Platelet Rich Fibrin in The Treatment of Furcation Defect : A Case Report

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Abstract

Platelet rich fibrin is a second generation platelet concentrate used to deliver growth factors in high concentration at the site of bone defect or a region requiring bone augumentation. It has an added advantage over platelet rich plasma because of its simplified processing. A case of endo perio lesion has been described with a furcation defect, which has been treated by bone grafting and platelet rich fibrin. Clinical and radiographic follow up has been described at one and six months. Significant reduction of pain and swelling with adequate bone fill was observed.

Key Words: Endo-perio lesions, furcation involvement, platelet rich plasma, platelet rich fibrin, osseograft.

Introduction

The importance of growth factors in enhancing wound healing stands as the corner stone of periodontal regeneration. Platelets act as an autologous source of growth factors along with their fundamental role in hemostasis. Platelet concentrates are blood derived products used in the prevention and treatment of hemorrhages. They are also used as bioactive surgical additives that are applied locally to promote wound healing[1]. Platelet rich plasma (PRP) is a platelet concentrate that has been used to accelerate wound healing and stimulate bone regeneration[2,3]. Platelet rich fibrin (PRF) belongs to second generation of platelet concentrate with an advantage of simplified processing over PRP[4].

The use of PRF to improve bone regeneration is a recent technique in periodontology and implantology[5]. These platelet concentrates are increasingly used in dentistry to deliver the growth factors in high concentration at the site of bone defect in a region requiring augmentation. The principle of using these platelet concentrates has also been used in furcation defects to increase the predictability of its successful healing[6].

There is a close relationship between endodontic and periodontal structures which is anatomically reflected in the apical foramen, the lateral accessory canals and the dentinal tubules[7]. Clinically this relationship promotes the spread of infection potentially resulting in typical manifestation of endo perio lesions[7]. Using the apical foramen, an infection of endodontium is able to produce lesions which form a fistulous pathway that provokes drainage via the marginal periodontium. Conversely, advanced periodontitis which has reached the apex and the vascular neural connection can provoke an infection of the endodontium (retrograde pulpitis)[8].

The present case report describes the treatment of a combined endo-perio lesion draining through the furcation area, using bone graft and PRF.

Clinical Presentation

A 32 year old male patient had reported to the department of periodontics with a chief complaint of pain and swelling in the lower left posterior tooth region. The patient also reported pus discharge since one week in the same area. His past medical history was non-contributory. On examination, there was diffuse redness and localized swelling with respect to 36 (figure 1). The tooth was tender on percussion. Exudation of pus through gingival sulcus was found with respect to same tooth. The tooth was depressible in its socket. On periodontal probing there was a pocket depth of more than 10mm with a friable gingiva. Pulp vitality test done using electric pulp tester revealed negative pulp response. Radiograph revealed periapical radiolucency and decreased radio opacity in the furcation region (figure 2).

Management

Initial Therapy

The initial therapy included scaling and root planing, abscess drainage, irrigation using povidone iodine in relation to 36. Antibiotics (amoxicillin with lactobacillus 500mg three times daily for 5 days) and analgesics (ibuprofen 400mg three times for 3 days) were prescribed. The clinical findings, radiographic findings and negative response of vitality tests led to a diagnosis of chronic apical periodontitis, necessitating endodontic therapy followed by periodontal therapy. The patient was referred to the department of endodontics for root canal therapy.

Endodontic Therapy

The involved tooth was anesthetized using local anesthesia of 2% lidocaine with 1:100,000 epinephrine and isolated using rubber dam. A conventional endodontic access opening was made on tooth. A sharp DG 16 explorer was used to locate canal orifices. Clinical evaluation of the internal anatomy revealed two canals one buccally and one lingually in mesial root and one in distal root. The pulp chamber was frequently flushed with 5% of sodium hypochlorite to remove debris and bacteria. Canal patency was checked with # 10 file (Mani, Inc., Tochigi, Japan).

