University Journal of Dental Sciences

MANAGEMENT OF BONY DEFECT USING PLATELET RICH FIBRIN: A CASE REPORT

Case Report

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ABSTRACT: In cases with persisting periapical symptoms and infections, periradicular surgery like apicoectomy is a requisite. The need for the biological modulators which can induce repair and regeneration led to the development of Platelet Rich Fibrin (PRF) which enhances soft tissue and bone healing. This case report highlights the advantages of using PRF for promoting healing of hard and soft tissues during periradicular surgery. PRF showed promising results by reducing post-operative healing period in a large bony lesion.

Key words :
Platelet rich fibrin (PRF), growth factors, wound healing, periradicular regeneration, periapical pathology

Conflict of interest: Nil
No conflicts of interest : Nil

INTRODUCTION :

Injury to the calcified structure of teeth and the supporting tissues by noxious stimuli may cause changes in the pulp and the periradicular tissues. Noxious stimuli can be physical, chemical, or bacterial. Depending on the duration, intensity, pathogenicity of the stimulus and the host ability to resist the stimulus and to repair tissue damage periapical lesions may vary from apical periodontitis to periapical cysts to periapical abscesses. Most of the periapical lesions require nonsurgical endodontic approach yet surgical endodontics accounts for 3-10% of total cases.[1]Periapical surgery is done to eliminate periapical pathology, which aids in wound healing. The success of periapical surgery depends on complete repair and regeneration of the periapical lesion. The platelet concentrates have been used for the enhancement of repair and regenerative procedure of soft and hard tissues after various periodontal surgical interventions. Using platelet concentrates is a way to accelerate and enhance the body's natural wound healing mechanisms.[2]Ross et al.[3]suggested the regenerative potential of platelets in the year 1974. Platelets perform many functions, including formation of a blood clot and release of various growth factors (GF) into the wound.

These growth factors; platelet derived growth factors (PDGF), transforming growth factor beta (TGF) and insulin-like growth factor (ILGF), function to assist the body in repairing itself by stimulating stem cells to regenerate new tissue. The more number of growth factors released into the wound, lead to stimulation of more number of stem cells to produce new tissue. Thus, it permits the body to heal faster and more efficiently. The ability of PRF to promote post-operative healing is well demonstrated in this case, thereby re-emphasizing its attributes as a valuable adjunct during endodontic surgical procedures.

CASE REPORT:

A 12 year old girl reported to the Department of Pedodontics and Preventive Dentistry with the chief complaint of pain and pus discharge from broken tooth in the upper front region of the jaw since past two months. There was history of dental trauma 3 years back for which she did not undergo any treatment at that time. Clinical examination revealed crown

fracture involving pulp and discolor ationalong with grade 1mobility in relation to tooth [11]. The adjacent tooth 21 was also fractured but only involving the enamel and dentine (Figure 1).

Fig. 1: Frontal view: Crown fracture in relation to 11,21 along with discoloration in relation to 11.

Pulp vitality test in relation to tooth 11 and 12 showed no response indicating that the teeth were non vital. Intra oral periapical radiograph revealed large periradicular radiolucency in relation to tooth 11 and 12 of dimension approximately 12 mm x 13 mm (Figure 2). Thus on the basis of history, clinical and radiographic examination diagnosis of irreversible pulpitis with periapical pathology was made.

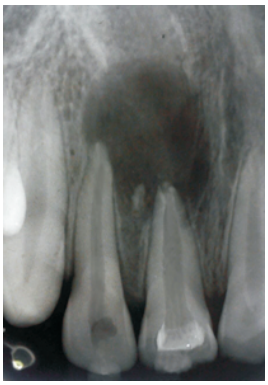


Fig. 2: IOPAR showing periapical radiolucency in relation to 11 and 12

The patient was healthy with no other medical complication, so it was decided to do root canal treatment in tooth 11 & 12 followed by periradicular surgery to remove the lesion. Informed consent was obtained. Access cavity and biomechanical preparation was done in relation to tooth 11 and 12 followed by placement of intracanal medicament using Ca(OH)2 for 1 week.

