were almost resorbed and replaced with new bone at the end of 12 months [Figure 15].

Discussion

Periapical lesions are usually composed of solid soft tissue (granulomas) or they have a semisolid, liquefied cystic area (bay cyst

Figure 1: Pre-operative clinical photograph

Figure 2: Palatal view - no evident lesion

Figure 3: Pre-operative radiograph showing periapical lesion in 21, 22, and lateral border of 23

Figure 4: Pre-operative radiograph

Figure 5: Cone beam computed tomography depicting close proximity of the lesion with the nasal floor

Figure 6: (a-c) Endodontic treatment was carried out for 21, 22, and 23
or true cyst). Therefore, to diagnose these lesions, the least dense area of the radiographic lesion should be measured.\textsuperscript{[16–20]} The combination of PRF in platelet gel form along with bone graft promoted wound healing, bone growth, maturation, graft stabilization, and homeostasis, 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 tissues regenerations.\textsuperscript{[4,5]} Many authors had concluded that the combination of growth factors in PRF along with bone graft had increased the bone density in many clinical trials.\textsuperscript{[6–8]} PRF is a rich source of platelet-derived growth factor (PDGF), transforming
growth factor (TGF), and insulin-like growth factor (IGF). TGF is known to stimulate biosynthesis of Type-1 collagen, which induces deposition of bone matrix in vitro. PDGF is known to increase bone regeneration in calvarias defect when used along with bioabsorbable membrane as carrier. 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.

DMBM is believed to act as an osteoconductive and osteoinductive material and also as a bone growth promotor. The DMBM was used in this study because the bone morphogenetic proteins present in it are osteoinductive, that is, they induce differentiation of mesenchymal cells into cartilage and bone. Kim et al. in his study evaluated histologically that there was enhanced new bone formation, cementum regeneration, new improved connective tissue growth, and improved adhesion capacity with the decalcified freeze-dried bone grafted on the intrabony graft. In this case report, the role of both PRF and DMBM was placed in the bony defect, the benefit 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. The use of bone graft material 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.

**Conclusion**

In this case report, there was radiographic evidence of almost complete bone healing of the periapical bone defect using PRF and DMBM in the lesion site after 1-year postsurgery. Thus, this combination has the potential to accelerate bone healing and regeneration.

**References**

14. Kim DH, Hong JY, Pang EK. The effect of freeze dried bone allograft and gell and putty type demineralized bone matrix on osseous bone regeneration in rat


