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## RESEARCH ARTICLE

### EXTERNAL ROOT RESORPTION – DIAGNOSIS & MANAGEMENT. A CASE SERIES

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#### ABSTRACT

External root resorption (ERR) is always pathological when observed in permanent dentition. By virtue of its asymptomatic nature, ERR can go unnoticed severely compromising the longevity of the tooth causing its unexpected premature loss. Therefore, early detection is extremely crucial for successful management of ERR. The treatment modality for this condition varies as per the type and etiology of resorption. Non-surgical endodontic therapy can arrest the inflammatory root resorption & can help to regenerate the periapical tissues. This report deals with three cases of the external root resorption of varied etiology & types as well as their successful management. One year follow up demonstrated recovery of clinical & radiographic signs and symptoms in inflammatory resorption cases.

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#### INTRODUCTION

The Root resorption is either physiologic or pathologic loss of dentin, cementum or bone.<sup>1</sup> Primary teeth exhibits physiologic resorption at the time of their exfoliation<sup>2</sup>. But in the permanent dentition the root resorption is always pathological & seen to be correlated with previous history of trauma, orthodontic tooth movement or chronic infections of periodontal tissues or the dental pulp.<sup>3</sup> The resorptive process can affect the inner wall of root canal or the external surface of the root. So accordingly the root resorption can be internal or external.<sup>4</sup> External resorption is more common than internal resorption & often confused radiographically as internal resorption.<sup>5</sup> External root resorption (ERR) is more common in age group 21-30 years (28.40%) and tends to be more frequent in females (59.04%) than males.<sup>6</sup> External resorption can exist as external surface resorption, external inflammatory resorption, external replacement resorption, invasive cervical resorption and transient apical breakdown.<sup>3,7</sup> Depending upon the kind of external root resorption, the endodontist frequently encounters difficulty in exact diagnosis and correct treatment protocol for the affected tooth.

This article basically presents three cases of external root resorption & their successful management with non-surgical orthograde endodontic treatment.

#### Case Reports

##### Case 1

A 27-year-old male patient reported to the Department of Conservative Dentistry & Endodontics with pain in relation to lower back teeth on left side since 4 days. History of present illness revealed that the patient was a chronic betel nut chewer for past 20 years. The pain was spontaneous, throbbing & radiating in nature. The patient's medical history was non-contributory. On clinical examination, no discoloration or fracture was evident in relation to tooth no 44 (Federation Dentaire Internationale). Although the vertical & axial percussions produced a painful response in the tooth, no metallic sound was observed on the both percussions. No erythema, swelling or sinus tract was detected & a negative response (as compared to control tooth) was observed on thermal and electric pulp testing.

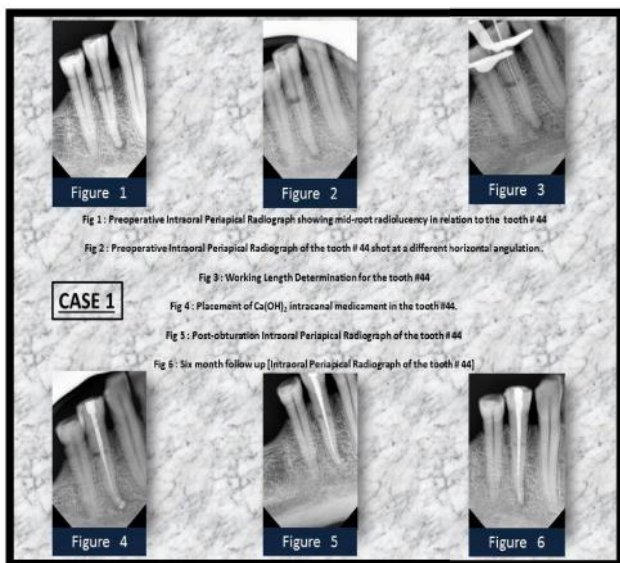
Intra-oral periapical radiograph revealed a small, ill-defined radiolucent area involving the middle third portion of the root

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extending from mesial to distal root outline. Root canal outline was evident running undistorted through the radiolucent defect area.(Fig 1)An additional radiograph exposed with a different horizontal angulation clarified that the lesion moves with change of angulation and there was an area of bone rarefaction in relation to lesion.(Fig 2) Radiolucency was also seen involving the bone around the root apex of same tooth. A definitive diagnosis of chronic periapical abscess with external inflammatory root resorption of tooth 44 was established based on history, clinical and radiographic findings. As the diagnosis was done ,thorough debridement of the root canal followed by placement of intracanal medicament & completion of root canal therapy was the treatment planned for the patient.

Tooth no 44 was isolated under rubber dam and it was disinfected with 5.2 % sodium hypochlorite. A conservative access opening was done & the canal was negotiated with no 10 K-File upto the apex. The pulp was nonvital. Gates–Glidden drills (sizes 3&4) were used to carry out coronal flaring of the canal. The working length was established with an electronic apex locator (Root ZX-2 J-Maritor, US ).Radiograph was taken to reconfirm the working length.(Fig 3)The root canal shaping & cleaning was performed with Ni-Ti rotary files ( Protaper Dentsply , Maillefer ,USA) & it was accompanied by copious irrigation of 5.2% sodium hypochlorite [ NaOCl ].The NaOCL irrigation was passively activated using ultrasonic files.[ Endoactivator ,Dentsply Maillefer]. The canal was dried with paper points and Ca(OH)<sub>2</sub> intracanal medicament was placed in the canal.(Fig 4)After 1 week, the calcium hydroxide was flushed out of canal with sterile water ,the canal was dried & coated with AH-Plus sealer (Dentsply Maillefer).Subsequently the canal was obturated with gutta percha using warm verticle compaction technique. [System B and Obtura II gun]. Postoperative radiograph was taken to verify the root canal filling.(Fig 5) Six month follow up revealed the patient being asymptomatic clinically with radiographic healing and repair of periapical tissue .(Fig 6)



**Case 2**

A 34-year-old male patient reported to the Department of Conservative Dentistry & Endodontics with mild pain in

relation to lower left back teeth since half an year which was aggravated drastically from 2 days. The patient's history revealed that the patient was feeling the tooth to be elevated from its natural position & even normal biting on the tooth aggravated the pain. The pain was chiefly throbbing in nature. Patient's medical history was non-contributory. On clinical examination, deep carious lesion was evident on tooth no 46 (Federation Dentaire Internationale). The tooth was grade I mobile & exhibited pain on verticle percussion. The metallic sound typical for replacement resorption was absent on percussion. No erythema, swelling or sinus tract was detected and the tooth was non-responsive to vitality tests. Radiographic examination of tooth no 46 revealed external resorption involving the entire apical third of the distal root with a diffuse area of bone rarefaction around it.(Fig 7)Definitive diagnosis of chronic periradicular abscess and external inflammatory root resorption was made. After rubber dam isolation the access was gained to the root canals and working length was determined.(Fig 8) