Original Research Paper

Volume -10 | Issue - 3 | March - 2020 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Periodontology

MANAGEMENT OF CHRONIC PERIODONTITIS WITH CRATER-LIKE BONE LOSS ASSOCIATED WITH TRAUMA FROM OCCLUSION: A CASE REPORT

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ABSTRACT Chronic periodontitis with trauma from occlusion may result in crater-like bone loss & tooth mobility. Flap procedures with bone graft and membrane have been used for pocket elimination and bone regeneration. This case report presented the treatment of deep pocket depth of 4 to 7 mm and grade III mobility of nonvital teeth (31 and 32) of a 48-year-old male. Radiograph revealed a crater-like bone loss on apical region with questionable prognosis. Scaling, root planing, splinting, selective grinding, and endodontic treatment were done prior to the surgery. Regeneration of deep periodontal intrabony defect was attempted using Carbonate Apatite and PRF membrane. Flap surgery is indicated to eliminate periodontal pockets which often include bony defects resulting from both horizontal and vertical bone loss that are not consistent with the overlying gingival architecture. Splinting and flap procedure using bone graft and membrane can preserve mobile teeth with crater-like bone loss.

KEYWORDS : Chronic Periodontitis, Crater-like Bone Loss, Tooth Mobility, Flap, Bone Graft

INTRODUCTION

Periodontitis is a multifactorial inflammatory disease, associated with bacteria and host, that affects supporting structures of the teeth.[1,2] The initial non-surgical periodontal therapy is the most important element of treatment in reducing periodontal pathogens in such cases. However, it is important to consider other elements such as the host environment and occlusal factors. Trauma from occlusion may act as a modulator in periodontitis and is defined as injury resulting in tissue changes within the attachment of apparatus as a result of occlusal force. Based on its mechanism, trauma from occlusion is classified into primary, which caused by excessive occlusal force in a tooth with healthy periodontium, and secondary when a tooth supported by compromised periodontal tissue is exposed to normal or excessive force.[3] When severe periodontitis is present, secondary trauma from occlusion may cause a change in the morphology of alveolar bone resulting craters and angular defects, on which inflammatory changes will later be superimposed.[3,4] If the condition goes on for a number of times, it may cause mobility of the tooth, and the severe condition of bone loss may result in a nonvital tooth. Here, we present a patient with severe chronic periodontitis with trauma from occlusion on 31 and 32, resulting crater-like bone loss and grade III mobility on the affected teeth, requiring periodontal regenerative surgery.

CASE REPORT

A 48-year-old male patient reported to the Department of Periodontics, Universitas Padjadjaran, Bandung, Indonesia, with chief complaint of swelling gums and discomfort in anterior lower region. The swelling was present since the last two weeks. Oral hygiene status of patient was poor. Edema and fistula were seen in relation to tooth 32 (Figure 1). Grade III mobility was evident in the 31 and 32, with pain and difficulty in mastication. Teeth were tender on percussion and vitality test was negative. Anterior deep bite was also evident.

Figure 1: (A) Pre-operative clinical & (B) radiographic view of 31 and 32

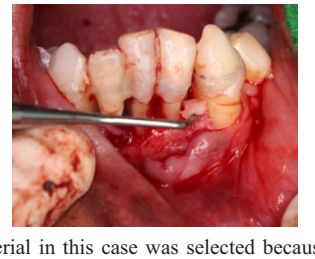
Periodontal examination revealed a clinical probing pocket depth of 4 to 7 mm, recession of the gingiva (Miller Class IV). Examination using articulating paper showed trauma from occlusion on both 31 and 32. Intraoral periapical radiograph revealed radiolucency in apical region of affected teeth, showing crater-like bone loss. Considering the factors influencing individual tooth prognosis, tooth 31 and 32 appeared to have a questionable to hopeless prognosis. Patient refused to have his teeth extracted due to personal esthetic consideration.

