

CASE REPORT

SURGICAL MANAGEMENT OF RADICULAR CYST AND USE OF PRF AND BONE GRAFT FOR ENDODONTIC REGENERATION: A CASE REPORT

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ABSTRACT:

Periapical surgery is required when periradicular pathosis associated with endodontically treated teeth which cannot be resolved by nonsurgical root canal therapy (retreatment), or when retreatment has been unsuccessful, not feasible or contraindicated. PRF has many advantages over platelet-rich plasma as it provides a physiologic architecture that is very favorable to the healing process, which is obtained due to the slow polymerization process. Being a rich source of growth factors, platelet rich fibrin (PRF) possess many advantages in bone regeneration. This paper discusses the clinical report of A periapical endodontic surgery which was performed on a 20 year old female patient with a sinus opening in the upper front teeth region and a large bony defect radiologically. The surgical defect was filled with a combination of PRF and HA bone graft crystals and sutured. Clinical examination revealed uneventful wound healing. The purpose of this case report is to present an attempt to evaluate the healing potential of the combination of PRF and Hydroxyapatite bone graft.

Key words: Radicular Cyst, Enucleation, PRF, Growth Factor, Wound Healing, Bone Graft.

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INTRODUCTION

Radicular cyst are inflammatory cyst of endodontic origin, known to be most common cyst in maxillofacial region. They arise from the cell rests of Malassez following pulp necrosis.¹

The incidence of radicular cysts is found to be highest in the third decade of patients' life and greater among men than women.^{2,3}

In apical surgery CBCT technology has evolved as a recent, commonly used diagnostic aid. Periapical lesions are often missed or unclear in conventional periapical radiographs because of superimposition

of cortical bone plates or other anatomic structures.⁴ Furthermore, the correct relationship of periradicular lesions to adjacent structures is seen in 3D imaging. The clinician can orient the reconstructed slices resulting in orthogonal views that are parallel or perpendicular to the long axis of the root under investigation

Demiralp reported that 24.5% of referred cases with radicular cyst required surgical intervention. Periapical surgery becomes the treatment of choice, if the root canal treatment cannot adequately eliminate periapical lesion.⁵

Healing of bone defect after invasive therapy always remains doubtful. In such cases endodontic regeneration can be achieved by using bone graft with barrier membrane, and growth factor promotes bone regeneration.

Recently, it was reported that PRF could stimulate cell proliferation of osteoblasts,^{6,7} gingival fibroblasts, pulp cells, and periodontal ligament cells, but suppress oral epithelial cell growth. These cell-type-specific actions of PRF may be beneficial for tissue regeneration

In order to maintain space for cell repopulation and for osteoconductive/inductive materials like bone grafts have been widely used Bone grafting materials have been used.⁸

CASE:

A 20-year-old female patient reported to the department of conservative dentistry and endodontics, KVG Dental College and Hospital Sullia with pus discharge, without swelling in the upper left front tooth region and there was no associated pain. Patient gives the history of root canal treatment i.r.t 21 and 22 three years back. Intraoral examination revealed acrylic crown i.r.t 21 and 22 and labial sinus tract (Figure 1).



Figure 1: Clinical View showing Tracking Sinus Using Guttapercha Cone

Sinus tracing using gutta-percha and intra oral periapical radiograph revealed 22 as the source of sinus tract (Figure 2). Radiographic examination revealed inadequate root canal fillings of left maxillary central, and gutta-percha was beyond the apex in the lateral incisors (Figure 3). In addition, a well-defined uni-locular apical radiolucency of size 2.5 x 1 cm i.r.t 21 and 22 region with well circumscribed sclerotic border was found.

From history, clinical and radiographic examinations a provisional diagnosis of infected radicular cyst was made.

The endodontic access was opened under rubber dam after removal of the acrylic crown (Figure 4). Previous gutta-percha filling was removed using Hedstrom files. A radiograph was taken to ensure complete removal of gutta-percha.

