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SURGICAL MANAGEMENT OF A LARGE PERIAPICAL LESION: A CASE REPORT

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Introduction

Periapical inflammatory lesion is the response of bone around the apex of tooth that occurs after the necrosis of the pulp tissue or due to some peri-radicular diseases. Conventional non-surgical endodontics has shown a high degree of clinical success in most cases. Many authors and researchers have suggested use of calcium hydroxide for resolving large periapical lesions [1,2]. But out of the many periapical lesion cases, periapical surgery becomes inevitable for about 3% to 10% of them [3]. This is owing to the position of the lesion close to any important anatomical landmark or in cases of long standing traumatic teeth with well-developed cystic lining that cannot be treated non-surgically.

Regeneration is the reproduction of a lost or an injured part of the body in such a way that the architecture and function of the lost or injured tissues are completely restored. Bone graft allows faster regeneration and remodelling of osseous defects. PRF, on the other hand is a 2nd generation platelet rich growth factor that acts both as a scaffold and as centre for release of various growth factors that further improves bone healing. This case report, shows the bone



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regeneration ability of combined use of platelet rich fibrin (PRF) and bio-resorbable Demineralized Bone Matrix (DBBM) – Osseo graft in the treatment of a large periapical lesion.

History and Examination

A 26-year-old female patient presented to the department with a chief complaint of palatal swelling in her upper front tooth region in the last 2 weeks. The patient gave a history of trauma 14 years ago due to road traffic accident. Clinical examination revealed fractured and discoloured 11. An evident palatal swelling was observed in the palatal region. On palpation, the swelling was soft and fluctuant with evident egg shell crackling sensation suggesting presence of a Radicular cyst. Sensibility tests (Cold and EPT) revealed non-vital 11,12,13 and 14. Occlusal radiograph

apex in 11 and a
lesion with
borders
and 14.



revealed immature
large periapical
well-defined
involving 11,12,13



Figure 1: (A) Pre-Operative Clinical photograph- Labial View. (B) Pre-Operative Clinical Picture-Palatal View



**Figure 2: Pre- Operative Radiographs (A) and (B) Intraoral periapical radiograph (C)
Occlusal Radiograph**



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Cone Beam Computed Tomography revealed a large palatal defect extending up to the first premolar region of the 1st quadrant.

Figure 3: 3-D Reconstruction of Palatal Defect

Treatment Planning

Root canal treatment of decided. Surgical cyst followed by apicectomy, relation to 11,12,13,14 Bone graft for of the osseous defect.



11,12,13 and 14 was enucleation was planned retrograde filling in and use of PRF and accelerating the healing



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Case Description

Access opening in the above foresaid teeth were done followed by collection of the cystic fluid that drained from the teeth. The cyst was digitally decompressed allowing as much cystic fluid to escape from the patent root canals. The canals of the teeth were irrigated thoroughly with saline and open dressing was given. The patient was recalled after 2 days.

The teeth were cleaned and shaped with ProTaper Universal files. The canals were rendered dry followed by Roll cone obturation in 11 (open apex), lateral condensation in 12 and 13 (master cone size: 50, 0.04%) and single cone obturation in 14 (25, 0.08%). The case was posted for surgical management under general anaesthesia owing to the proximity of the lesion to the nasal floor.



Figure 4: Root Canal Treatment done

Prior to the surgery, 10ml of venous blood was drawn from the patient for the preparation of PRF (Platelet Rich Fibrin). Under general anaesthesia, surgical flap was elevated and the site of defect

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was exposed carefully. The pathological tissue was removed; the cystic lining was thoroughly enucleated. The extracted pathological tissue was sent for biopsy.

The osseous defect was thoroughly rinsed with saline. The root apices of the involved teeth were resected by approximately 2.5 to 3mm using a round bur. Using the same bur, root end preparation was done followed by placement of Biodentine as the retrograde filling. The freshly centrifuged PRF was now mixed with a bio-resorbable Demineralized Bone Matrix (DBBM) – Osseo graft and placed in the defect. A guided tissue regenerative membrane (Advanced Biotech Healguide) was used to hold the bone graft in place. The flap was approximated and sutured.

