ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1224

# Endodontic and Surgical Management of Trauma-Induced Combined Internal and External Root Resorption with Periapical Cyst: A Case Report

Dr. Kalpana MB[1]; Dr. Gowthami G Kava[2]; Dr. Divya Shetty[3]; Dr. Aftab Damda[4]
Postgraduate[1,2]; Reader[3]; Head of the Department[4]
Department of Conservative Dentistry and Endodontics
AJ Institute of Dental Sciences, Mangalore, Karnataka

**Abstract:- Root resorption, involving the breakdown of hard tissues like dentin and cementum, can result from trauma and subsequent infection, potentially leading to tooth loss. This case report details the management of combined internal and external root resorption with a periapical cyst in a 32-year-old male. After trauma, the maxillary left central incisor (#21) presented with root resorption and a displaced apex. Endodontic treatment using MTA and surgical enucleation of the cyst were performed. A 12-month follow-up showed successful resolution and tissue regeneration. This case emphasizes the effectiveness of combining advanced endodontic and surgical techniques for complex resorption cases.**

***Keyword:-*** *External Resorption, Endodontic Treatment, Internal Resorption, Mineral Trioxide Aggregate (MTA), Periapical Cyst, Platelet-Rich Fibrin (PRF), Root Resorption.*

## I. INTRODUCTION

Root resorption is a condition characterized by the breakdown of hard tissues like dentin, cementum, or bone, which can occur through either physiological or pathological processes.[1] According to Andreassen, tooth resorption can be categorized into internal and external types.[2]

When resorption is severe and affects a significant portion of the root, the tooth becomes irreparable, leaving extraction as the only solution. Early detection of root resorption is crucial, as immediate treatment is necessary to halt the resorptive process and preserve the tooth. Root resorption begins when the protective non-mineralized outer precemental layer or the inner predentinal layer of the root is compromised by mechanical or chemical trauma.[3,4]

Internal resorption occurs when the pulp tissue becomes inflamed and starts to erode the internal surface of the root, leading to the formation of a resorptive defect. External resorption, on the other hand, is characterized by the loss of root structure due to inflammation or infection from the external surface of the root. When combined with a periapical cyst, which is a common outcome of chronic periapical inflammation, the treatment becomes more intricate.[2]

Traumatic injury to the teeth, followed by intrapulpal and periradicular infection, is a leading cause of inflammatory root resorption. This condition can present as internal, external, or a combination of internal-external lesions.[5,6]

This case report highlights the successful endodontic and surgical treatment of a maxillary central incisor that was previously traumatized, presenting with a large periapical cyst and combined internal-external root resorption along with a displaced root apex.

## II. CASE REPORT

A 32-year-old male patient was referred to the Department of Conservative Dentistry and Endodontics for treatment of his upper left and right anterior teeth. The patient presented with a chief complaint of pain and swelling in the upper front tooth region since 2 days. He had a significant history of trauma sustained 2 years prior, for which he initially sought dental treatment but did not follow up thereafter. The patient's medical history was otherwise non-contributory. The pain was described as continuous, throbbing and radiating pain.

On clinical examination, a labial swelling was observed in the apical region of the maxillary left central incisor. Tooth #11 and #21 exhibited a brownish discoloration of the crown, and sinus tract was noted on vestibular region #21. Teeth #11, #12, and #21 was tender to percussion, although no mobility was detected [Figure 1]. Temporary restorations were present on the palatal aspects of #11 and #21. Electric pulp testing and cold testing showed negative responses for #11, #12, and #21.

Radiographic assessment, including an intraoral periapical radiograph [Figure 2], identified a large radiolucency associated with the root apex of teeth #11, #12, and #21, and apical region of 21 showed external resorption and displacement of root apex.

Further examination using cone-beam computed tomography (CBCT) [Figures 3 a-d] revealed a well-defined oval-shaped radiolucent lesion extending from tooth #12 to #22, with measurements of 18.8 mm bucco-palatal and 6.6

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1224

mm mesio-distal. The imaging also showed internal and external root resorption, along with displacement of the apical root segment #21 [Figures 3b].

Based on the history, clinical examination, and radiographic investigation, the provisional diagnosis for tooth #21 is a previously initiated therapy with periapical cyst associated with trauma-induced inflammatory combined internal-external root resorption.