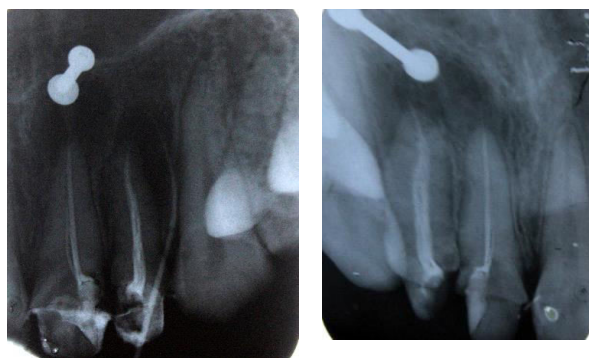


Figure 2: Radiographic view Figure 3: Preoperative radiograph



Figure 4: Access Opening Under Rubber Dam



Figure 5: CBCT view of lesion



Figure 6: Obturation radiograph

Gutta-percha extruded beyond the apex could not be retrieved with H-file and so was left to be removed during apical curettage. Canal was irrigated using 3.5% sodium hypochlorite followed by normal saline. The canal was dried with absorbent paper points and filled with calcium hydroxide. Calcium hydroxide dressing was repeated at the interval of 7 days for 2 weeks. The



Figure 7 (a-c): Incision With #15 Bp Blade

Raising Flap

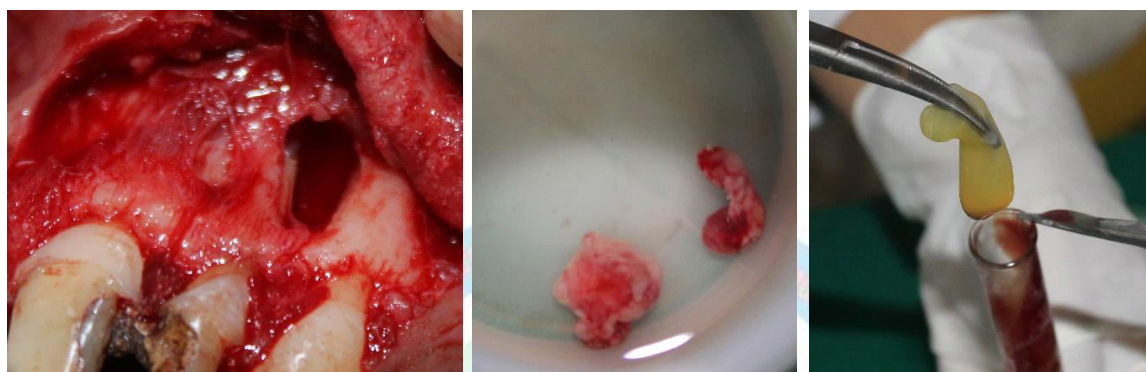
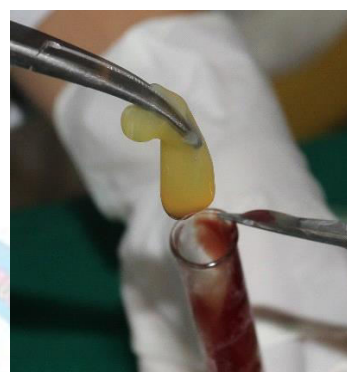


Figure 8: Curettage Of Defect



Figure 9: Tissue for histopathologic analysis



PRF

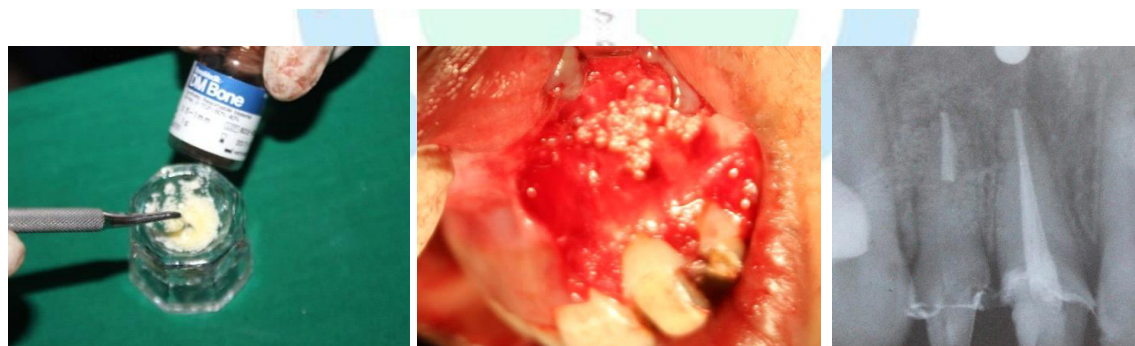
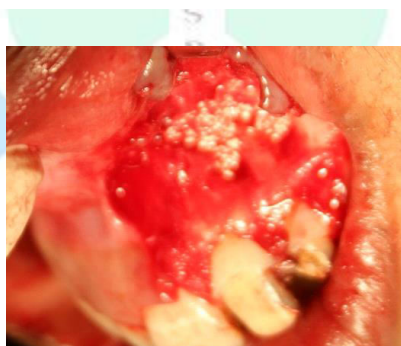


