

**Endodontic Management and Rehabilitation of Internal Root Resorptive Defect using Fibre Post and Dual Cure Resin: Two Years Follow up Case Study****Akash Kumar Baranwal**

Department of Conservative Dentistry and Endodontics, Service Senior Resident, Faculty of Dental Sciences, IMS, B.H.U., Varanasi – 221005, India.

**Address for Correspondence:**

Dr. Akash Kumar Baranwal, Service Senior Resident, Faculty of Dental Sciences, IMS, B.H.U., Varanasi – 221005, India. E-mail: baranwalakash@yahoo.com

**ABSTRACT:**

Internal root resorption (IRR), a type of root resorption, is an uncommon lesion of the tooth, mostly affecting the maxillary central incisor. The etiology of it can vary from trauma to idiopathic cause. It is generally due to considerable loss of root dentin resulting in round to oval root space enlargement. Mostly, such case remains undetected until it is diagnosed radiographically. The management of IRR includes the concept of treating immediately once diagnosed otherwise it may lead tooth loss. Till date, various treatment options have been implemented to manage IRR.

The aim of this case report is to discuss about the etiology, diagnosis and endodontic management and rehabilitation of an IRR case involving maxillary central incisor with less coronal tooth structure using fiber reinforced composite (FRC) post and dual cure resin.

**Keywords:** Dual cure resin, External cervical resorption, FRC post, Internal resorption, Root resorption.

**INTRODUCTION:**

Resorption is an occurrence that can be either physiologic or a pathologic phenomenon leading to loss of dentin, cementum, and/or bone.<sup>1</sup> The cause for resorption may include various injuries to the tooth, like thermal, mechanical, and chemical.<sup>2</sup>

Broadly, the resorption can be seen as either external or internal. Compared to external resorption, internal resorption is a rare occurrence in permanent teeth and its etiology and pathogenesis have not been

completely understood. When the specific cause cannot be identified, the resorption may be attributed to an idiopathic change and such cause generally represents our limitations in knowing the exact etiology and pathogenesis behind it.<sup>3</sup>

IRR, often confused with external cervical resorption (ECR), must be differentiated since these lesions have totally different pathogenesis, different causative factors and treatment regimes. The misdiagnosis may lead to improper treatment.<sup>4</sup>

Internal root resorption (IRR) is a pathologic process resulting in the loss of

root dentine due to clastic cells action. It is associated with pulpal inflammation and the vascular supply generally supports the clastic cells in the pulp chamber.<sup>2</sup> Odontoclasts i.e. tooth resorbing cells have similar enzymatic properties and resorption patterns like osteoclasts and morphologically, they are analogous to such cells. The differences include smaller size of odontoclasts and smaller resorption lacunae than osteoclasts.<sup>5</sup>

Internal inflammatory resorption and root canal replacement resorption are two different types of IRR. In both the cases, there is a progressive loss of dentin, but in case of replacement resorption, there is subsequent deposition of hard tissue i.e. bone or cementum like structure but not dentin. Internal inflammatory resorption can be further sub-divided into transient or progressive type.<sup>6,7</sup>

IRR is generally asymptomatic, but pain or discomfort may occur if the granulation tissue has communication with oral fluids. The granulation tissue may also contribute to “pink spot”, when there is severe crown dentin destruction.<sup>8</sup> The vitality tests response, either thermal or electrical, is usually positive until the lesion leads to a perforation. Also, the inflamed connective tissue of the defects may undergoes necrosis and may induce an apical periodontitis which may further produce symptoms and periradicular abscesses.<sup>2</sup>

IRR generally remains undetected until it is diagnosed clinically during routine radiographs. Maxillary central incisor is most commonly affected tooth and cervical region of the root canal is most commonly involved.<sup>8</sup> On radiograph, a defined outline of the pulp chamber can be the main differentiating feature. If the pulp chamber outline is within the lesion itself,

it is likely IRR. If the pulp chamber outline is definite and remarkable within a radiolucent halo, then it is likely external resorption.<sup>2,8</sup> To be clearly detectable on radiograph, a definite amount of root dentinal wall has to be resorbed.<sup>9</sup> If the infection spreads rapidly via root canal leading to complete pulpal necrosis, the resorption stops at an early stage and remains undetected both clinically as well radiographically.<sup>4</sup>

