PLATELET RICH FIBRIN IN ORAL SURGERY REPORT OF THREE CASES

Aaisha Siddiqa, Sumaiyya Patel, Pavan Khichade, Chaitanya Kothari, Shereen Fatima, Juhi Bandegeri

ABSTRACT
Platelet-rich fibrin is a second generation platelet concentrate widely used to accelerate soft and hard tissue healing. This paper reports the management of three different cases with platelet rich fibrin. This includes management of periapical defect during apicectomy in a 24-year-old male, alveolar ridge augmentation along with sinus lift during implant placement in a 50 year old male and intra bony defect management in a 45 year old male during periodontal surgery.

Keywords: Apicectomy; Implants; Platelet rich Fibrin; Ridge augmentation

Introduction
Platelet-rich fibrin (PRF), developed in France by Choukroun et al.1 PRF is a second-generation platelet concentrate widely used to accelerate soft and hard tissue healing and is a strictly autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines.1,2 Its advantages over the better known platelet-rich plasma (PRP) include ease of preparation/application, minimal expense, and lack of biochemical.3 The various clinical application of PRF includes, a) sinus lift procedures by accelerates the healing and reduces the healing time with stable bone gain, b) ridge augmentation, c) socket preservation to maintain the alveolar bone height, d) intrabony defects or osseous defects, e) jaw reconstruction surgeries, f) soft tissue procedures like gingival grafts, sub epithelial grafts, and so forth, because of its property of accelerating soft tissue healing.1 PRF is easy to obtain, less costly, and very effective in producing the regenerative mix. This paper reports the management of three different cases with platelet rich fibrin.

Case Reports
Case I: A 28-year-old male complaining of pain in the upper right maxillary region was referred from a private clinic to the department of oral and maxillofacial surgery, Al-Badar Rural Dental college and Hospital Karnataka for apicectomy following root canal treatment. Intraoral examination revealed discoloration of 11 with periapical draining sinus. A periapical radiograph was taken using the standardized techniques, which along with clinical evaluation revealed presence of periapical pathology involving 11. Following medical investigations a written consent was taken and apicectomy with PRF filling of the defect was planned under local anesthesia. 2% Lidocaine with 1:80,000 Adrenaline was used to establish Local anesthesia and mucoperiosteal flap was reflected. Direct sinus lift with implant placement was done and PRF was used as a grafting material to aid bone regeneration and suture placed (Figure 4). Postoperative instructions were given and medications prescribed. The suture was removed after one week and postoperative healing was uneventful and follow up was done for six months. The results showed complete implant bone contact with satisfactory osseous integration and good implant stability (Figure 5).

Case II: A 50-year-old male reported to department of periodontics of the same institution complaining of pain and food lodgment in the lower right posterior region of mandible and mobility in relation with the last molars. Intra oral examination and radiographic findings confirmed the presence of intra bony pocket between to 46 and 47 (Figure 6). Patient was referred to the department of oral and maxillofacial surgery for the planning of PRF placement along with the periodontal surgery. Medical investigations were completed. A written consent was obtained from the patient for performing apicectomy with using PRF as a filling material in the intra bony defect. 2% Lidocaine with 1:80,000 Adrenaline was used to establish Local anesthesia and mucoperiosteal flap was reflected. Intra bony defect was curetted and PRF was placed as a grafting material to aid bone regeneration and suture placed (Figure 7). Postoperative instructions were given and medications prescribed. The suture was removed after one week and postoperative healing was uneventful and follow up was done for one year.

Case III: A 45-year-old male reported to department of periodontics of the same institution complaining of pain and food lodgment in the lower right posterior region of mandible and mobility in relation with the last molars. Intra oral examination and radiographic findings confirmed the presence of intra bony defect. 2% Lidocaine with 1:80,000 Adrenaline was used to establish Local anesthesia and mucoperiosteal flap was reflected. Intra bony defect was curetted and PRF was placed as a grafting material to aid bone regeneration and suture placed (Figure 7). Postoperative instructions were given and medications prescribed. The suture was removed after one week and postoperative healing was uneventful and follow up was done for one year.

PRF preparation: The PRF was prepared in accordance with the protocol developed by Choukroun et al.4,5 just prior to surgery. The required quantity of intravenous blood was drawn and collected into 10ml sterile test tubes without an anticoagulant and centrifuged immediately for 12 min at 2700 rpm. The resultant product consisted of following three layers. Topmost layer consisted of acellular platelet poor plasma (PPP),
PRF clot in the middle and RBC’s at the bottom. PRF was easily separated from red corpuscles base [preserving a small red blood cell (RBC) layer] using a sterile tweezer and scissors just after removal of PRF and then transferred onto a sterile dappen dish.4

