



Management of a Large Periapical Lesion by Endodontic Surgery Using Platelet Rich Fibrin

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Abstract

Periapical lesion develops after the necrosis of the pulp tissue or extensive periodontal disease. The ideal desirable outcome of the nature of wound healing after endodontic surgery should be regeneration and not repair. The outcome depends on the nature of the wound, the availability of progenitor cells, signaling molecules and micro-environmental cues such as adhesion molecules, extracellular matrix and associated non-collagenous protein molecules. The purpose of this case report is to add knowledge to the existing literature about the use of Platelet Rich Fibrin (PRF) in the treatment of a large periapical lesion. A periapical endodontic surgery was performed on a 22 years old female patient with a swelling in the upper front teeth region and large periapical radiolucency. The surgical defect was filled with PRF and also a PRF membrane was applied as a barrier membrane over the defect before suturing. Clinical examination revealed uneventful wound healing. Radiologically the defect has been reduced and bony trabeculations are visible after three months. On the basis of the result obtained in our case, we

Hypothesize that the use of PRF in the body cavity as well as application of PRF membrane might have induced the rapid rate of bone formation.

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Introduction

Regeneration is defined as the reproduction or reconstitution of a lost or injured part of the body in such a way that the architecture and function of the lost or injured tissues are completely restored [1]. Post-healing, regeneration and not repair is the ideal outcome. Therefore, various regenerative approaches have been introduced with the primary aim of restoring the lost periodontal tissues including the bone and cementum [2,3]. The prerequisite and a key biologic requirement for bone regeneration is placement of barrier membranes. These are the materials that maintain a confined space, which is one of the key biologic requirements for bone regeneration [4-9]. Creation of a space after periapical surgery leads to proliferation and migration of cells from the adjacent tissues into this space. In order to ensure the growth of desired cells into this space and prevent cells from undesired tissues that have access to the space, membranes are placed. These membranes act as barriers and give selective preference to cells from desired tissues [2].

Platelet Rich Fibrin (PRF) is an immune and platelet concentrate with a specific composition. This has a three-dimensional architecture and physiologically all the constituents of a blood sample favor wound healing and immunity [10]. PRF comprises of a multitude of growth factors like Platelet Derived Growth Factor (PDGF), Transforming Growth Factor β 1 (TGF β 1), Insulin Like Growth Factor (IGF) etc., exhibiting varied potent local properties such as cell migration, cell attachment, cell proliferation and cell differentiation.

PRF has the capability of being utilized both as a healing and inter-positional inert barrier. It can be used to accelerate wound closure and mucosal healing wherever desired. This can be attributed to the fibrin bandage and growth factor release. It can also be used to avoid the early invagination of undesired cells, thereby acting as an inter-positional competitive inert barrier between desired and

undesired cells [10].

Case Presentation

An 18 years old female patient reported to the Department of Endodontics of a tertiary care setup, with the chief complaint of palatal swelling and pus discharge from upper front teeth. Dental history revealed an incidence of trauma to the upper front teeth 5 years ago. The patient was apparently normal 30 days back when she suddenly started having episodes of pain and discomfort. No relevant medical history was reported by the patient.

Once the detailed history was recorded, a thorough clinical examination revealed discolored tooth #21 and 22 without any fracture. Both the teeth were sensitive to percussion and radiographic examination revealed a huge periapical radiolucent area with respect to teeth #21 and #22 (Figure 1A). The treatment plan formulated was to complete the root canal therapy initially and to be followed by periapical surgery later.

Root canal treatment was performed using step back technique till an apical size of # 80 and #60 in relation to teeth #21 and #22 respectively (Figure 1B). The root canals were obturated by cold lateral condensation (Figure 1C). For periapical surgery a full thickness mucoperiosteal flap was reflected by a sulcular incision and two vertical releasing incisions. A periapical defect was seen with slight perforation of labial cortical plate (Figure 2A). A surgical round bur was used in slow speed under constant saline irrigation for osteotomy and an access was made for cyst enucleation. Tissue curettage was done at the defect site followed by thorough irrigation using sterile saline and betadine solution (Figure 2B). 20 ml of patient's venous blood was drawn into the tubes without anticoagulant and immediately

centrifuged at 3,000 rpm for 10 min for preparation of PRF which was placed into the defect site (Figure 2C). PRF membrane was prepared by compressing the gel between two layers of moist gauze and placed as a layer covering the edge of the defect (Figure 2D). Flap stabilization was done followed by suturing with a 3-0 black silk suture material (Figure 2E). Suture removal was done 1 week later with uneventful healing (Figure 2F). Patient was reviewed on monthly basis for three months, during which there were no symptoms of pain, swelling, or discomfort. There was radiographic evidence of bone deposition after three months (Figures 3A-3C).

Discussion

A blood clot being the host's own biologic product is indispensable in tissue wound healing. It is therefore, better space filler than any other natural or synthetic bone grafting material. A higher level of growth factors concentration as compared to a blood clot makes PRF suitable for rapid healing. Platelet Rich Fibrin (PRF) is a platelet concentrate. Its unique composition and structure favors wound healing and immunity [10].

