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CASE REPORT

Management of the radicular cyst by surgical enucleation with bone graft and platelet-rich-fibrin

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ABSTRACT

Radicular (periapical cysts) are the inflammatory type of odontogenic cysts associated with the root of non-vital teeth, typically asymptomatic. Radiographically, they appear as oval or pear-shaped unilocular radiolucency in the periapical region. Cyst development is the final stage of the inflammatory process after a periapical infection; hence, it often occurs later in life. Radicular cysts in the maxilla can occasionally spread across the maxillary sinus. The treatment modalities include endodontic treatment, enucleation with primary closure, and removal of the problematic tooth. Hence, the present study describes a successful case of endodontic treatment and surgical enucleation followed by placement of demineralised-freeze dried bone allograft (DFDBA) and platelet-rich-fibrin (PRF).

Keywords: *Radicular cyst; periapical cyst; enucleation; bone graft; platelet-rich-fibrin.*

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INTRODUCTION

The periapical cyst, also termed radicular cyst and apical periodontal cyst, is by far the most common type of odontogenic cyst, representing over one-half of all oral cysts. A cyst is a pathological cavity in the bone or soft tissue, with a well-defined outer wall of connective tissue and inner wall of epithelial tissue. Periapical cysts are most commonly treated surgically for the least chance of recurrence. Surgical interventions are necessary when non-surgical, less invasive procedures fail to give promising results and relief to patients. A periapical or radicular cyst arises from epithelial cells resting in 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 region. Bhaskar[1] and Shear[2] reported that the incidence of radicular cysts is highest among patients in their third decade of life and greater among men than women. Shear[2] also reported that they have a particularly high incidence in the maxillary anterior region, presumably as a result of trauma. A case report is presented of an individual with an infected radicular cyst.

Case history:
*A 60-year-old female patient was reported to Dept of Periodontics and Oral Implantology of Regional Dental College in November 2020 with a chief complaint of pain related to the right first quadrant. She gave a history of swelling along with pus discharge from gums forthe last 6 months. On clinical examination, no cystic fluctuant swelling was associated with 11, 12, and 13 (**Figure 1a**).*

Figure 1a No evident external swelling

MANAGEMENT OF THE CASE

The pulp vitality test gave a negative response in relation to 11 and 12. An intraoral periapical radiograph (IOPA) about 11, 12, and 13, and based on clinical and radiological, a provisional diagnosis of a radicular cyst was made. An endodontic therapy was planned concerning 11, 12, and 13 (**Figure 1b**). However, there was persisting periapical radiolucency in relation to 11, 12 and 13; hence, surgical cyst enucleation through a buccal approach was planned. The patient was informed about the procedure and obtained written consent.

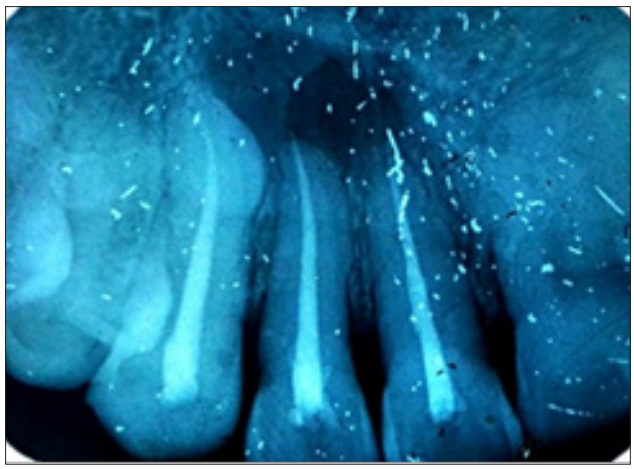

Figure 1b Intraoral periapical radiograph after endodontic treatment

Afteradministration of local anaesthesia(Xicaine, ICPA Healthcare products Ltd.), following crevicular incision around 11, 12, and 13, a full-thickness mucoperiosteal flap was elevated, as shown in **Figure 2a**.