**Discussion**

PRF production protocol attempts to accumulate platelets and released cytokines in a fibrin clot.6-8 Platelet-rich fibrin (PRF) represents a new step in the platelet gel therapeutic concept with simplified processing minus artificial biochemical modification.7 Unlike other platelet concentrates, this technique requires neither anticoagulants nor bovine thrombin (nor any other gelifying agent), making it no more than centrifuged natural blood without additives.2,7 Unlike PRP, the PRF results from a natural and progressive polymerization which occurs during centrifugation. This clot is removed from the tube and the attached red blood cells scraped off and discarded. The exudate may be used to hydrate graft materials, rinse the surgical site, and store autologous grafts.9

PRF is a matrix of autologous fibrin, in which are embedded a large quantity of platelet and leukocyte cytokines during centrifugation. The intrinsic incorporation of cytokines within the fibrin mesh allows for their progressive release over time (7-11 days), as the network of fibrin disintegrates.7,10,11 The easily applied PRF membrane acts much like a fibrin bandage, serving as a matrix to accelerate the healing of wound edges.7 It also provides a significant postoperative protection of the surgical site and seems to accelerate the integration and remodeling of the graft material.10 According to Simonpietri et al, the use of this platelet and immune concentrate during bone grafting offers the following four 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.11-13 Second, the integration of this fibrin network into the regenerative site facilitates cellular migration, particularly for endothelial cells necessary for the neo-angiogenesis, vascularization and survival of the graft. Third, the platelet cytokines (PDGF, TGF- β, IGF-1) are gradually released as the fibrin matrix is resorbed, thus creating a perpetual process of healing. 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.13-15

PRF processing does not require the use of bovine thrombin and anticoagulants, thereby, eliminating biochemical blood handling during its preparation. It is simpler to process and is inexpensive as compared to the commercially available graft materials.9 It presents a particularly homogenous 3-dimensional organization, even more highly coherent than the natural fibrin clots. Conversion of fibrinogen to fibrin takes place by physiologically available fibrin present in the blood sample itself. This slow polymerization during PRF processing leads to increased incorporation of platelet cytokines and leukocyte-derived growth factors which induces efficient cell migration, proliferation and cicatrisation matrix remodeling. PRF promotes wound healing, wound sealing, graft stabilization, bone growth, hemostasis and immune support. The systematic use of this biomaterial during sinus-lift procedure, with or without bone substitute, seems an interesting option for protection of the Schneiderian membrane as well as it stabilizes bone around the implants.16 The use of PRF as an optimized natural blood clot seems to avoid the enmeshment of implant end in a thick sinus connective tissue. PRF as grafting material has numerous advantages like no donor site morbidity, seals small sinus perforation, acts as a guided tissue regeneration membrane (GTR) and protects the sinus membrane.17 This bio graft material is an autologous fibrin matrix containing platelet and leukocyte growth factors which stimulates the proliferation and differentiation of osteoblasts suggesting regenerative potential of PRF.18 It has shown to be an interesting substitute during sinus elevation, as it can help in natural bone regeneration, reduce healing time before functional loading of the implants, acts as a space filler preventing recoil of the sinus membrane, seals any perforations and cushions the membrane during implant placement.14

Platelet rich fibrin helped in bone regeneration in localized gingival recession in mandibular teeth using combined laterally positioned flap technique and PRF membrane. Joint use of platelet rich fibrin and bone graft has also been reported for combined periodontic endodontic furcation defects. PRF biomaterial as a sole grafting material in our experience shows to be a dependable graft for achieving bone formation with subsequent increase in bone height in the posterior maxilla for the placement of implants. PRF has been shown to be an effective regenerative material in the management of Grade II furcation, displaying greater reduction in pocket depths and gain in clinical attachments with significant radiographic evidence of bone fill. Similarly, for the treatment of multiple gingival recessions, PRF can be considered as a viable cost-effective option.

**Conclusion**

In conclusion, Our clinical experience seems to indicate the PRF improves early wound closure, maturation of bone grafts, and the final esthetic result of the peri-implant and periodontal...
Platelet rich fibrin in oral surgery report of three cases

soft tissues. The use of the PRF biomaterial as the sole grafting material, has shown to stimulate bone formation in the sub-sinus area after the sinus lift procedure.

Authors Affiliations
1. Aaisha Siddiqua, MDS, Professor, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 2. Sumaiyya Patel, BDS, Postgraduate Student, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 3. Pavan khichade, BDS, Postgraduate Student, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 4. Chaitanya Kothari, MDS, Reader, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 5. Juhi Fatima, MDS, Reader, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 6. Shereen Fatima, MDS, Reader, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India, 7. S. Juhi Bandegeri, MDS, Senior Lecturer, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India.

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Address for Correspondence
Dr. Sumaiyya Patel, BDS, Postgraduate Student, Department of Oral and Maxillofacial Surgery, Al-Badar Rural Dental College and Hospital, Karnataka, India.
Email: dr.sumaiyapatel@gmail.com

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