



Periodontology

PERIAPICAL CYST ENUCLEATION FOLLOWED BY GUIDED BONE REGENERATION: A SIX-MONTH CLINICAL AND RADIOGRAPHIC FOLLOW UP CASE REPORT

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ABSTRACT Periapical cysts are among the most frequent inflammatory odontogenic cysts in humans. They are primarily caused by chronic pulpitis and necrosis. Endodontic treatment is often the preferred method for treating periapical lesions. This case report includes the management of a periapical cyst with regeneration.

KEYWORDS :

INTRODUCTION

Periapical cysts comprise 50-75% of all odontogenic cystic lesions and are formed by proliferation of the epithelial rests of Malassez in the periodontal ligament under the influence of a chronic inflammatory process developing after the death of the pulp tissue [1].

Treatment options include non-surgical root canal therapy, periapical surgery, or extraction. Surgical interventions have proven successful in more than 90% of cases with the use of novel microsurgical approaches and root-end filling materials [2]. Regenerative techniques, including grafts and membranes, may further promote healing in large lesions by providing scaffolds for osteogenesis [3].

Membranes act as a physical barrier based on Melchers' concept, selectively permitting PDL cells to repopulate. Following Cystic enucleation, guided bone regeneration was performed to enhance bone regeneration, maintain the post-enucleation defect space, prevent soft tissue ingrowth, and facilitate predictable healing of the residual osseous defect [4]. Recurrence after complete surgical enucleation is uncommon, particularly when the entire cystic lining is completely removed [1].

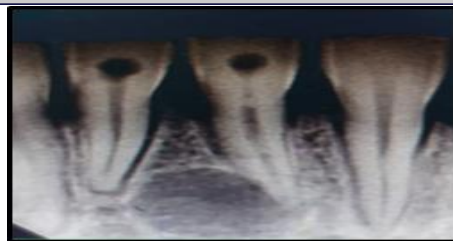
Case Report

A 27-year-old female presented to the Department of Conservative Dentistry and Endodontics with the chief complaint of a swelling in the mandibular anterior region present since 7-8 months.

The past dental history revealed patient visited dental clinic for same and endodontic treatment was initiated, however patient failed to complete the treatment. Current clinical evaluation revealed tenderness with 31 and 41 with a persistent, well-defined periapical radiolucency Along with Periodontal ligament widening (Fig-1,2).



(Fig 1- Preoperative)



(Fig 2- Preoperative Radiograph)

The patient's medical history was non-contributory, with no known systemic illness, drug allergy, or long term medication use & also no personal history was there.

Extraoral examination was unremarkable. Intraoral examination showed previously performed access opening with 31 & 41. The biomechanical preparation and irrigation of root canal followed by Calcium hydroxide dressing for 21 days was performed. On recall visit when the canal was non wiping the surgical cystic enucleation was planned and obturation was planned after cystic enucleation.

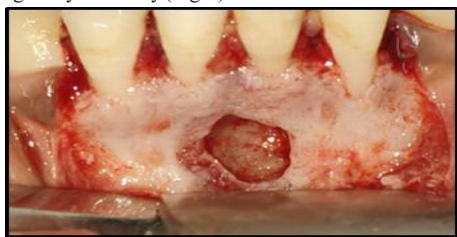
- Routine blood investigation were done and written and informed consent was obtained.
- Patient preparation was done with extraoral scrubbing with povidone iodine solution and rinsing with 0.12% chlorhexidine gluconate 10ml solution for 1 min.
- Local anesthesia was achieved using 2% lignocaine hydrochloride with 1:80,000 epinephrine.

A crevicular incision was made extending from 32 to 42 with bilateral vertical releasing incisions to provide adequate surgical access. A full-thickness mucoperiosteal flap was carefully elevated using a periosteal elevator, exposing the underlying labial cortical plate (Fig-3).



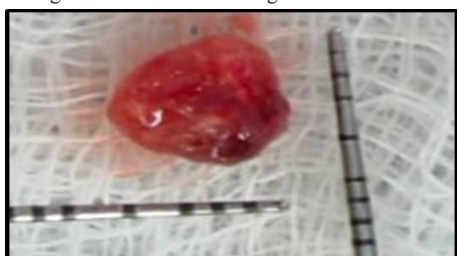
(Fig 3- Flap reflection)

A bony window was created by trephination over the periapical lesion, revealing the cystic cavity (Fig-4).



(Fig 4- Trephination)

The cystic lesion enucleated completely (Fig- 5) & sent for the histopathological evaluation with storing in 10 % formalin solution.



(Fig 5- Enucleated cyst)

The cystic lining and associated soft tissue were visualized within the osseous defect and were subsequently enucleated in toto. The surrounding bone was curetted thoroughly prior to graft placement. The bony cavity was debrided thoroughly and irrigated under constant saline irrigation. The defect was filled with an alloplastic bone graft material (Fig-6).



