

Surgical Management of Radicular Cyst Using Platelet Rich Fibrin: A Case Report

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ABSTRACT

Background: Traumatic injuries commonly affect the anterior teeth leading to slow death of the pulp. This may give rise to a periapical or radicular cyst which results from the proliferation of cell rests of Malassez following pulpal necrosis of a non-vital tooth. Radicular cyst or periapical cysts are the most common cystic lesions in the jaw. It is common odontogenic cyst. Around 60% of all jaw cysts are radicular cyst. This condition is usually asymptomatic but can result in a slow-growth tumefaction in the affected region. They found mostly near apex of teeth. Most radicular cysts are smaller size of around 1.5 cm, but they can even extend up to 5.6 cm. On radiography the lesion can be seen as a round or oval, well circumscribed radiolucent lesion in periapical region attaching the affected tooth root. This case reports presents the successful surgical and endodontic management of large infected radicular cyst involving the anterior teeth of maxilla. Pathogenesis, clinical features, and treatment option are discussed.

Keywords: Trauma, Radicular Cyst, Retrograde MTA, PRF.

INTRODUCTION

Cyst is defined as a pathologic epithelium lined cavity usually containing fluid or semi-solid material. Odontogenic cysts are derived from the epithelium associated with the development of dental apparatus. Several types of cyst may occur depending on the stage of odontogenesis during which they originate. Odontogenic cysts are derived from 1) Tooth germ 2) Epithelial rests of malassez 3) Reduced enamel epithelium of a tooth crown 4) Remnants of dental lamina or 5) possibly the basal layer of oral epithelium¹. Radicular cyst is the most common odontogenic cyst which arises from epithelial cell rests of Malassez which proliferate by an inflammatory process originating from pulpal necrosis of a non-vital tooth. This condition is

usually asymptomatic but can result in a slow-growth tumefaction in the affected region².

They are most commonly found at the apices of the involved teeth, however they may also be found on the lateral aspects of the roots in relation to lateral accessory root canals³. These cysts can occur at any age in the periapical area of any teeth, but are rarely associated with the primary dentition⁴. The incidence of radicular cysts is found to be highest among patients in their third decade of life and greater among men than women⁵.⁶ Shear also reported that they have particularly high incidence in the maxillary anterior region, presumably as a result of trauma². On a radiograph, the cyst appears as a unilocular or multilocular with radiopaque periphery of dense sclerotic bone. Patient often complains of slowly enlarging

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swellings. The treatment options for radicular cyst can be surgical treatment like enucleation when lesion is large and conventional root canal therapy when lesion is localized and small⁷.

To encourage the growth of key surrounding tissues Endodontic regenerative procedures frequently include the use of barrier membranes and bone grafting materials⁸. Platelet-rich fibrin (PRF) described by Choukroun et al. is a second-generation platelet concentrate that allows one to obtain fibrin membranes enriched with platelets and growth factors⁹. The PRF clot forms a strong natural fibrin matrix, which concentrates almost all the platelets and leucocytes of the blood harvest and creates a complex architecture as a healing matrix, including mechanical properties no other platelet concentrate offers^{10,11}. Recently, we reported that PRF could stimulate cell proliferation of osteoblasts, gingival fibroblasts, pulp cells, and periodontal ligament cells, but suppress oral epithelial cell growth^{12, 13, and 14}. These cell-type-specific actions of PRF may be beneficial for tissue regeneration.

The aim of this case report is to describe two cases of radicular cysts in the maxillary anterior region that were individually managed, depending on the underlying etiology, by using an interdisciplinary approach including nonsurgical restorative and endodontic therapy followed by surgical management with PRF.

CASE REPORT

A 42 year old male patient reported to the Department of Conservative Dentistry & Endodontics, MIDSAR Dental College & Hospital, and Latur with the chief complaint of pain and swelling in the upper front teeth region of jaw. He gave a history of trauma 7 years back for which no treatment was sought. Post trauma, he had pain in relation to maxillary central incisors which subsided after 1 week on its own. He gave a history of swelling along with pus discharge from gums since last 3-4 months.

On intra oral examination a swelling was present in the palatal region, which was extending from 21 to 23 regions measuring 2.5 x 3 cm (fig.1). Swelling was soft and fluctuant in nature. Electric and thermal pulp vitality testing showed negative

response in 21 and 22 while adjacent teeth showed normal response. Teeth were painless to vertical percussion. Initially an IOPA was taken to know the extent of lesion which revealed a lesion involving periapical region of 21 and 22 regions (fig.2). A fine needle aspiration of the swelling showed a discharge containing pus and blood. From the History and Clinical examination a provisional diagnosis of infected radicular cyst in 21 and 22 was made. An endodontic therapy was planned with respect to 21 & 22 for which consent was taken from the patient. Repeated calcium hydroxide dressings were given at an interval of 5 days for 1 month. Preformed radio-opaque calcium hydroxide paste (Metapex) was introduced intentionally into the periapical region and the whole canal was filled with this paste (fig.3) obturation was carried out with 21 & 22 (fig.4)

