



THE ROLE OF PRF IN MANAGEMENT OF RADICULAR CYST IN ANTERIOR MAXILLA: A CASE REPORT AND REVIEW OF LITERATURE

Oral & Maxillofacial Surgery

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ABSTRACT

Radicular cysts are the most common cysts of the jaws and are frequently found in maxillary anterior region due to increased propensity of this area to sustain trauma. Surgical management in recent years has included enucleation of the cyst with grafting of bony defect to attain predictable healing at faster rate. Platelet rich fibrin (PRF) has generated interest in the surgical community due to its regenerative properties and ability to aid wound healing. It is also easily produced chairside from patient's own blood without addition of anticoagulants and can be made with limited armamentarium. Here, a case report of a 46 year old male with radicular cyst in anterior maxilla is discussed which was managed with grafting with PRF.

KEYWORDS

PRF, cyst, maxilla, biomaterial

INTRODUCTION:

In recent years, research has been focused on accelerated healing of both soft and hard tissues and the role of various mediators in this process.^{1,2} Platelets have since become a subject of interest as their role in immune regulation, wound healing, angiogenesis and promotion of bone growth has been recognized.^{1,3} Platelet rich fibrin is a second generation autologous platelet concentrate that was first developed in France by Choukroun et al for specific use in oral and maxillofacial surgery.⁴ PRF protocols require neither anticoagulant nor bovine thrombin; activation occurs naturally during collection. Since introduction, PRF has provided a reliable means of regeneration in endodontic defects with ease of availability and fabrication, especially in distant areas with restricted access to advanced materials.

Case report:

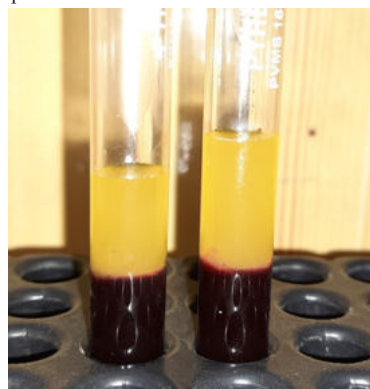
A 46 year old male patient reported with a painless swelling of anterior maxilla with a history of trauma to the area in childhood. Clinical examination showed discolored maxillary central incisors and mild palatal swelling in anterior maxilla. Radiographic examination showed incomplete root canal fillings in teeth no 11 and 21, and well defined corticated radiolucency associated with apices of 11,12 and 21. Endodontic retreatment was performed by removing the remaining gutta percha, cleaning of canals and copious irrigation with 5% sodium hypochlorite. Root canals were subsequently obturated and radiographs were taken to confirm satisfactory obturation.

For surgical management of cystic lesion, after local anaesthetic administration, a sulcular incision was placed from 13 to 23 with a vertical releasing incision distal to 13 and triangular mucoperiosteal flap was raised to expose the thin cortical bone and cystic lesion. The bony window was created by removing overlying cortical bone and cystic lining was enucleated. After verification of complete removal of entire cystic lining, apicectomy of root apices was carried out by removing 2-3 mm of root end and retrograde restoration was done with GIC.



Picture 1: defect after cyst enucleation and apicectomy

For PRF fabrication, blood samples were collected in 5 ml glass tubes without anticoagulant and centrifuged at 3000rpm for 10 min. A fibrin clot formed between the bottom layer of red blood corpuscles and top layer of acellular plasma was collected. PRF from one glass tube was packed into the defect while from the other was compressed into a membrane and applied over the defect. Closure of the mucoperiosteal flap was then performed with 4-0 Prolene sutures.



Picture 2: separated blood components after centrifugation



Picture 3: placement of PRF in defect

Diagnosis of radicular cyst was confirmed histopathologically and patient was followed up for a period of 1 year, during which no untoward clinical symptoms were noted and radiographs showed satisfactory bone healing.

