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Comparison of DFDBA with L-PRF Vs FDBA with L-PRF for Degree II Furcation Defects

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Running Title: Treatment of furcation defects with bone grafts and platet rich fibrin

Abstract: ***Furcations are frequently inaccessible for maintenance of personal oral hygiene and even for adequate professional debridement which is due to the multiple anatomical variations like degree of separation of root, enamel projections, presence of root concavities, accessory canals and intermediate bifurcation ridges. Predictable correction of furcation defects has however posed as a constant therapeutic challenge. Allografts are the bone graft materials which have been used extensively in periodontal therapy for regeneration. Platelet-rich fibrin (PRF) is a concentrated suspension of growth factors found in platelets. These growth factors moderate the wound healing and promote tissue regeneration. This article describes a case report of a patient who showed mandibular degree II furcation defects which were treated with DFDBA and FDBA in combination with L-PRF on both side. This case report tried to compare the clinical and radiographical outcome obtained by combination of DFDBA with L-PRF and FDBA with L-PRF.***

Keywords: Chronic periodontitis, DFDBA, FDBA, L- PRF, Furcation defects, Regeneration

Key messages: Periodontal regeneration of furcation defects are challenging because of complex anatomical structure. Allografts materials have osteoconductive property with L-PRF its gives adductive effect for regeneration

1. Introduction

Periodontitis is an inflammatory disease of the supporting tissue of the teeth caused by specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession or both.[1] The invasion of furcation areas of multirooted teeth by periodontitis represents a serious complication in periodontal therapy. Also it is reported that molars with furcation involvement caused by periodontitis, respond less favorably to periodontal therapy than molars without furcation involvement. An important objective of periodontal regeneration in furcation defects is the formation of a new attachment apparatus including alveolar bone, cementum and periodontal ligament. Various approaches have been used to resolve furcation defects including autografts, allografts, bovine-derived xenografts, barrier membranes, combinations of membranes and bone grafts. [2]

According to Practical Applications from the AAP Regeneration Workshop (2015) the treatment of furcation defects can vary based on the type and location of the furcation involvement and dependent on the control of local and systemic factors. A combined treatment approach barrier membrane and bone replacement graft with or without biologic membrane generally offers the better therapeutic outcome over monotherapy.[3]

Freeze-dried bone allograft (FDBA) and Demineralized freeze dried bone allograft (DFDBA) are well-documented bone-grafting materials which provides an osteoconductive scaffold. Demineralized freeze dried bone allograft (DFDBA) which contains bone morphogenic proteins, are thought to be responsible for osteoconductive and an osteoinductive effect by eliciting the differentiation of host mesenchymal cells into osteoblasts. In Freeze-dried bone allograft (FDBA) particles that are farthest from host bone are also lined by osteoblast, actively secreting osteiod matrix and newly formed bone, As in DFDBA only particles near host bone are get involved in mineralization processes. [4-5] Platelet rich fibrin (PRF), which is a second generation platelet concentrate, offers the surgeon an access to growth factors with a simple and available technology. These growth factors which are autologous, nontoxic and non immunogenic, enhance and accelerate the normal bone regeneration pathways. [6]

2. Case Report

A 45-year-old male patient reported to the Department of Periodontics, with the complaint of food lodgment and pain in the gingiva. Medical history and family history were noncontributory. On intraoral examination, 5mm probing pocket depth (PD) with 46, 36, Grade I mobility with 46, Degree II furcation defects were detected in 46,47,36,37 regions. A periapical radiograph was taken. Radiographs were standardized by using paralleling technique, which revealed presence of degree II furcation defects [Figure 1]. This intraoral periapical radiograph (IOPA) were scanned through X digi USB * and grid was applied and the defect was measured.

Figure 1: Pre-operative view (a) clinical 46 and 36 (b) radiographic 46 and 36

Keeping all the findings in the mind, the periodontal therapy was planned.

