

**SURGICAL MANAGEMENT OF PERIAPICAL LESION WITH RETROGRADE
BIODENTINE AND BONE AUGMENTATION USING STICKY BONE: A CASE REPORT****Dr. Jayalakshmi P. A.^{1*}, Dr. Anju K. S.², Dr. Nayana S. M.³, Dr. Divya Shetty⁴ and Dr. Parimala Kumar⁵**^{1*}Rajiv Gandhi University of Health Science, Department of Conservative Dentistry and Endodontics, AJ Institute of Dental Sciences, Karnataka, India.²Rajiv Gandhi University of Health Science, Department of Periodontics and Oral Implantology, AJ Institute of Dental Sciences, Karnataka, India.³Rajiv Gandhi University of Health Sciences, Department of Oral Medicine and Radiology, AJ Institute of Dental Sciences, Karnataka, India.⁴Rajiv Gandhi University of Health Sciences, Department of Conservative Dentistry and Endodontics, AJ Institute of Dental Sciences, Karnataka, India.⁵Rajiv Gandhi University of Health Sciences, Department of Periodontics and Oral Implantology, AJ Institute of Dental Sciences, Karnataka, India.***Corresponding Author: Dr. Jayalakshmi P. A.**

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ABSTRACT

The aim of this report is to discuss a case about a failed root canal treated upper left central and lateral incisor presented with chronic periapical pathology. When normal endodontic therapy is unable to resolve a tooth with a periapical disease, an apicoectomy is required. The aim of apical surgery is to prevent leakage of bacteria and their byproducts from the root canal system into peri-radicular tissue. Present case report describes a case of retreatment successfully treated by endodontic periapical surgery.

KEYWORDS: Periapical lesion, Apicoectomy, Bone augmentation, Biodentine, Endodontic retreatment, Sticky bone.

INTRODUCTION

Conventional endodontic therapy seeks to clear the root canal system of microorganisms and provide strong barriers to prevent root recontamination.^[1] The presence of persistent bacteria (permanent infection) or reinfection in a canal that has recently been cleaned and sanitized (secondary infection) is frequently linked to failure factors in traditional root canal therapy^[2] extraradicular infections like periapical actinomycosis^[3], foreign body reactions that can be brought on by the extrusion of endodontic material^[4], the buildup of endogenous cholesterol crystals in the apical tissues^[5], and unresolved cystic lesions.^[6] Success thus depends on a variety of variables and is confirmed during follow-up through clinical and radiographic evaluations^[4,6] Surgical endodontics is a time tested method for correcting those teeth with periapical lesions that do not respond well to conventional root canal treatment or when orthograde treatment is not viable. It aids to maintain the form, function and esthetics of the relevant teeth and their roots when conservative instrumental, pharmacotherapeutic and physiotherapeutic treatments failed^[7] 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 is 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.^[7]

Contraindications of apicoectomy include.

1. Strong adjacent teeth available for bridge abutments as alternatives to hemisection.
2. Inoperable canals in root to be retained.

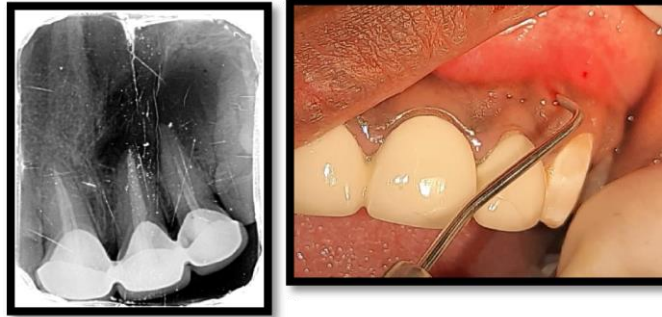
3. Fused roots making separation impossible
4. The tooth has no function (no antagonist, no strategic importance serving as a pillar for a fixed prosthesis)
5. Unrestorable tooth
6. Periodontally compromised tooth and
7. An uncooperative patient or a medically compromised patient for an oral surgical intervention.^[7]

