10.5005/jp-journals-10042-1037

CASE REPORT

Revitalization of periodontally Compromised Tooth using Platelet-rich Fibrin

[1]Navnita Singh, [2]P Anuroopa, [3]S Savita

ABSTRACT

The primary objective of periodontal therapy is to gain access to the diseased sites, achieving reduction in pocket depth, arresting further disease progression, and finally restoring the periodontal tissues lost due to disease process. This can be achieved with the help of bone grafts and guided tissue regeneration. In recent times, the use of growth factors in different forms has been advocated to regulate various cell–stromal interactions in periodontal regeneration.

Platelet-rich fibrin (PRF), a rich source of autologous growth factors and cytokines, is an upcoming therapeutic approach in the management of periodontal osseous defects. Platelet-rich fibrin along with the commercially available bone grafts provides a potential for enhanced bone and soft tissue regeneration. This case report focuses on saving a mandibular anterior tooth with poor prognosis using PRF and alloplast bone graft to meet with the esthetic demand of patients.

Keywords: Bone graft, Esthetic region, Platelet-rich fibrin.

How to cite this article: Singh N, Anuroopa P, Savita S. Revitalization of periodontally Compromised Tooth using Platelet-rich Fibrin. J Health Sci Res 2016;7(2):63-66.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Periodontitis is an inflammatory process, of multifactorial origin, affecting the periodontal tissues provoking the destruction of the supporting tissues to the teeth. The primary goal of periodontal therapy is regeneration of periodontal supporting tissues that have been lost as a consequence of periodontitis. The complete and predictable restoration of the periodontium following trauma or infection remains a critical objective of periodontal therapy.[1]

Reconstructive periodontal surgical procedures provide the most reliable improvement in the treatment of intrabony defects of all currently available modalities. The techniques currently and routinely used in the field of regenerative periodontics include: (1) bone grafts; (2) guided tissue regeneration; (3) growth factors; (4) tissue engineering.

A series of interactions take place between epithelial cells, gingival fibroblasts, periodontal ligament cells, and osteoblasts to bring about periodontal wound healing. The advantages of alloplasts over other graft materials are that it is available in unlimited quantity, no additional surgical site, and no potential for disease transmission.[2] Various biomaterials have been used for periodontal tissue regeneration in addition to autogenous and allogenic bone grafts, but not a single graft material is considered as gold standard for the treatment of intrabony defects. Of lately, a number of different growth factors are used either alone or in combination together with graft materials. One among them being platelet-rich fibrin (PRF), an autologous fibrin matrix, which contains platelets and leukocyte growth factors. Platelet-rich fibrin, an autologous healing biomaterial, incorporating leukocytes, platelets, and a wide range of key healing proteins within the dense fibrin matrix is proven to be effective as a regenerative material. It was recently demonstrated *in vitro* that PRF enhances proliferation of many different cell types, such as fibroblasts, osteoblasts, adipocytes, and keratinocytes. Osteoblastic differentiation is also known to be stimulated by PRF.[3]

So, this case report focuses on saving a mandibular anterior tooth with poor prognosis (grade II mobility with severe bone loss) using PRF and alloplast bone graft to meet with the esthetic demand of patients.

CASE REPORT

The present case report is about a 45-year-old woman who visited the Department of Periodontology, RajaRajeswari Dental College & Hospital, Bengaluru, Karnataka, India, with the chief complaint of dull gnawing pain in lower front tooth region since 1 month. The patient presented with a lingering type of pain after subjecting it to heat test using a heated gutta-percha point. On clinical examination, 9 mm probing pocket depth was noted with grade II mobility in relation to 41. Figure 1 shows clinical preoperative view. Radiograph findings revealed severe intrabony defect extending up to apex of 41 with only 20%

[1]Postgraduate Student, [2]Reader, [3]Principal, Professor and Head

[1-3]Department of Periodontology, RajaRajeswari Dental College & Hospital, Bengaluru, Karnataka, India

Corresponding Author: Navnita Singh, Postgraduate Student Department of Periodontology, RajaRajeswari Dental College & Hospital, Bengaluru, Karnataka, India, Phone: +918197600464 e-mail: navnita17@gmail.com