Tooth #11 was previously initiated therapy with periapical cyst and tooth #12 pulp necrosis with periapical cyst was made.

Fig 1: Discoloration of Maxillary Central Incisors #11, #21 with Sinus Tract

Fig 2: Preoperative Radiograph

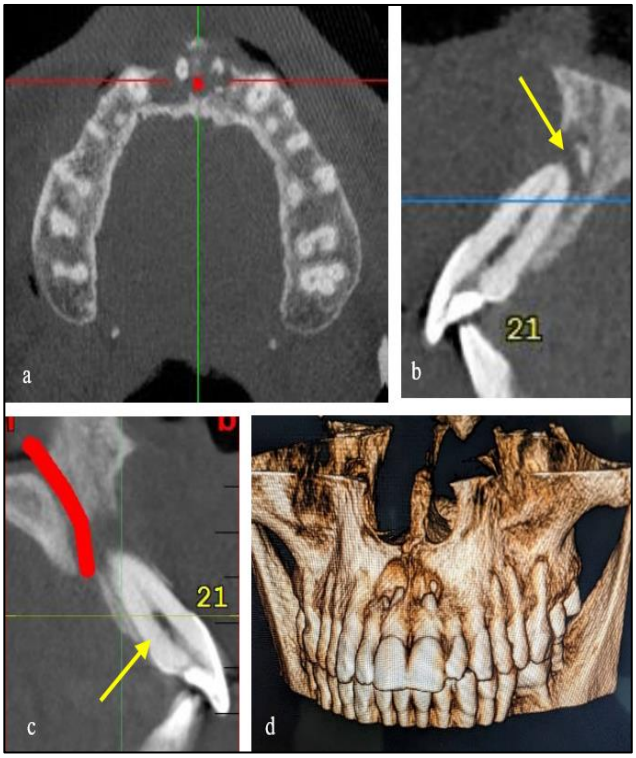


Fig 3: CBCT Images Showing: a) Axial View with Disruption of the Buccal Cortical Plates in Relation to Teeth #11, #12, and #21. b) External Root Resorption with Displacement of the Apical Root Apex. c) Internal Root Resorption. d) 3D reconstruction Revealing a Well-Defined, Oval-Shaped Radiolucent Lesion Extending from Tooth #12 to #22

*A. Endodontic Treatment*

The treatment plan included endodontic therapy for teeth #11, #12, and #21, along with the surgical removal of the periapical cystic lesion due to the presence of a weeping canal in tooth #21. The surgical approach involved an apicoectomy with MTA used as the orthograde filling material.

Prior to the surgical intervention, informed consent was obtained from the patient after explaining the treatment plan. Blood investigations, including a complete blood count, were performed and revealed no conditions that would contraindicate the planned treatment.

Local anesthesia was administered, and the teeth were isolated with a rubber dam. Initial removal of the temporary seal (tooth #11 and #21) and coronary access (teeth #12) were achieved with a high-speed diamond bur. Initial exploration of the root canals was performed with a size 15 K-file files (Mani Inc, Tochigi Ken, Japan). The working length was established using electronic apex locator (Root ZX mini J Morita, Japan) and was confirmed on the radiograph [Figures 4]. During the procedure, a straw coloured fluid could be seen draining through the canal of #21. Cleaning and shaping of the canals were done using ProTaper hand files (Dentsply) in a crown-down manner till F3 (30/0.09) and calcium hydroxide medicament was placed.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1224

At the second appointment, two weeks later, the calcium hydroxide medication was removed. The tooth was then re-irrigated and dried using paper points. Since the canal was dry, obturation was planned and carried out. The root canal was then filled with mineral trioxide aggregate (MTA Plus) to address apical root resorption and prevent overextension in tooth #21.

MTA was mixed according to the manufacturer's instructions. A small portion of the MTA was introduced into the canal using an MTA carrier, and it was gently condensed to the working length with hand pluggers. This process was repeated until the apical 6 mm of tooth #21 was filled with MTA. The access cavity was temporarily sealed, allowing the MTA to set.

