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Surgical *In toto* enucleation of large periapical cyst: A case report

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Abstract

The aim of this report is to discuss a case about a failed root canal treated upper right lateral incisor presented with chronic periapical pathology. Apicoectomy involves surgical management of a tooth with a periapical lesion, which cannot be resolved by routine endodontic treatment. The goal of apical surgery is to prevent leakage of bacteria and their byproducts from the root canal system into peri-radicular tissue. With the advancements in magnification, armamentaria and materials, the success rate of treatment outgrows. Hence, present study describes a case of retreatment successfully treated by endodontic periapical surgery by *in toto* enucleation of large periapical cyst.

Keywords: Apicoectomy, enucleation, periapical cyst

Introduction

Surgical endodontics is a time tested method for correction of those teeth with periapical lesions that do not respond well to conventional root canal treatment or when orthograde treatment is not viable^[1]. It aids to maintain the form, function and esthetics of the relevant teeth and their roots when conservative instrumental, pharmacotherapeutic and physiotherapeutic treatments failed.

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. Several methods are proposed depending on its size and location for promising managements. Periapical cysts are most commonly treated surgically for least recurrence chances. Surgical interventions are necessary when non-surgical less invasive procedures fail to give promising results and relief to patients.

The primary objectives of surgical approach are to make the root canals free of diseased necrotic tissue, debride them thoroughly and to seal the cavity or defect to bring down the microorganism spread in the peri-radicular tissues, thus rendering an environment conducive of a normal periodontal apparatus regeneration. This goal should be attained by root-end resection, root- end cavity preparation, and a bacteria-tight closure at the apical end of the root- canal system with a retrograde filling. Besides, curettage plays an important role for debridement of the periapical pathological tissue in favour of removing any extra-radicular infection, foreign body material, or cystic tissue^[2].

According to the updated guidelines by the European Society of Endodontology, indications for apical surgery comprise^[3].

1. Radiological findings of apical periodontitis and/or symptoms associated with an obstructed canal (the obstruction proved not to be removable, displacement did not seem feasible or the risk of damage was too great)
2. Extruded material with clinical or radiological findings of apical periodontitis and /or symptoms continuing over a prolonged period.
3. Persisting or emerging disease following root-canal treatment when root canal retreatment in inappropriate.
4. Perforation of the root or the floor of the pulp chamber and where it is impossible to treat from within the pulp cavity.
5. In addition, traumatic injury, cases with severe destructive processes due to furcation or

sub-gingival caries, and large root perforations also require apicoectomy.

Contraindications of apicoectomy include

1. Strong adjacent teeth available for bridge abutments as alternatives to hemisection.
2. Inoperable canals in root to be retained.
3. Fused roots making separation impossible.
4. The tooth has no function (no antagonist, no strategic importance serving as a pillar for a fixed protheses)
5. Unrestorable tooth.
6. Periodontally compromised tooth and
7. An uncooperative patient or a medically compromised patient for an oral surgical intervention ^[11].

Thus, in our institution, we planned enucleation with aim of good complete enucleation followed by chemical cauterisation with freshly prepared Carnoy solution followed by apicoectomy wrt #21 and #22. The treatment success is qualified by major factors including the correct indication, the correct technique, the follow up and patient's observance of the post-surgery recommendations. The treatment outcome of



Fig 1: Pre-operative clinical Picture



Fig 2: Pre-operative radiographic picture

Differential diagnosis

Globulomaxillary cyst; odontogenic keratocyst.

Diagnosis

Based on radiographic and clinical examination, the case was diagnosed as the periapical cyst of 2.5 x 2.5 cm dimensions.

Treatment plan

Root canal treatment combining with surgical approach for surgical excision and biopsy of the cyst. Hematological investigations were carried out before the surgery with patient written consent.

Surgical intervention

Mouth preparation with betadine and swab, local anesthesia (2% lidocaine with 1:100,000 epinephrine) was given. Using 11c blade, sharp incision was given deep into the bone. A

apical surgery needs periodic clinical and radiographic assessment.

This paper presents a case report of surgical removal of a periapical pathology due to failure of conventional endodontic treatment, persistence of pathology and sinus formation.

Case report

A 23 years old male patient reported to the department of Conservative Dentistry & Endodontics, Jaipur dental college and hospital, Jaipur; with the chief complaint of pain, soft swelling in the upper right front teeth region since 3-4 months. Patient underwent NS-RCT at private practitioner 2 months back for the same complaints. On clinical examination, patient revealed sinus track formation wrt tooth # 21; #21 & #22 were tender on percussion and palpation with no significant tooth mobility (Figure 1). Occlusal radiograph showed well defined radiolucency surrounds the periapex of the root of 2.5 x 2.5 cm with radio-opacity within the root canal indicative intracanal medicament as an attempt non-surgical healing of periapical disease by placing of intracanal Calcium-hydroxide (Metapex) as told by previous clinician (Figure 2).

sulcular incision with papilla preservation in addition to two vertical releasing incisions were given and full thickness periosteal flap was raised. As an excisional biopsy would be required procedure, the cyst was opened carefully by de-roofing the cystic cavity creating a window on the bone with utmost care to not perforate the cystic membrane.

