Case Report

Combination therapy using advanced biomaterials in the management of mandibular Grade II furcation defect

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Abstract

Periodontitis is a multifactorial disease. Even though plaque is a primary etiological factor; there are so many aggravating factors such as calculus, genetics, lifestyle habits, systemic health, and occlusal trauma. Trauma from occlusion is caused by occlusal force that surpasses the periodontium's adaptive capacity, causing injury to periodontal structures. This case highlights the management of a furcation defect of Grade II which was induced by occlusal trauma. The patient presented with periodontal abscess in relation to 36 and on radiographic examination, bone loss and high points were evident in relation to endodontically treated 36. A full-thickness mucoperiosteal flap was elevated and after debridement injectable platelet-rich fibrin (iPRF), osseograft, and guided tissue regeneration (GTR) membrane were placed. The patient was recalled after 3 months for re-evaluation. On re-evaluation, the radiograph showed adequate bone fill which suggested that using iPRF, bone graft, and GTR may enhance periodontal regeneration in Grade II furcation defects. Therapy using iPRF, bone graft, and GTR may enhance in Grade II furcation problems, and periodontal regeneration is possible.

Key words: Bone graft, furcation defects, guided tissue regeneration, occlusal trauma, regeneration, trauma from occlusion

INTRODUCTION

Trauma from occlusion (TFO) is caused by occlusal force that surpasses our periodontium's adaptive capacity, causing injury to periodontal structures. On TFO, there are various schools of thought; some believe it is not an etiological factor, whereas others believe it is a cofactor in the development of periodontal disorders. One of dentistry's long-standing mysteries has been the association between occlusion and periodontal disease. Plaque is widely acknowledged as the primary cause of periodontal disease beginning and development.[1] These modifying elements frequently include occlusion effects.

Occlusion plays an important component in periodontal health because periodontal tissues rely on trophic stimulation from occlusal pressures. In the development of periodontal disease, occlusion and local variables may work independently or in concert. As a result, knowledge of occlusion principles and their relevance to oral health and illness is required.[1,2] It is important to note, however,

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that symptoms of occlusion trauma may appear only when the amplitude of the stress evoked by occlusion is such that the periodontium surrounding the exposed tooth is unable to appropriately sustain and distribute the force while maintaining the tooth's position and stability. This indicates that in circumstances when the periodontium is drastically reduced in height, even minor stresses might cause trauma or adaptive changes in the periodontium.[3]

Occlusion-related trauma causes noninflammatory alterations in the periodontal attachment apparatus tissue. Within the periodontium, distinct cellular responses are elicited by pressure and tension forces. Pressure causes resorption of bone and, in some cases, cementum, and necrosis of periodontal fibers, hemorrhage, and vascular thrombosis. In the absence of inflammation, tension encourages the formation of bone and, in certain cases, cementum. It also affects the periodontal fibers in a variety of ways.[4] When periodontitis and occlusion trauma coexist, the first line of treatment should be on resolving the inflammatory disease. If occlusion-related damage contributes to the progression of periodontal disease, occlusion adjustments should be considered a viable periodontal treatment technique. According to Zander *et al.*, occlusal equilibration should result in normal, functional interdental interactions between teeth, which must be able to maintain a healthy periodontium that does not destroy itself while performing its role.[5]

Periodontitis is a multifactorial disease defined by microbially induced, host-mediated inflammation that leads to periodontal attachment loss and tooth loss.[6-8] The goal of periodontal therapy is to regenerate lost tissues by enhancing new attachments. Periodontal regeneration is one of the difficult tasks to accomplish as there will be a continuous microbial load in the oral cavity, and also depends on the systemic conditions of the patients, local factors, technique-sensitive, and cost-dependent factors.[9-11] Furcation management is challenging as it greatly influences the tooth's prognosis and the complexity of periodontal disease.[12-17] Several techniques and biomaterials have been studied in the management of furcation defects including guided tissue regeneration (GTR), enamel matrix derivatives, platelet concentrates, and bone grafts[18] were found to be the most effective approaches from a histological and[18,19] clinical standpoint.[15,20-22] Our research and knowledge have resulted in high-quality publications from our team.[23-36] However, studies assessing the effectiveness of the combination of various biomaterials in the management of Grade II furcation defect is minimal. This case report highlights the management of Grade II furcation defects induced by occlusal trauma.