After 1 week intracanal medicament was removed and Guttaperchao bturation was done in relation to tooth 11 and 12. Access cavity was sealed with glassionomer cement followed by compos iteresin using sandwich technique. Surgery was planned for next day.

PRF PREPARATION :

The PRF was prepared in accordance with the protocol developed by Choukrounet al.[4] Just prior to surgery, 8 ml intravenous blood (by venipuncturing of the ante cubital vein) was collected in a 10-ml sterile tube without anticoagulant and immediately centrifuged incent rifugation machine at 3,000 revolutions perminute for 10 minutes. Centrifugation of blood leads to formation of structured fibrin clotse parating it from red blood corpuscles and plasma. PRF is formed due to consequence of natural and progressive polymerization which occurs during centrifugation. PRF wasse parated from redcor puscules base using asterile tweezers and scissors just after removal from the tube and then transferred onto asterile dapen dishand refrigerated until its placement into the bony defect (Figure 3).

Fig. 3: Platelet Rich Fibrin derived from patient's own blood sample.

SURGICAL PROCEDURE :

Surgical management of the periapical lesionunder local anaesthesia in relation to tooth 11 and 12was initiated by raising full thickne ssmuco periosteal flap. Bony window was enlar gedusing straight fissure bur mounted on a straight hand piece under copious saline irrigation. Periapical curettagewas done with bone curette to remove the granulation tissues. Minimal root end resection with bevelling was performed, in order to conserve the root length especially in tooth 11. Root end cavity was prepared and restored with MTA.

The PRF prepared and stored prior to surgery was filled into the intrabony defect to cover the defect (Figure 5).

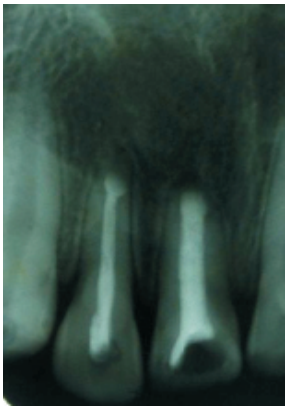
The muco periosteal flaps were repositioned and secured in place using 3-0 non absorbable black silk surgical suture. The simple interrupted sutures were placed. Intraoral periapical radiograph was taken.

During post operative care, patient was kept on oral antibiotics, analgesics and antiinflammatory along with mouthwash for five days. Sutures were removed 1 week

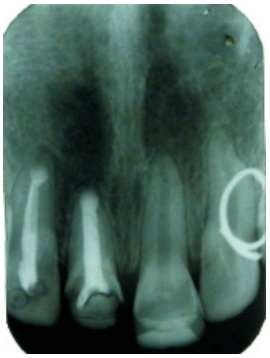
postoperatively. Patient was reviewed at regular intervals of 1,3 and 6 months [Figure 4 (a),(b) and (c)]and for respectively to access healing without any complications.

RADIOGRAPHIC EVALUATION

Immediate post-operative: Demonstrating good quality of fill.



After 3 months:Formation of bony trabeculae indicating healing of periapical lesion and



After 6 months : Continued healing of periapical lesion indicated by deposition of new bone.

Prosthetic rehabilitation done with PFM crown in relation to tooth 11 and with composite resin in relation to tooth 21 (Figure 5).

Fig. 5: Prosthetic rehabilitation of 11 by PFM crown and 21 by composite build up

DISCUSSION :

The present case report evaluated the clinical efficacy of PRF in the treatment of large periapical defect. PRF is a matrix of autolog ousfibrin, embedded with large quantity of platelet and leukocyte cytokines during centrifugation.[5]The intrinsic incorporation of cytokines with inthe fibrin mesh allows for their progressive release over time (7-11 days), as the network off ibrin disintegrates.[6]The main constituent of PRF is high concentration of growth factor present in the platelets which are required for wound healing.[7]The PRF acts much like a fibrinbandage[8], serving as a matrix to accelerate the healing of wound.[6]According to Simonpieriet al.[9]the use of thisplatelet and immune concentrate during bone grafting offers the following 4 advantages: First, the fibrin clot plays an important mechanical role, with the PRF membrane maintaining and protecting the grafted biomaterials and PRF fragments serving as biological connectors between bone particles. Second, the integration of this fibrin network into the regenerative site facilitates cellular migration, particularly for end othelial cells necessary for the neoangiogenesis[10], vascularization and survival ofthe graft. Third, the platelet cytokines (PDGF,TGF- β, IGF-1) are gradually released as thefibrin matrix is resorbed, thus creating aperpetual process of healing. [7,11] Lastly, the presence of leukocytes and cytokines in the fibrin network can play a significant role in the self-regulation of inflammatory and infectious phenomena within the grafted material. The follow up of 6 months shows adequate bone regeneration of the periapical lesion. It isevident from our case report that PRF is efficacious both clinically and radiographically in treating large periapical defect. Thus PRF shows good potential for bone

regeneration and will certainly reform and improve the healing by regenerative process.

CONCLUSION :

PRF serves as soft and hard tissue healing, bone regenerative and inter positional biomaterial. It is a byproduct of patient's own blood, which results in fewer complications as compared to any other bio material. PRF is an autologous preparation which is easily prepared, less time consuming and more cost effective than any other available regenerative materials. Early invagination of undesired cells are restricted as it plays an inter positional material. PRF with its favorable outcomes will definitely reform the surgical dentistry in years to come.

REFERENCES

1. Cohen S, Hargreaves KM. Pathways of the Pulp.9th ed. Missouri: Mosby; 2006. p. 724-85.
2. Gupta V, Bains VK, Singh GP, Mathur A, Bains R. Regenerative potential of platelet rich fibrin indentistry: literature review. Asian Journal of Oral Health and Allied Sciences 2011;1(1):22-28.
3. Ross R, Glomset J, Kariya B, Harker A. A plate letdependent serum factor that stimulates the proliferation of arterial smooth muscle cells in vitro. Proc Natl AcadSci U S A 1974;71:1207-10.
4. Choukroun J, Adda F, Schoeffler C, Vervelle A. Aopportunite' in paroimplantology: the PRF.Implantodontie2001;42:55-62.
5. Toffler M, Toscano N, Holtzclaw D, Corso MD, Ehrenfest DD. Introducing Choukroun's plateletrich fibrin (PRF) to the reconstructive surgery milieu. The Journal of Implant and Advanced Clinical Dentistry 2009;1(6):21-32.
6. Van Hinsbergh VW, Collen A, Koolwijk P. Role offibrin matrix in angiogenesis. Ann N Y Acad Sci2001;936:426-37.
7. Simonpieri A, Corso DM, Sammartino G, Dohan DM. The Relevance of Choukroun's Platelet-RichFibrin and Metronidazole during Complex Maxillary Rehabilitations Using Bone Allograft. Part II: Implant Surgery, Prosthodontics, andSurvival. Implant Dent 2009;18:220-9.
8. Wang HL, Boyapati L. PASS principles forpredictable bone regeneration. Implant Dent2006;15(1):8-17.
9. Simonpieri A, Corso DM, Sammartino G, DohanDM. The Relevance of Choukroun's Platelet-RichFibrin and Metronidazole during Complex Maxillary Rehabilitations Using Bone Allograft.Part I:M A New Grafting Protocol. Implant Dent2009;18:102-111.
10. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin(PRF): a second-generation platelet concentrate. Part I: technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral RadiolEndod2006;101:37-44.
11. Mazor Z, Peleg M, Garg AK, Luboshitz J. Plate letrichplasma for bone graft enhancement in sinusfloor augmentation with simultaneous implant placement: patient series study. Implant Dent2004;13:65-72.

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