Case Report

Autologous platelet-rich derivatives along with alloplastic bone substitute in the management of complex perio-end-endo cases

Lata Goyal, Namita Gupta,1 Narinder Dev Gupta1

Abstract:
Combined endodontic periodontal lesion is one of the most challenging dental conditions as making a definite diagnosis and henceforth treatment plan is a daunting task. The prognosis of complex lesion involving both endodontic and periodontic components is complex, but success rate can be improved with regenerative therapies. However, there is paucity of literature regarding its effectiveness in the clinical scenario as only few case reports have been documented in literature for the use of platelet-rich derivatives in regenerative osseous surgery requiring both endodontic and periodontal treatment. We are hereby presenting three cases requiring both endo and perio treatment. The first two cases involve mandibular first molar and maxillary first molar, respectively. The third case involves maxillary central incisor. In all the cases, first, endodontic treatment was initiated, then open flap curettage along with alloplastic bone substitutes was done. Platelet-rich fibrin and platelet-rich plasma were used along with. Three of the treated cases showed significant improvement radiographically and clinically. There was gain in clinical attachment, reduction in probing depth, and radiographic bone fill. Autologous platelet-rich derivative can be used in combination with alloplastic bone substitute for the management of endo-perio cases. Further long-term studies are needed to explore the clinical effectiveness of platelet-rich derivatives and predicting the probability of success of periodontal therapy.

Key words:
Bone graft, bone regeneration, furcation, root canal

INTRODUCTION

Many a times, it is difficult to treat cases involving both periodontal and endodontic component of tooth. Both the tissues share the same anatomic and embryological origin. Combined endo-perio lesion involves root canal therapy and periodontal treatment. The success of the therapy lies in the systematic approach toward diagnosis, clinical and radiographic examination, and extent of the lesion. In general, the success rate of conventional root canal therapy is quite high (approximately 95%).[1] but this is not the case when it is complicated by periodontal involvement. Success rate of root canal therapy in endo-perio cases has been reported to be very low (approximately 25%-35%)[2] when regenerative measures are not performed. The current concept involves restoring lost periodontium in addition to maintaining the functional status of tooth.

Various earlier treatment modalities such as open flap debridement and root resection are available, but they are inefficient to completely treat the disease. With extensive research, new treatment modalities with better techniques and materials that aim to restore lost tissue have improved the success rate of periodontic-endodontic therapy. Recently, the attention has shifted toward the use of growth factors in periodontal regenerative procedures. Platelet-rich substitute enriched with platelets and growth factors can regulate the proliferation, chemotaxis, and differentiation of the locally derived progenitor cells in the defect site.[3] To date, very few case reports are there depicting the use of this autologous biological material in the management of combined endodontic-periodontal lesions.[4-7] The present case series presents an attempt to evaluate the healing potential of the combination of

How to cite this article: Goyal L, Gupta N, Gupta ND. Autologous platelet-rich derivatives along with alloplastic bone substitute in the management of complex perio-endo cases. J Indian Soc Periodontol 2020;24:182-5.
platelet-rich derivatives (fibrin and plasma) and bioactive glass substitute as compared to using these materials alone.

**CASE REPORTS**

**Case 1**
A 45-year-old male came with the chief complaint of pain and food lodgment in the lower right back region (46) for the past 6 months. The tooth was tender to percussion, noncarious and there was swelling in the periapical area. On periodontal examination, there was deep periodontal pocket 11 mm buccally in the furcation area [Figure 1a]. Probing reveals Grade III furcation involvement. Intraoral periapical (IOPA) reveals radiolucency in furcation region till apex [Figure 1b]. The tooth was tender to percussion; electric pulp testing confirmed the tooth to be nonvital. Root canal therapy was carried out with respect to 46. Local anesthesia was given. An access opening was created, and all the four canals were located. During subsequent visits, root canal treatment was completed with protaper (Dentsply), and irrigation with 5.25% sodium hypochlorite was done. The tooth was obturated with lateral condensation of gutta-percha and followed for 3 months [Figure 1c]. Radiographically and clinically, there was no change in probing depth which was initially 11 mm. The tooth was planned for regenerative therapy.

**Case 2**
A 30-year-old male patient reported to the department of periodontics with a complaint of pain in the upper right posterior tooth region associated with pus discharge for 1 month. On intraoral examination, there was no caries. IOPA X-ray of the maxillary right first molar also showed widening of periodontal ligament space in relation with the mesial root and radiolucency in the furcation area [Figure 2a]. The horizontal probing depth with Nabers probe and vertical probing depth with the University of North Carolina-15 probe were measured which were found to be 9 mm and 4 mm, respectively [Figure 2b]. To check the vitality of the tooth, electric pulp testing was done which confirmed the tooth to be nonvital and tender on percussion. Endodontic treatment was completed with protaper (Dentsply), and irrigation with normal saline was done and followed up for 4 months. There was no change in clinical attachment and probing depth. Open flap curettage was planned for the defect.