CASE REPORT

Clinical and radiographic presentation

A 35-year-old female patient reported with the chief complaint of severe pain in relation to the lower left back tooth region for the past 1 week. On clinical examination, the periodontal abscess was seen in relation to 36, probing pocket depth was recorded as 8 mm, and Grade 1 mobility was seen [Figure 1]. The patient had undergone root canal treatment (RCT) for the same tooth and got the prosthesis after completion of RCT. On radiographic examination, widening of the periodontal ligament and Grade II furcation involvement was seen [Figure 2]. Bone loss was extended till the junction of the middle third and apical third of the root surface. Using articulating paper, high points were checked which showed high points in relation to the prosthesis in 36.

To rule out the etiology of bone loss, previous records were checked. Radiographs were taken before RCT, immediately after RCT, and 3 months postoperative were verified and bone loss was evident only in 3-month postoperative radiograph [Figure 3]. Based on the radiographic findings, it was concluded that bone loss was mainly due to the TFO caused by faulty restoration.

Case management

Phase 1 therapy (scaling and root planing in relation to 36) and occlusal adjustment were done to relieve the tooth from occlusion. After 2 weeks, the patient was recalled for flap surgery in relation to 36. Informed consent was obtained from the patient. Under local anesthesia, a full-thickness mucoperiosteal flap was elevated with crevicular and vertical-releasing incisions. Debridement was done using Quetin furcation curette and Gracey curette. Intrabony defect was seen in relation to 36 after complete debridement [Figure 4]. Root biomodification was done by applying ethylenediaminetetraacetic acid on root surfaces to remove the smear layer and saline irrigation was done. Osseograft which is bovine-derived type 1 collagen mixed with injectable PRF was placed in the defect and was covered by PerioCol GTR membrane [Figure 5]. Absorbable sutures were given using PETCRYL to stabilize the membrane and the flap was secured using silk sutures. Antibiotics and analgesics were prescribed for 5 days and the patient was recalled after a week for suture removal.

RESULTS

On re-evaluation after a week, healing was satisfactory and suture removal was done. On 3-month follow-up, the gingival appeared healthy, probing pocket depth was 3 mm, and no mobility and bone fill were evident in the radiograph [Figure 6].

DISCUSSION

The current case report highlights the treatment of mandibular Grade II furcation defect which was induced by occlusal trauma.

Belal conducted a study to assess the efficacy of bioabsorbable

Figure 1: Periodontal abscess in relation to 36

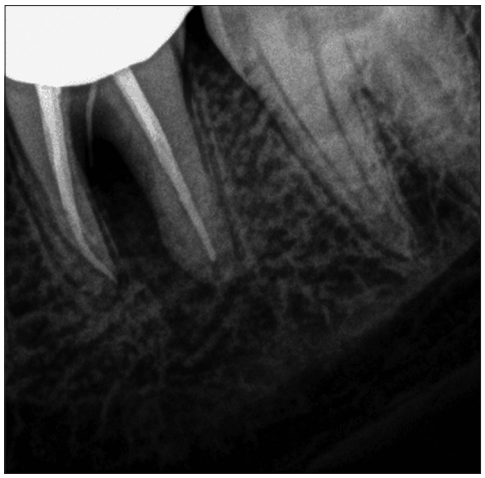

Figure 2: Radiographic presentation of 36 showing a bone loss in furcation

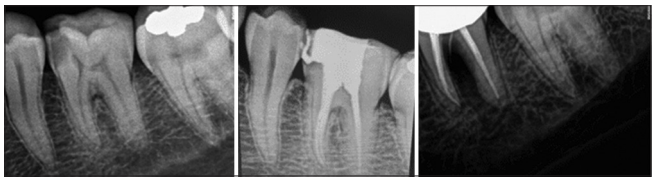

Figure 3: Radiographs showing pre-RCT, immediately after RCT, and 3 months post-RCT. RCT: Root canal treatment