1) Non-surgical periodontal therapy by means of conventional scaling and root planning using ultrasonic instrument and curettes.
2) Re-examination of patient was done at 4th week after phase I therapy. Mobility and pockets persisted after 4 weeks.
3) Blood investigation done along with platelet count, hemoglobin, bleeding time and clotting time were assessed and found to be within normal limits. Then the surgical periodontal therapy was planed.

3. Surgical Procedure

Intraoral antisepsis was performed using 0.2% Chlorhexidine digluconate rinse and iodine solution was used to carry out extra oral antisepsis for the patient. Following administration of local anesthesia, crevicular incisions was made and mucoperiosteal flap was reflected. Meticulous defect debridement and root planning was carried out with the help of area specific curettes. The direct examination after debridement confirmed the presence of Degree II defect in 46,36 region. L-PRF was prepared by collection of intravenous blood from antecubital in the 10 ml of sterile tube without an anticoagulant and centrifuged† immediately. Blood was centrifuged using a table top centrifuging machine for 12 min at 2,700 rpm. L- PRF + DFDBA bone graft was filled into the 46 furcation defect. Simultaneously FDBA with L-PRF was filled in 36 defect region [Figure2-3]. The mucoperiosteal flap were repositioned and secured in place using 3-0 non-absorbable black-braided silk surgical suture. The simple interrupted sutures were placed. Periodontal dressing was placed.

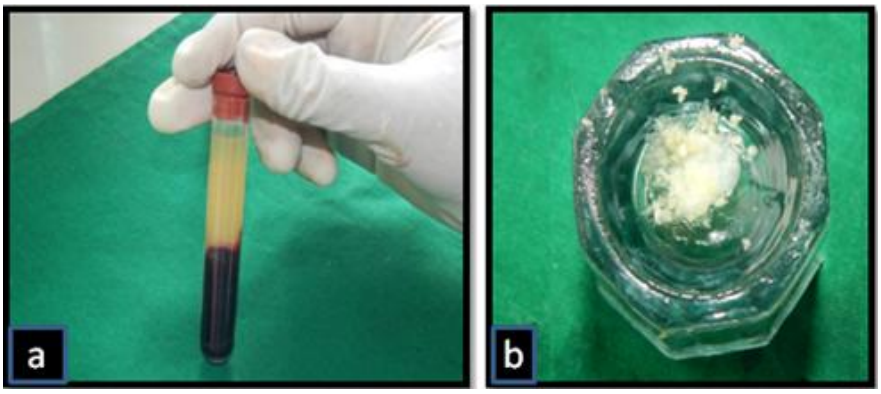

Figure 2: (a) PRF prepared (b) bone graft with PRF

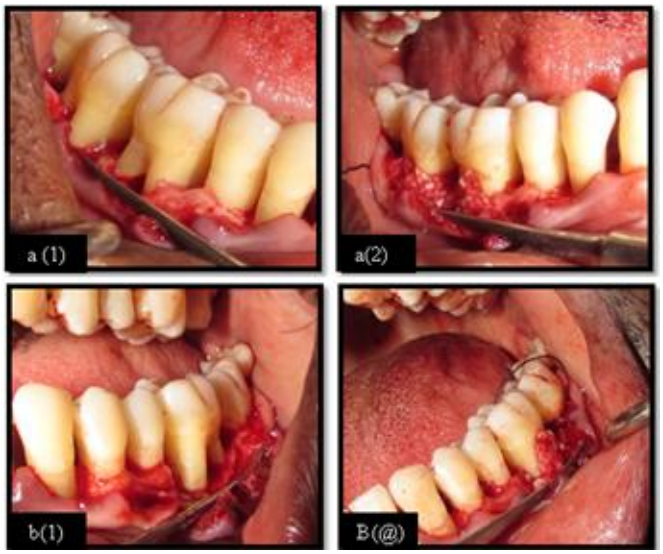

Figure 3: During Surgery **a (1)** Furcation defect with 46 **a(2)** Defects filled with DFDB and L-PRF **b (1)** Furcation defect with 36 **b (2)** Defects filled with FDBAA and L-PRF