The intended role of the PRF membrane in this case was to contain the blood clot and PRF in the bony defect in the early phase of wound healing. Advanced periodontitis with deep pocket formation has been found to be associated with chronic periradicular inflammation after endodontic surgery that results in subsequent failure of the root-end surgery [4]. The in growth of non-osteogenic tissues into the periradicular surgical site and down growth of epithelial tissue along the root surface have been attributed as the etiological factors leading to this failure.

Successful treatment may depend more on controlling epithelial

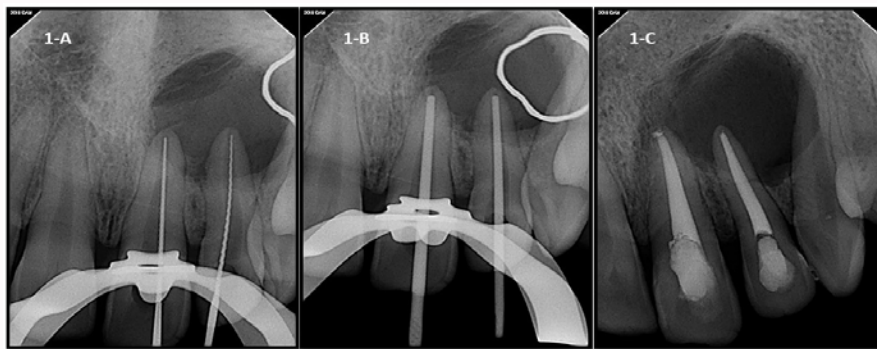


Figure 1: (A) Pre-operative and working length RVG (B) Master cone RVG, (C) Post obturation RVG.

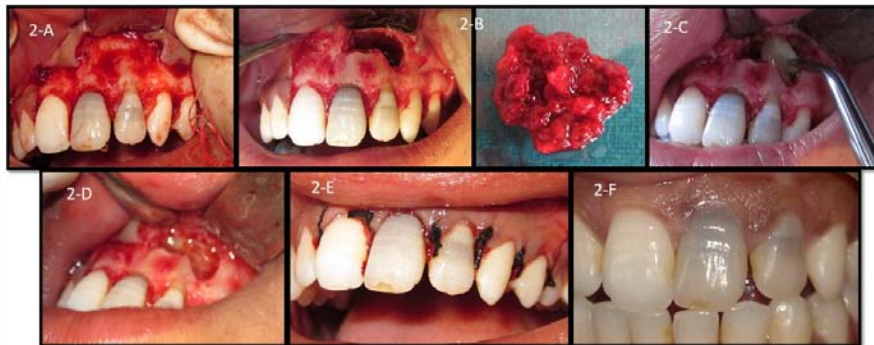


Figure 2: (A) Periapical defect with perforation of buccal cortical plate (B) Cyst enucleation and curettage (C) Placement of PRF in to bony defect (D) Placement of PRF membrane (E) Placement of sutures (F) Uneventful healing after suture removal.

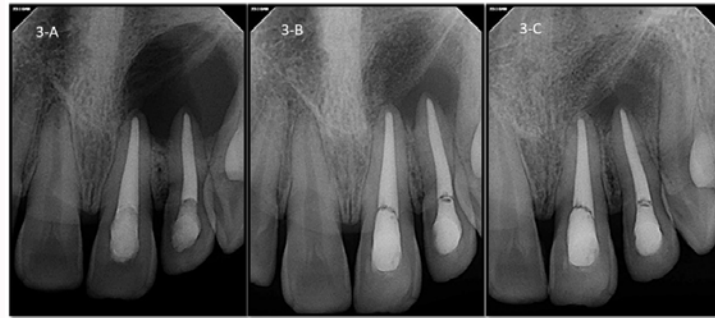


Figure 3: (A) RVG immediately after surgery (B) Healing after two months (C) Healing and appearance of bony trabeculations after three months.

proliferation than root end management. Guided tissue regeneration techniques have been advocated for use in such cases. Soft-tissue cells are considerably more motile than hard-tissue cells; therefore they tend to migrate into the wound more quickly during healing. The use of an absorbable barrier theoretically would allow PDL cells and other cells with osteogenic potential to repopulate the defect, resulting in new connective tissue attachment and bone formation.

Conclusion

Periradicular surgery, when indicated, should be considered as an extension of nonsurgical treatment, because the underlying etiology of the disease process and the objectives of treatment are the same i.e. prevention or elimination of apical periodontitis. The parallel development of new instruments and materials, along with a better understanding of the biology of wound healing, has made surgical treatment a viable alternative to extraction and tooth replacement rather than a treatment of last resort.

On the basis of the results obtained in this case report, it can be hypothesized that the use of PRF in the bony defect site as a graft and barrier membrane might have induced rapid bone formation that resulted in the clinical success of this case.

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