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 year old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain and pus discharge in the upper left front tooth region. Patient has undergone root canal treatment

irt to 11,21,22 eight years back . A three unit crown was placed irt 11,21,22. There was no relevant medical history. On clinical examination there was sinus opening present irt 21,22 region. Radiographic examination revealed a well defined radiolucency extending from 21 to 23 region. A definite diagnosis of previously root canal treated teeth with chronic apical abscess irt 21,22 was arrived. The treatment plan was advised for Re RCT wrt 22, and Root canal treatment wrt 23 followed by periapical surgery irt 21,22. Treatment plan was explained to the patient and informed consent was obtained from the patient, before the intervention. Re RCT of 22 was done by gaining coronal access through the crown. Access cavity was prepared for tooth 23. Working length was determined for tooth 22 to be 21mm and tooth 23 to be 27mm. Following the complete removal of Gutta percha irt 22 and cleaning and shaping irt 23 two calcium hydroxide dressing was given at 1 week interval. After two weeks as the patient was asymptomatic obturation was done irt 22,23.



Preoperative radiograph and clinical photograph showing sinus tract irt 21,22



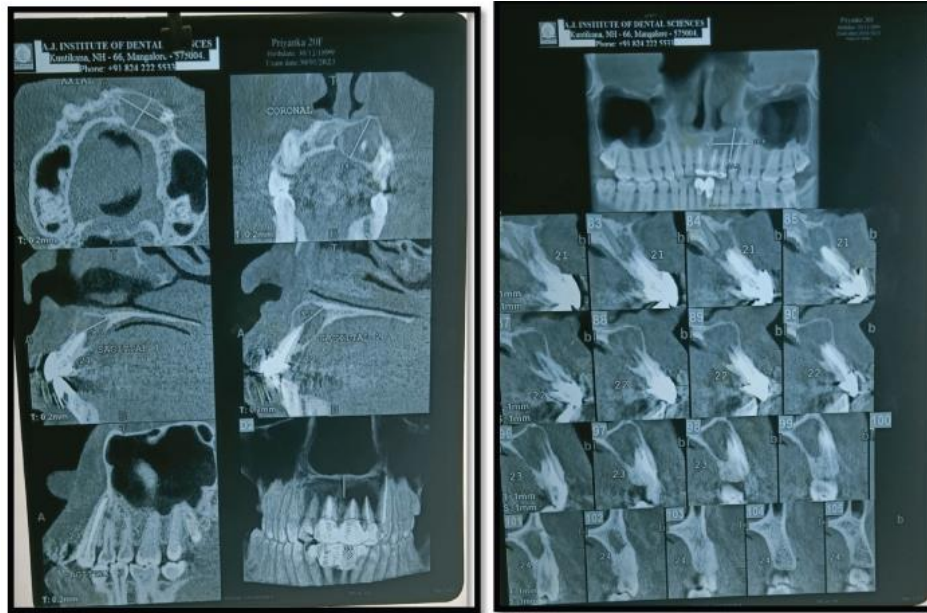
Radiograph showing Retreatment of 22 done



Radiograph showing Obturation of 22,23 done

A CBCT was advised i.r.t 22,23 region to determine the extent of resorptive defect before periodontal therapy. CBCT revealed a well defined unilocular radiolucency noted of size measuring approximately 21.8mm x

16.5mm on periapical region of maxillary anterior teeth extending from incisive canal to root of 24. Lesion is involving the incisive region of 12 to 23 with sclerotic border.



CBCT i.r.t 22,23 showing a well defined unilocular radiolucency on periapical region of maxillary anterior teeth extending from incisive canal to root of 24

After mouth preparation with povidine iodine rinse and swab, local anesthesia (2% lidocaine with 1: 100,000 epinephrine) was administered. Full thickness Trapezoidal flap was reflected from 21-23 region. After elevating the flap and inspecting, a breach in the cortical bone was located. After visualization of the defect, Curettes were used to remove the soft granulation tissue, which further aided in adequate visualization of root apex. Hemostasis was achieved with the use of sterile gauzes. The excised lesion was send for biopsy. Apical end of 3mm was resected at an acute angle of 10 degree in faciolingual direction to the long axis of tooth with a tapered fissure bur in high-speed handpiece, under constant irrigation. The cavity was then filled with retrograde filling material once it was isolated thoroughly. The material of choice for retrograde restoration was biodentine because of its high success

rate. It was placed into the preparation upto 3-4mm apically and plugged to assure dense filling and minimal voids.

