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A Case Report on Endodontic Management of Inflammatory Intra-Radicular (Balloon Shaped) Resorption in Mandibular Molar

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Abstract

Internal root resorption (IRR) of inflammatory type among mandibular molars is a rare phenomenon (Prevalence 0.01% - 1%). Its diagnosis and treatment can be challenging, depending on the extent of the defect and its location, so a thorough clinical and radiographic examination should be done before treatment. It is usually asymptomatic and discovered by chance on routine radiographic examination. The treatment of this condition should be initiated as soon as possible to prevent further loss of hard tissue or an eventual root perforation. A Patient reported in the outpatient department with a chief complaint of pain in the lower posterior region of the jaw, on thorough clinical and radiological examinations, a diagnosis of irreversible pulpitis was made and nonsurgical root canal treatment was planned using thermoplastic obturation technique. Six-month follow-up showed arrest of the Internal root resorption. Early detection of such resorption is the key to successful management and preserving the tooth's integrity.

Keywords: Internal Root Resorption; Mesiolingual Canal; Balloon-Shaped Defect; Thermoplasticized Technique; CBCT

Abbreviations

IRR: Internal Root Resorption; CBCT: Cone Beam Computed Tomography.

Introduction

Treating teeth with root resorption may be quite challenging. Root resorption can be found either inside or outside the root, depending on the site of origin. Internal root resorption is a rare and distinct phenomenon that can manifest in different shapes, as stated by the American Association of Endodontists [1]. The prevalence of internal inflammatory root resorption was found to be between 0.01% and 1% by Haapasalo and Endal, respectively [2]. The dentin wall's resorption is caused by chronic pulpal irritation, which triggers the movement of clastic cells towards it. To initiate the IRR, it is necessary to provide a certain segment of pulp tissue that supports the resorption by the responsible cells. A pathological process known as internal root resorption (IRR) is characterized by chronic pulp irritation and dental hard tissue degeneration. Odontoclastic activities cause damage to the dentinal tubules from the pulpal canal surface towards the outer root surface during Intra-radicular internal resorption. According to the American Association of Endodontics Glossary, resorption is an instance where there is no dentin, cementum, or bone due to either physiologic or pathologic methods [1]. Generally Both the internal (pulpally-derived) and external (Periodontal linked) methods of tooth resorption are present [3].

It is unclear that what etiological factors may be linked to internal root resorption. However, this can be because of acute or chronic trauma, pulp amputation, crown preparation with inadequate cooling, hyperthyroidism, autotransplantation, or Aggressive orthodontic treatment [4], or Chronic pulpal infection. It is suggested that trauma and pulpal infection are the primary factors involved in initiating internal root resorption.

IRR can be classified as transient or progressive, as per Wedenberg and Lindskog's explanation.The transient type arises without infection from the pulp, while a progressive type requires continuous stimulation by bacterial inflammation, as stated by the authors.

Haapasalo, et al. [2] emphasized that two factors are necessary for the development of internal root resorption: 1) The presence of vital pulp tissue at the resorption site is essential. And 2) The pulp adjacent to resorption must be partially or completely necrotic, Permitting bacterial infection and microbial antigens to enter the root canal. If the progression of the infection is gradual and the necrosis of the entire pulp takes time, the IRR can persist in creating a connection between the root canal and the periodontium that surrounds it and further complicating the treatment with a negative prognosis. The IRR may be very small and radiographically not seen or produce a great hollow space of various shapes and sizes, typically with symmetrical walls, which seems as a radiolucent location that distorts the dentin wall. Clinically, the condition is usually asymptomatic, slowly progressing, and detected by routine radiographic examination, which reveals a round to oval radiolucent enlargement of the pulp space. The margins are smooth and clearly defined with distortion of the original root canal outline [4]. Nevertheless, clinical indications such as pain and swelling may emerge when internal resorption develops to more advanced stages. Sometimes, the root canal system is perforated by resorption, which makes the tooth vulnerable to breakage [5].

Case Presentation

A woman patient of 37 years old reported experiencing pain in her lower left back tooth area to the department of conservative dentistry and endodontics after 4 months.