TREATMENT AND DISCUSSION

Emergency treatment included drainage of the abscess with prescription of antibiotic regimen (Metronidazole 500 mg & Amoxicillin 500 mg combination) and Mefenamic Acid 500 mg three times a day for five days as analgesic agent. Scaling and root planing were done following the drainage of abscess. Patient was re-evaluated after a week, as the swelling and inflammation subsided; extracoronal splinting using wire and composite was conducted at the second appointment. Stainless steel wire of 0.25 mm was selected as the material for splinting procedure on 31,32, and 33 using combination of Figure of Eight and Essig method. Composite was applied on the interdental area to prevent plaque retention to maintain oral hygiene and occlusal adjustment was performed by selective grinding. Root canal treatment of teeth 31 and 32 was initiated at the next appointment and Class I composite restorations were performed on both teeth.

After evaluation of endodontic treatment, splinting was reconstructed using a combination of wire and acrylic tooth to replace the missing tooth of 41. The acrylic tooth acted as a splint to gain more support from the adjacent teeth. Patient was re-evaluated after a week.

Figure 2. (A) Debridement procedure; (B) Bone defect on buccal region of 31 and 32. (C) Bone graft application on bone defect; (D) PRF application covering the bone graft material on defect region.



Bone graft material in this case was selected because of its unique combination of type B carbonate apatite and denaturalized collagen which mimics the true nature of human bone. Prior to the surgery, blood was drawn in a 10 mL test tube without an anticoagulant and centrifuged immediately at 3000 rpm for 20 minutes. The resultant

product consisted of the following three layers: topmost layer consisting of acellular platelet-poor plasma (PPP), PRF clot in the center, and red blood cells (RBCs) at the bottom. The PRF clot was then squeezed in the form of a membrane.[5]

Under local anesthesia, a full thickness mucoperiosteal flaps were elevated from 33 to 41 region. Vertical releasing incision from the edentulous region of 42 extending into the alveolar mucosa was performed for proper access to the defect. The inner surface of the flap was carefully curetted to remove granulation tissue. Complete defect debridement as well as scaling and root planing was done (Figure 2A). The surgical area was then rinsed with copious amount of sterile saline. On surgical debridement, a crater-like bone loss was evident which was filled with the bone graft material and covered with PRF membrane (Figure 2C,D). After placement of the biomaterial, the flap was sutured using single interrupted technique with 5-0 black silk, periodontal dressing was applied and post operative instructions were given. Post operative medications included antibiotic Amoxicillin 500 mg three times a day and analgesic Diclofenac sodium 50 mg twice a day for five days.

On recall visit after a week, periodontal dressing was removed, and post-operative maintenance care was continued at regular intervals. A week later, sutures were removed and post operative healing was satisfactory with minimal discomfort (Figure 3A). Three-month clinical re-evaluation revealed an improvement in the clinical parameters with mobility reduced from Grade III to Grade I (Figure 3B,C). An intra oral periapical radiograph revealed bone fill about 1 mm in relation to 32 (Figure 3D).

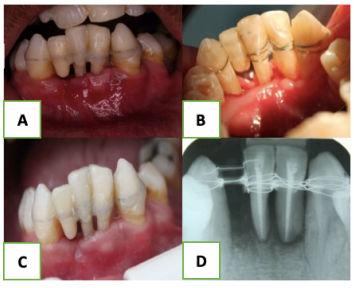


Fig 3. (A) Post-operative view after 2 weeks. (B) Post-operative view after 3 months (buccal) and (C) lingual area. (D) Post-operative radiograph after 3 months.

Chronic periodontitis can be clinically diagnosed by the detection of chronic inflammatory changes in the marginal gingiva, presence of periodontal pockets, and loss of clinical attachment. It is diagnosed radiographically by evidence of bone loss. Another cause of periodontal destruction is trauma from occlusion, which can produce bone destruction in the absence or presence of inflammation. When combined with inflammation, trauma from occlusion aggravates the bone destruction caused by the inflammation and results in osseous craters or angular defects**.** It causes vascular changes in the periodontium within 30 minutes. The stasis and vasodilatation are accompanied by pain, and in some cases, these changes even cause pulpal pain and hypersensitivity.