A working length radiograph was taken by applying SLOB rule. Cleaning and shaping was performed using a crown-down technique with protaper series nickel titanium rotary instruments (Maillefer, Dentsply, Ballaigues, Switzerland) under abundant irrigation with 5% sodium hypochlorite solution in a 5-ml syringe and EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). A sterile cotton pellet was placed in the pulp chamber, and IRM cement (Dentsply De Trey GmbH, Konstanz, Germany) was used to seal the access cavity. In the next appointment, after 3 days the root canals of tooth were dried with paper points and obturated with 0.06 taper (ProTaper gutta-percha Dentsply), single cone obturation technique followed by warm vertical compaction with resin sealer (AH plus, Maillefer, Dentsply, Ballaigues, Switzerland).After completion of root canal treatment, the tooth was restored with a posterior composite filling (Ceram X mono Dentsply) (figure 3).

Periodontal Therapy

At the end of initial phase of scaling and root planing and root canal therapy, patient was recalled after one month. Gingival swelling with respect to the affected area had subsided. Gingiva was no more friable and presented with normal color and contour. All the periodontal parameters were rechecked. Probing depth remained same (>10mm) (figure 4). The tooth was no more depressible.

Surgical Phase

One month after phase 1 therapy, a periodontal surgery for furcation defect with bone graft and PRF was planned. Informed consent was obtained from the patient.

PRF Preparation

The required quantity of blood was drawn from the patient in 10ml test tubes without an anticoagulant and centrifuged immediately. Blood was centrifuged using a table top centrifuge for 12 min at 2700rpm. The resultant product consisted of the following three layers:

- Top-most layer consisting of acellular platelet poor plasma
- PRF clot in the middle
- Red blood cells at the bottom

The obtained PRF was compressed between two glass slides and used as a membrane (figure 5). The expressed fluid was used to moisten the bone graft.

Surgical Management

The operative site was aneasthesised using 2% lidocaine with 1:100,000 epinephrine. Sulcular incisions followed by full thickness muco periosteal flap elevation were done taking care to preserve as much as keratinized gingiva as possible. The furcation defect was thoroughly debrided, root surface planed; flap was trimmed to remove tissue tags (figure 6). The site was irrigated with normal saline. After proper isolation a bone graft, Osseograft [(DMBM)™ Advanced biotech products(p) Ltd, Chennai, India] was taken in a dappen dish. It was moistened with PRF fluid and was packed into the furcation defect. Following this, the PRF membrane was placed over the grafted region (figure 7), mucoperiosteal flap was replaced and wound closure was obtained using 4-0 black silk .A periodontal dressing (coe pak) was placed over the site.

Post operative care was explained to the patient. Patient was given strict instructions for oral hygiene maintainence. Analgesics and antibiotics were prescribed. Patient was recalled after 10 days, 1 month and 6 months. Sutures were removed after 10 days. Periapical radiograph was taken at the end of 6 months.

Discussion

The 1 month post operative recall showed significant reduction in gingival swelling and probing depth (figure 8). Gingiva had reverted back to its normal size and contour. The six month post operative radiograph showed significant bone formation in the furcation and periapical region (figure 9).

The presence of endo-perio lesions was suggested by the following findings from the dental history, clinical and radiographic examination:

1. Negative pulp vitality test
2. Periodontal defect characterized by deep localized probing depth and presence of horizontal component of furcation
3. Localized bony defect as seen radiographically in a patient with otherwise healthy periodontium
4. Moderate pain, non specific complaints, bite sensitivity, recurrent exudation.

The endodontic therapy was carried out first, since the healing of the endodontic lesion is highly predictable, provides relief of symptoms to the patient and as in this case significantly reduced the size of the gingival swelling. The residual periodontal defect can then be treated after sealing off one source of infection that is the root canal system.

