

## Endodontic Intervention for Managing External Inflammatory Root Resorption in Mandibular First Molar

Nehal Amir, Ayesha Nazakat

### ABSTRACT:

External inflammatory resorption (EIR) is the pathological destruction of external radicular structures with a multifactorial etiology. Prompt diagnosis and meticulous intervention are obligatory to retain the salvageability of the tooth and to circumvent the premature loss of permanent dentition. Infected pulpal tissues and microbial toxins are the mainstay of the persistent inflammatory response in the periodontal tissues. This provokes odontoclastic activity, precipitating radicular loss. In this report, a 17-year-old male patient reported severe pain in the mandibular right first molar. After a thorough history and examination, the case was diagnosed as inflammatory root resorption. Nonsurgical endodontic therapy was performed under rubber dam isolation. After adequate chemomechanical preparation, intracanal, non-setting calcium hydroxide was utilized to arrest the resorptive process. This case enlightens the fact that mechanical debridement alone cannot achieve the prime goal of endodontic intervention. Chemical disinfection using intracanal medicaments can magnify the outcomes by eradicating the nidus of infection.

**Keywords:** Calcium hydroxide, Periapical tissues, Root resorption

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### INTRODUCTION:

Pathological root resorption is implicated in the non-microbial disfigurement of the mineralized dental tissues by odontoclasts. Roots are principally guarded by a delicate anti-resorptive barrier comprising an unmineralized organic zone of pre-cementum and pre-dentin shielding the external and internal radicular walls respectively. This is attributed chiefly to the insufficiency of the clastic cells to adhere to unmineralized substrate.<sup>1,2</sup> By expeditious detection and meticulous intervention, the resorptive process can be halted thus augmenting the longevity of the tooth. The resorptive process embracing the internal radicular wall is termed internal root resorption (IRR) while external root resorption (ERR) encompasses the external root surface. External resorption is more common than internal resorption and can be sub-categorized as external surface resorption, external inflammatory resorption, external replacement resorption, invasive cervical resorption, and transient apical breakdown.<sup>3,4</sup> External inflammatory resorption is fundamentally related to infected root canals. There is either damage to the external radicular surface during traumatic events or the establishment

of an avenue of bacteria and their toxins between the root canal and the peri-radicular tissues. If the infected endodontic system is not treated timely, then the result will be sustained activity of clastic cells with persistent inflammation and destruction of dental hard tissues.<sup>5</sup>

### Case Report:

A 17-years old male patient, resident of Rawalpindi, presented to the Outpatient Department of Operative Dentistry and Endodontics, School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad on 5<sup>th</sup> June 2023 with the complaint of pain in his lower right back tooth since 1-week. The patient had been experiencing moderate-intensity pain for the past 2 months with severe exacerbation since 1-week. Pain was continuous and throbbing in nature, and was aggravated during mastication. The patient had a similar episode of pain 6 months back for which he took oral analgesics (Ibuprofen 400mg three times daily) for 5 days after which the pain subsided. The patient was otherwise healthy and medical history was insignificant. Extraoral findings were non-contributory. On intraoral assessment, a deep carious lesion was found in tooth # 46. No mobility, swelling, or sinus tract was associated. The tooth was tender to percussion and non-responsive to vitality testing. On radiographic evaluation, external root resorption was evident involving distal root with areas of periapical radiolucency encompassing both mesial and distal roots. The case was diagnosed as External inflammatory root resorption associated with necrotic pulp and chronic apical periodontitis. Nonsurgical endodontic therapy was opted as the treatment modality of choice. The treatment plan was discussed with

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the patient and informed consent was taken.

The endodontic intervention was initiated under rubber dam isolation after adequate anesthesia using 2% Lidocaine with 1:100,000 Epinephrine. After the access opening was done, the pulp chamber floor was explored and four canal orifices were located: Mesio Buccal (MB), Mesio Lingual (ML), Distobuccal (DB), and Distolingual (DL). Using Digital Periapical Radiography, working lengths were taken (25mm for MB, and ML canals and 18mm for DB canal, and 17mm for DL canal). Canals were subjected to Chemomechanical preparation using the Protaper Universal file system (Dentsply Sirona, USA) under copious irrigation with 5.25% Sodium hypochlorite (Figure 1). After cleaning and shaping, canals were dried using absorbent paper points, and intracanal non-setting calcium hydroxide medication UltraCal XS paste (Ultradent, USA) was placed. The tooth was temporarily restored and the patient was recalled after 2 weeks. On the second visit, the patient reported multiple episodes of pain during the interappointment phase and the tooth was still tender to percussion. Intracanal medication was placed again for 2 weeks.

