

Management of Recurrent Periapical Abscess with Platelet Rich Fibrin

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Abstract- In cases of recurrent periapical abscess occurring post peri-apical surgery, platelet rich fibrin presents a viable alternative to bone grafts for osseous defects. Bone grafts may act as a nidus in cases where there is incomplete removal of granulation tissue. It is a 2nd generation platelet concentrates, which is a natural scaffold, derived from an autogenous preparation of concentrated platelets from human blood. These case reports illustrate the use of PRF in management for recurrent periapical abscess following failed periapical surgeries with bone grafts.

Index Terms- Bone graft, Platelet derived growth factor, Platelet rich fibrin, Recurrent periapical abscess, Periapical surgery, Wound healing

I. INTRODUCTION

Chronic periapical abscess with draining sinus develops due to infection of necrotic pulp tissue which most of the time heals satisfactorily after non-surgical endodontic intervention [1]. Persistent chronic periapical abscess after non-surgical endodontic therapy requires surgical endodontics which frequently involves apicoectomy with placement of bone grafts to fill the defect and promote regeneration. Success of surgical endodontics with bone grafts depends on the reduction and complete elimination of the surrounding chronic inflammatory granulation tissue [2]. Placing of bone grafts in recurrent chronic periapical abscess can further act as nidus for infection and further bone loss may occur due to persistent infection [3]. Platelet rich fibrin presents a viable alternative in such cases. It is a 2nd generation platelet concentrate, that serves as a natural scaffold, derived from an autogenous preparation of concentrated platelets from human blood[4]. Leukocyte-platelet-rich fibrin (L-PRF) is a polymerized fibrin clot that contains a high number of platelets and leukocytes[5]. Platelets perform many other important functions other than simple homeostasis. Platelets contain important growth factors which promote collagen production, recruitment of progenitor cells at the injury site, initiate vascular ingrowth and induces cell differentiation which are crucial steps in wound healing[6]. These growth factors (GF) are released for at least 1 week [7] and up to 28 days, [8] thus serving as a bio-physiological scaffold in the process of wound healing.

The following case report describes the management of the chronic recurrent periapical abscess occurring post root canal treatment and peri-apical surgery with using PRF which acts as a

source of GF at the healing site, thereby accelerating soft and hard tissue healing[9,10].

II. CASE I

A 17 year old female patient, reported to department of Periodontology with chief complaint of pus release in respect to upper left lateral incisor region since 1 year[Figure 1a] . Patient gave a history of traumatic injury to the front teeth area three years back and had undergone periapical surgery with bone grafts twice in relation to 21 & 22 region followed by finally extraction of 22 six months back. On clinical examination there was pus draining sinus with respect to missing 22. Radiographic examination revealed ill-defined radiolucency at peri apex of 21 & 22 & sinus tract was traced to peri apex of 21 using gutta percha [GP] cone [Figure 1b]. Head and neck examination showed no palpable lymph nodes. Patients vitals were normal.

Patient was diagnosed as Chronic periapical abscess with respect to 21 & missing 22.

Management

The treatment plan consisted of removal of old gutta percha [GP] cone and placement of calcium hydroxide dressing. Periapical surgery was planned following remission of acute signs and symptoms simultaneously with root canal obturation and retrograde restoration in relation to 21.

Surgical phase - Local anaesthesia with 2% lignocaine was administered and sulcular incision around 21 region extending to the ridge of 22 with vertical incisions were placed. A Full-thickness mucoperiosteal flap was raised[Figure 1c]. A large defect was visible in the buccal cortical plate with 21 & 22, which was widened to facilitate thorough curettage of the granulation tissue[Figure 1d]. Root canal was obturated with gutta percha cone and retrograde restoration using GIC in relation to 21 was done. The surgical site was irrigated with betadine and sterile saline solution.

PRF was prepared [Figure 1e] in accordance to the Choukroun *et al* (2001) protocol. Prior to the surgery, 10 ml intravenous blood (by veni-puncture of the antecubital vein) was drawn into a sterile tube without anticoagulant which was centrifuged immediately in centrifugation machine at 2700 revolutions per minute for 12 minutes. PRF formed was detached from red blood corpuscles base [keeping a small red blood cell (RBC) layer] using a sterile tweezers & scissors. PRF clot

collected was left into sterile dappen dish for 10mins to release the serum contained in it.

The degranulated bony defect was then packed with PRF clot [Figure 1f] and wound closure was achieved using 4-0 prolene sutures [Figure 1g]. Nonsteroidal anti-inflammatory analgesics were prescribed. Post 72 hours of surgery the patient was instructed to use .12% chlorhexidine mouth wash for 7 days to maintain the oral hygiene. The sutures were removed post 7 days, and satisfactory healing was seen. On Recall visits at 3 and 6 months [Figure 1h], follow-up radiographs showed adequate bone regeneration in the defect [Figure 1i] along with good clinical healing.