Figure 4: Intraoperative picture showing intrabony defect in 36

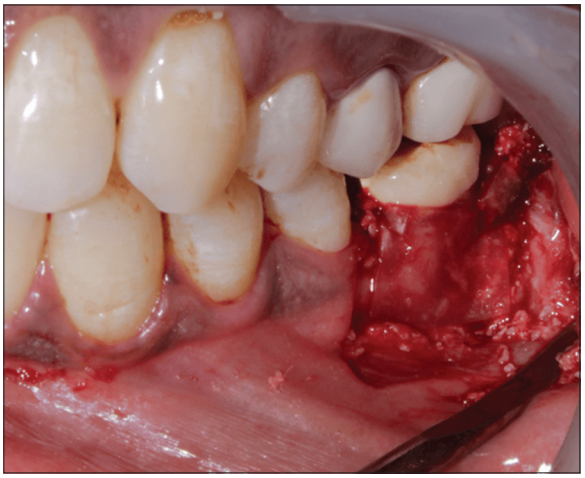

Figure 5: Intraoperative picture showing placement of bone graft mixed with iPRF and GTR in intrabony defect. iPRF: Injectable platelet-rich fibrin, GTR: Guided tissue regeneration

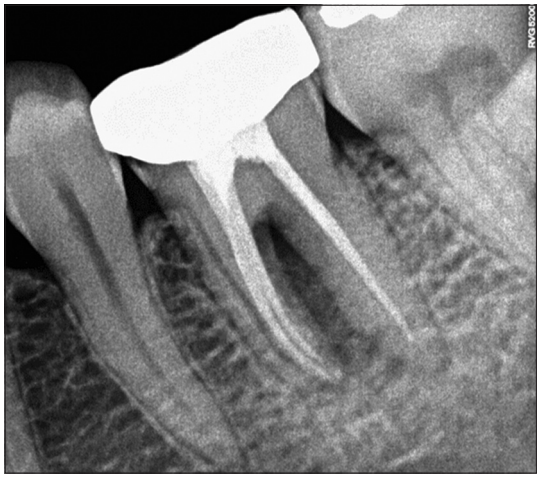

Figure 6: Three-month postoperative radiograph showing bone fill in furcation defect in 36

membranes with and without bone grafts in the treatment of intrabony defects. Better healing and regeneration were seen in combination therapy when compared to membrane placement alone.[37] When PRF and allogeneic graft was used for treating mandibular Grade III furcation defects, on a 12-month follow-up, it was found to be successful. The use of PRF in conjunction with a bone graft can improve the regeneration of Grade III furcation defects.[38]

Similarly, in another study, GTR and xenograft were used in the treatment of Grade III furcation involvement, showing successful regeneration and better soft-tissue healing.[39] The present case showed similar results using injectable platelet-rich fibrin (iPRF) along with the bone

graft. Despite minimal studies evaluating the effectiveness of furcation therapy in combination with GTR and various filling materials, there appears to be a tendency toward greater horizontal furcation resolution when combined therapy is used.

A grafting substance used in conjunction with GTR would serve as a scaffold to ensure clot stabilization and to supply and preserve space anytime the membrane has the potential to collapse, lowering the amount of space available for regeneration.[40] Murphy and Gunsolley, conducted a systematic review and found that adding augmentation materials to the physical barrier improves the regeneration of furcation defects.[41] This is in accordance with the present case, where successful regeneration was seen using GTR and bone graft.

CONCLUSION

The treatment of a mandibular Grade II furcation defect was successful in this case report utilizing the combination of iPRF, bone graft, and GTR membrane. It suggests that combination therapy it is possible that it will help with periodontal regeneration and wound healing. To substantiate the benefits of such biomaterials in the management of furcation problems, more major clinical trials and histological examinations are needed.

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.

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Conflicts of interest

There are no conflicts of interest.

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