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ENDODONTIC MANAGEMENT OF INTERNAL ROOT RESORPTION "FROM PATHOGENESIS TO SUCCESSFUL CLINICAL RESOLUTION USING MODERN ENDODONTIC TECHNIQUES – A CASE REPORT

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ABSTRACT

This case report examines a scarce instance of inflammatory internal root resorption (IIRR) featuring in the mandibular second premolar—IIRR in permanent teeth is condition estimated to occur in only 0.01% to 1% of cases. This pathological process typically stems from persistent pulpal inflammation, often triggered by dental caries or traumatic injury. While the prevalence is higher in anterior teeth—largely due to their vulnerability to physical impact. Achieving a favourable prognosis depends on timely identification, elimination of the underlying etiology, and meticulous clinical intervention of the defect. This article reviews current perspectives on the management of internal root resorption (IRR) and explores a hybrid approach. This approach combines Mineral Trioxide Aggregate (MTA), known for its exceptional biocompatibility and sealing ability within the resorptive defect, with a thermoplasticized gutta-percha technique for the remainder of the root canal. This combined protocol achieves a dense, three-dimensional obturation that effectively seals the root canal system, prevents bacterial microleakage, and creates a favorable environment for periapical healing

INTRODUCTION

Internal root resorption (IRR) involves the advancing destruction of intraradicular dentin and tubules, typically localized to the middle or apical segments of the canal walls. This process is driven by clastic cell activity and manifests radiographically as a radiolucent expansion of the pulp cavity. Primary etiological triggers include mechanical trauma, bacterial infection, and excessive orthodontic forces. The resorptive sequence unfolds in two distinct phases: the breakdown of inorganic minerals followed by the collapse of the organic matrix. Internal inflammatory resorption results in a progressive void within the dentin, whereas replacement resorption involves the deposition of bone-like or cementum-like hard tissue within the defect.

While IRR is frequently asymptomatic, a clinical "pink spot" may appear on the crown, signifying vascular granulation tissue visible through thinned enamel. Definitive diagnosis relies on radiographic imaging, which typically reveals a well-defined, oval-to-round radiolucent expansion that distorts the natural canal anatomy. Modern diagnostic protocols utilize microscopic analysis.

Successful management requires hermetic sealing of the resorptive defect. A variety of restorative materials have been utilized, ranging from traditional amalgam and composite resins to specialized polymers and zinc-based cements. However, Mineral Trioxide Aggregate (MTA) has emerged as the gold standard due to its superior biocompatibility, marginal seal, and ability to stimulate osteogenesis and cementogenesis. This is often paired with thermoplasticized gutta-percha to ensure a dense obturation of the irregular canal space.

The presence of a perforation complicates the long-term outlook, as it weakens the tooth structure and may lead to periodontal complications. Despite these challenges, the prognosis is significantly improved by the application of bioactive materials.

This case series highlights the successful clinical resolution of non-perforating IRR, demonstrating stable healing and structural integrity over a follow-up period of 8 to 12 months.

CASE REPORT

A 20-year-old female patient came to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in the lower left posterior tooth region since 1 month. The patient's medical history was non-contributory. Clinical examination of the mandibular left 1st premolar (35) revealed extensive deep proximal caries. The tooth exhibited significant tenderness to vertical percussion, suggesting an inflammatory involvement of periapical tissues. The tooth exhibited no mobility, confirming that the periodontal ligament and attachment apparatus remained functionally intact. On cold test using refrigerant spray (Coltene Whaledent) tooth elicited an immediate and lingering response. Thermal evaluation was further confirmed with heat test using heated gutta-percha which produced a delayed and lingering response, a classic indicator of irreversible pulpal inflammation. Radiographic examination (IOPAR) (Figure 1a) showed radiolucency involving the pulp space in relation to tooth 35 and presence of well-defined scooped-out balloon-shaped radiolucency seen in middle third of root surface of the premolar indicating a case of internal resorption. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was established. Non-surgical root canal treatment was planned with tooth 35.