Periodontal regeneration is a multi factorial process and requires an orhchestrated sequence of biological events including cell adhesion, migration, multiplication and differentiation[9]. The combination of various regenerative biological agents and techniques has attracted the interest of researchers in the field of reconstructive periodontal surgery. PRF is a form of platelet concentrate and can be used in conjuction with bone grafts, which offers several advantages including promoting wound healing, bone growth and maturation, graft stabilization, wound sealing and hemostasis[10].

The treatment of grade II furcation involvement includes resective procedures like odontoplasty, osteoplasty, root resection and also regenerative procedures using Guided tissue membrane along with bone graft. In the present scenario a well contained grade II bony defect in the furcation area justified the use of bone regenerative material. The bone regenerative material used was osseograft. Osseograft is a demineralised bone matrix xenograft, with osteoinductive and osteoconductive properties.

PRP and platelet concentrates made from autologous blood are used to deliver growth factors in high concentration to the site of a bone defect.PRF belongs to a second generation platelet concentrate that eliminates the risk associated with the use of bovine thrombin[11]. Since it utilizes the patient's own blood, the risk of human to human disease transmission is virtually eliminated, making it a safe treatment modality. PRF which is platelets in a non thrombinized fibrin meshwork, along with leukocytes releases PDGF, VEGF, thrombospondin over 7-11 days[12], during which angiogenesis peaks and bone growth begins. PDGF is the most important growth factor which acts on osteoblastic cell proliferation, exerting most of its effects during early wound healing.

PRF can be used in the form of gel as a carrier for bone grafts, improving their handling characteristics or can be used in the form of membrane by squeezing out the fluid between two flat surfaces. The serum exudate thus obtained by squeezing the fibrin clot is rich in proteins vitronectin and fibronectin and can be used to hydrate the graft materials, rinse the surgical site and store autologous grafts[13].When used as a membrane PRF may act as a biological barrier creating a space conducive for cell events leading to periodontal regeneration and facilitation of mineralized tissue formation due to osteoconductive properties present within the graft material.

Conclusion

Furcation involved endo perio lesions present with a unique dilemma to the clinician ranging from diagnostic problems to unpredictable available treatment options. PRF can be used in such patients to successfully manage the attachment and bone loss occurred as a result of spreading periapical infection in the peridontium. Use of this autologous platelet concentrate should be carried out in larger groups to study the predictability of healing patterns in such subjects.

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Legends

Fig. 1 Pre operative clinical picture showing gingival swelling.
Fig. 2 Pre operative radiograph
Fig. 3 Radiograph after root canal therapy
Fig. 4 Probing depth after phase I therapy
Fig. 5 PRF membrane
Fig. 6 Furcation defect
Fig. 7 PRF placement at the site
Fig. 8 One month post operative clinical presentation
Fig. 9 Six month post operative radiograph


Fig. 1

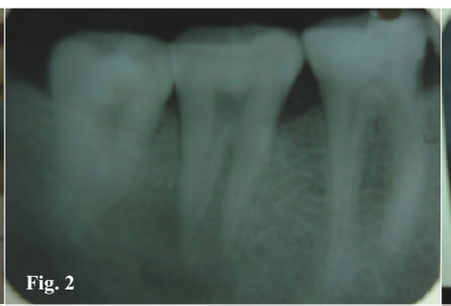
Fig. 2


Fig. 3


Fig. 4

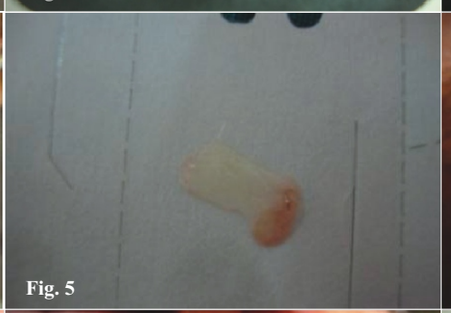
Fig. 5


Fig. 6


Fig. 7


Fig. 8


Fig. 9

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