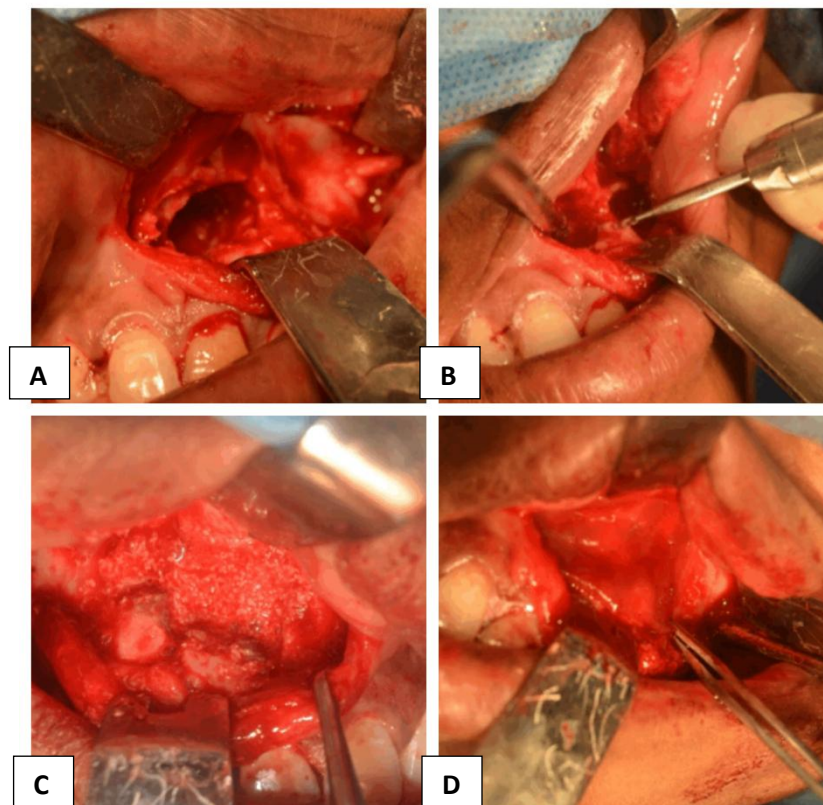


Figure5: Periapical Surgery (A) Surgical exposure of defect; Cyst enucleation (B) Apicectomy done (D) PRF + Bone graft mixture placed in the defect (E) GTR Membrane placed over the filled defect

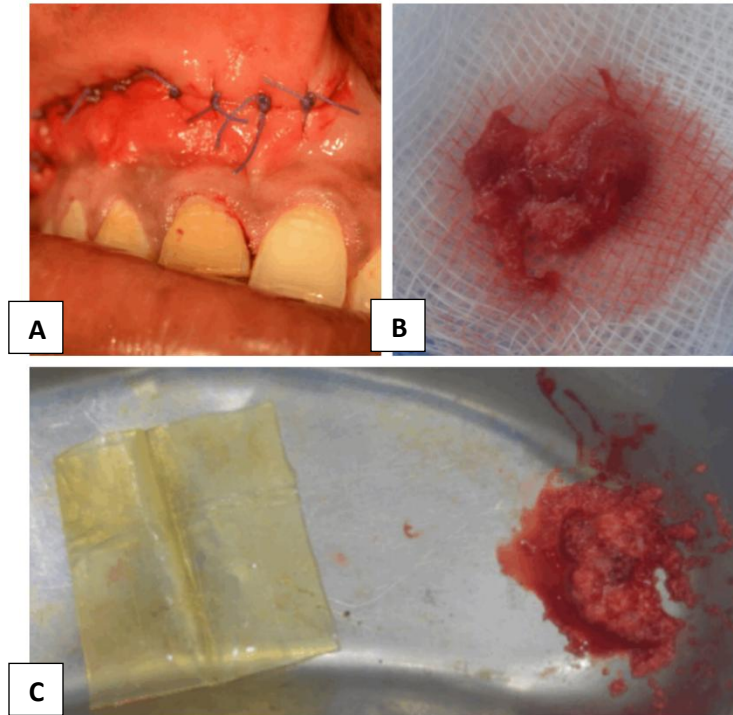


Figure 6: (A) Sutures given (B) Pathology sent for histopathology analysis (C) GTR Membrane and Bone Graft mixed with PRF used to fill the osseous defect

1-week post-operative occlusal radiograph reveals adequate bone fill. On clinical examination, the patient was asymptomatic with no palatal swelling.

22 months post-operative occlusal radiograph revealed good healing of the osseous defect.