Fig. 1: Preoperative clinical view

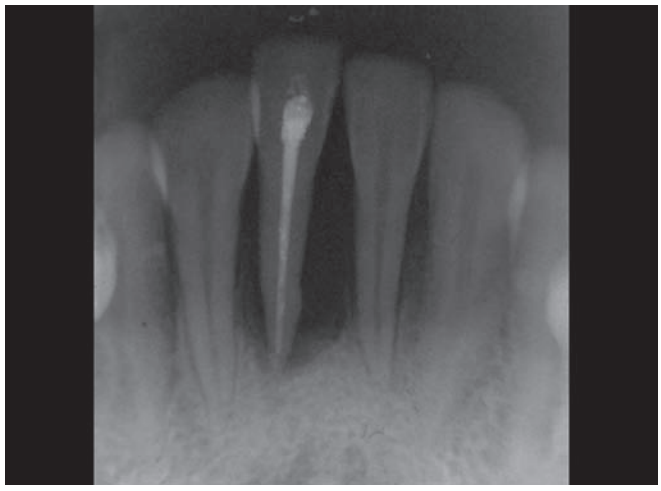

Fig. 2: Preoperative radiograph

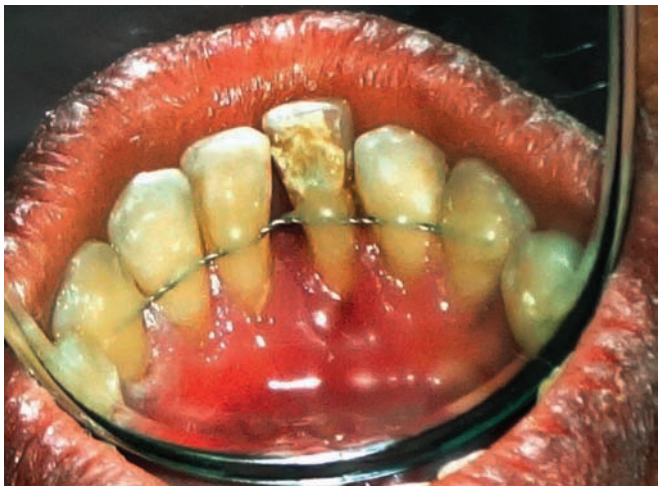

Fig. 3: Splinting done with respect to 41

Fig. 4: Post open-flap debridement

of alveolar bone remaining (Fig. 2). Trauma from occlusion was present in relation to upper and lower anterior teeth revealed by positive fremitus test.

The diagnosis of primary chronic periodontitis with secondary endodontic involvement in relation to 41 was made. Ideally, the tooth with 20% remaining alveolar bone and mobility should be advised for extraction. But as the tooth was in esthetic zone, the patient was not willing for extraction of the same tooth. Thus, the treatment plan was concentrated on saving the tooth for esthetic purpose.

Preliminary treatment included oral hygiene instructions, scaling and root planing. The patient was referred to the Department of Conservative Dentistry and Endodontics for root canal therapy in relation to 41 teeth (which were symptomatic to the heat test).

Four weeks following phase 1 therapy and root canal treatment, selective grinding was performed in relation to anterior teeth, followed by splinting using ligature wire in relation to 33 to 43 (Fig. 3). Following that, a periodontal reevaluation was performed to confirm the suitability of 41 for further periodontal surgical procedure. Graduated William's periodontal probe was used to make the clinical measurements.

A total of 0.2% chlorhexidine digluconate rinse and povidone iodine solution were used to perform intraoral and extraoral antisepsis respectively. Following administration of local anesthesia, open flap debridement was performed (Fig. 4). Just prior to surgery, 8 mL intravenous blood (by venipuncturing of the antecubital vein) was collected in a 10-mL sterile tube without anticoagulant and immediately centrifuged in centrifugation machine at 3,000 revolutions per minute for 10 minutes. The PRF clot obtained (Fig. 5) was gently pressed between two sterile dry gauges to obtain a membrane, which was later mixed to the graft material alloplast (Perioglas™) and applied to the defect walls and root surface. The flaps were repositioned to their presurgical levels and sutured with silk utilizing an interrupted technique (Fig. 6).