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Figure 2a Removal of cystic lining; **Figure 2b** Debridement of cystic cavity

Cyst enucleation was carried out in toto with the help of Curettes (**Figure 2b**). The cystic lining was removed, and complete debridement was performed with copious irrigation. This further aided in adequate visualisation of the root apex. Hemostasis was achieved with the use of sterile gauze. Following enucleation, the cavity was examined, revealing the expansion of the cyst palatally as well as in the direction of the nasal floor (**Figure 2b**). The enucleated cyst was sent for histopathological examination, which confirmed the radicular cyst diagnosis. After complete enucleation of cystic lining, demineralised freeze-dried bone allograft (DFDBA) was placed sandwiched between 2 layers of platelet-rich fibrin (PRF) as shown in **Figure 2c**, **2d**, **2e**. To prepare PRF, 5 ml of whole venous blood was collected in two sterile Vacutainer tubes without adding an anticoagulant. The Vacutainer tubes were then centrifuged for 10 min at the speed of 3000 rpm.


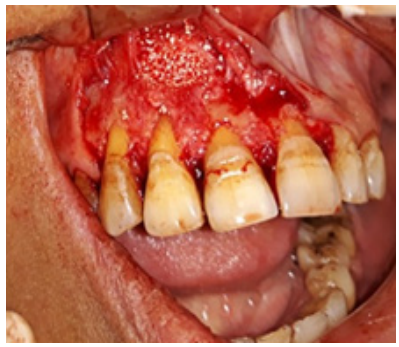


Figure 2c Placement of PRF; **Figure2d** Placement of Bone graft; **Figure 2e** Placement of PRF

Figure 2f Placement of PRF

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The flaps were sutured with a 3-0 silk suture (Ethicon, Division of Johnson and Johnson Ltd.) (**Figure 2f**). The patient was prescribed broad-spectrum antibiotics and analgesics and was asked to maintain oral hygiene. The patient returned to remove the sutures after 1 week with uneventful soft tissue healing and no reported complications (**Figure 7**). At the end of one year, palatal swelling subsided completely (**Figure 3a)**. An intra-oral periapical radiograph about 11 and 21 (**Figure 3b**) reveals complete resolution of the cystic lesion.

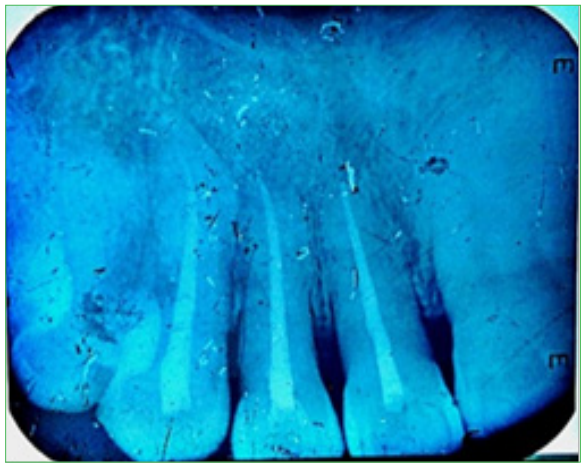

Figure 3a Postop follow-up after one year; **Figure 3b** Postop IOPA reveals complete resolution

DISCUSSION

Periapical cysts/Radicular cysts are inflammatory jaw cysts at the apex of infected teeth with necrotic pulp. They make up about 52%- 68% of all cysts. The anterior maxilla is more commonly affected than the mandible.[3-4] It is present as the jaw swelling and associated with the loosening of the tooth. Displacement of the adjacent teeth and root resorption of the affected teeth have also been reported.[4] Cystic lesions are the most commonly treated pathologies via surgeries, and they are the most reliable and effective method to treat radicular cysts. Surgical enucleation and curettage have been carried out for many ages. Though the enucleation method is proposed for smaller cysts, it should also be used whenever possible as it's proved to have superior advantages over marsupialisation, a surgical method commonly used for treating large cysts. The most common disadvantage includes recurrence and spillage of intracystic contents due to incomplete enucleation. This can be overcome by ensuring techniques that allow complete or in toto enucleation of cysts.[5] Nowadays, Guided tissue regeneration techniques, i.e., bone graft and barrier membranes and endodontic surgeries, have been used to promote bone healing.[6] PRF is an autologous biomaterial without risk such as rejection/allergy, so freshly prepared PRF from the patient's whole blood was utilised for graft.[7-8] PRF reduces post-operative pain and encourages wound healing. Considering the literature, we performed this case with conventional endodontic therapy, cyst enucleation, and DFDBA bone graft placement to enhance bone regeneration combined with PRF.

CONCLUSION

The radicular cyst in this case report was effectively treated by endodontic therapy to enucleate the cyst, curettage, and regenerative therapy by bone graft and platelet-rich fibrin. Although some literature suggests non-surgical management of minor lesions, endodontic treatment followed by surgical enucleation yields better results in long-standing chronic lesions.

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