Figure 10: Hydroxyapatite (Ha) Bone Graft Radiograph



Bone graft and Prf placed in defect



Figure 11: Post Operative



Figure 12: Post Operative Clinical photograph

access cavity was sealed with a temporary restorative material at the end of each appointment. A pre-operative CBCT scan was done to evaluate extent of bone resorption (Figure 5). The results showed well defined radiolucency with corticated borders in the periapical region, measuring about 6.5 X 4.6 mm i.r.t 21 and 7.5 X 6.2 mm in diameter i.r.t 22 suggestive of periapical cyst, with an extended obturation material beyond the apex i.r.t 22. There was perforation of lingual cortical plate at the apical 1/3rd i.r.t 22.

After 2 weeks root canal was re-entered, working length was determined, cleaning and shaping done and the canal was obturated using gutta-percha (Figure 6). Then periapical surgery was planned under local anaesthesia.

A full mucoperiosteal flap was raised with a sulcular incision (Figure 7 a-c). Cystic fluid was clearly visible through the perforation. Cyst enucleation was carried out in toto, followed by curettage of the defect (Figure 8). This was followed by irrigation with sterile saline solution. Platelet-rich fibrin was prepared by drawing the required amount of blood into a 10 ml test tube without an anticoagulant and centrifuged immediately using a table top centrifuge for 12 min at 300rpm. A fibrin clot was formed in the middle part of the test tube, while the upper part contained acellular plasma and the bottom part contained red corpuscles. The fibrin clot was separated (Figure 9). Commercially available Hydroxyapatite (HA) bone graft crystals (Figure 10) were sprinkled over PRF gel and together the mixture was placed into defect site (Figure 11). Flap was repositioned by suturing using 3-0 black silk suture material (Figure 12). Patient was prescribed with antibiotic regime and 0.2% chlorhexidine gluconate mouth wash for period of 5 days. Suture removal was done after 1 week. Enucleated cystic lining was sent for histopathological examination which revealed non keratinized stratified squamous epithelium and areas of osteoid tissues Figure 13. Connective tissue was fibrous with dense infiltrate of inflammatory cells. The diagnosis of radicular cyst was confirmed.

DISCUSSION

The Historical triad, states that “debridement, disinfection and obturation” are important for success of root canal therapy,⁹ and in present case due to poor treatment there was no hermetic seal and as a result the existing lesion did not heal.

The diagnosis and determination of extent of periapical lesion was done using CBCT and OPG. Radiographic techniques like OPG and IOPA only

shows two dimensional images of three dimensional lesion,¹⁰ hence to overcome this CBCT was used. The lesion was provisionally diagnosed as chronic apical periodontitis following clinical and radiographic findings, and was given a final diagnosis of Periapical cyst along with the report of post-surgical histopathological analysis.

Surgical treatment followed by placement of suitable graft material is considered as an option when non-surgical root canal therapy fails in removing lesion.¹¹

Bone regeneration after the periapical surgery depends upon critical factors such as primary wound closure, angiogenesis as a blood supply and source of undifferentiated mesenchymal cells, space maintenance, and stability of the wound (PASS principle).¹² Use of bone graft is the most commonly used regeneration technique. Bone grafting materials include autograft, allograft, xenograft, and alloplasts. Alloplasts such as osteoconductive hydroxyapatite have been widely used in periapical surgery to enhance new bone formation.¹³ Within a short period after PRF introduction, It is been found to have a wide application in dentistry. It is commonly used to fill the surgical defects following periapical surgery as it has numerous advantages over other materials. It is an autogenous bone filling material, therefore shows minimal adverse reactions and can be easily prepared chairside by ‘Choukroun’s technique’. Another factor for the frequent use of PRF is its cost-effectiveness. PRF acts by enhancing body’s natural bone healing mechanism as it contains various growth factors like PDGF, TGF and IGF.¹⁴ Therefore surgical cyst enucleation was performed and the dead space was filled with a mixture of PRF and bone graft. Follow-up was done after 3 months, 6 months and 1 year which showed progressive healing with total resolution of signs and symptoms as well as the sinus tract.

CONCLUSION

This case report, concludes that PRF in conjunction with bone graft is effective in the treatment of large periapical bony defect. PRF is an autologous preparation which is found to be clinically effective and economical, than any other available regenerative materials. The use of PRF in conjunction with bone graft induced a rapid rate of bone formation. However, histological evaluation is required to examine the nature of newly formed tissue in the defect and long-term, double blinded randomized controlled clinical trial will be required to know the effect of this combination over their individual use for bone regeneration.

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