Surgical procedural steps (Figure 3)

Flap design markings

Incision

Full thickness flap raised

Enucleation of the cyst *in toto* & application of Carnoy solution

Apicoectomy

Retrograde MTA filling at the root tip

PRF + bone graft placement

Single interrupted suturing

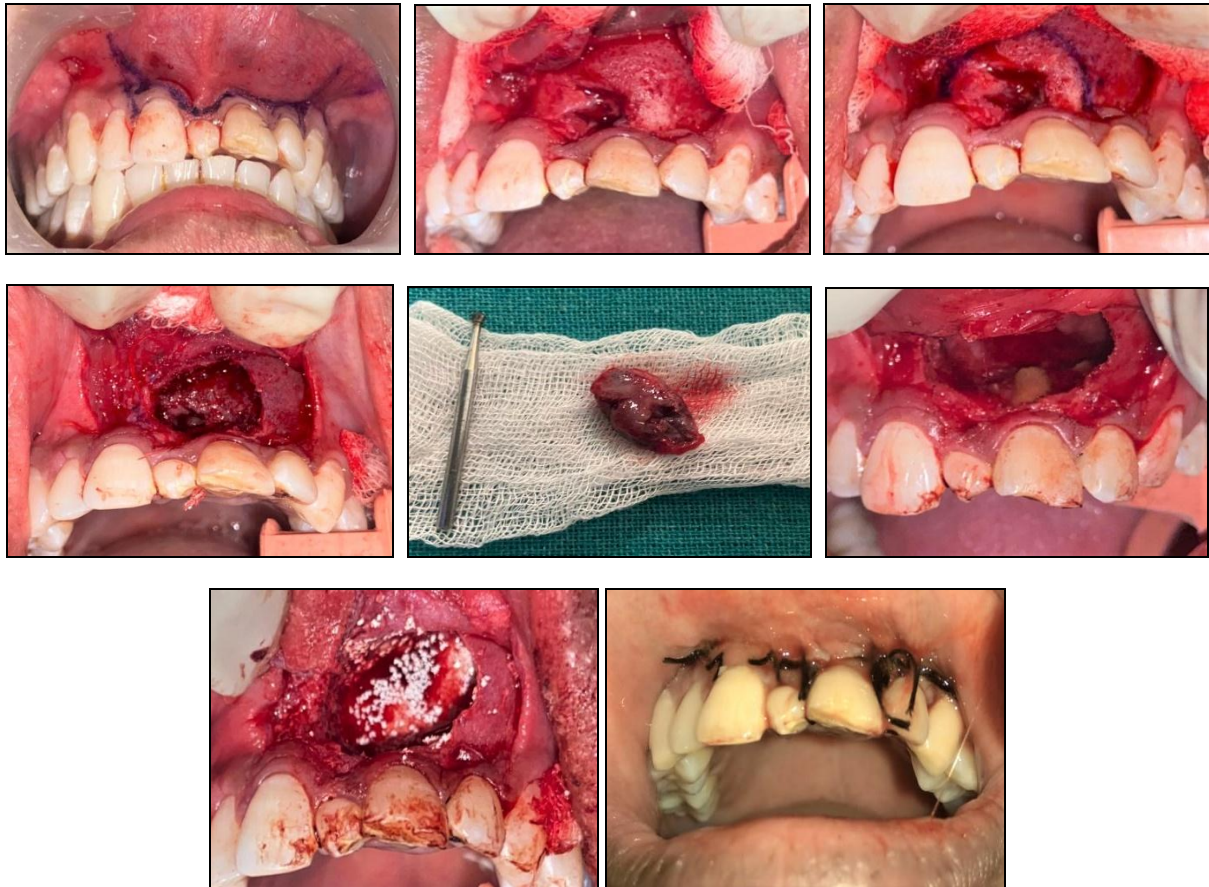


Fig 3: Surgical procedural steps

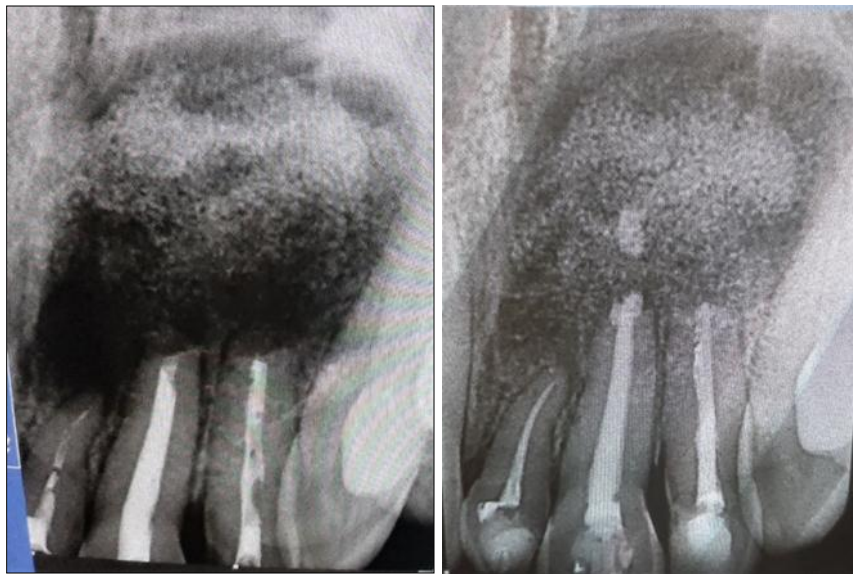


Fig 4(a): Immediate post-operative radiograph **Fig 4(b):** 6 months follow-up radiograph

