

Management of endodontic-periodontic lesion with regenerative procedure: a split-mouth observational comparative case report

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Abstract

The proper diagnosis and treatment plan of endodontic-periodontic lesions is a clinical challenge. This lesion may have unusual presentation and may be present with absence of carious teeth, which makes it more difficult to diagnose. Though the radiographic investigations show periapical radiolucency, which suggests combined lesions, primary involvement is always difficult to diagnose. The treatment of such lesions is always difficult. Platelet-rich fibrin (PRF) is a concentrate from platelets widely used to accelerate soft and hard tissue healing. In addition, bioactive glass, an alloplastic bone graft, has a specific biological response, resulting in the formation of a bond between the tissues and graft thus facilitating bone healing. The purpose of this article is to present a case which was successfully treated by incorporating these novel grafting materials in regeneration of the intra-bony defects found in association with an endodontic-periodontic lesion.

Keywords: Bioactive glass, Bone graft, Platelet Rich Fibrin (PRF), Endodontic- Periodontic Lesion, Regeneration, Intrabony defects

Introduction

The pulp and the periodontium are in close inter-relationship. They communicate through dentinal tubules, lateral and accessory canals and apical foramen. The apical foramen is the most direct way of communication between pulp and periodontium, so infections from deep periodontal pockets reaching the root apex may affect the pulp or vice versa. However, the pulp won't be affected by inflammation until gingival recession opens the communication between the dentinal tubules, accessory and lateral canals towards the pulp. When one of these two tissues is infected, microorganisms circulate between them and the infection from one tissue may cause pathology of another or exacerbate the current disease.⁽¹⁾

According to Simon et al, endo-perio lesions are classified as:⁽²⁾

- Primary endodontic
- Primary periodontal
- Primary endodontic with secondary periodontal involvement
- Primary periodontic with secondary endodontic involvement
- True combined lesions.⁽²⁾

Depending on the type of lesion, root canal treatment or periodontal therapy or combined therapy is given. Correct choice of treatment technique is the key to successful healing. Proper shaping and three dimensional filling of root canal system are the imperatives. Periapical healing can be achieved with successful root canal therapy, but healing of periodontium is not predictable, it depends on severity and spread of combined lesions.⁽¹⁾

The goal of periodontal therapy is to arrest progression of periodontal disease as well as regeneration of vital tissues lost due to the periodontal disease. Several treatment options have been investigated for the management of infra-bony defects. It includes open flap debridement, bio-modification of the root surface and various regenerative procedures, including guided tissue regeneration and bone grafts. To overcome the healing limitation in the endodontic-periodontic lesion, the principles of tissue engineering have been applied by using a purified growth factor to stimulate the patient's own cells towards a regenerative response.^(3,4,5)

Recently platelet-rich plasma (PRP), a first-generation platelet concentrate has been used widely to accelerate soft tissue and hard tissue healing with promising results.⁽⁶⁾ Additionally, there are potential health related risks associated with the use of PRP.

PRF a second-generation platelet concentrate which was first described by Choukroun *et al*, in 2001 has caught the interest of the various specialties in field of dentistry. Its advantages over Platelet Rich Plasma include ease of preparation or application, minimal expense, and lack of biochemical modification (no bovine thrombin or anticoagulant is required). It is an autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines. Therefore, the purpose of this case report is to discuss the clinical and radiological outcome of true combined endo-perio lesion with severe bilateral bone loss in maxillary canine after regeneration using PRF.⁽⁷⁾

Case Report

A 42-year-old female outpatient reported to the Department of Periodontics complaining of pain and slight mobility in upper right and left front teeth region since 4-5 months. On intra-oral examination, inflammation of the attached gingiva with periodontal abscess with respect to maxillary right canine, lateral incisor and maxillary left canine, lateral incisor were evident. Clinically, the tooth was normal with no evidence of dental caries or trauma, but it was tender on percussion with severe pain and extrusion of pus from gingival sulcus. The presence of deep periodontal pockets measuring 15 mm (right maxillary) and 10 mm (left maxillary) were respectively found in the canine and the lateral incisors respectively. The teeth were found to be grade I mobile. Vital pulp testing was done using vitalometer to access the tooth vitality, which confirmed that the teeth were non-vital. Intra-oral peri-apical radiographs were taken that showed deep intra-bony pockets on the mesial aspect of the maxillary canines. Based on the clinical and radiographical findings, a diagnosis was made as a primary periodontal with secondary endodontic involvement.

Treatment Objectives and Plan: Treatment planning was done in accordance with the clinical examination and radiological investigations. The patient was in good systemic health with no contradiction to endodontic and periodontal surgical therapy. Endodontic treatment of the teeth was planned first. The endodontic treatment of the infected tooth included root canal opening, biomechanical preparation and obturation of canals with gutta-percha and glass ionomer sealer that was accomplished in three consecutive sittings and simultaneously periodontal therapy was started with

scaling, root planing and oral hygiene instructions. The patient was seen 1 month after the endodontic therapy giving enough time for healing of periapical lesion. Periodontal evaluation showed no significant changes so it was decided to do periodontal regenerative therapy using platelet rich fibrin with bioactive glass bone graft in relation to right maxillary teeth and only bioactive glass bone graft in relation to left maxillary teeth.

Surgical Procedure: Under local anesthesia (2% lidocaine with 1:1,00000 epinephrine), a full-thickness buccal and palatal mucoperiosteal flaps were reflected using intra-crevicular incision using periosteal elevator. After reflection, the defect was thoroughly debrided and examined. This was followed by irrigation with betadine and sterile normal saline jet sprays. After debridement, bioactive glass was placed in the bony defect to the level of the surrounding bone walls in relation to left maxillary canine and lateral incisor (Fig. 1) and with platelet rich fibrin mixed with bioactive glass bolus in relation to right maxillary canine and lateral incisor (Fig. 2). Care was taken not to overfill. The muco-periosteal flap was replaced and primary soft tissue closure of the flap was achieved by means of non-resorbable silk sutures.

Following the surgery, the patient was strictly instructed to avoid chewing on the operated site for the first two post-operative days. She was advised to maintain meticulous oral hygiene. The sutures were removed 7 days after surgery. Recall appointments were scheduled every month for first 3 months and then at 3 months and 6 months. The oral hygiene of the patient was checked and reinforced at every recall appointment.

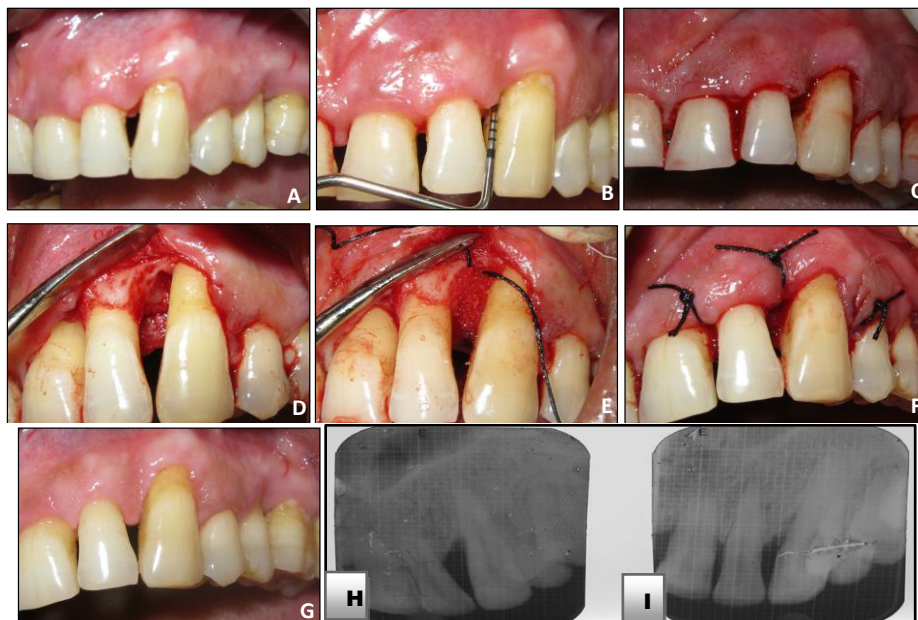


Fig. 1: A: Pre-operative clinical picture B: Probing Depth: 10mm C: Incision D: Reflection and Debridement E: Graft (Bioactive glass) in place F: Sutures taken G: Post-operative clinical picture H: Pre-operative Radiograph I: Post-operative Radiograph