The patient was recalled after 2 days. At this follow-up appointment, the remaining root canal space was obturated with gutta-percha using the lateral condensation technique. Teeth #11 and #12 were obturated with BioRoot RCS sealer (Septodont Saint-Maur-Des-Fosses, France) and gutta-percha using single cone technique [Figures 5]. Next, the access cavities were sealed using composite resin (Shofu Inc, Tokyo, Japan).

Fig 4: Working Length Determination

Fig 5: Post Obturation Radiograph

*B. Surgical Treatment*

A trapezoidal incision was made in the labial area from teeth #12 to 22 after administering local anesthesia. Upon raising a full-thickness mucoperiosteal flap, a significant bone defect was observed. The cystic lesion was enucleated following thorough curettage, and the granulation tissue was removed [Figures 6]. The lesion was then sent for histological analysis.

Additionally, the displaced root apex of tooth #21 was extracted [Figures 7]. For the remaining teeth, a resection of the apical 3 mm of root segments was performed for teeth #11, #12, and #21. Retrograde filling with mineral trioxide aggregate (MTA) was completed for teeth #11 and #12.

About 10 ml of venous blood was drawn from the patient during the surgery and placed into two sterile 5 ml vacutainer tubes without any anticoagulant. The tubes were centrifuged at 3000 rpm for approximately 10 minutes. The platelet-rich fibrin (PRF) obtained was then applied to the defect area, and the site was sutured using 3-0 silk suture. The patient was given postoperative instructions and continued on a course of antibiotics and analgesics.

The histopathological analysis revealed the presence of a lumen and a capsule. The capsule was inflamed and covered with a non-keratinized stratified squamous epithelium, indicating a cystic lining. The surrounding connective tissue exhibited a significant number of chronic inflammatory cells within a fibrovascular stroma. Additionally, cholesterol clefts were observed. Histopathological examination confirmed the diagnosis of a radicular cyst [Figure 8].

Postoperative IOPA radiograph was taken [Figure 9]. At 12-month follow-up, the patient was completely asymptomatic on presentation and periapical healing was noted [Figure 10].

