

CASE SERIES

# Platelet Rich Plasma (PRP) Augmentation: A Novel Approach in Management of Radicular Cyst Present at Different Locations within Jaw: A Case Series

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## **ABSTRACT**

Periapical cysts are inflammatory cysts that developed due to caries and trauma of the involved tooth. Usually, the tooth becomes nonvital with pain, swelling, and sinus formation. On radiographic examination these cyst shows radiolucency around the apex of the involved tooth. On aspiration straw colored inflammatory fluid with or without pus comes out suggestive of a radicular cyst. Surgical removal with curettage of the lesion, apicoectomy, and root canal treatment should be performed to treat the lesion. Excised cavity can be augmented with PRP (Platelet rich plasma) or PRF (Platelet rich fibrin) for better healing of the lesion. This case series reported 3 such cases and their treatment with follow-up.

## **KEYWORDS**

Radicular cyst; Apicoectomy; Curettage; Platelet rich plasma

## **ABBREVIATIONS**

PRP : Platelet Rich Plasma

RCT : Root Canal Treatment

## **INTRODUCTION**

Odontogenic cysts are pathological cavities, that may or may not be filled with fluid and associated with any tooth [1]. A radicular cyst is the most common inflammatory odontogenic cyst associated with nonvital tooth originating from epithelial remnants of the periodontal ligament [2]. They are the most common of all jaw cysts and comprise about 52.3% to 68% of all cysts affecting the mandible [3]. Males are more commonly affected by it.

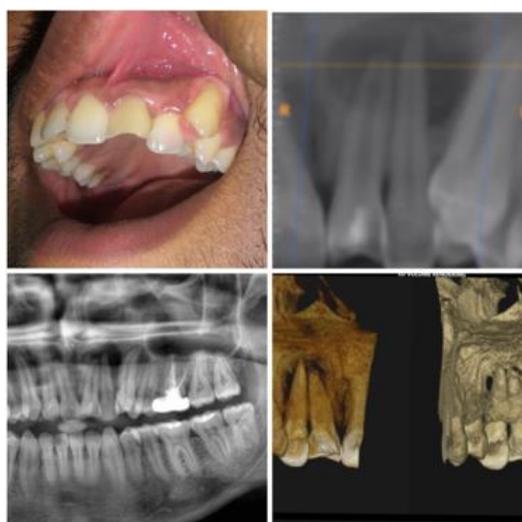
Caries and trauma are the most common etiological factor associated with it [2]. Diagnosis can be done by history, clinical examination, and proper radiographs. Patients may complain of pain and swelling with or without sinus formation. On vitality testing, the tooth may show a negative response. The radiograph reveals periapical radiolucency with a well-defined border associated with the affected tooth [4].

Treatments for radicular cysts include total enucleation in case of small lesions, marsupialization for decompression of larger cysts, or a combination of the two techniques followed by root canal treatment of the affected tooth. Inflammatory cysts do not recur after adequate treatment [3]. Platelet rich plasma (PRP) is a new approach for tissue regeneration in maxillofacial surgery. Commonly, PRP is used in a gel formulation, which is formed by mixing PRP (derived from the centrifugation of autologous whole blood) with thrombin and calcium chloride. PRP gel includes a high concentration of platelets and a native concentration of fibrinogen [5]. This case series describes the surgical enucleation of a large radicular cyst aimed at preserving the vitality of the associated teeth with augmentation using Platelet Rich Plasma (PRP) and the results of long-term follow-up.