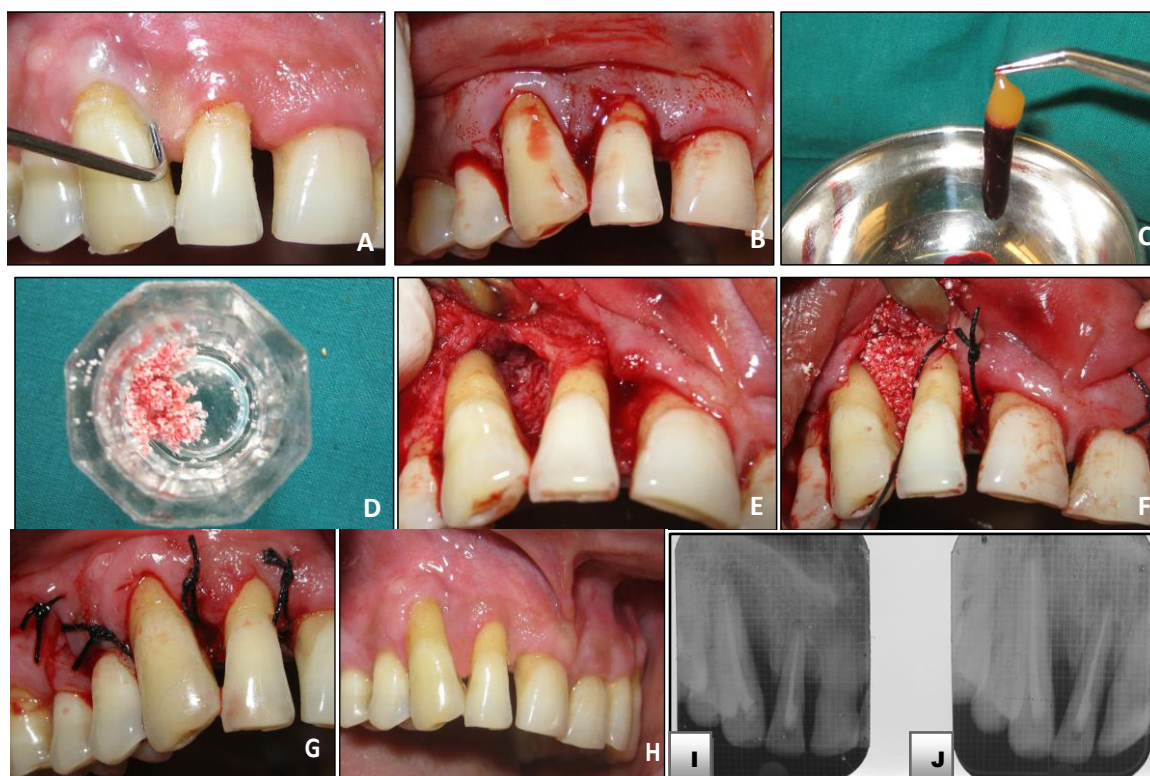


Fig. 2: A: Post-operative clinical picture probing Depth: 15mm B: Incision C: Platelet Rich Fibrin D: PRF mixed with bioactive glass bone graft E: Reflection and Debridement F: Graft (Bioactive glass) in place G: Sutures taken H: Post-operative clinical picture I: Pre-operative Radiograph J: Post-operative Radiograph

Treatment Outcome: Suture removal was done after 1 week of the surgery. Adequate healing was obtained. The patient faced no discomfort. The clinical appearance of periodontium surrounding tooth had improved considerably at the time of evaluation at 3 months and 6 months follow up. The probing depth had decreased considerably and was found reduced to 3 mm (left maxillary canine) and 4mm (right maxillary canine) respectively. Radiographic investigation showed significant bone filled in the defect. At 6 month follow up, considerable bone fill was achieved.

Discussion

Endodontic- periodontic lesions occur due to the communication of pathologic inflammation between the pulpal and periodontal tissues. The treatment of such lesions requires both meticulous root canal therapies along with regenerative periodontal procedure. The role of pulp pathology in etio-pathogenesis of periodontal destruction is not yet clear.

Regenerative procedures have emerged as the gold standard therapy to restore periodontal health and have become an important research topic. Bone regeneration is a multi-factorial process and requires a well-knit sequence of biological events which might include cell adhesion, cell migration, cell multiplication and cell differentiation.⁽⁷⁾ The advent of invention of various

regenerative materials and techniques has interested the researchers in the field of reconstructive surgery.⁽⁸⁾

Numerous studies have shown varying degrees of success of different forms of bone substitutes, guided tissue regeneration and growth factors. Although autogenous bone grafts are being considered as gold standard for grafting procedures; difficulty in procurement and need for an additional surgical site limits their usage.⁽⁹⁾

Bone grafts generally have one or more components of: osteoconductive matrix, which supports the ingrowth of new bone; osteoconductive proteins, which support mitogenesis of undifferentiated cells; osteogenic cells, which are capable of forming new cells. Bioactive glasses are alloplastic materials and act by osteoconduction and osteopromotion. Bioactive bone glass grafting particulate exhibits enhanced new bone formation that is many times faster as compared to hydroxyapatite

Numerous studies have shown that bone regeneration can be improvised by the addition of specific growth factors to the grafting procedure. Platelet rich fibrin was proposed as a method of introduction of various concentrated growth factors like platelet derived growth factor (PDGF), transforming growth factor beta 1 (TGF-B1), and Intrinsic growth factor 1 (IGF-1) to the surgical operative site, thus

enriching the natural blood clot to hasten wound healing and stimulate bone regeneration.⁽⁸⁾

Choukroun et al introduced platelet rich fibrin to overcome the limitations of plasma rich platelets for regenerative procedures. PRF represents a new step in the platelet gel therapeutic concept with simplified processing without artificial biochemical manipulation. It can be considered as an autologous healing biomaterial incorporating leukocyte, platelets and wide range of key healing proteins in a dense fibrin matrix.⁽⁸⁾ The only disadvantage of incorporation of PRF in the regenerative procedure includes the invasive procedure of blood sample collection and specialized equipment required for the procedure.

PRF in conjugation with bone grafts offers several advantages including promoting wound healing, bone growth and maturation, graft stability, wound healing and hemostasis, and improves handling properties of graft materials.⁽¹⁰⁾

Conclusion

Treatment with a combination of bioactive bone graft and platelet rich fibrin led to a significantly greater clinical improvement in intra-bony periodontal defects compared to bioactive bone graft alone.

Current case showed clinical parameters dramatically improved in both the cases whether it may be only bioactive glass or bioactive glass particulates combined with platelet rich fibrin as a grafting material. The combination graft showed better results in improvisation of probing depth and bone fill when compared to bone graft alone. Further studies should be done to justify and authenticate this case result.

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