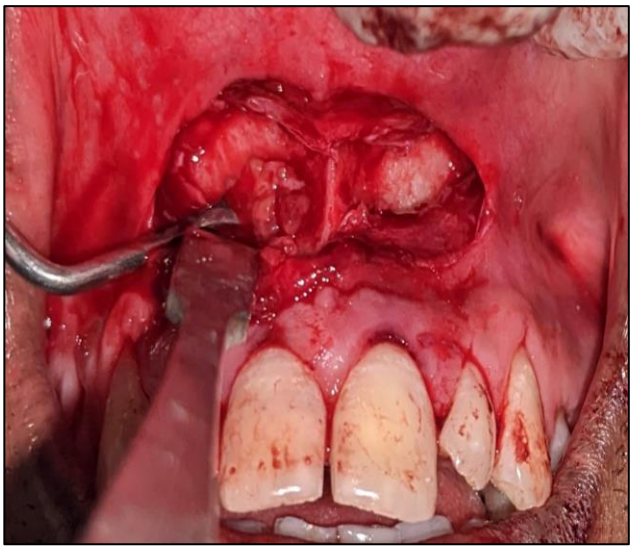

Fig 6: Enucleation of Cystic Lesion

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1224

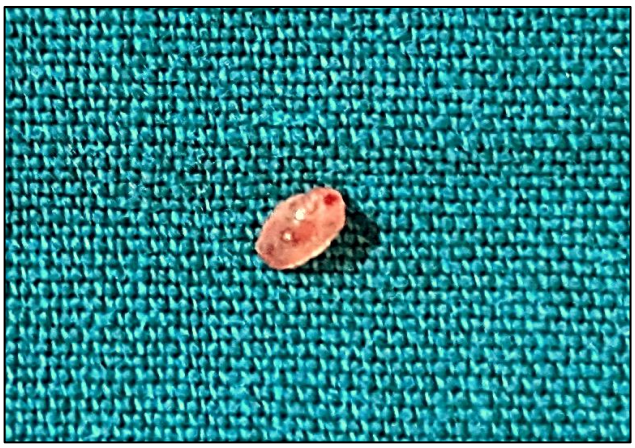
Fig 7: Displaced Root Apex

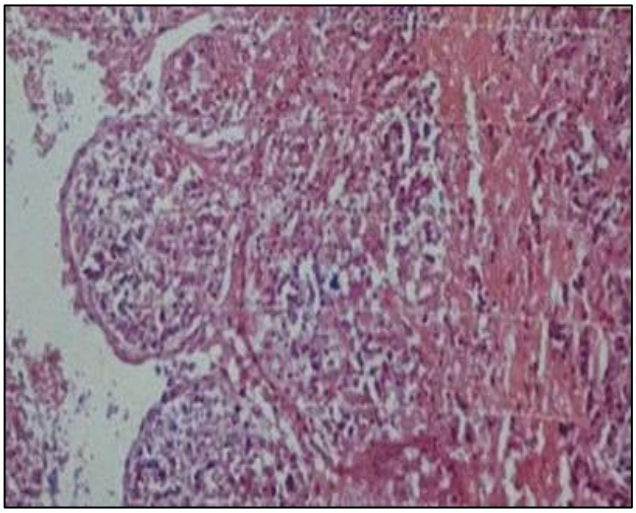
Fig 8: Histopathological Analysis Showed an Inflamed Cystic Lining, Chronic Inflammation and Cholesterol Clefts


Fig 9: Post Operative Radiograph

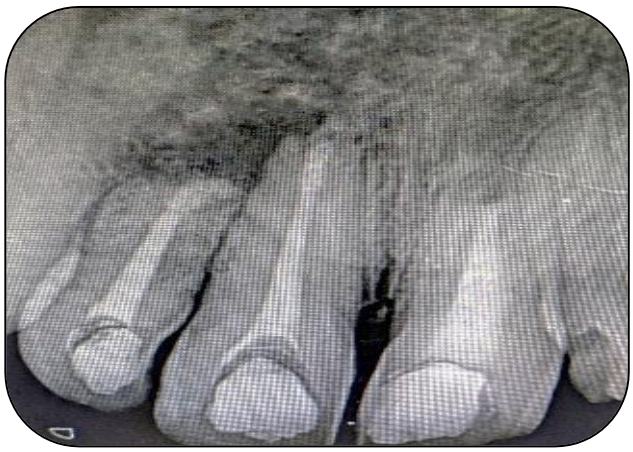
Fig 10: 12 Months Follow Up Radiograph

## III. DISCUSSION

This case report illustrates the effective management of a tooth exhibiting severe internal and external resorption associated with a periapical cyst. Tooth #21 presented with a displaced root and significant resorption, associated by the presence of a periapical cyst. The initial challenge was to address both the resorption and the cyst effectively. Given the severity of the resorption and the size of the lesion, a detailed diagnostic approach was crucial.

A CBCT scan was suggested in this case to evaluate the three-dimensional scope of the periapical lesion and to assess the severity and nature of the root resorption. Compared to traditional 2D periapical radiographs, CBCT offers more precise details regarding the location and size of the lesion. Research by Estrela et al. found that CBCT is superior to periapical radiographs in detecting inflammatory root resorption, especially in identifying the specific root third, surface, and extent of the damage.[7]

In this present case, trauma along with pulpal and periapical infections were the primary factors contributing to root resorption. To stop the resorptive process, it was essential to address and eliminate these triggers, specifically the pulpal and periapical infections. Seltzer and Bender (1975) noted that resorption often results from chronically inflamed or necrotic pulp, commonly seen in teeth with apical periodontitis. The condition worsens when bacteria enter the root canal after pulp necrosis.[8,9] Proper endodontic treatment and intra-canal medication are essential to remove microorganisms, prevent further damage, and promote repair. Treatment approaches for large periapical lesions can range from nonsurgical root canal therapy to a variety of surgical procedure.[5,10]

Nair et al. reported that periapical cysts occur in 6% to 55% of periapical lesions. Generally, larger periapical lesions have a higher likelihood of being cystic.[11] However, research by Natkin et al. indicates that even large lesions can sometimes be periapical granulomas. The only definitive way to diagnose a cyst is through histopathological examination.[12]

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24SEP1224

The apical 6 mm of tooth #21, which was most affected by resorption, was filled with MTA. This material was chosen for its excellent sealing properties, biocompatibility, and ability to promote hard tissue formation.[13,14] Studies have shown that MTA releases calcium ions into resorption defects through the dentinal tubules, enhancing the repair potential of the surrounding tissues. These characteristics make MTA an ideal choice for treating inflammatory root resorption.[15,16]

The treatment strategy involved a combination of endodontic therapy and surgical intervention. The root canal was filled with MTA, and the displaced apical root segment was resected. Following this, a thorough curettage of the cystic lesion was performed, and a PRF (Platelet-Rich Fibrin) membrane was placed to enhance healing. The successful arrest of resorption and the complete regeneration of periapical tissues were confirmed through clinical evaluation and follow-up imaging. The absence of clinical signs and symptoms post-treatment indicated the effectiveness of the approach.