Later changes result in loss of bone lining the socket, with a resultant widened periodontal ligament and increased tooth mobility.[4] In this case, patient was diagnosed with a severe chronic periodontitis and a secondary trauma occlusion was present on teeth 31 and 32, resulting a crater-like bone loss on intra oral periapical radiograph. Secondary trauma occlusion occurs when the adaptive capacity of the tissues to withstand occlusal forces is impaired by bone loss resulting from marginal inflammation. This reduces the periodontal attachment area and alters the leverage on the remaining tissues. The periodontium becomes more vulnerable to injury, and previously well-tolerated occlusal force become traumatic.[4]

Periodontal therapy is performed in this case with the primary objectives of gaining 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 and achieving tangible benefits in the form of improved function and esthetics. The ultimate aim is to achieve periodontal regeneration through a new attachment formation. Regeneration has been defined as the reproduction or reconstitution of a lost or injured part to restore the architecture and function of the periodontium.[6,7]

Regeneration, however, proves to be an elusive goal to achieve, especially when we encounter a compromised clinical situation such as one presented in our case study. The advanced bone loss in relation to 31 and 32, associated with grade III mobility rendered the prognosis for any attempt at saving the tooth and restoring the function, as questionable to hopeless. However, the patient's insistence on not extracting the tooth led to a look at various alternatives in such a compromised situation.[6]

The first aim of stabilizing the periodontal condition was achieved by performing phase I therapy. Scaling and root planing were the initial treatment to eliminate etiologic factor of plaque and calculus. However, root canal treatment was not feasible as there was advanced bone loss with deep angular bone defect in the region of 31 and 32 resulting grade III mobility. Therefore, an extracoronal wire and composite splint were performed. It helped control mobility by distributing the masticatory forces across multiple teeth. It would also improve masticatory function to a certain extent.[6] Selective grinding on 31, 32, and 33 was performed following the splinting procedure to eliminate trauma occlusion which might disturb healing process of periodontium.

Flap technique along with bone graft and Platelet Rich Fibrin (PRF) membrane placement was considered the treatment of choice in our case study. Carbonate apatite containing bone graft was used to fill the osseous defect. It contained carbonate apatite and gelatin (denaturalized collagen), formed in a cylindrical block. The properties that made it suitable as a bone graft were its osteoconductive property, and excellent tissue compatibility.[6] Bone grafting materials function, in part, as structural scaffolds and matrices to allow attachment and proliferation of anchorage dependent osteoblasts.[8]

Past research knowledge suggests that conventional Open Flap Debridement (OFD) offers only limited potential towards recovering the lost periodontal structures. Various biomaterials have been developed and experimented for periodontal tissue regeneration based on their endogenous regenerative capacity. However, none of them has been established as a gold standard in the treatment of intrabony defects.[6,7] It is very well known that regeneration of tissues destroyed by periodontal disease cannot be achieved by conventional OFD alone. Thus, the use of PRF adjunctive to OFD is justified.[7]

Platelet-rich fibrin was developed in France by Choukroun et al. It is a second-generation platelet concentrate. Its advantages over the better known PRP include an ease of preparation and application, minimal expense and lack of biochemical modification as no bovine thrombin or anticoagulant is required for its preparation. PRF is a fibrin matrix in which platelet cytokines (growth factors) and cells are trapped and are released over time. It can also serve as a resorbable interpositional membrane. The PRF layer avoids early invagination of the gingival epithelium, thereby serving as a barrier to epithelium migration.[5—7,9—11] The PRF has been proposed to improve the handling of particulate grafts, facilitate graft placement and stability, improve the rate and quality of the vascular ingrowths, increase bone regeneration, enhance soft tissue healing and exert mitogen effects on critical cells.[5]

CONCLUSION

Splinting and flap procedure using bone graft and membrane could preserve mobile teeth with crater-like bone loss, increasing masticatory and speech functions, and to help maintaining oral hygiene.

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