III. CASE 2

A 44 year old male patient reported to department of periodontology with chief complain of pus release in respect to upper left central incisor region since nine months [Figure 2a]. Patient gave a history of traumatic injury to the front teeth area five years back and had undergone periapical surgery with bone graft placement twice in relation to 21 at one year and six months back. On clinical examination there was a pus draining sinus with respect to 21. Radiographic examination revealed ill-defined radiolucency at peri apex of 11 [Figure 2b] & sinus tract was traced to peri apex of 21 using gutta percha cone.

Head and neck examination showed no palpable lymph nodes. Patients vitals were normal. Case was diagnosed as Chronic periapical abscess with respect to 21.

IV. MANAGEMENT

The treatment plan consisted of removal of old gutta percha [GP] cone and placement of calcium hydroxide dressing. Periapical surgery was planned upon remission of clinical signs simultaneously with root canal obturation and retrograde restoration in relation to 21.

Surgical therapy- Local anaesthesia with 2% lignocaine was administered. Sulcular incision around 21 and 22 with vertical releasing incisions were placed and full thickness mucoperiosteal flap [Figure 2c] was reflected. The defect [Figure 2d] in the buccal cortical plate with respect to 21, was widened to facilitate thorough curettage of the [Figure 2e] of the unhealthy granulation tissue. Management of root canal-Root canal obturation with gutta percha cone and retrograde restoration using GIC in relation to 21 was done. The surgical site was irrigated with betadine and sterile saline solution.

The PRF was prepared [Figure 2f] as in case 1, following the protocol developed by Choukroun *et al* [2001].

The degranulated bony defect was then packed with PRF clot [Figure 2h] and wound closure was achieved using 4-0 prolene sutures [Figure 2g]. Nonsteroidal anti-inflammatory analgesics and chlorhexidine mouth wash was prescribed for a week. The sutures were removed post 7 days, and satisfactory healing was seen. On Recall visits at 3 and 6 months [Figure 2i] follow-up radiographs showed adequate bone regeneration in the defect [Figure 2j and k] and good clinical healing.

V. DISCUSSION

Periapical lesions are inflammatory reactions evoked due to irritants from infected root canal into the peri-radicular tissue. Depending upon the nature and quantity of irritants, duration of exposure, the lesion varies from simple periodontitis to granulomas, cysts or abscess. When nonsurgical root canal therapy fails to remove the lesion then surgery is the last option by which lesion is removed followed by placement of suitable bone graft substitute.

However, in cases of recurrent periapical abscess, which occur post peri apical surgery, bone graft may act as a nidus in cases with incomplete/difficult removal of granulation tissue.

The present case reports evaluated the clinical effectiveness of PRF in the management of recurrent periapical abscess post peri apical surgery.

PRF is a biological matrix of autogenous fibrin, rich in platelet and leukocyte cytokines. PRF provides the subsequent four advantages: First, the fibrin clot plays a mechanical role, by maintaining and protecting the site from epithelium invagination. Second, this fibrin network accelerates cellular migration of progenitor cells, particularly endothelial cells needed for the neo-angiogenesis (11) and vascularization. Third, the platelet growth factors (PDGF, TGF- α , IGF-1) which are slowly released as the physiological fibrin matrix resorbs, thus creating a perpetual healing process (12). Lastly cytokines and leukocytes in the fibrin network may have an important role in the regulation of infectious and inflammatory phenomenon (13).

VI. CONCLUSIONS

PRF is efficacious clinically and radiographically in the treatment of recurrent periapical abscess following peri apical surgery where bone graft substitute used may act as a nidus. PRF is an autologous preparation which is clinically effective and economical than any other available regenerative materials. Although the role of growth factors, ideal ratio of the components and the exact mechanisms, are still being investigated, and more clinical research with long-term results are needed. PRF will definitely revolutionize the surgical dentistry with its clinical efficacy.

Appendices

Appendix 1: Case 1-Fig 1a,1b, 1c, 1d, 1e, 1f, 1g, 1h,1i

Appendix 2 : Case 2-Fig 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h, 2i

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Pre -Operative

Appendix 1



Fig1a. Pus discharge from sinus i.r.t. missing 22 region



Fig 1b. Pre Operative IOPA Tracing of sinus tract using GP point



Intra -Operative



Fig 1c. Full thickness flap



Fig 1d. Bony defect post degranulation



Fig 1e. PRF- Preparation at 2700 RPM -12 Min



Fig 1f. PRF placed into defect



Fig 1g. Flap repositioned

Post -Operative 6 months



Fig 1h. Clinical View



Fig 1i. IOPA

Pre -Operative Appendix2



Fig 2a. Pus discharge from sinus i.r.t. 21 region



Fig 2b. Pre Operative IOPA

Intra -Operative



Fig 2c. Full thickness flap



Fig 2d. Bony defect & granuloma i.r.t. 21



Fig 2e. Bony defect post degranulation i.r.t 21



Fig 2f. PRF- Preparation. 2700 RPM -12 Min



Fig 2g. PRF placed into osseous defect



Fig 2h. Flap repositioned

Post -Operative



Fig 2i. View



Fig 2j. IOPA 6 months



Fig 2k. IOPA 8 months