Post-operative care

The suitable antibiotics and analgesics (Amoxicillin 500 mg three times a day for 5 days and Ibuprofen 400mg three times a day for 5 days) were prescribed along with 0.2% Chlorhexidine mouth wash twice daily for 1week. Periodontal pack and sutures were removed after 1 week postoperatively. Surgical wound were cleaned with iodine and patients were instructed for gentle brushing with soft toothbrush.

Clinical outcome

The patient was recalled after 7 days for suture removal and further follow-up was done at 15th days, 1 month, 3 months intervals. Clinical attachment loss was 8mm and 7mm for 46 and 36 respectively at baseline, which reduced to 5 mm at 3 months respectively. The follow-up radiographs also showed good amount of bone fill in furcation defect 36 and 46 [Figures 4] [Table 1]

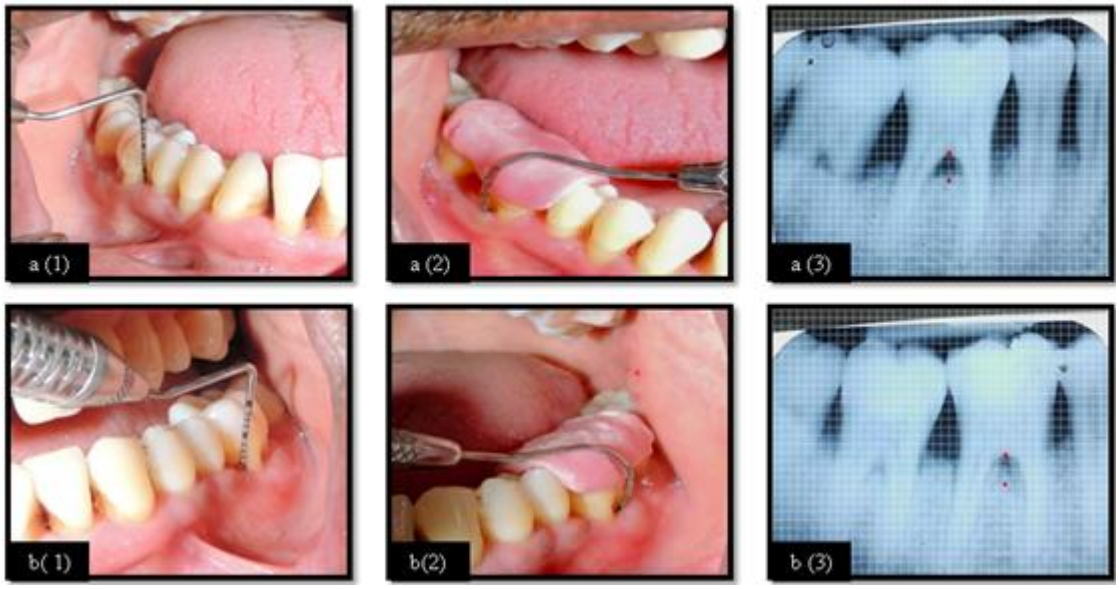

Figure 4: Post-Operative clinical and radiographical evaluation (a) 1, 2, 3 shows 3 mm probing depth with 2 mm horizontal furcation defects with bone filled in furcation defcts (b) 1, 2, 3 shows 4 mm probing depth with 3 mm horizontal defects with bone filled in furcation defects

Table I: Pre-Operative and Post-Operative Clinical and Radiographical Parameter
Result