(Fig 6- Bone grafting)

Approximately 10 mL of the patient's venous blood was collected and centrifuged at 2700 RPM for 12 minutes to obtain a platelet-rich fibrin (PRF) clot. The clot was gently compressed to form a PRF membrane (Fig-7).



(Fig 7- PRF membrane)

Subsequently, PRF membrane was cut to the appropriate size and placed over the bony defect by extending it at least 2-3 mm beyond the edges of the defect (Fig-8).

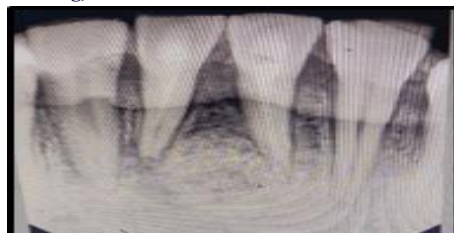


(Fig 8- PRF membrane placement)

The flap was then repositioned and secured with simple interrupted sutures without any tension (Fig-9) and immediate postoperative radiograph was taken (Fig-10).

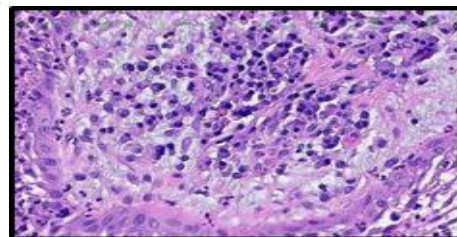


(Fig 9- Suturing)



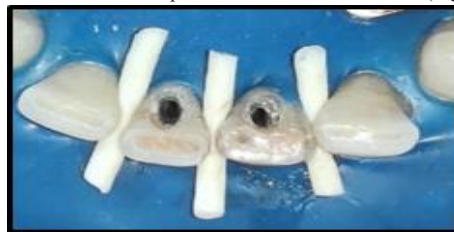
(Fig 10- Postoperative Radiograph)

A periodontal dressing was placed. Post-operative instruction were given to avoid hot and spicy food & nonsteroidal anti-inflammatory drug for 3-4 days to relieve post operative, amoxycillin and potassium Clavulanate 625mg for bd for 5 days. Patient recalled after 15 days periodontal dressing and suture removal was performed. Histopathological findings confirmed the diagnosis of periapical cyst (Fig-11).



(Fig 11- Histopathological Examination)

Following satisfactory postoperative healing, obturation with 31 and 41 was completed using gutta-percha and an endodontic sealer by the lateral condensation technique under rubber dam isolation (Fig-12).

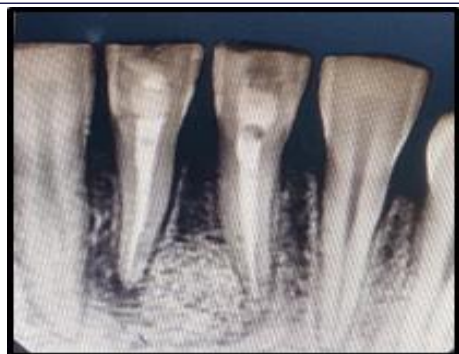


(Fig 12- Rubber Dam Isolation)

- A postoperative intraoral periapical radiograph confirmed satisfactory obturation with adequate length and density of the root canal filling.
- The six-month follow-up intraoral periapical radiograph demonstrated progressive osseous healing with appreciable bone fill in the previous cystic cavity (Fig-13,14).



(Fig 13- 6 month follow up)



(Fig 14- 6 month follow up Radiograph)

A marked reduction in the size of the periapical radiolucency was observed in relation to teeth 31 and 41, with restoration of the trabecular bone pattern, indicating favorable bone regeneration.

DISCUSSION

Periapical cyst is the most often encountered inflammatory cyst[5]. Pulp necrosis leading to periapical inflammation appears to be the most common etiology of periapical cyst[1]. The approach to managing osseous defects after radicular cyst enucleation should be based on the size and morphology of the defect, together with the anticipated functional and clinical outcome[6].

After cyst enucleation, small osseous defects with intact surrounding bone generally undergo spontaneous healing through the body's natural regenerative process[7]. However, healing of large or critical-size defects may be prolonged or incomplete because of collapse of the overlying soft tissues into the defect and inadequate maintenance of the regenerative space[6]. In these situations, guided bone regeneration (GBR) can be used to maintain the space required for new bone formation, prevent soft tissue from growing into the defect, stabilize the blood clot, and create a favorable environment for bone regeneration[8] [9]. Wang et al. concluded that bone grafting following cyst enucleation may enhance early bone regeneration and improve bone quality in selected cases. However, its routine use is not supported, and the decision should be based on the characteristics of the osseous defect [10].