Her medical history and family background had no bearing on it. Following detailed questioning, the patient stated that there was no history of trauma to the affected area. Clinical examination revealed a dislodged restoration on the mesio-occlusal aspect of the left mandibular first molar and mild tenderness to vertical percussion. In relation to the tooth number 36, there were signs of grade 1 tooth mobility and sinus opening using an electric pulp tester and cold test (Endo-Frost, Coltene Whaledent Inc., USA), the tooth's vitality was verified (Figure 1).

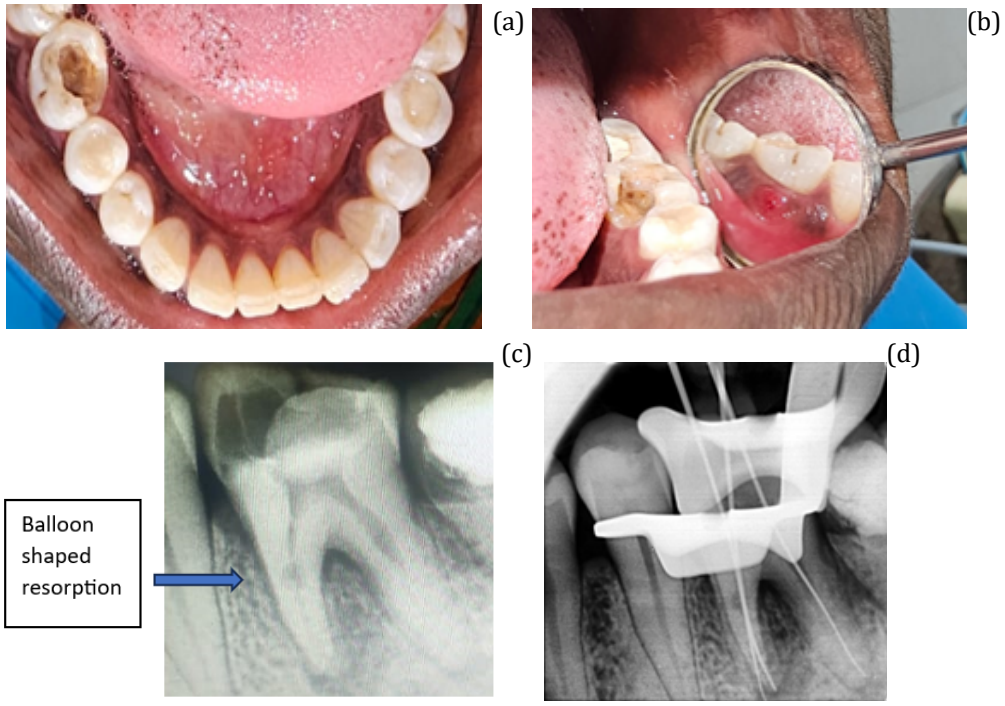

Figure 1: (a): Intraoral clinical photograph (Occlusal View); (b): Sinus opening seen on buccal aspect i.r.t 36; (c): Intraoral periapical (IOPA) radiograph i.r.t 36; (d): Working length determination.

The radiolucency is found to be ranging from round to oval during preoperative intraoral periapical radiographic examination, which balloons out of the root canal concerning the mesial canal of tooth number 36. To determine the location and boundaries of the resorption zone, mesial and distal shift radiographs were taken. Additional analysis was carried out using a CBCT scan to determine the location, extent, and magnitude of the resorption zone. Based on the axial, sagittal, and coronal cbct cross-sections (IRR) resorption area in the middle third of the mesiolingual canal, diagnosed was the condition that did not perforate the root surface (Figures 2 & 3).