Radiographically, IRR may represent as a fairly uniform, symmetrical or eccentric, round-to-oval radiolucent enlarged lesion of the root canal. The margins can be sharp, smooth and clearly obvious, with loss of the original pulpal outline. The size and location of the resorptive lesion can have variations.<sup>10</sup>

After diagnosis, treatment options and prognosis must be considered for IRR. Root canal treatment remains the treatment of choice as it eliminates the granulation tissue and cut the vascular supply of clastic cells. Still, there is some difficulties in instrumentation and filling while treatment because of shape of resorptive defect. Hence, the chemical dissolution of organic pulp tissue with sodium hypochlorite becomes a great concern. Also, calcium hydroxide as an intracanal dressing offers maximum disinfection of the root canal, bleeding control, and necrotized residual pulp tissue.<sup>2</sup>

About the root canal filling, a flowable material should be the choice as it can fill and seal the resorptive defect. Thermoplastic gutta percha techniques seem to give good results in such cases.<sup>2</sup> In case of root canal wall perforation, mineral tri-oxide aggregate (MTA) is the material of choice because of its biocompatibility, bio-activeness and well tolerance by peri-

radicular tissues.<sup>11</sup> In teeth with a large resorptive defect in the coronal region of root canal, use of composite resin materials should be opted in order to strengthen the tooth structure and to make it more fracture resistant.<sup>12</sup>

Therefore, the aim of this case report is to discuss about the etiology, diagnosis and endodontic management and rehabilitation of an IRR case involving maxillary central incisor with less coronal tooth structure using fiber reinforced composite (FRC) post and dual cure resin.

#### **CASE REPORT:**

A 34 year old, male patient referred to the Department of Conservative Dentistry and Endodontics, Dr. R. Ahmed Dental College & Hospital, Kolkata with a chief complaint of pain in upper front tooth. He also reported for discoloration of the same tooth from inner side. Patient's medical history was non-contributory. He gave no history of trauma but asking about dental history, he stated that he had undergone for root canal treatment by some outside practitioner 3-4 years back. On intra-oral clinical examination, the right maxillary central incisors i.e. 11 was found with short clinical crown which was laminated with the tooth colored acrylic material. On a close view from the palatal side, there was open pulp chamber, highly discolored tooth structure with remaining carious lesion. There was no associated swelling or sinus and the mobility of tooth was within the normal range. The tooth gave negative response to cold vitality test, suggestive of non-vital nature of tooth. The clinical examination also revealed normal adjacent teeth, a moderate oral hygiene and healthy gingival tissues.

The patient was advised for an intra-oral periapical (IOPA) radiograph of the maxillary incisors (Figure 1 – Pre-operative IOPA Radiograph) which on examination revealed the unobturated root canal with a well-defined, oval shaped rarefaction in the coronal portion of root canal characterizing the radiographic presentation of internal root resorption. Slight widening of periodontal ligament space and slight periapical radiolucency were also noticed on IOPA radiograph. The patient was informed about the previous maltreatment, current diagnosis and prognosis of the tooth. Also, a conservative conventional endodontic treatment option was provided to the patient including its post endodontic rehabilitation with fiber reinforced composite (FRC) post and dual cure resin followed by fixed crown. Patient was willing to save the tooth, hence he opted the same.