	DFDBA +L-PRF		FDBA+L-PRF	
	BASELINE	AT 3rd MONTH	BASELINE	AT 3rd MONTH
OHI-S INDEX	4.7	0.9	4.9	1.1
GINGIVAL INDEX	2.8	0.7	2.9	0.5
PROBING DEPTH	5mm	3 mm	5 mm	4 mm
CLINICAL ATTACHMENT LEVEL	8 mm	5mm	7 mm	5 mm
FURCATION DEFECT (RADIOGRAPHIC FINDINGS)	3.8 mm	3.0 mm	4.5 mm	3.4 mm

4. Discussion

There are a broad range of treatment options are available for periodontal reconstruction generation, but only some are considered regarded as truly regenerative procedures. The present case report evaluates the clinical efficacy of L-PRF + DFDBA and L-PRF +FDBA allograft in the treatment of furcation defects in patient with chronic periodontitis. We found a significant improvement in clinical and radiographic parameters in furcation defects.

A variety of regenerative materials have been used in periodontal surgeries. DFDBA and FDBA along with PRF were chosen as regenerative material in our case with furcation defects. DFDBA has been widely used in periodontal therapy. In various animal experiments, it is reported that DFDBA being osteoinductive could stimulate the formation of new bone. It maintains the space for tissues to form and osteoconductive property of the graft may act as scaffold for the growth of mineralized tissue. [7]

PRF, a second‐generation platelet concentrate that was introduced by Choukroun *et al*. in 2001.has also shown optimistic and promising results. It is a fibrin matrix concentrate enriched with platelets and growth factors that stimulate tissue regeneration and healing. When PRF is used in conjunction with bone graft, which offers several advantages including promoting wound healing, bone growth and maturation, graft stabilization, wound sealing and hemostasis, and improving the handling properties of graft material.[6]

Rummelhart JM et al (1989) [7]conducted a study to compare FDBA and DFDBA clinically in osseous defects. Group 1 was treated with DFDBA and Group 2 was treated FDBA with 6 months follow up a mean clinical attachment gain of 1.7 mm was obtained with DFDBA and 2.0 mm with FDBA. Probing depths decreased a mean of 2.00 mm for both DFDBA and FDBA. FDBA shows slightly more bone fill than DFDBA but there were no significant differences between the both grafts when placed in predominately one wall osseous defect.

Gothi R et al (2015) [8] compared the FDBA and DFDBA in intrabony defects in patients with chronic periodontitis. 20 bilateral infrabony defects were treated with freeze dried bone allograft (FDBA-Group A) and decalcified freeze dried bone allograft (DFDBA-Group B). Clinical and radiographic parameters were assessed preoperatively, at 3 months and 6 months postoperatively. Study concluded that DFDBA did not show any improvement in the clinical and radiographic

parameters in the treatment of the intrabony defects as compared to FDBA.

Bansal *et al.* (2013)[9] and Khattar Sakshi *et al.* (2014)[10] had done a study to evaluate the efficacy of autologous PRF with the DFDBA, in the treatment of periodontal intrabony defects. They concluded that a combination of PRF and DFDBA demonstrated significant improvement in the clinical probing depth, relative attachement level, and radiographical bone fill.
Above studies show that when PRF is used in combination with bone graft, demonstrate significant amount of pocket depth reduction, CAL gain, and radiographic bone fill. There are wide range of regenerative procedures that have been developed over the years. It is important to recognize and harness the benefits of this process and use them in indicated situations. The patients could be benefited in such situations, by maximum possible regeneration, ideally
reaching physiological levels.

5. Conclusion

From the present case report, it can be concluded that both the materials were found to be effective in all respects clinically and radioghraphically in the furcation defect. This study shows FDBA with L-PRF gives marginally more bone fill as compare to DFDBA with L- PRF. However, long-term, multi-center, randomized, controlled clinical trials are necessary to effectively compare the clinical & radiographic outcome of both the graft materials in the management of Degree II furcation defects.

6. Conflict of Interest

Authors declare no conflict of interest.

Source of support: X digi USB, Jolly computers, Surat

Centrifuge machine of company REMI

FDBA and DFDBA bone graft from Tata Memorial Tissue Bank Mumbai

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