## **CASE PRESENTATION**

### ***Case 1***

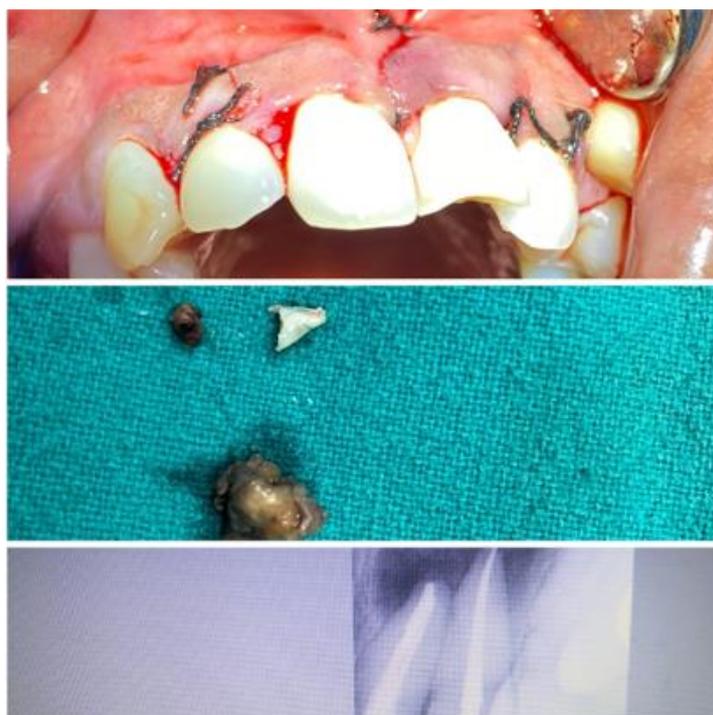
A twenty-eight years male came to the department with the chief complaint of a discoloured front upper tooth (Figure 1A). On history taking he explained about the football trauma that happened 3 years back. On radiographic examination, periapical radiolucency was seen w.r.t 21 and 22 (Figure 1B and Figure 1C). On CBCT examination the lesion was 2 cm × 4 cm involving 21 and 22 extended palatally (Figure 1D). Based on these findings a diagnosis of the periapical cyst or radicular cyst was made. Surgery was planned after a thorough blood examination. Surgical excision was done with curettage of the lesion (Figure 2A and Figure 3). MTA apexification was done (Figure 2B) followed by platelet rich plasma (PRP) was placed in the cavity which was obtained from the patient (Figure 2C - Figure 2D). Silk 3.0 sutures were placed postoperatively (Figure 3A and Figure 3B). Endodontic treatment was done w.r.t 21 and 22 in follow up period (Figure 3C). On follow up examination the healing was uneventful.



**Figure 1:** A) Preoperative clinical picture showing discoloured crown w.r.t. 21, B) Preoperative intraoral periapical radiographs showing radiolucency of size 2 cm × 4 cm involving 21 and 22, C) OPG showed periapical radiolucency w.r.t. 21 and 22 and root canal treated 26, D) CBCT showed tooth 21 and 22 infected with radicular cyst extended palatally, erosion of palatal bone present.



**Figure 2:** A) Intraoperative picture showing cyst enucleation w.r.t. 21 and 22, B) Apicoectomy followed by MTA apexification done w.r.t. 21 and 22, C) Platelet rich plasma (PRP) obtained from the patient, D) Intra - operative picture after PRP placement.



**Figure 3:** A) Silk 3.0 suture placed in anterior region, B) Excised enucleated cyst along with apical part of the tooth, C) MTA apexification with root canal treatment done w.r.t. 21 and 22.

### Case 2

A 30-year-old male reported with the chief complaint of labially moved lower front tooth for a few months (Figure 4A). On history taking, he talked about the fall from his bicycle 1 year back. The patient did not take treatment then. On examination, tooth 41 was labially displaced and 42 was discoloured (Figure 4A). Intraoral periapical radiographs showed radiolucency involving 31, 41, and mesial aspect of 42 (Figure 4B). On CBCT examination

lesion was 2 cm × 2 cm extended from 31 to 42 (Figure 4C and Figure 4D) and 41 was labially displaced (Figure 4C). A radicular cyst was diagnosed after thorough clinical and radiographic examination. Surgical removal of the cyst was done (Figure 5A - Figure 5D) and the lesion was curettage well and augmented with PRP (Figure 5B and Figure 5C). MTA apexification was done along with root canal treatment w.r.t. 31, 41 and 42 (Figure 6A). Silk 3.0 sutures were placed (Figure 6B). On follow-up examination there was no fresh complaint associated with the tooth.



**Figure 4:** A) Preoperative photograph showing labially moved lower 41 and discoloured 42, B) Intra Oral Periapical radiograph showed periapical radiolucency of size 2 cm × 2 cm present w.r.t. 41 and 42, C) Panoramic radiographs showed labially moved 41, D) CBCT showed periapical radiolucency w.r.t 31, 41 and 42.