Fig.1 – Pre-operative IOPA Radiograph

#### **MANAGEMENT:**

##### **First visit:**

The access cavity of 11 was modified from the palatal side using Endo-Z bur (Dentsply) and achieved a straight line access to the apex. The canal was flushed

with 3% sodium hypo-chlorite (NaOCl) solution and normal saline to wash out the debris from the root canal as the canal was open for a long period of time. The working length determination was done with #50 K file. (Figure 2-Working Length Determination) After apical preparation, the chemo-mechanical preparation of root canal was done with progressively increasing numbers of #K files using step-back technique. Irrigation was done throughout the preparation using 3% NaOCl, 17% EDTA and normal saline. The canal was completely dried using paper points and it was filled with calcium hydroxide,  $\text{Ca}(\text{OH})_2$  as intra-canal medicament in order to achieve proper disinfection of the root canal. (Figure 3-Intracanal Calcium Hydroxide Medicament) The access cavity was temporarily sealed with cavit and patient was recalled for next visit after two weeks.

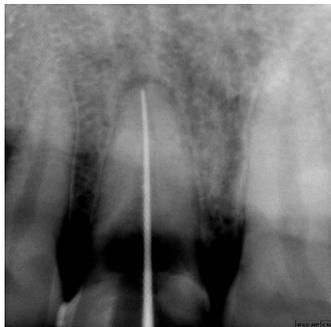


Figure 2: Working Length Determination



Figure 3: Intracanal Calcium Hydroxide Medicament

**Second visit:**

The  $\text{Ca}(\text{OH})_2$  medicament was removed from the root canal and the canal was irrigated using enormous volume of 3% NaOCl and normal saline. After confirming the G.P. length, (Figure 4 – G.P. Length Confirmation) the canal was dried with paper points and the sealer Apexit Plus (Ivoclar Vivadent) was applied properly on the root canal walls. Now, the sealer coated G.P. cones were condensed inside the canal using cold lateral condensation technique and after procedure, the condensed G.P. was removed up to apical level of internal resorptive defect with the help of warm hand plugger. Closed dressing was given. (Figure 5 - Post obturation IOPA Radiograph)



Figure 4: G.P. Length Confirmation

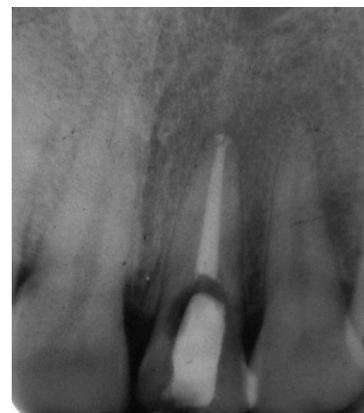


Figure 5: Post obturation IOPA Radiograph

**Third visit:**

This visit consisted of post endodontic rehabilitation of resorptive tooth with light transmitting FRC post (ColteneWhaledent) along with filling of internal resorptive defect with dual cure resin (Paracore, ColteneWhaledent) followed by core restoration. Slight G.P. removal and post space preparation was done with the help of peeso reamer (up to #4) leaving 5mm of G.P. at the apical end. (Figure 6 – Post Space and 5mm apical G.P. remaining) The FRC post of desired size (1.3 mm) was tried in the canal and adjusted to the desired length. The bonding agent was applied over the fiber post and light cured. (Figure 7- Light Curing of Bonding Agent applied over FRC Post)



Figure 6: Post Space and 5mm apical G.P. remaining



Fig. 7- Light Curing of Bonding Agent applied over FRC Post

The root canal was then etched with 37% phosphoric acid, rinsed, dried with paper points, and bonding agent (Parabond,

Coltene Whaledent) was applied and light cured. Now, the resin cement was filled within the resorptive canal and the post was then inserted in the canal after coating it with same resin cement (Figure 8 – Fiber Post Coated with Dual Cure Resin) and it was moved from inside out 2-3 times for proper flow of resin cement within canal. Then light curing was done for 20 sec through the light transmitting transparent post. The remaining core-build up was done using light cured composite restoration. (Figure 9 - Post-operative IOPA Radiograph)