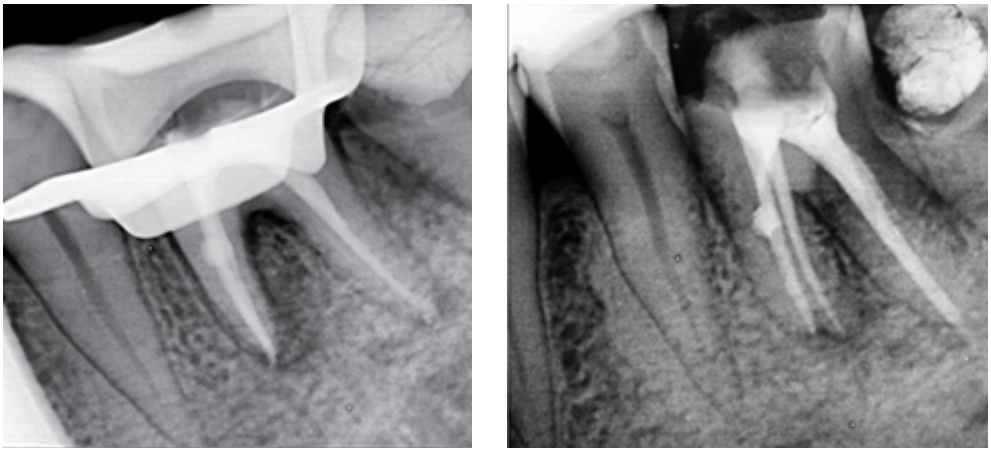

Figure 2: Postobturation radiograph.

Figure 3: PFM crown irt 36.

The Thermoplasticized obturation technique was recommended as the treatment modality for obturating the root canal with gutta-percha. Prior to commencing treatment, the patient was provided with information on procedures and consent was obtained. To anesthetize tooth number 36, we administered 2% lignocaine with epinephrine 1: 100000 (lignox, indoco, india) which caused an inferior alveolar nerve block. A rubber dam was used to isolate the area(tooth number 36) and then an access cavity was prepared. Working length was determined by an electronic apex locator) (VDW, Germany) with #15-K stainless steel file (DENTSPLY, USA) after three root canal orifices were located (mesiobuccal, mesiolingual, and distal) The working length was confirmed radiographically. A biomechanical preparation was performed, resulting in enlargement of the distal root canal up to F2(NeoEndo Neotaper) file and the enlargement of mesio-buccal and mesio-lingual canals up to F1 (NeoEndo Neotaper). file. The root canals had been flushed with EDTA (PULPDENT, USA) between instrumentation and rinsed with 1% sodium

hypochlorite solution using a syringe with a 27 gauge needle. The irrigants had been activated with sonic activation (MM sonic endo 1500, MICRO-MEGA, FRANCE) and the final flush was completed with 5 mL of normal saline. The prepared canals were dried using absorbent paper points and subjected to chemo-mechanical preparation. An intracanal medication of calcium hydroxide was packed into the canals and left for a period of two weeks. Following the temporary sealing of the access cavity with Cavit-g (3 M USA), the patient was recalled after 2 weeks.

The Thermoplasticized obturation technique was planned for the second appointment as there were no indications of symptoms. The removal of Calcium hydroxide using H file (Dentsply Maillefer, Switzerland) and 17EDTA was achieved through sonic activation, (MM sonic endo 1500, MICRO-MEGA, FRANCE). Obturation till the apical end of the resorbed area was done with a sectional obturation method. A thermoplastic gutta-percha was used to fill the remaining portion of the canal. Following the completion of root canal obturation, the tooth was restored using glass ionomer cement. A radiograph obtained during an immediate postoperative period revealed dense obturation in the resorptive defect. the procedure was successful. The patient was recalled after 6 months for follow-up. Intraoral periapical radiograph and CBCT scans had been performed to assess the outcomes, showing proper healing.