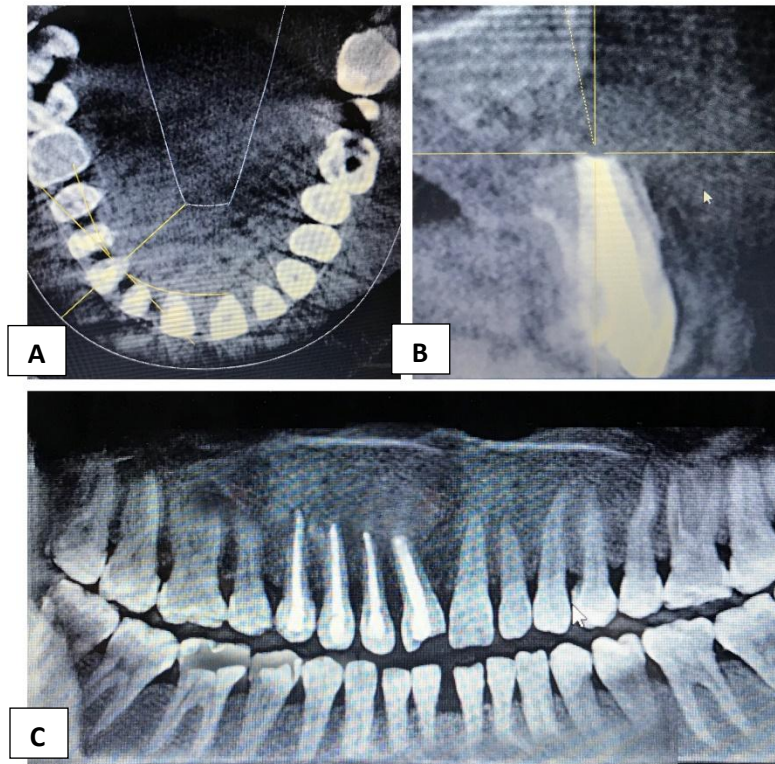


Figure 7: 22 Months Post-Operative CBCT (A) Axial view(B) Cross Sectional view

(C) Panoramic View



Figure 8: 3D Reconstruction Image: 22 months Post-Operative

Discussion

Periapical lesions are usually composed of solid soft tissue (granulomas) or they have a semisolid, liquefied cystic area (bay cyst or true cyst). Therefore, to diagnose these lesions the least dense area of the radiographic lesion should be measured [16-20]. The combination of PRF in platelet gel form along with bone graft promoted wound healing, bone growth, maturation, graft stabilization and homeostasis, leading to an overall improvement in the handling properties of graft materials. PRF is a concentrated suspension of growth factors found in platelets which are involved in wound healing and are known to be promoters of tissues regenerations [4,5]. Many authors had concluded that, combination of growth factors in PRF along with bone graft had increased the bone density in many clinical trials [6,7,8,19-20]. PRF is a rich source of PDGF, TGF and IGF. TGF known to stimulate biosynthesis of type-1 collagen, which induces



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deposition of bone matrix in vitro. PGDF is known to increase bone regeneration in calvarias defect when used along with bio-absorbable membrane as carrier [9]. IGF-1 is synthesized and secreted by osteoblast. It stimulates bone formation by proliferation and differentiation, all these factors along with epidermal growth factor, increases the growth factor of human osteoblast. [10, 11, 12-18] DMBM is believed to act as an osteo-conductive and osteo-inductive material and also as a bone growth promotor [6]. The DMBM was used in this study because the bone morphogenetic proteins (BMPs) present in it are osteo-inductive that is, they induce differentiation of mesenchymal cells into cartilage and bone [8-15]. In this case report the role of both PRF and DMBM was placed in the bony defect, the benefit being superior proliferation of human periosteal cells thereby enhancing bone regeneration [15]. Progressive proliferation mode of PRF coagulation results in increased incorporation of circulating cytokines into the fibrin mesh which further augments wound healing [15,21-25].

The retrograde filling used also plays an important role in the healing of the defect. Review of literature supports that mineral trioxide aggregate (MTA) due to its higher biocompatibility and sealing ability promotes better healing of the tissues when placed in contact with the dental pulp or periradicular tissues over the available root end filling materials. Recently, Biodentine has been gaining steady popularity owing to its shorter setting time and better handling characteristics [26-30]. The use of bone graft material along with PRF might have accelerated the resorption of graft and would have induced the rapid rate of bone formation. However histologically studies are required to examine the nature of the newly formed tissues in the defect and controlled long term clinical trials will be required to know the effect of this combination.



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Conclusion

In this case report, there was radiographic evidence of almost complete bone healing of the periapical bone defect using PRF and DMBM in the lesion site after 22 months post surgery. Thus, this combination has the potential to accelerate bone healing and regeneration.

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