On the third visit, the patient was asymptomatic and the tooth was ready for obturation. Intervention was accomplished under rubber dam isolation and calcium hydroxide paste was efficiently removed by sonic activation of endodontic irrigant. Protaper Universal Master Apical file F3 was inserted in all four canals and the final radiograph was taken before obturation as illustrated in figure 1. After drying the canals, obturation was done using Protaper Universal gutta percha points and Sealapex- root canal sealer (Kerr Manufacturers) (Figure 2). The access cavity was restored using Glass ionomer cement and the patient was recalled for subsequent follow-ups at 2 weeks and 1 month interval (Figure 3).

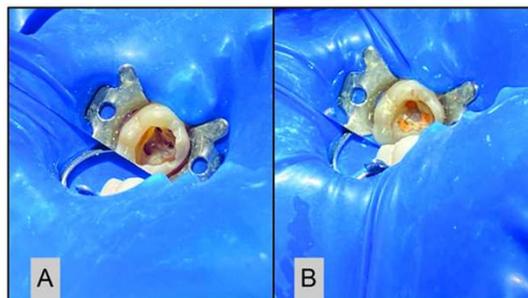
#### DISCUSSION:

External inflammatory resorption is an untoward phenomenon prevailing injury to the external radicular wall and adjacent periodontium. The majority of cases are interrelated with chronic apical periodontitis and dental traumatic injuries. Initially, the resorptive process is self-limiting targeting only the damaged radicular substrate. The successive progression

**Figure 1** Intra-Operative Radiographs A) Working Length estimation B) Radiograph of Master Apical Files in canals



**Figure 2** Intra-Operative Photographs A) Photograph depicting the access cavity following chemomechanical preparation immediately before obturation B) Post-Obturation Photograph of Access cavity



**Figure 3** Post-Operative Radiographs at follow-up periods A) At 2 weeks follow-up B) At 1 month Follow-up



of the lesion is associated with the loss of pulpal vitality and infection of necrotic tissue.<sup>6</sup> The “Resorption Triad” is distinguished by (1) the destruction of anti-resorptive barriers (2) a persistent provoking factor (3) a sustained vascular supply for the odontoclasts.<sup>5</sup> It is chiefly divided into two phases: injury and stimulation. Injurious episodes are linked to dental trauma, pulp necrosis, apical periodontitis, pressure from an impacted tooth and neoplasm, bleaching procedures, and orthodontic tooth movements. The most common stimulant for resorptive events is pulpal infection generating an inflammatory response in the periodontium.<sup>7</sup> Consequently, it is crucial to exclude the etiological factor for successful management of resorption.

In this case, the resorption was fundamentally due to pulpal necrosis, hence, nonsurgical endodontic therapy was accomplished. However, complete eradication of endodontic microbiota is not practically feasible by chemomechanical preparation alone. Therefore, intracanal medication was utilized to achieve disinfection. Owing to its outstanding antimicrobial potential and high alkalinity, Calcium hydroxide medication was used in this case. It enables the dissolution of necrotic remnants, inhibition of the resorptive process, and induction of repair by hard tissue formation.<sup>8</sup>

EIR can occur either along the length of the root (Lateral root resorption) or at the root apex (Apical root resorption).<sup>5</sup> This was the case of External Inflammatory Apical

resorption in which the apical constriction of the distal root was destroyed due to the resorptive process. Scouting files could easily cross the apex. Henceforth, working length was established in distal canals using a larger size file (25k) to achieve an apical stop for subsequent instrumentation and obturation.

Follow-up of patients at recall visits is obligatory to monitor favorable periapical tissue healing. In the current case, obturation was done after complete assurance that the resorptive process had been arrested and the patient was asymptomatic with no tenderness to percussion. The patient was also reassessed at 2 weeks and 1 month period. He was comfortable and had no symptoms. The success of endodontic therapy is dependent not only on the alleviation of symptoms but also on the survival of the tooth under functional loading. By considering this goal, the patient was advised a full-coverage restoration. According to the literature support, full-coverage cast restorations enhance the longevity of endodontically-treated teeth.<sup>9</sup> The patient was referred to the Prosthodontic department for permanent restorative intervention. The management protocol implemented in this case is supported by the literature that signifies the role of immediate pulp extirpation and intracanal calcium hydroxide medication in root resorption cases.<sup>10</sup> Furthermore, the antimicrobial potential of calcium hydroxide can be significantly enhanced by reinforcing it with nanoparticles.<sup>11</sup> This can prove to be a milestone in the management of inflammatory root resorption.

#### CONCLUSION:

Inflammatory root resorption is a common sequela of necrotic pulp with chronic apical periodontitis. The accuracy in diagnosis and timely intervention is fundamental to arresting the resorptive process, and to augment the prognosis and longevity of the tooth.

#### Authors Contribution:

**Nehal Amir:** Conception, Principal Investigator (Clinician), Literature review, Manuscript writing and critical revision

**Ayesha Nazakat:** Contributed to assistant during the treatment, contributed to manuscript writing and editing

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