ORIGINAL RESEARCH PAPER

Volume - 15 | Issue - 08 | August - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CONSERVATIVE ENDODONTIC MANAGEMENT OF MID-ROOT INTERNAL RESORPTION USING BIOCERAMIC MATERIAL: A 12-MONTH FOLLOW-UP CASE REPORT

Conservative Dentistry

Dr. Dimple Rakhecha MDS, Conservative Dentistry & Endodontics, Government Dental College & Hospital, Ahmedabad.

ABSTRACT

Aim: Internal root resorption is an uncommon condition that may compromise tooth structure if not diagnosed and treated promptly. Early diagnosis and appropriate endodontic management are essential for preserving the affected tooth. **Case Report:** This case report describes the nonsurgical management of mid-root internal resorption in a maxillary anterior tooth. Cone beam computed tomography (CBCT) was used to assess the location and extent of the resorptive defect and aid treatment planning. Root canal treatment included chemomechanical preparation using sodium hypochlorite irrigation with ultrasonic activation, followed by calcium hydroxide as an intracanal medicament. The resorptive defect was obturated with mineral trioxide aggregate (MTA), and the access cavity was restored with composite resin. Clinical and radiographic follow-up was performed at 6 and 12 months. **Results:** The tooth remained asymptomatic and functional throughout the follow-up period. Radiographic examination at 12 months demonstrated satisfactory periapical healing with no evidence of progression of the resorptive lesion. **Conclusion:** This case highlights that early diagnosis and appropriate nonsurgical endodontic management using bioactive materials can successfully manage internal root resorption and preserve the natural tooth in appropriately selected cases.

KEYWORDS

Root Resorption; Mineral Trioxide Aggregate; Cone Beam Computed Tomography (cbct); Ultrasonics

INTRODUCTION

Tooth resorption is a pathological process resulting in the loss of dentin, cementum, or surrounding alveolar bone and may remain undetected for a prolonged period because it is often asymptomatic.[1] [2] Based on the site of resorption, it is broadly classified as internal or external root resorption.[3] [4] Internal root resorption (IRR) is an uncommon condition with a reported prevalence ranging from 0.01% to 1%, most frequently affecting the maxillary incisors.[5–7]

IRR is characterized by progressive destruction of the intraradicular dentin due to chronic pulpal inflammation following disruption of the odontoblastic layer and predentin.[1] [2] [8] [9] Common predisposing factors include dental trauma, orthodontic treatment, internal bleaching, chronic pulpal inflammation, and, in some cases, idiopathic causes.[10] Clinically, IRR is usually asymptomatic and is often detected incidentally on routine radiographic examination. In advanced cases, a characteristic "pink spot" may be observed when the resorptive lesion extends coronally.[1] [2] Radiographically, IRR typically appears as a well-defined, symmetrical enlargement of the root canal space.[11–13]
Early diagnosis is essential to arrest the resorptive process and preserve the remaining tooth structure. Successful management depends on complete debridement and disinfection of the root canal system, followed by sealing of the resorptive defect with a biocompatible material. The present case report describes the nonsurgical management of a mid-root internal resorptive defect using mineral trioxide aggregate (MTA), followed by a 12-month clinical and radiographic follow-up.

Case Presentation

A 29-year-old female patient with no significant medical history presented to the Department of Conservative Dentistry and Endodontics with a chief complaint of swelling in the maxillary anterior region. She reported a history of dental trauma two years prior. Clinical examination revealed discoloration of teeth #21 and #11, along with a sinus tract associated with tooth #22 (Figure 1a). Percussion testing elicited tenderness in tooth #21, while cold and electric pulp sensitivity tests demonstrated delayed responses in teeth #11 and #21, and an absence of response in tooth #22. No periodontal pocketing was detected.

Radiographic evaluation via intraoral periapical radiography revealed an oval-shaped radiolucency at the mid-root level of teeth #11 and #21, accompanied by periapical widening in tooth #21 and periapical radiolucency in tooth #22 (Figure 1b, c). CBCT imaging was subsequently recommended to assess the three-dimensional extent of the lesions. CBCT analysis demonstrated buccal plate perforation in relation to tooth #22 (Figure 1d) and confirmed the oval-shaped mid-root radiolucency in teeth #11 and #21 (Figure 1e).