Excisional biopsy results

Histopathological findings showed nonkeratinized stratified squamous epithelium with underlying connective tissue stroma with severe chronic inflammatory cell infiltrate indicative presence of inflammatory radicular cyst.

Post-surgical considerations

Patient was advised to follow post operative instruction:-

- a) Cold ice packs after 4-6 hours of surgery.
- b) Maintain good oral hygiene with the help of mouth rinses with mouthwash.
- c) Antibiotics and analgesics for 7 days.
- d) Patient recalled after 4 days to check for any sign of pain

- e) and infection at the site of surgery.
- e) After 7 days suture removal was done and root canals were filled by gutta percha followed by composite as final restoration.
- f) Obturation was done and RCT was completed after 1 month period after satisfactory healing and relief of symptoms.

Results

After 6 months follow up, (Figure 4 (b)) there was absence of significant symptoms with radiographic signs of partial healthy bone formation around the root apex indicative of successful surgery and healing.

Discussion

Periapical cyst are inflammatory jaw cysts that are present at the apex of infected teeth with necrotic pulp. Nowadays, they are referred as radicular cyst or true cyst. Radicular cysts make up about 52%- 68% among all the cysts. Anterior maxilla is more common as compared to mandible [4].

Apicoectomy is the standard surgical procedure to preserve the tooth after a failed endodontic treatment. Surgical endodontics has advantage over non-surgical that we can address the entire root canal system and eliminate the complete bacteria.

Clinically, the teeth with the radicular cyst are asymptomatic. It is present as the swelling of the jaw 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

There are chances of transformation of radicular cyst into squamous cell carcinoma associated with long standing cases, but there was no histopathological evidence of epithelial dysplasia in our case [5].

Cystic lesions are most commonly treated pathologies via surgeries. Choosing best management of such lesions which focuses on lowest recurrence rates and least morbidity has always been controversial and debatable for dentists as well as researchers. Although various less invasive procedures have been proposed, aggressive forms of management like enucleation with/without curettage along with adjunctive uses of chemical/cryocauterisation or resections has, so far, been most reliable and effective methods to treat true cysts.

Surgical enucleation and curettage has been carried out since many ages. Though the method of enucleation is proposed for smaller cysts, it should be also used whenever possible as its proved to have superior advantages over marsupialization: a surgical method used commonly 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 allows complete or *in toto* enucleation of cysts [12].

Metapex treatment and endodontic procedures carried out prior to surgery by previous clinician could have proved beneficial in decompression and periodic drainage of the cyst. As metapex contains iodoform along with calcium hydroxide, controlled secondary infection owing to antibacterial effect of Metapex would lead to slight fibrosis of cystic connective tissue inducing fibrosis of cyst wall. This decompression and fibrosis would help in providing stable plane thus reducing chances of wall fragmentation during enucleation procedure.

In this case, MTA was chosen because of its ideal property for retrograde filling after apicoectomy. MTA has moisture free application, biocompatibility with superior sealing ability with capacity to strengthen the root [6]. MTA as a root-end filling material has higher success rate in follow-up studies.

Nowadays, GTR techniques i.e. use of bone graft and barrier membranes in addition to endodontic surgeries has been used to promote bone healing [2]. PRF is a autologous biomaterial with absence of risk such as rejection/allergy, so freshly prepared PRF from patient's whole blood was utilized for graft [7, 8].

PRF reduces post operative pain and it encourages healing of the wound. The tight seal of the microstructures at apical end is necessary to prevent the entry of bacteria and toxins from the root canal into the periradicular tissues and to avoid the re-infection [9]. Complete obturation of the root canal was done after the surgery not during the surgery so as to provide time for MTA to set completely.

Entire procedure was carried out under galilean 3.2x loupes for better visuality, precision & outcome. Advantage of doing microsurgery include easier identification of root apices and small osteotomies to conserve cortical bone and root length [10].

Multiple factors including prognosis, size of periapical lesion, apical seal and techniques and materials used to treat the tooth decides the success rate of the surgical treatment [11].

Conclusion

Radicular cyst is one of the common lesions encountered in the dental practice. Proper treatment and follow ups are recommended as there are chances of neoplastic transformation within the lining of radicular cyst. In recent times apicoectomy procedures have greatly improved with the contemporary understanding of endodontics concept for success and failure. In this case surgical technique i.e. cystic enucleation and apicoectomy were appropriate and the results were satisfactory. Cases which cannot be managed by non-surgical endodontics, can go for apical surgery to save the tooth.

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Conflict of interest

All authors declared no conflicts of interest for current case report.

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