This case underscores the importance of a multifaceted treatment approach in managing complex endodontic conditions. The integration of modern diagnostic tools, such as CBCT, and advanced materials, like MTA, significantly contributes to successful outcomes in challenging cases.

## IV. CONCLUSION

In conclusion, the successful resolution of severe internal and external resorption, combined with the management of a periapical cyst, demonstrates the efficacy of contemporary endodontic techniques and materials. This case serves as a valuable reference for managing similar complex dental conditions, emphasizing the role of advanced diagnostic and treatment modalities in achieving positive patient outcomes.

## REFERENCES

[1]. Digole VR, Dua P, Pathak P, Prakash P, Kumar V. Management of internal inflammatory root resorption - an endodontic challenge: Case series. IP Indian Journal of Conservative and Endodontics. 5(3):140–3.
[2]. Tronstad L. Root resorption--etiology, terminology and clinical manifestations. Endod Dent Traumatol. 1988 Dec;4(6):241–52.
[3]. Trope M. Root resorption of dental and traumatic origin: classification based on etiology. Pract Periodontics Aesthet Dent. 1998 May;10(4):515–22.
[4]. Rai S, Kumari RA. Nonsurgical management of trauma-induced inflammatory internal- external root resorption: A case report. IP Indian Journal of Conservative and Endodontics. 5(4):212–5.
[5]. Heithersay GS. Management of tooth resorption. Aust Dent J. 2007 Mar;52(1 Suppl):S105-121.
[6]. Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth. Part 2. A clinical study of the effect of preinjury and injury factors, such as sex, age, stage of root development, tooth location, and extent of injury including number of intruded teeth on 140 intruded permanent teeth. Dent Traumatol. 2006 Apr;22(2):90–8.
[7]. Estrela C, Bueno MR, De Alencar AHG, Mattar R, Valladares Neto J, Azevedo BC, et al. Method to evaluate inflammatory root resorption by using cone beam computed tomography. J Endod. 2009 Nov;35(11):1491–7.
[8]. Nayak MT, Nayak A. External Inflammatory Root Resorption in Mandibular First Molar: A Case Report. Malays J Med Sci. 2015 Nov;22(6):63–6.
[9]. Fuss Z, Tsesis I, Lin S. Root resorption--diagnosis, classification and treatment choices based on stimulation factors. Dent Traumatol. 2003 Aug;19(4):175–82.
[10]. Trope M. Root Resorption due to Dental Trauma. Endodontic Topics. 2002;1(1):79–100.
[11]. Ramachandran 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 Jan;81(1):93–102.
[12]. Natkin E, Oswald RJ, Carnes LI. The relationship of lesion size to diagnosis, incidence, and treatment of periapical cysts and granulomas. Oral Surg Oral Med Oral Pathol. 1984 Jan;57(1):82–94.
[13]. Holden DT, Schwartz SA, Kirkpatrick TC, Schindler WG. Clinical outcomes of artificial root-end barriers with mineral trioxide aggregate in teeth with immature apices. J Endod. 2008 Jul;34(7):812–7.
[14]. Witherspoon DE, Small JC, Regan JD, Nunn M. Retrospective analysis of open apex teeth obturated with mineral trioxide aggregate. J Endod. 2008 Oct;34(10):1171–6.
[15]. Rezende T, Ribeiro Sobrinho A, Vieira L, Sousa M, Kawai T. Mineral trioxide aggregate (MTA) inhibits osteoclastogenesis and osteoclast activation through calcium and aluminium activities. Clin Oral Investig. 2021 Apr;25(4):1805–14.
[16]. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod. 1999 Mar;25(3):197–205.