DISCUSSION:

Periapical, or radicular, cysts are the most commonly found cysts of the maxillofacial region and are inflammatory in origin.⁵ They arise from rest cells of Malassez, remnants of Hertwig's epithelial root sheath present in the periodontal ligament due to pulpal death and necrosis.⁶

They are most commonly seen around the apices of maxillary anterior teeth, and quite often, they remain behind in the jaws after removal of the offending tooth.⁵ Surgical intervention aims to eliminate the pathology and obtain bone regeneration of the surgical defect and healing of periapical tissues. Treatment options include endodontic treatment or extraction of offending tooth and marsupialization or enucleation of the cyst, resulting in tissue repair. This has led to the use of various regenerative procedures including barrier membranes and graft materials, that have predictably shown better healing and bone regeneration of surgical defects.^{7,8}

Although autologous platelet concentrates have been around since 1950s, when the term PRP was coined by Kingsley to describe a platelet concentrate,⁹ interest in maxillofacial surgery increased after Marx showed that PRP can be an osteoinductive force by retaining a high concentration of PDGF and TGF beta, resulting in a radiographic maturation rate 1.62 to 2.16 times that of grafts without platelet-rich plasma.¹⁰

Choukroun's PRF, introduced in 2000, is a leukocyte and platelet rich fibrin biomaterial with a specific composition and three-dimensional architecture. PRF is classified as a second-generation platelet concentrate as it is prepared as a natural concentrate without the addition of any anticoagulants.^{11,12}

PRF provides an autogenous source of graft material without the disadvantage of donor site morbidity. It aims to preserve those components of whole blood that promote wound healing at much higher concentrations than those found physiologically into the wounds in a fibrin matrix. This fibrin matrix provides a scaffold for the platelets and leukocytes, and their growth factors, which get released into the wound as it heals.

Since then, variants like sticky bone (autologous fibrin glue mixed with bone graft) by Sohn, advanced PRF (A-PRF) by Choukroun, and injectable PRF (I-PRF) by Muorao have been introduced.^{11,13}

PRF production protocol attempts to accumulate platelets and released cytokines in a fibrin clot. Granules present in platelet contain many proteins, which may be platelet specific (eg. beta-thromboglobulins) or non platelet specific (fibrinectin, thrombospondin, fibrinogen, and other coagulation, growth promoters, fibrinolysis inhibitors, immunoglobulins etc).¹⁴ Also phospholipids double layer of platelet membrane constitute many receptors for other molecules. Growth factors released by alpha-granules encompass a group of cytokine polypeptides with relatively low molecular weight ranging from 6 to 45 kDa. release of the cytokines (IL-1 beta, IL-6, TNF-alpha) and growth factors (TGF beta 1, PDGF, VEGF, EGF) stimulates cell migration and proliferation within the fibrin matrix and thus begins the first stage of healing.¹⁵

Standardization of production protocol and procedures is necessary for obtaining reproducible results. Lolas et al have found in their systematic review that centrifugation protocol of 3000 rpm x 10 minutes or 2700 rpm x 12 minutes is the most commonly used.¹⁶

Since introduction, the technique has found applications in implantology, bone defects, in maxillary sinus lift, cleft reconstruction, exodontia, and soft tissue grafting.¹⁷⁻²² Much of the evidence comes from periodontologists who have shown clinically significant results in bone growth of intrabony defects.¹³

Mazor et al have shown that PRF membranes, grafted into sinus membrane, in direct sinus lift resulted in 7 mm of bone growth at 6 months.²³ Garg et al and Del Corso et al have shown good results with PRF placement around implants.^{18,20} Dhote et al reported a case of radicular cyst which was grafted with PRF and showed complete bony healing at 2 years.²²

PRF is a biomaterial with growth potential that can be produced with limited armamentarium and is completely autologous, without any addition of anticoagulants. It provides a means for surgeons located in areas with limited resources to treat cases with bone defects, without referral to higher centers that requires funding and leads to loss of manpower.

CONCLUSION:

There are many case studies showing beneficial effects of PRF and

favor its use over control groups. However, there are many PRF protocols without standardization. Standard PRF protocols need to be determined and more randomized controlled trials to be conducted to determine surgical indications, efficacy, and long term effects.

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