POSTOPERATIVE EVALUATION

Sutures were removed after 10 days. Clinical healing was uneventful during post recall visit (Fig. 7). The patient was

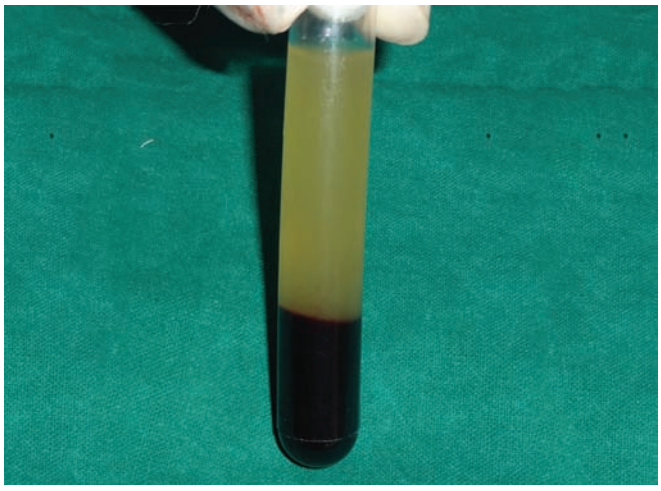

Fig. 5: Platelet-rich fibrin collected

Fig. 6: Sutures placed

Fig. 7: Postoperative clinical view after 1 month

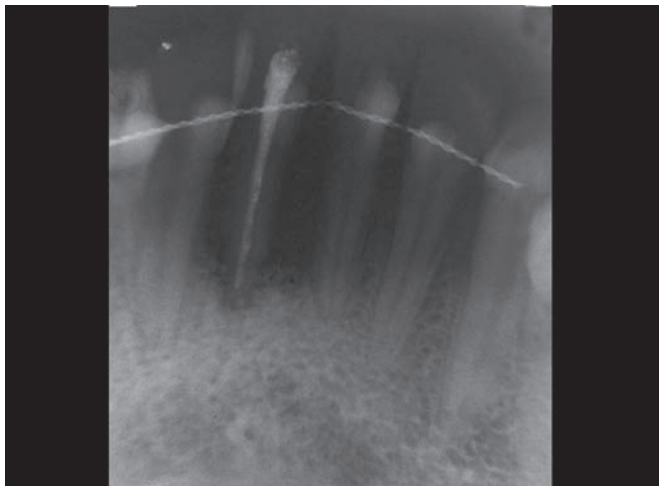

Fig. 8: Postoperative radiograph after 6 months

recalled at 2nd week, 1st, 3rd, and 6th month. Periapical intraoral radiographs were obtained from the periodontal defect site at baseline, 3 and 6 months after surgery.

At 6 months postoperative recall visit, a reduction in pocket depth from 9 to 4 mm was observed. Also, there was a gain in clinical attachment level by 3 mm. Radiographs revealed 2 to 3 mm gain in the bone fill in the intrabony defect (Fig. 8) compared to baseline.

DISCUSSION

The periodontal regeneration is still considered a poorly understood, complex, and elusive phenomenon. To understand it further, the present case report evaluated the clinical and radiographic efficacy of autologous PRF and bioactive synthetic bone graft in the treatment of an intrabony defect.

The PRF by Choukran's technique is prepared naturally without addition of thrombin. Moreover, PRF is known to have a natural fibrin framework that can protect growth factors from proteolysis. Thus, growth factors present in PRF can keep their activity for a relatively longer period and stimulate tissue regeneration effectively. The important characteristics of PRF compared with other platelet concentrates, including platelet-rich plasma, are that it does not require any anticlotting agent.[4] The naturally forming PRF clot has a dense and complex three-dimensional architecture and this type of clot concentrates not only platelet but also leukocytes. The PRF has various advantages over the other platelet concentrates, such as it is simpler and less expensive to prepare with lesser adverse effects to the patients. Owing to its dense fibrin matrix, PRF takes longer time to be resorbed by the host, which results in slower and sustained release of platelet-derived growth factor (PDGF) and leukocyte-derived growth factor into the wound area.[5]

In this case report, the decision to utilize minced PRF as defect fillers in combination with alloplast was made due to its ease of manipulation and delivery to the surgical site. The intended role of the minced PRF in the intrabony defect was to deliver the growth factors in the early phase of healing that help in both soft and hard tissue regeneration.

