

Interdisciplinary management of large periapical lesion: a case report

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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 peri-radicular 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. 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 platelet rich fibrin (PRF) and bio-resorbable Demineralized Bone Matrix (DBBM) – Osseo graft in the treatment of a large periapical lesion.

Keywords: Periapical lesion, Platelet rich fibrin, Bone graft, Regeneration.

Introduction

Periapical pathology occurs as sequelae of microbial activity from within the root canal. If the infection within the canal are contained, it will progress to the periapical region leading into excessive osteoclastic bone resorption circumscribing the root [1]. 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 [2]. 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, PRF [3] and bone

grafts [4] 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.

Case Report

25-years-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 non-tender to percussion test. Upon 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. CBCT revealed its close proximity to the nasal floor.



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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



(a)



(b)



(c)

Figure 4(a-c): Endodontic Treatment Was Carried Out For 21, 22 and 23



Figure 5: Pre-Operative CBCT Depicting Close Proximity of the Lesion with The Nasal Floor

5.25% sodium hypochlorite was used to irrigate the canals during the canal preparation. Calcium hydroxide was used an intracanal medicament for 2 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 presence of immature Apex, Roll Cone Technique of Obturation was done in 22.

Pre-medical evaluation was done before surgery. Under local anesthesia (1:200000 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 3mm length using Ultrasonics, Mineral trioxide aggregate (MTA) (ProRoot MTA; Dentsply, Tulsa) was used as the root end filling material. Prior to the surgery, 20 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. Commercially available bio resorbable Demineralized Bone Matrix (DBBM) - Osseo graft 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). 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. 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.

Surgical Management



Figure 6: Flap Elevation



Figure 7: Exposure of Defect



Figure 8: Apicectomy in 21



Figure 9: Retrograde Filling with MTA



Figure 10: PRF Obtained



Figure 11: PRF + Bone Graft



Figure 12: Sutures Placed



Figure 13: Pathological Tissue Sent For



Figure 14: 1 Year Post-Operative

Discussion

Periapical lesions are usually composed of solid soft tissue (granulomas) or they have a semisolid, liquefied cystic area (bay cyst or true cyst). Therefore, to diagnose these lesions the least dense area of the radiographic lesion should be measured [15-9]. 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 [4, 10]. Many authors had concluded that, combination of growth factors in PRF along with bone graft had increased the bone density in many clinical trials [11-13]. 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 calvarias defect when used along with bio-absorbable membrane as carrier [14]. IGF-1 is synthesized and secreted by osteoblast. It stimulates bone formation by proliferation and differentiation, all these factors along with epidermal growth factor, increases the growth factor of human osteoblast. [15-17] DMBM is believed to act as an osteoconductive and osteo-inductive material and also as a bone growth promotor [11]. The DMBM was used in this study because the bone morphogenetic proteins (BMPs) present in it are osteo-inductive that is, they induce differentiation of mesenchymal cells into cartilage and bone [13]. Deug 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 [18]. 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 [19]. Progressive proliferation mode of PRF coagulation results in increased incorporation of circulating cytokines into the fibrin mesh which further augments wound healing [19-24]. 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 post surgery. Thus, this combination has the potential to accelerate bone healing and regeneration.

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