The definitive diagnoses were as follows: internal resorption with symptomatic apical periodontitis for tooth #21; internal resorption with normal periapical tissue for tooth #11; and pulpal necrosis with a chronic apical abscess for tooth #22. Given the favorable periodontal status, a conservative treatment strategy was formulated, comprising root canal therapy for teeth #11, #21, and #22, along with bioceramic material (MTA) restoration of the resorptive defects under dental operating microscope magnification.

During the initial treatment session, rubber dam isolation was established and endodontic access cavities were prepared using a #2 round bur (Figure 2a). Profuse bleeding from the active resorptive lesions was managed by chemically dissolving pulpal tissue with sodium hypochlorite. Working lengths were established radiographically as 21 mm for teeth #11 (Figure 2b) and #21 (Figure 2c), and 20 mm for tooth #22 (Figure 2d). Biomechanical preparation was performed with a master apical file of ISO size 60 for teeth #11 and #21, and up to ProTaper Gold F4 (Dentsply Sirona) for tooth #22. Copious irrigation with 3% sodium hypochlorite, activated ultrasonically, was employed throughout to achieve thorough chemomechanical debridement. Calcium hydroxide paste (Prime Dental RC Cal, India) was applied as an intracanal dressing to alkalinize the resorptive defects, dissolve residual pulpal tissue, and achieve hemorrhagic control (Figure 2e, f).

At the two weeks recall, the calcium hydroxide dressing was removed using normal saline (0.9%) and 3% sodium hypochlorite. The root canals were then irrigated with buffered EDTA solution (pH 7.4) under instrument agitation. The resorptive cavities and root canals were obturated with MTA (Prevest MTA Plus, India), delivered using an MTA carrier, condensed vertically with Schilder pluggers, and subjected to ultrasonic agitation to enhance material flowability and adaptation. A moistened cotton pellet was placed for 24 hours to facilitate MTA setting, after which the root canal of tooth #22 was obturated with gutta-percha. Coronal restorations were completed using Short Fibre-Reinforced Composite (GC Everx Posterior, Japan). Post-operative radiographs confirmed satisfactory obturation of the root canals and adequate filling of the resorptive defects (Figure 3a, b). At the six-month (Figure 4a, b) and twelve-month clinical and radiographic follow-up examinations, all treated teeth remained functional with no evidence of endodontic pathology (Figure 5a, b, c).

DISCUSSION

Internal root resorption (IRR) is usually asymptomatic and is often detected incidentally on routine radiographic examination. Clinical symptoms may develop depending on the pulpal status or when perforation results in secondary periodontal involvement. The clinical presentation varies according to the location and extent of the lesion. Coronal lesions may present as the characteristic "pink spot" due to vascular granulation tissue, whereas progressive pulpal necrosis can lead to grey discoloration and the development of apical periodontitis or sinus tract formation. Once complete pulp necrosis occurs, the

resorptive process generally ceases because the resorbing cells lose their blood supply.

Conventional intraoral radiographs typically demonstrate IRR as a well-defined oval radiolucency within the root canal. However, the two-dimensional nature of periapical radiographs may limit accurate assessment of the lesion. In the present case, CBCT was used to determine the location and extent of the resorptive defect, facilitating treatment planning. The three-dimensional views provided by CBCT allow improved visualization of resorptive lesions compared with conventional radiography and have been reported to improve diagnostic accuracy in similar cases.