**Leukocyte platelet-rich fibrin preparation**
On the day of surgery, platelet-rich fibrin (PRF) was prepared and 10 ml of blood was taken in a 10 ml test tube without an anticoagulant and centrifuged immediately for 12 min at 2400 rpm in a tabletop centrifuge. PRF was obtained in the form of the membrane by squeezing out the fluids in the fibrin clot [Figure 1c].

**Surgical procedure**
After administration of anesthesia, intracrevicular incision was given at the site selected for surgery and full-thickness flap was elevated till the base of furcation. After thorough curettage of the defect area, a combination of PRF and bioactive glass was placed [Figures 1d-f and 2c, d]. The soft-tissue flap was repositioned using interrupted suturing technique with nonresorbable black silk (3-0). The patient was prescribed 0.12% chlorhexidine mouthwash for rinsing twice daily. The patient was put on regular recall at 3 months’ interval. After 12 months, the probing depth reduced to 3 mm in the first case and 4 mm in the second case. The IOPA X-ray after 3-year follow-up showed evidence of apparent bone fill in the furcation defect in the first case and after 1 year in the second case [Figures 1g, 1h and 2e].

**Case 3**
A 35-year-old male with noncontributory medical history reported with pain and pus discharge in upper right central incisor for the last 5–6 months. He had already undergone root canal treatment 5–6 years back followed by prosthesis in 11, 12. Clinical examination revealed 13 mm probing depth with respect to mesial aspect 11 [Figure 3a]. 11 and 12 were tender on percussion. Radiographic examination revealed incomplete obturation, radiolucency on mesial aspect of tooth, and periapical area with respect to 11 [Figure 3b]. Re-root canal treatment of 11, 12 was done without removing the prosthesis. Followed by root canal treatment, clinically, there was no pus discharge. Regenerative periodontal therapy was planned. Papilla preservation flap was elevated; intrabony defect was filled with bioactive glass and platelet-rich plasma (PRP) [Figure 3c and d]. Two-year postoperative radiograph shows complete hard-tissue and soft-tissue regeneration [Figure 3e-g]. Probing depth also reduced to 3 mm postoperatively.

**DISCUSSION**

The treatment of endo-perio lesion can be unpredictable because of the difficulty faced in proper diagnosis of the lesion. However, with proper history and step by step complete examination, a definitive diagnosis can be made that aids in charting out a treatment plan that can achieve favorable outcome.

Grudianov et al. studied 298 patients, and the prevalence of endo-perio lesion was 17.78%. The success rate of the endodontic–periodontal combined lesion without a concomitant regenerative procedure is not very high (27%–37%),[2] as compared to conventional endodontic therapy. Hence, regenerative periodontal treatment should be considered as treatment modality based on clinical presentation to improve the prognosis of tooth. Herrera et al. proposed a classification based on prognosis of tooth.

1. Endo-perio lesion with root damage
2. Endo-perio lesion without root damage.
   a. Periodontitis
   b. Nonperiodontitis.

This was further subdivided into Grade 1, 2, and 3
1. Grade 1: Narrow deep periodontal pocket in one tooth surface
2. Grade 2: Wide deep periodontal pocket in one tooth surface
3. Grade 3: Deep periodontal pocket in more than 1 tooth surface.

The success rate in these complex perio-endo cases depends on root fracture, perforation, furcation involvement, mobility, and root resorption. Prognosis also depends on clinical expertise of the operator, compliance, and medical status of the patient. All the three cases presented without root fracture, without
periodontitis, and with no medical history. In the first two cases, there was Grade 3; and in the third case, Grade 1 involvement was there. All the cases responded well to treatment. Recent advances in tissue engineering and growth factors have presented a reignited hope to regenerate lost periodontal structures. Platelet-rich derivatives are emerging therapeutic
modality in the field of regenerative periodontics as it does not require complex handling and has greater bone growth and apposition, better wound healing, and graft stabilization.[9] PRF and PRP possess many growth factors mainly transforming growth factor-beta and platelet-derived growth factor (PDGF) in high concentration which have angiogenic, proliferative, and differentiating effects on osteoblasts and thus promote bone healing.[10] PRF and PRP have also been successfully used with different graft materials in the treatment of human periodontal defect.[11]

There are also advances in flap designs. In cases where diastema is more than 2 mm, whale technique[12] can be used for better tissue management. However, it was not used here as there was high frenal attachment where this technique is contraindicated. Papilla preservation flap was used in the present case for esthetic management of papilla.