Discussion

The loss of dentine due to clastic cell action is a pathological phenomenon that results in internal root resorption. Trauma is the leading etiological factor, followed by carious lesion, A more recent histological study concluded that internal resorption was frequently detected in teeth affected by pulpitis and pulp necrosis.Generally, there are two types of internal root resorption are described: the internal root canal inflammatory resorption and the internal root canal replacement resorption. In inflammatory resorption, the resorptive process of the intraradicular dentin progresses without adjunctive deposition of hard tissues adjacent to the resorptive sites. The phenomenon is associated with the presence of granulation tissues in the resorbed area and identifiable with routine radiograph as a radioclear zone centered on the root canal. The aim of treatment for teeth diagnosed with IRR, which are considered to be restorable, is to retain them in a healthy and functional state. IRR is a rare type of resorption characterized as an idiopathic, gradual, and progressing type of resorptive process. The process of tooth resorption may take months or years to occur without any indication [6]. Symptoms are rare, except in cases of significant pulpal inflammation or visible communication with the periodontal ligament. Internal resorption was found to be most common in anterior teeth by Dao, et al. [7]. (15.6%), but almost four times as likely for molars (4%) and almost two times greater prevalence than for premolars (8.3%). This is more common among males than females [8]. In this case, IRR was observed in a mandibular molar and female, which is dissimilar to this information.

Each case requires careful planning of treatment, which becomes increasingly important in difficult cases. The x-ray of IRR using intraoral techniques displays an oval shape within the of the root canal, as seen through radiographic analysis. Early diagnosis of the IRR can be challenging through the examination of a conventional X-ray [9]. When suspecting IRR it is recommended to take several shots at different angles of incidence [9]. The use of CBCT to evaluate teeth with resorption was approved by the joint position statement announced by the American Association of Endodontics and the American Academy of Oral and Maxillofacial Radiology, CBCT gives information about location, size and shape of the lesion,presence of root perforations, root wall thickness,and localization of anatomical structures like maxillary sinus, mental foramen and inferior alveolar nerve. A balloon-shaped defect that was not perforating was observed in the middle third of the mesiolingual canal. One of the key strengths for CBCT is that it receives images from the target region in three dimensions. and is a suitable method for imaging the buccolingual view of teeth affected by IRR. A limited CBCT scan was carried out with exposure parameters of 80 kV, 3.0 mA and 17.5s.

Inflammatory resorption occurs when the previously resorbed dentin is replaced with inflamed granulation tissue, and treatment involves the removal of all infected tissue from the underlying defect. hence endodontic therapy of 36 was initiated. To maintain the structural integrity of the tooth, conservative cavity preparation is necessary to avoid further weakening of the already compromised area. The resorption defect hence is typically not detectable by biomechanical instrumentation due to its shape and location [10].

The primary objective of successful treatment in IRR cases is to fill the root canal system completely, even if there are complex root irregularities, particularly those caused by IRR defects., Hence, a mixed method of hand-operated instrumentation and sonic activation was employed. Effective cleaning of the resorptive defect was done with 3% Sodium hypochlorite because it has a tissue-dissolving property. Intracanal antibacterial medicament (Calcium Hydroxide) is used to disinfect the inaccessible areas of a resorptive defect. The root canal wall in the current case was not perforated by resorption, and there could be some constriction of the canal in its apical third region relative to the mesiolingual canal. The filling in the root canal must be able to flow and effectively seal the resorptive defect. The thermoplastic gutta-percha technique gives the best results.

Nilsson, et al. have demonstrated the warm gutta-percha method to work with molar with IRR without perforation, as seen in this case. The apical part of the resorbed area is filled with sectional obturation and the remaining part of the root canal is filled with Obtura II Thermoplastic injection technique, When the IRR communicates with the periodontium area, MTA, Biodentine or similar product is the filling of choice. Reinforcement of tooth structure is done by placing a Porcelain fused metal crown, and to prevent further progression of lesion scaling and root planing are done. The patient was recalled and reviewed at the 1st 3rd and 6th month, she was completely asymptomatic, and clinical and radiographic examination indicates successful healing.

Conclusion

The success of treatment depends on prompt diagnosis, removal of the underlying cause, complete elimination of residual resorptive defect, and appropriate management of the lesion. The utilization of CBCT enabled the selection of an optimal therapy to manage the lesion more effectively. Thermoplasticized gutta-percha techniques were used to fill the IRR cavities and after 6 months of follow-up, the condition was found to be satisfactory with no resorptive defect progression.

Acknowledgements

Conflict of Interest: None

Patient Consent Form

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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