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Management of Hemiseptal Defect In Maxillary Anterior Tooth – A Case Report

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Abstract

Intrabony defect can create serious functional and aesthetic problems. In such situations, a combined endodontic and periodontal treatment is often indicated. The goal of the surgical periodontal therapy is to regenerate the lost periodontal tissue. PRF is considered as a second generation platelet concentrate consisting of viable platelets releasing various growth factors. In this case report, a multidisciplinary approach including splinting of tooth, endodontic treatment followed by regenerative therapy with platelet‑rich fibrin and DFDBA (Demineralized freeze dried bone graft membrane) for the treatment of osseous defect were considered for hemiseptal defect in maxillary left central incisor. Hence, this report presents the clinical and radiographical effectiveness in bone regeneration.

Keywords: Hemiseptal defect, PRF, DFDBA, Regeneration.

Introduction

The relation between the pulpal tissue and the periodontal tissue was first described by Simring and Goldberg in 1964.[1] The periodontium and the pulp have embryonic, anatomic and functional interrelationship.[2] Ectomesenchymal cells after 8-10 weeks of intrauterine life proliferates to form dental papilla and dental follicle and these serves as precursors of the growth of periodontium and the pulp respectively. Because of this embryonic development there is an anatomical connection between periodontal and pulpal tissue, which remain throughout life. This communication allows exchange of bacteria and inflammatory bio-products between the pulp and the periodontal ligament, and if either is infected it may cause primary periodontal disease which can lead to degenerative process in the pulp or primary pulpal disease which can lead to degeneration of periodontium.

Clinically there are mainly three communications between pulp and periodontium which will lead to the development of periodontal-endodontic lesions, namely [2]

1. Dentinal tubules
2. Lateral and accessory canals
3. Apical foramen

Pulpal and periodontal problems are responsible for more than 50% of tooth mortality.[3] The prognosis of such

lesions depends on the structures involved. If there is an extensive loss of attachment the prognosis of tooth is generally poor, but can be improved with osseous regeneration.[4] For regeneration a combination of bone graft material with growth factors can more effectively stimulate formation of mineralized as well as non-mineralized tissues.[5]

In this case a combination of demineralized freeze dried bone allograft (DFDBA) and platelet rich fibrin (PRF) was utilized to improve the prognosis of grade III mobile tooth with hemiseptal defect.

Platelet Rich Fibrin (PRF) was first described by Choukroun et al.[7] It is a second-generation platelet concentrate. The fibrin membranes have complex architecture and are enriched with platelets and growth factors such as Platelet-derived growth factor (PGDF), transforming growth factors-β (TGF-β), vascular endothelial growth factor (VEGF), and epidermal growth factor (EGF) which accelerates the healing process.

Demineralized Freeze Dried Bone Allograft (DFDBA):[8] This are obtained from genetically dissimilar members of same species. It induces host mesenchymal cells to differentiate into osteoblasts. Osteogenic potential is enhanced by demineralization and freeze-drying of cortical bone. Bioinductive proteins are exposed by demineralization of hydrochloric acid. Bone morphogenic proteins are present which stimulate the host stem cell to differentiate into osteoblast.

Case Report

A 35 year old female patient reported to the Department of Periodontology, Rural Dental College, Loni. with the chief complain of pain and loose tooth in the upper front region of jaw since 3 months. She gave history of trauma one year ago with 21 and pain with the same since 3 months for which she consumed analgesics since 3 months. Systemic history was non-contributory. Clinical examination revealed reddish pink gingiva with bleeding on probing with 21, exudation of pus from the periodontal pocket, Class I Miller's gingival recession, Grade III mobility (measured with PerioTest) with secondary trauma from occlusion (Figure:1). Fremitus test was positive which suggested presence of trauma from occlusion. Clinical probing depth on mesial aspect was 8mm, buccal aspect 7mm, palatal aspect 6mm and distal aspect 3mm. There was presence of supragingival and subgingival deposits on tooth. Radiographic examination revealed PDL space widening, angular bone loss in mesial aspect, with obturating material in the tooth canal (Figure:2). It was an combined periodontal and endodontic lesion. A comprehensive treatment was planned abscess drainage was done and was re-evaluated after 5 days. Phase I therapy and later surgical regenerative approach was planned with PRF with bone graft (DFDBA).

Treatment: Phase I (Etiotrophic)

Included patient motivation and oral hygiene instructions followed by blood investigations which showed values within normal limits. Scaling and root planning was done. Splinting was done from 11-22 with wire and composite followed by coronoplasty with 21(Figure:3). Chlorhexidine mouth wash of 0.2% B.D for 15 days was prescribed. Re-evaluation of Phase I therapy was done after 4 weeks.