For the bony defect, sticky bone was prepared (i-PRF injectable platelet rich fibrin with bone graft). The bone graft used for polymerization was ossiograft. After 20 minutes of polymerization obtained sticky bone was placed over the bone defect and condensed within the defect. Flap was approximated with 4-0 vicryl suture. Post operative instructions were given and analgesics and antibiotics were prescribed. Patient was recalled after one week for reevaluation. After one week of re evaluation, healing was satisfactory. Oral hygiene instructions were given. After 14 days the surgical area had healed with no signs of scarring, following there was no signs of pain or discomfort



Trapezoidal incision using no.15 scalpel blade



Full thickness flap reflected



Visualization of the defect



Degranulation



Excised lesion



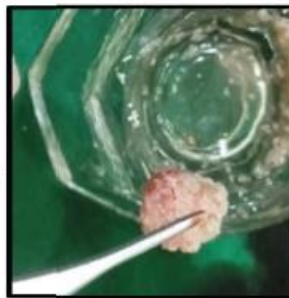
Biopsy specimen



Root-end Resection



Root-end filling (Biodentin) placed



Sticky bone (iprf+Bone graft)



STICKY BONE (IPRF+BONE GRAFT) PLACED



Collagen membrane placement



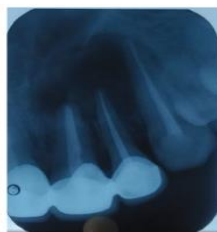
3-0 vicryl resorbable sutures placed



Periodontal pack placed



3 month revaluation



3 month IOPAR showing healing lesion



6 month IOPAR showing healing lesion

Post – operative follow up: Clinical and radiographic images

DISCUSSION

Apical lesions can occur or recur in dental organs with endodontic treatment when the root canal system has not been properly cleaned, shaped and disinfected by instrumentation and copious irrigation, or the absence of disinfection, or due to apical or coronal leakage.^[8] Apicoectomy is the standard surgical procedure for such failed endodontic cases to still preserve the tooth. The advantage of surgical endodontics over non-surgical endodontics is the ability to address the entire root canal system and complete elimination of bacteria.^[9] Anatomical study of the root apex showed that at least 3 mm of the root-end must be removed to reduce 98% of the apical ramifications and 93% of the lateral canals.^[10]

In this case, Biodentine was chosen as a retrograde filling material because of its ideal properties. It has easy and moisture independent application, biocompatibility, superior seal and ability to strengthen the root. The primary clinical advantage of Biodentine is its fast setting (between 12 and 15 min). It is non toxic, has bioactivity, i.e., activation of angiogenesis and activation of progenitor pulpal cells promoting healing and remineralization, easy handling, moisture deprived nature, biocompatibility, superior sealing ability.

In recent times, GTR techniques i.e. use of bone graft and barrier membranes in addition to endodontic surgeries has been used to promote bone healing.^[11] Developed in France by Choukroun *et al.* in 2001, the PRF production protocol attempts to accumulate platelets and released cytokines in a fibrin clot. Unlike other platelet concentrates, this technique requires neither anticoagulants nor bovine thrombin. According to systematic review and meta-analysis by T. J. Liu (2021), different regenerative techniques and materials improved the outcome of endodontics surgery among which PRF was associated with better outcome and promote significantly better healing.^[12] Freshly prepared PRF from patient's whole blood was utilized as PRF being autologous biomaterial is a safe graft with absence of risks such as rejection or allergy.^[13,14] PRF supports and encourages healing of wounds as well as reduces post-operative pain. Since the main objective of apical surgery is to avoid re-infection, the tight seal of the microstructures at apical end is a necessity to prevent

egress of bacteria and toxins from the root- canal system into the periradicular tissues.