Dohan et al.[10] in their study stated that PDGFs leads to cytokine release at the site of inflammation and its high fibrin content aids in the stability of the bone graft and blood clot.[9] In the present case series, bioactive glass and PRF were used in two cases; and in one case, PRP had been used. Treatment of periodontal intrabony defects with bioactive glass had shown significant clinical improvement by enhancing bone formation.

A silica gel layer is formed when the bioactive glass comes in contact with body fluid, and quickly a calcium phosphate layer is formed over the silica gel layer. Initially, the calcium–phosphorus layer is amorphous, but later, it becomes a crystalline hydroxy carbonate apatite layer which is similar to bone material and provides a surface for osteoblast cell attachment and bone dissolution.[13]

Goyal[14] also found encouraging results in the management of periodontal intrabony defects with respect to the left lateral incisor when PRF was used in combination with bioactive glass graft material. Karunakar et al.[9] also presented a combined approach with PRF which was effective in treating perio-endon lesion and intrabony defects. Patel et al.[14] employed a combined approach along with PRF in the left lateral incisor and found it can be used as treatment modality to fasten the healing process. Autologous platelet derivate offers several advantages such as better tissue handling, release of growth factors, faster healing, and stabilization of graft. There is a question regarding the clinical effectiveness of growth material in defects of varying size, but no major disadvantage has been reported so far.[10] In the present scenario, significant bone fill and clinical attachment level gain were observed in furcation and intrabony defect. However, it also has limitations such as no surgical re-entry, or histological examination was done to confirm bone fill.

CONCLUSION

The use of PRF and plasma described here enables the clinician to be benefited from the full regenerative capacity of this autologous biologic material. However, further long-term, controlled clinical trials are necessary to determine whether the addition of platelet derivatives alone or in combination significantly enhances bone formation in combined endo-perio lesions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Hirsch J, Ahlström U, Henrikson PA, Heydne G, Peterson LE. Periapical surgery. Int J Oral Surg 1979;8:173-85.
2. Imura N, Pinheiro ET, Gomes BP, Zaia AA, Ferraz CC, Souza-Filho FJ. The outcome of endodontic treatment: A retrospective study of 2000 cases performed by a specialist. J Endod 2007;33:1278-82.
3. Meschi N, Castro AB, Vandamme K, Quirynen M, Lambrechts P. The impact of autologous platelet concentrates on endodontic healing: A systematic review. Platelets 2016;27:613-33.
4. Goyal L. Clinical effectiveness of combining platelet rich fibrin with alloplastic bone substitute for the management of combined endodontic periodontal lesion. Resor Dent Endod 2014;39:51-5.
5. Karunakar P, Prasanna JS, Jayadev M, Shrivani GS. Platelet-rich fibrin, “a faster healing aid” in the treatment of combined lesions: A report of two cases. J Indian Soc Periodontol 2014;18:651-5.
6. Grudianov AI, Makeeva MK. Endo-perio lesions prevalence and awareness of dentists about diagnostics and treatment. Stomatologija (Mosk) 2014;93:11-4.
7. Betancourt P, Elgueta R, Fuentes R. Treatment of endo-periodontal lesion using leukocyte-platelet-rich fibrin. A case report. Colomb Med (Cali) 2017;48:204-7.
8. Herrera D, Retamal-Valdes B, Alonso B, Feres M. Acute periodontal lesions (periodontal abscesses and necrotizing periodontal diseases) and endo-periodontal lesions. J Periodontol 2018;89 Suppl 1:S85-S102.
9. Singh S. Management of an endo perio lesion in a maxillary canine using platelet-rich plasma concentrate and an alloplastic bone substitute. J Indian Soc Periodontol 2009;13:97-100.
10. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part I: Technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:e37-44.
11. Döri F, Huszár T, Nikolidakis D, Arweiler NB, Gera I, Sculean A. Effect of platelet-rich plasma on the healing of intra-bony defects treated with a natural bone mineral and a collagen membrane. J Clin Periodontol 2007;34:254-61.
12. Mrunal DM, Jaypal JS, Wilson RS, Chatterjee A. Whale’s tail technique: A case series. J Indian Soc Periodontol 2016;20:460-3.
13. Patel GK, Deepika PC, Sisodia N, Manjunath MK. Platelet rich fibrin in management of complex endo-perio cases. Kathmandu Univ Med J (KUMJ) 2017;15:102-5.
14. Piemontese M, Asprillo SD, Rubini C, Ferrante L, Procaccini M. Treatment of periodontal intrabony defects with demineralized freeze-dried bone allograft in combination with platelet-rich plasma: A comparative clinical trial. J Periodontol 2008;79:802-10.