Phase II (Surgical)

Pocket depth still persisted. There was reduction in mobility with no clinical signs of inflammation. 2% local anesthesia was injected after which crevicular incision with # 12 blade and interdental incision with # 15 blade extending from 12 to 22 was given and full thickness mucoperiosteal flap was elevated. On surgical debridement mesial aspect showed- A hemiseptal defect with presence of only palatal wall. PRF was prepared by

withdrawing 10 ml of blood from patient's anticuboidal vein and equal amount of blood transferred to 2 glass test-tubes. It was immediately centrifuged in a centrifuge (REMI R-8C) at a rate of 1600 rpm for 12 minutes (Figure: 4). The middle layer (PRF) was removed with sterile tweezers and separated from the underlying RBC layer using scissors, transferred and mixed with bone graft material (Figure:5). Obtained PRF and DFDBA were mixed and placed in the defect (Figure:6). 3-0 silk sutures were given and periodontal dressing was given.

Post Operative Care

Amoxicilin 500mg T.D.S for 5 days and Aceclofenac 100mg + Paracetamol 325 mg B.D for 3 days were prescribed. Chlorhexidine 0.2 % mouth wash was continued. Patient was instructed not to masticate or brush on the area of dressing. The dressing and sutures were removed after 10 days (Figure:7). The site was gently cleaned and irrigated with betadine and saline. Charter's bushing technique was reinforced in the surgical area. Patient was evaluated for the same at 1 month, 3 months (Figure:8), and 6 months (Figure:9) period. No periodontal probing was done in this period. Re-evaluation at 6 months after the procedure showed clinically healthy gingiva, reduced mobility, reduction in probing pocket depth from (meaislly- 8mm to 3mm, bucally-7mm to 4mm, palatally- 6mm to 3mm), marked radiographic changes and Class I Miller's gingival recession.

Figure 1: Pre-operative intraoral view.

Figure 2: Pre-operative IOPA

Figure 3: splinting and Coronoplasty.

Figure 4: Withdrawal of blood and centrifuge.

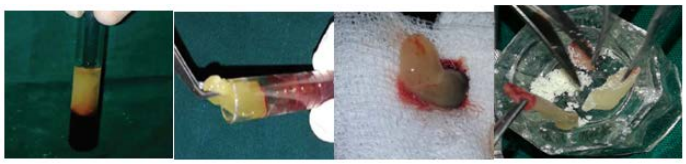

Figure 5: PRF formed, separated and mixed with bone graft.

Figure 6: PRF placement at the site.

Figure 7: 10 Days follow-up.

Figure 8: 3 months post-operative.

Figure 9: 6 months post-operative.

Discussion

This type of lesions requires meticulous root canal therapies along with regenerative periodontal procedure. Regenerative procedures are the gold standard therapy to restore periodontal health and have become an important research topic. Main goal is not only to arrest periodontal disease progression, but also regeneration of lost structures[9]. Bone grafts are the most common and essential for restoration of lost supporting tissues.[10] Wide range of bone grafting materials have been applied and evaluated clinically.[11] DFDBA has both osteoconductive and osteoinductive properties and is safe and capable of inducing new bone formation. It induces undifferentiated mesenchymal cells to differentiate into osteoblasts which helps in bone formation[10,11]. DFDBA provides significant improvement in soft and hard tissue for the periodontal bone defects[12]. The use of growth factors along with bone graft shows promising results[9]. Growth factors regulate cellular events in regeneration which includes cell proliferation, chemotaxis, matrix synthesis and differentiation via binding to specific cell surface receptors. Alpha (α) granules of platelets provides growth factors which include Transforming Growth Factor β (including β^{-1} and β^{-2}-isomers), Platelet-Derived Growth Factor, Epidermal Growth Factor, Vascular Endothelial Growth Factor, Insulin-like Growth Factor-1.[13] Combination of DFDBA with PRF gives better results in probing pocket depth reduction and gain in clinical attachment level when compared to DFDBA alone. Choukroun et al. introduced PRF in 2001. It contains fibrin matrix polymerized in a tetramolecular structure, platelets incorporation, leukocytes, cytokines and circulating stem cells. There is intrinsic incorporation of platelet cytokines and glycan chains in the fibrin meshes due to slow fibrin polymerization during the process. This helps in progressive release of cytokines during fibrin

matrix remodeling[14]. It also contains leukocytes which influence growth factor release, anti-infectious activity, immune regulation and matrix remodeling during healing. PRF promotes rapid angiogenesis[15]. In the present case report PRF seems to have additional favorable effect on defect fill and defect resolution in the treatment of hemiseptal defect. PRF acts as biological connector between the particles of bone. And also releases cytokines that plays role in the self-regulation of inflammation of the grafted material. Thus in the present case PRF and DFDBA shows better result in healing and clinical attachment gain in hemiseptal defects. However, histological assessment will give the exact gain in the clinical attachment level.

Conclusion

Tough endodontic periodontal lesions presents a diagnostic and treatment challenge .Treatment suggested for periodontal abscess with hemiseptal defect can be successfully managed by root canal therapy followed by periodontal regenerative therapy. Tissue regeneration techniques using DFDBA and PRF can effectively enhance healing of tooth with poor prognosis.

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