The primary objective of treatment was to eliminate inflamed and necrotic pulp tissue, disinfect the root canal system, and obturate the resorptive defect with a bioactive material to preserve the tooth. Conservative access preparation was performed to maintain the remaining tooth structure. A dental operating microscope was used to improve visualization of the resorptive cavity and facilitate accurate placement of the repair material.[18]

Complete mechanical debridement of IRR defects is often challenging because of their irregular morphology. Therefore, copious irrigation with sodium hypochlorite, activated using ultrasonics, was employed to enhance tissue dissolution and improve disinfection of areas inaccessible to instruments. Ultrasonic activation has been shown to improve irrigant penetration and debris removal, although complete bacterial elimination cannot always be achieved.[15] [16]

To enhance canal disinfection, calcium hydroxide was placed as an intracanal medicament between appointments. Its high alkaline pH provides antimicrobial activity, promotes dissolution of residual organic tissue, and helps control inflammatory resorption. Although calcium hydroxide has limitations in completely eliminating microorganisms within complex canal anatomy, it remains a widely accepted intracanal medicament for the management of internal resorption.[15] [17]

Mineral trioxide aggregate (MTA) was selected to obturate the resorptive defect because of its excellent sealing ability, biocompatibility, and favorable biological properties. In the present case, MTA provided adequate sealing of the defect while reinforcing the weakened root structure, supporting satisfactory clinical and radiographic healing during follow-up.[18]

Following obturation, the access cavity was restored using short fibre-reinforced composite (SFRC). Previous studies have shown that SFRC possesses greater fracture toughness than conventional composite resins and may improve the fracture resistance of structurally compromised teeth, making it a suitable restorative material in such cases.[19]

Limitations

Long-term follow-up is essential in cases of internal root resorption because recurrence may occur despite successful initial treatment. Although the treated teeth remained asymptomatic with favorable radiographic healing at the 12-month follow-up, continued clinical and radiographic evaluation for at least 2–4 years is recommended to confirm long-term treatment success. The prognosis depends on several factors, including lesion size and location, the degree of microbial contamination, and the quality of canal disinfection and obturation..

CONCLUSION

Internal inflammatory root resorption is a pulp-originated pathology diagnosed through integrated clinical and radiographic assessment. The advent of three-dimensional imaging has substantially enhanced diagnostic precision, leading to improved clinical management of resorptive defects and more favorable conservative treatment outcomes. Contemporary endodontic adjuncts—including optical magnification, ultrasonic debridement, and calcium silicate-based cements—collectively expand the rehabilitative potential for teeth affected by internal resorption, offering clinicians effective tools for the preservation of compromised dentition.

Figure 1 a- discolored teeth irt 21, sinus tract irt 22; b-oval shaped radiolucency irt 11,21; c-periapical radiolucency irt 22 ;d-CBCT cross section for periapical radiolucency with buccal plate perforation irt 22 ;e-oval radiolucency irt 11,21.

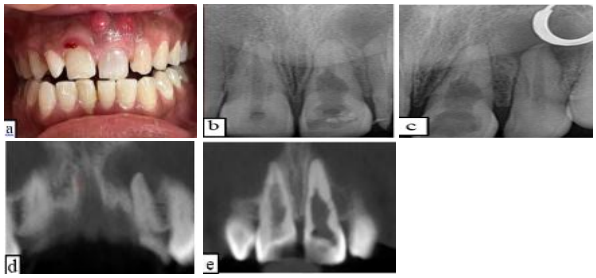


Figure 2 a-access opening under Dental Operating Microscope;b,c,d-working length determination ;e,f- intracanal medicaments placed

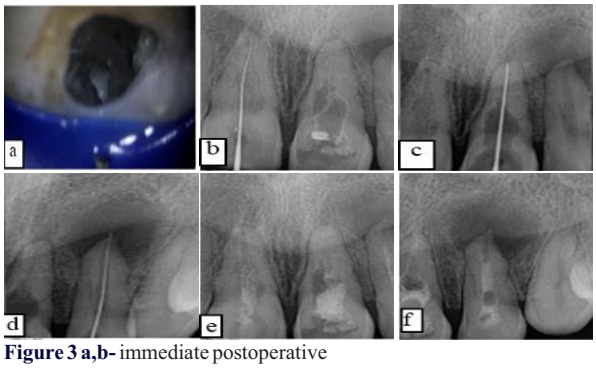


Figure 3 a,b- immediate postoperative

Figure 4 a,b- Follow up at 6 month

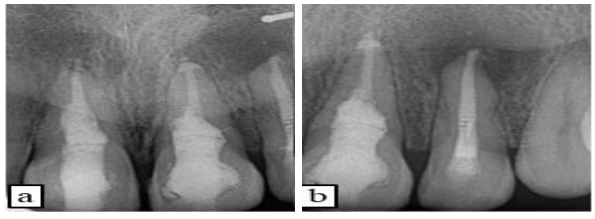
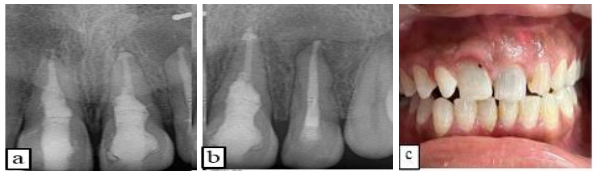