Under local anaesthesia and rubber dam application, access opening was made. The canals were negotiated using ISO sizes 10,15 and 20 K-files, and working length was determined using an electronic apex locator (Tri auto ZX 2 plus) and confirmed radiographically (Figure 2b). Cleaning and shaping were performed with protaper gold rotary instruments up to size F2. Irrigation was carried out with 5.25% sodium hypochlorite (safe endo) and saline, after each instrument change, sonic activation (super endo) of NaOCl was done. An aqueous calcium hydroxide dressing was given as an intracanal medicament with temporary restoration twice at the interval of 7-10 days. During the follow-up appointment, the medicament was cleared using 17% EDTA liquid assisted by sonic activation, followed by a final 3 ml saline flush. The procedure progressed once the canals remained dry (no bleeding) and the patient reported no symptoms, Sectional Obturation was performed by placing apical plug (down-pack) and thermoplastic gutta-percha(backfill) with bio ceramic sealer (safe endo bioactive RCS) till the middle third of the canal, rest of the canal was obturated with MTA (orthograde-filling) under Dental operating microscope(Figure 2d). Post-obturation radiograph confirmed well-obturated canals and post obturation restoration was done with light-cured composite resin (Figure 2e). A porcelain-fused-metal crown was given after 1 month follow up.

DISCUSSION

Since Bell's initial observation in 1830, internal resorption has been extensively documented in dental literature. This multifactorial phenomenon is generally classified into four

categories: physiological, local, systemic, or idiopathic.

Internal resorption is driven by pulpal inflammation, which recruits clastic precursor cells via the vascular system. Because the process relies on this nutrient supply, it is highly manageable; standard root canal therapy effectively halts the destruction by severing the blood flow to the resorptive tissues.

The treatment strategy depends largely on whether the resorption has breached the external root surface:
Perforating Defects :-These may require surgical intervention or techniques to encourage hard tissue bridges and remineralization, providing a matrix for permanent canal obturation.

Non-Perforating Defects: In the specific case described, the defect remained contained within the root. The root apex was sealed using down-pack and backfill via the vertical condensation technique. Mineral Trioxide Aggregate (MTA) was selected to fill the resorptive cavity. MTA is the material of choice here due to its superior biocompatibility, hermetic sealing properties, and its ability to stimulate both bone and cementum growth (osteogenesis and cementogenesis).

CONCLUSION

Early diagnosis, removal of the cause, proper treatment of the resorbed root is mandatory for successful treatment outcome. Internal resorption is an uncommon resorption of the tooth, which starts from the root canal and destroys the surrounding tooth structure. It is easy to control the process of internal root resorption via severing the blood supply to the resorbing tissues with conventional root canal therapy. Regular recall is important to check the status of healing and for the overall prognosis of the tooth.

Figures:-

FIGURE 1: (a) Pre operative radiograph. (b)Working length determination. (c)Master cone fit check. (d)Obturation. (e) Post endodontic restoration. (f) PFM crown.

REFERENCES

1. Patel S, Ricucci D, Durak C, Tay F. Internal root resorption: a review. Journal of endodontics. 2010 Jul 1;36(7):1107-21.
2. Heboyan A, Avetisyan A, Karobari MI, Marya A, Khurshid Z, Rokaya D, Zafar MS, Fernandes GV. Tooth root resorption: A review. Science Progress. 2022 Jul;105(3):00368504221109217.
3. Gabor C, Tam E, Shen Y, Haapasalo M. Prevalence of internal inflammatory root resorption. Journal of Endodontics. 2012 Jan 1;38(1):24-7.
4. Tronstad L. Root resorption—etiology, terminology and clinical manifestations. Dental Traumatology. 1988 Dec;4(6):241-52.
5. Mittal S, Kumar T, Mittal S, Sharma J. "Internal root resorption: An endodontic challenge": A case series. Journal of Conservative Dentistry and Endodontics. 2014 Nov 1;17(6):590-3.
6. Mittal N, Dhakad C, Sharma S, Singh D, Dhakad Jr C. Management of Internal Root Resorption With Mineral Trioxide Aggregate in Mandibular Molar: A Case Report. Cureus. 2025 Nov 5;17(11).
7. Rathi S, Nikhil V, Sharma A, Chandani R. Internal root resorption in permanent mandibular molars–A rare entity: Report of two cases. Journal of Conservative Dentistry and Endodontics. 2024 Apr 1;27(4):442-6.
8. Deep A, Thakur S, Singhal P, Chawla D. Management of root perforation due to internal resorption: A 1-year follow-up study. International Journal of Clinical Pediatric Dentistry. 2021 Jul;14(4):593.
9. Mehra N, Yadav M, Kaushik M, Roshni R. Clinical management of root resorption: a report of three cases. Cureus. 2018 Aug 27;10(8).
10. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. Journal of endodontics. 1999 Mar 1;25(3):197-205.