Several growth factors, including platelet-derived growth factor and transforming growth factor, have been found to be secreted from PRF, which affect the healing process of the wound as well as bone. It is recently utilized as a grafting material due to its capability to enhance the wound healing and bone formation[11].

Apicectomy was not performed because the tooth was considered restorable, and preservation of the root apex allowed subsequent conventional root canal treatment. Complete cyst enucleation was performed to remove the pathological lesion, followed by orthograde root canal treatment to eliminate the intraradicular source of infection. Root-end surgery is generally reserved for cases in which conventional root canal treatment is not feasible or has failed[12] [13].

Consistent with the present case, Kriplani et al. demonstrated favorable clinical and radiographic healing following radicular cyst enucleation with the use of advanced platelet-rich fibrin and bone graft. Their report highlights the potential of regenerative materials to support bone regeneration and improve healing of the residual osseous defect[14].

Zhang et al. observed favorable periapical healing after the use of PRF combined with bioactive glass for radicular cyst management, indicating that PRF-based regenerative approaches may contribute to improved bone healing and defect repair[15].

RESULT

The six-month follow-up intraoral periapical radiograph demonstrated progressive osseous healing with appreciable bone fill in the previous cystic cavity. A marked reduction in the size of the periapical radiolucency was observed in relation to teeth 31 and 41, with restoration of the trabecular bone pattern, indicating favorable bone regeneration.

Although encouraging healing was observed in the present case,

incorporating an alloplastic composite graft might provide additional osteoconductive benefits and may further support bone regeneration.

CONCLUSION-

The successful clinical and radiographic results seen after six months indicate that the use of an alloplastic bone graft along with a platelet rich fibrin membrane can possibly improve healing of the post-enucleation periapical osseous defects.

REFERENCES-

1. Nair PNR. New perspectives on radicular cysts: do they heal? *Int Endod J*. 1998;31(3):155-160.
2. Mishra A, Sharan J, Marya A. Periapical Bone Healing of a Large Radicular Cyst Following Surgical Endodontic Treatment Without Regenerative Procedures: A 2.5-Year Follow-Up Case Report. *Clin Case Rep*. 2025 Dec 29;14(1):e71791. doi: 10.1002/ccr3.71791. PMID: 41476806; PMCID: PMC12747859.
3. T. J. Liu, J. N. Zhou, and L. H. Guo, "Impact of Different Regenerative Techniques and Materials on the Healing Outcome of Endodontic Surgery: A Systematic Review and Meta-Analysis," *International Endodontic Journal* 54, no. 4 (2021): 536–555, <https://doi.org/10.1111/iej.13440>.
4. Santamaria J, García AM, de Vicente JC, Landa S, López-Arranz JS. Bone regeneration after radicular cyst removal with and without guided bone regeneration. *Int J Oral Maxillofac Surg*. 1998;27(2):118-120.
5. Fernandes M, Ataide I de. Nonsurgical management of periapical lesions. *J Conserv Dent*. 2010;13(4):240-5.
6. Ettl T, Gosau M, Sader R, Reichert TE. Jaw cysts – Filling or no filling after enucleation? A review. *J Craniomaxillofac Surg*. 2012;40(6):485-493.
7. Chiapasco M, Rossi A, Motta JJ, Crescentini M. Spontaneous bone regeneration after enucleation of large mandibular cysts: A radiographic computed analysis of 27 consecutive cases. *J Oral Maxillofac Surg*. 2000;58(9):942-948.
8. Dahlin C, Linde A, Gottlow J, Nyman S. Healing of bone defects by guided tissue regeneration. *Plast Reconstr Surg*. 1988;81(5):672-676.
9. Schenk RK, Buser D, Hardwick WR, Dahlin C. Healing pattern of bone regeneration in membrane-protected defects: A histologic study in the canine mandible. *Int J Oral Maxillofac Implants*. 1994;9(1):13-29.
10. Wang J, Yao QY, Zhu HY. Efficacy of bone grafts in jaw cystic lesions: A systematic review. *World J Clin Cases*. 2022;10(9):2801-2810. doi:10.12998/wjcc.v10.i9.2801.
11. Tunali M, Ozdemir H, Kucukodaci Z, et al. A novel platelet concentrate for guided bone regeneration: Titanium-prepared platelet rich fibrin (T-PRF). *Gulhane Med J* 2015; 57: 102–106.
12. Berman LH, Hargreaves KM, editors. *Cohen's Pathways of the Pulp*. 12th ed. St. Louis: Elsevier; 2021.
13. Kim S, Kratchman S. Modern endodontic surgery concepts and practice: a review. *J Endod*. 2006;32(7):601-623.