Figure 5 a,b,c- Follow up at 1 year



REFERENCES

1. Gaskill JH. Report of a case of internal resorption. Dent Cosmos. 1894;36:1019–24.
2. Mummery JH. The pathology of "pink spots" on teeth. Br Dent J. 1920;41:301–11.
3. Andreasen JO. Review of root resorption systems and models: Biology of root resorption and the homeostatic mechanisms of the periodontal ligament. In: Davidovitch Z, editor. Proceedings of the International Conference on the Biological Mechanisms of Tooth Eruption and Root Resorption. Birmingham (UK): Ebsco Media; 1988. p. 9–21.
4. Tronstad L. Root resorption: Etiology, terminology and clinical manifestations. Endod Dent Traumatol. 1988;4:241–52.
5. Heithersay GS. Management of tooth resorption. Aust Dent J. 2007;52(Suppl 1):S105.
6. Goultschin J, Nitzan D, Azaz B. Root resorption: Review and discussion. Oral Surg Oral Med Oral Pathol. 1982;54:586–91.
7. Çalışkan MK, Türkün M. Prognosis of permanent teeth with internal resorption: A clinical review. Endod Dent Traumatol. 1997;13(2):75–81.
8. Consolaro A, Consolaro RB, Prado RF. Reabsorção interna: Uma pulpopatia inflamatória. Maringá: Dental Press; 2005. p. 572–94.
9. Nascimento GJF, Emiliano GBG, Silva IHM, Carvalho RA, Galvão HC. Mecanismo, classificação e etiologia das reabsorções dentárias. Rev Fac Odontol Porto Alegre. 2006;47(3):17–22.
10. Wedenberg C, Lindskog S. Experimental internal resorption in monkey teeth. Endod Dent Traumatol. 1985;1(6):221–7.
11. Goon WW, Cohen S, Borer RF. External cervical root resorption following bleaching. J

Endod. 1986;12:414–8.
12. Rotstein I. Bleaching nonvital and vital discolored teeth. In: Cohen S, Burns RC, editors. Pathways of the Pulp. St Louis: Mosby; 1998. p. 755–86.
13. Friedland B, Faiella R, Bianchi J. Use of rotational tomography for assessing internal resorption. J Endod. 2001;27(12):797–9.
14. Nilsson E, Bonte E, Bayet F, Lasfargues JJ. Management of internal root resorption on permanent teeth. Int J Dent. 2013;2013:929486. doi:10.1155/2013/929486.
15. Digole VR, Dua P, Pathak P, Prakash P, Kumar V. Management of internal inflammatory root resorption—an endodontic challenge: Case series. IP Indian J Conserv Endod. 2020;5(3):140–3.
16. Mohammadi Z, Shalavi S, Giardino L, Palazzi F, Asgary S. Impact of ultrasonic activation on the effectiveness of sodium hypochlorite: A review. Iran Endod J. 2015;10(4):216–20.
17. Chowdhury SS, Alam MS. Management of tooth resorption by using calcium hydroxide: A case report. Bangabandhu Sheikh Mujib Med Univ J. 2012;5(1):72–5.
18. Gupta R, et al. Management of internal root resorption with MTA and thermoplasticised gutta-percha: A case report. IOSR J Dent Med Sci. 2020;19(8):38–42.
19. Fráter M, Sáry T, Garoushi S. Bioblock technique to treat severe internal resorption with subsequent periapical pathology: A case report. Restor Dent Endod. 2020;45(4):e43. doi:10.5395/rde.2020.45.e43.