**Figure 5:** A) Surgical excision of the cyst w.r.t. 41 and 42, B) PRP placed in the enucleated cavity w.r.t. 41 and 42, C) Intraoperative picture after PRP placement, D) Excised tissue.



**Figure 6:** A) Root canal treatment done w.r.t. 31, 41 and 42, B) Silk 3.0 suture placement.

### Case 3

A 22-year-old male complained of discomfort in his upper front teeth. On examination, an intraoral sinus was present w.r.t. 11 (Figure 7A). On the Gutta-percha test, the concerned tooth was 11 with periapical radiolucency of 2 cm × 3 cm (Figure 7b). Based on history and clinical examination, a diagnosis of radicular cyst w.r.t. 11 was made. Root canal treatment was done w.r.t. 11 (Figure 8) along with apicoectomy was performed w.r.t. 11 (Figure 7C). Silk 3.0 sutures were placed (Figure 7D). On follow up examination the lesion was healing with no fresh complaint observed.



**Figure 7:** A) Preoperative clinical picture showed sinus w.r.t. 11, B) Gutta percha test showed non vital tooth w.r.t 11, C) Periapical surgery and apicoectomy was done w.r.t 21, D) post-operative picture after suture placement.



**Figure 8:** Root canal treatment with apicoectomy performed w.r.t. 11.

## **DISCUSSION**

The radicular cyst is classified under inflammatory cyst as a result of the foremost case involves caries and trauma followed by pulp necrosis. These cysts can occur in the periapical region of any teeth, at any age but are seldom seen associated with the primary dentition [6]. Swelling, tenderness, tooth mobility, and a whitish tinge caused by buccal expansion of the cortical plates are the consequences of untreated radicular cyst. Moreover, displacement of the successor's tooth might occur with the loss of its vitality [7,8].

The pathologic process of radicular cysts has 3 distinct sections: The phase of initiation, the phase of cyst formation, and also the phase of enlargement [9]. Radiographically, most radicular cysts seem as spherical or pear-shaped unilocular radiolucent lesions within the periapical region. The cysts might displace adjacent teeth or cause delicate root resorption. Radiographically, characteristic difference between a neoplasm, granuloma and a cyst are not possible, though some say that if the lesion is larger than 2 cm it's additional doubtless to be a cyst [10].

Microscopically, all radicular cysts are lined fully or partially by nonkeratinized stratified squamous epithelial tissue. These linings could or might not be discontinuous and one to fifty cell layers thick. Microscopic histopathological examination confirms the diagnosis [10].

The treatment of radicular cyst, as a disease of root canal infection, consists of eradicating microbes or substantially reducing the microbial load from the root canal and preventing reinfection by orthograde root filling. The prognosis of the treatment is remarkably sensible or else, a root canal filling could also be performed in association with apicoectomy to allow direct operation of the cystic lesion. Different choices are surgical removal, enucleation and marsupialization of the jaw cysts is treated through nasal antrostomy (Caldwell-Luc procedure) [11].

Recently, the use of PRP has been proposed in dentistry. Platelet-rich plasma gel is formed by mixing PRP (derived from the centrifugation of autologous whole blood) with thrombin and calcium chloride. Adding thrombin and calcium chloride to PRP automatically activates the alpha granules to release the following biological growth factors: platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF- $\beta$ ), vascular endothelial growth factor (VEGF), insulin-like growth factor I, epidermal growth factor (EGF) and epithelial cell growth factor[5].The therapeutic strategy of this approach is to promote the process of tissue repair, improving the quality of healing and healing time [12]. According to Celio-Mariano et al. (2012) showed a greater radiographic bone density in the PRP group, thereby demonstrating a significant improvement in bone healing in the sockets after extraction of mandibular third molars as compared to the control group [13]. In our cases, post-operative bone healing was good with less pain and swelling.

## **CONCLUSION**

These three clinical cases of radicular cyst present at different locations were managed successfully by endodontic therapy followed by surgery. Apicoectomy was performed where the root apex was involved. The treatment of the radicular cysts should be decided according to the clinical and radiographic evaluations according to each case.

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