The procedure is as follows: After administration of local anesthesia crevicular incision was given which extends from 11 to 23 regions. A full thickness mucoperiosteal flap was reflected and irrigated with normal saline (fig.5). Large palatal bone resorption was present on the site. Complete curettage and enucleation of cyst done. For apicoectomy trapezoidal flap which extends from 12 to 23 region and site was exposed. Complete curettage done and granulation tissue was removed (fig.6). Root end of involved teeth are resected (fig.7) and retrograde filling was done with MTA (fig.8) This case is a good example of a large lesion been treated with conventional RCT and cyst enucleation with the use of materials which enhance bone regeneration like Platelet Rich Fibrin (PRF). Blood samples were taken according to the PRF protocol, with a PC-02 table centrifuge and collection kits provided by Process (Nice, France). Quickly, blood samples were taken from this patient without using an anticoagulant, in 10-ml glass-coated plastic tubes (Vacutainer; Becton, Dickinson and Company, Franklin Lakes, NJ, USA) and immediately centrifuged at 3000 rpm for 12 minutes. A fibrin clot formed in the middle part of the tube, while the upper part contained acellular plasma, and the bottom part contained red corpuscles. The fibrin clot was separated easily from the lower part of the centrifuged blood. The PRF were carried and packed into the defects (fig.9) Wound closure was then obtained with 3-0 silk sutures (fig.10). The histopathology report

confirmed the diagnosis of an infected radicular cyst. Post-operative instruction given to the patient and patient was kept under Antibiotics and

Fig.1: PRE-OPERATIVE PHOTOGRAPH



Analgesics. Patient was recalled at intervals of 1, 7 days and after 6 months (fig.11).

Fig.2: PEROPERATIVE RADIOGRAPH



Fig.3: METAPEX DRESSING



Fig.4: OBTURATION



Fig.5: FULL THICKNESS FLAP



Fig.6: GRANULATION TISSUE REMOVED



Fig.7: APICECTOMY



Fig.8: RETROGRADE MTA PLACEMENT



DISCUSSION

The periapical cyst is the most common odontogenic cyst (52.3-70.7 percent) followed by the dentigerous cyst (16.6-21.3 percent) and odontogenic keratocyst (5.4 - 17.4 percent)¹⁵. The choice of treatment may be determined by factors

such as the extension of the lesion, relation with noble structures, evolution, and origin, clinical characteristic of the lesion, systemic condition and cooperation of the patient¹⁶. However, in large lesions the endodontic treatment alone is not sufficient and it should be associated with

decompression or marsupialisation or enucleation¹⁷.

In the present case, endodontic treatment was carried out in multiple visits with interim calcium hydroxide dressings. The use of root canal dressings between sessions in root canal treatment of teeth with chronic periapical lesions is important for reducing levels of bacteria better than that obtained with mechanical preparation, particularly by penetration of areas that are unreachable by instruments or irrigation solutions, such as dentinal tubules and ramifications. Calcium hydroxide has also shown clinical efficiency in reducing exudates due to its hygroscopic properties. Studies have shown that at least 2 weeks are necessary for calcium hydroxide bactericidal activity¹⁸. Calcium hydroxide intracanal medicament created a more favourable environment leading to healing of periapical lesion in the right central incisor which was obturated by lateral condensation using zinc oxide eugenol sealer and gutta percha before the surgery. The periapical lesion on the left side, however, did not respond to the intracanal medicament because of the causative factor being located beyond the root canal system, viz., within the inflamed periapical tissue, thus requiring surgical intervention. After the surgery a plan for long term treatment of 21 with intracanal medicament was made. Metapex (Calcium hydroxide with Iodoform, META BIOMED CO. LTD) was used this time. At the end of 6 month follow-up, patient was free from all symptoms and signs with optimum tissue healing. Radiographic examination revealed a decrease in the size of periapical radiolucency bilaterally. Tooth 21 was obturated using Inverted cone technique and lateral condensation of gutta percha with zinc oxide eugenol sealer. A definite apical stop could be felt at the end of canal during obturation.

However in this case a root end respective procedure would have resulted in a compromised crown root ratio. Hence a treatment plan was formulated to create an apical matrix using MTA and thus preserve the existing crown root ratio. As to the fabrication of apical plugs, Torabinejad and Chivian (1999) recommended carrying the MTA with a large amalgam carrier to the root canal and then condensing the material to the apical end of the root with pluggers or paper points. MTA, when

used as a root-end filling material, showed evidence of healing of the surrounding tissues. Studies have shown that osteoblasts have favorable response to MTA as compared to IRM and amalgam. With longer duration, new cementum was found on the surface of the material. MTA is a widely accepted retrograde filling material which is biocompatible, has antibacterial action and reduces microleakage^{19, 20}. MTA plugs of four millimeter thickness have been shown to be the most efficient with respect to root canal sealing ability and resistance to displacement^{21, 22}.

PRF is organized as a dense fibrin scaffold, with a specific slow release of growth factors^{23, 24}. PRF can be considered as a natural fibrin based biomaterial to guide cell migration into the wound. In addition, growth factors are active for a relatively longer period and are effective in stimulating tissue regeneration. This leads to the idea of using PRF as a biomaterial for periapical tissue regeneration. The clinical use of PRF as the grafting material in treatment of radicular cyst will need to be studied in further cases.

CONCLUSION

The clinical case reported was managed successfully by endodontic therapy with emphasis on thorough debridement and disinfection of the root canal system which was followed by surgery and placement of PRF in defect. The use of PRF as monotherapy for achieving periapical regeneration has shown promising results. As this platelet concentrate is entirely autologous in nature, it could be especially useful for defect resolution in patients who are unable to afford expensive regenerative therapies rather than leaving the defects to heal on their own. However in specific situations where the size and extent of the lesion is of critical importance surgery using PRF is a viable option with good prognosis. An endodontist should have thorough knowledge about materials and various treatment options or techniques involved in management of such a case.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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