Bio-oss—a deproteinized bovine bone, a xenograft has been used in dentistry for bone augmentation procedures due to its good osteoconductive and osteoinductive properties. The combined effect of PRF and bio-oss, results in better healing and bone regeneration. In the present case patient was completely asymptomatic on recall visits at 2 week, 1 month, 3 months and 6 months respectively. Bogdan *et al.* compared the outcomes of apicoectomy with traditional and modern concepts and suggested the clinical success rate after 1 year increased to 85-96.8% with microsurgery compared to 40-90% with traditional way. The success rate also depends on multiple factors including prognosis, size of periapical lesion, apical seal and techniques and materials used to treat the tooth. Moreover, use of CBCT enhances the pre and postoperative examination three dimensionally.^[15]

CONCLUSION

When traditional endodontic therapy is found to be ineffective, the dentist must take alternative therapies into account. Nonsurgical retreatment is not an option for all failures. Clinicians must balance risk and reward and understand that, on occasion, a patient may benefit from surgery or extraction. With the correct case selection and operator skill, periradicular surgery can be a predictable, economical option to tooth extraction and tooth replacement.

REFERENCES

1. Kim S, Kratchman S. Modern endodontic surgery concepts and practice: a review. *J Endod.*, 2006; 32: 601- 623.
2. Siqueira JF Jr. Reaction of periradicular tissues to root canal treatment: benefits and drawbacks. *Endod Topics.* 2005; 10: 123- 147.
3. Tronstad L, Barnett F, Cervone F. Periapical bacterial plaque in teeth refractory to endodontic treatment. *Endod Dent Traumatol.*, 1990; 6: 73- 77.
4. Nair PN, Sjögren U, Krey G, Sundqvist G. Therapy-resistant foreign body giant cell granuloma at the periapex of a root-filled human tooth. *J Endod.*, 1990; 16: 589- 595.
5. Nair PN. Cholesterol as an aetiological agent in

- endodontic failures: a review. *Aust Endod J.*, 1999; 25: 19- 26.
6. Nair PN, Pajarola G, Schroeder HE. Types and incidence of human periapical lesions obtained with extracted teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.*, 1996; 81: 93- 102.
 7. Case Report Salvage through endodontic surgical management: A case report DeepakKumarSharma1, SavinaGupta2, ManuBansal1, KrishnaPopat1, SidharthaSPBehra3,*
 8. Villarreal-Arango D, Ramos-Manotas J, Díaz-Caballero A. Apicoectomy and retrograde filling as Periapical granuloma treatment. A case report. *Rev Fac Odontol Univ Antioq.*, 2016; 28(1): 203–9.
 9. Kulkarni M, Mohan J, Bakshi PV. Platelet rich fibrin as a grafting material in periapical surgery: a caseseries. *Int J Peiodontics Restor Dent.*, 2019; 34(4): 123–7.
 10. Sharma DK, Gupta S, Bansal M, Popat K, Behra SSP. Salvage through endodontic surgical management: A case report. *IP Indian J Conserv Endod.*, 2021; 6(1): 59-63.
 11. AvinashS, AgrawalE, MushtaqI, BhandariA, KhanF. Apicoectomy: An elucidation to a hitch. *J Dent Specialities*, 2019; 7(1): 28–32. doi:10.18231/j.jds.2019.006.
 12. Hadziabdic N. PRF and Sticky Bone as Regenerative Materials in Oral Surgery. *Craniofacial Surgery - Recent Advances, New Perspectives and Applications*. IntechOpen; 2022. <http://dx.doi.org/10.5772/intechopen.108807>
 13. Mangat P. Periapical Surgery of Left Lateral Incisor Using Mta Angelus as a Root End Filling Material- A Case Report. *IOSR J Dentaland Med Sci (IOSR-JDMS)*. 2019; 18(5): 71–4.
 14. Jabeen S. Management of Bony Defect Using Platelet Rich Fibrin: A Case Report. *University J Dent Scie.*, 2019; 5(1): 38–41.
 15. Petrov KB. Periapical Surgery. Review. Classic vs Modern Concepts. *Int J Med Rev Case Rep.*, 2019; 3(12): 865–72.
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