The tooth with poor prognosis (41) showed reduction in pocket depth from 9 mm at baseline to 4 mm after 6-month follow-up and 3 mm gain in clinical attachment level after 6 months. A gain of 2 to 3 mm bone was observed as revealed in the radiograph.

This observation is in accordance with a study by Lekovic et al[6] in which PRF in combination with bone mineral showed the ability to increase the regenerative effects in intrabony defects. In another study by Tatullo et al,[7] amorphous PRF when used along with bio-Oss for augmentation in maxillary atrophic cases showed reduced healing time and favorable bone regeneration. So, this positive result could be attributed to the action of PRF which can upregulate phosphorylated extracellular signal regulated protein kinase expression and suppress the osteoclastogenesis by promoting secretion of osteoprotegerin (OPG) in osteoblasts cultures.[8]

Furthermore, many growth factors are released from PRF as PDGF, transforming growth factor and have slower and sustained release up to 28 days, which means PRF stimulates its environment for a significant time during remodeling. Moreover, PRF increase cell attachment, proliferation, and collagen-related protein expression of human osteoblasts. The PRF also has the property to enhance phosphorylated extracellular signal-regulated kinases, OPG, and alkaline phosphatase expression, which benefits periodontal regeneration by influencing human periodontal ligament fibroblasts.[9]

CONCLUSION

From the results obtained in our case report, it could be concluded that PRF enhances the regenerative potential along with alloplastic material in the intrabony defect. However, clinical trials with larger sample size and confirmatory histological evaluations are required to better assess the clinical benefits of combination approach using PRF with bone grafts.

CLINICAL IMPLICATION

Usually, extraction is the treatment of choice in teeth with severe bone loss and mobility. In clinical situations where the patient is not willing to extract the teeth because of esthetic reasons, alloplast bone graft along with PRF can be used as an alternative to preserve the tooth in esthetic region. As presented in this case report, significant clinical improvement and bone fill can be achieved by the use of alloplast and PRF.

REFERENCES

1. Reynolds M, Reidy MA, Mays GB. The efficacy of bone replacement grafts in the treatment of periodontal osseous defects—a systematic review. Ann Periodontol 2003 Dec;8(1): 227-265.
2. Dalal S, Dalal M, Momin R. Periodontal surgery—revolution from resection to regeneration: Review Article. Healtalk 2012 Jan-Feb;4(3):1-4.
3. Corso MD, Toffler M, Ehrenfest DMD. Use of an autologous leukocyte and platelet rich fibrin (L-PRF) membrane in post avulsion sites: An overview of Choukroun's PRF. J Implant Adv Clin Dent 2010;1(9):27-35.
4. Lundquist R, Dziegiel MH, Agren MS. Bioactivity and stability of endogenous fibrogenic factors in platelet-rich fibrin. Wound Repair Regen 2008 May-Jun;16(3):356-363.
5. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, Gogly B. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part II: Platelet-related biologic features. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006 Mar;101(3):e45-50.
6. Lekovic V, Milinkovic I, Aleksic Z, Jankovic S, Stankovic P, Kenney EB, Camargo PM. Platelet-rich fibrin and bovine porous bone mineral *vs* platelet-rich fibrin in the treatment of intrabony periodontal defects. J Periodontal Res 2012 Aug;47(4):409-417.
7. Tatullo M, Marrelli M, Cassetta M, Pacifici A, Stefanelli LV, Scacco S, Dipalma G, Pacifici L, Inchingolo F. Platelet rich fibrin (P.R.F.) in reconstructive surgery of atrophied maxillary bones: Clinical and histological evaluations. Int J Med Sci 2012;9(10):872-880.
8. Chang IC, Tsai CH, Chang YC. Platelet-rich fibrin modulates the expression of extracellular signal-regulated protein kinase and osteoprotegerin in human osteoblasts. J Biomed Mater Res A 2010 Oct;95(1):327-332.
9. Wu CL, Lee SS, Tsai CH, Lu KH, Zhao JH, Chang YC. Platelet-rich fibrin increases cell attachment, proliferation and collagen-related protein expression of human osteoblasts. Aust Dent J 2012 Jun;57(2):207-212.