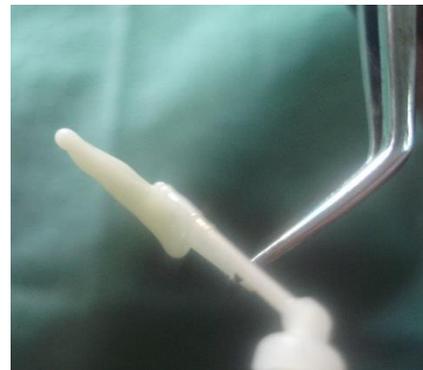


Figure 8: Fibre Post Coated with Dual Cure Resin



Figure 9: Post-operative IOPA Radiograph

Now, the acrylic laminate of the tooth was removed easily with help of hand instruments without damaging tooth structure and tooth was prepared for PFM crown using crown reduction kit (Shofu, Japan). Impression was made and was

send to the dental lab for crown fabrication. At the final visit, the Porcelain fused to metal (PFM) crown was luted to prepared tooth. Finally, the patient was advised to come for regular follow-up at 3 months, 6 months, one year and two years.

#### **DISCUSSION:**

About the etiology of IRR, it has been stated that trauma, pulpotomy, extreme heat produced during cutting of dentin, chronic inflammation of the pulp following caries, cracked tooth, tooth transplantation, and orthodontic treatment may initiate the internal resorptive process and sometimes, it may be idiopathic.<sup>10</sup> Among the causes, trauma seems to be the most common factor. A study<sup>13</sup> has confirmed about the trauma as most common etiological factor (43%), followed by carious lesions (25%). In this case of IRR, trauma is not the cause behind it rather open pulp chamber, unobturated canal and carious lesion left behind for a long period of time may be the major contributory factors to its etiology.

About diagnosis of IRR, clinically, pink color hue of the crown was not obvious but it was solely confirmed by IOPA radiograph which showed well defined, oval shaped radiolucency in the coronal part of root canal. The pulpal anatomy was not continuous since it was included within the lesion itself whereas in case of external cervical resorption (ECR), the pulp canal anatomy is maintained with its obvious outline.

Once diagnosed, immediate treatment should be initiated so that it can be arrested at its earliest stage otherwise delay in treatment may result in progressive IRR. The main objective behind the treatment of

IRR is to cut the vascular supply hence, pulpectomy remains the treatment of choice as it removes the granulation tissue and blood supply of the clastic cells.<sup>9</sup>

IRR presents specific difficulties in instrumentation and filling because of the concavity of the resorptive defect and it has less dentin thickness as compared to the rest unaffected root dentin. Since, the defect may harbor the granulation tissues and clastic cells, this needs to be completely eliminated. Hence, the chemical preparation of the canal plays a major role. Because of their organic tissue dissolving property, the NaOCl solution remains the choice for irrigation. As intracanal medicament, calcium hydroxide because of its high alkalinity, is able to suppress the clastic cells activities and to achieve maximum disinfection of the root canal.<sup>2</sup>

As root canal filling materials in IRR, thermoplastic gutta percha and MTA are the valid options. As in this case, the coronal tooth structure was less, the post endodontic post and core restoration seemed to be a viable option. Resin-based restorative material (dual cure resin) with tooth-colored FRC post was considered for this case in order to reconstruct the lost tooth structure and at the same time, to fill the resorptive defect because of several advantages like suitable elastic modulus, esthetics, good bonding among post, cement and root dentin, lower chair time, and minimal tissue removal.<sup>14</sup> The flowable property of resin material helped in filling the resorptive defect and allowed it to adapt the walls completely. Finally, the prepared tooth was esthetically restored with the fabricated crown. On the follow-up visits, patient showed complete absence of clinical signs and

symptoms while the IOPA x-ray interpretations confirmed the fast radiographic healing. The two years follow-up IOPA radiograph is in agreement with the successful outcome of this managed internal root resorptive case. (Figure 10 - Two years follow-up IOPA Radiograph)



Figure 10: Two years follow-up IOPA Radiograph

### CONCLUSION:

The internal root resorption is an uncommon variety of root resorption that should be managed on the basis of earliest arrest of clastic cell activities, once diagnosed. Considering the possible mechanism behind the lesion, the immediate treatment of such cases may result in a successful and prolonged outcome.

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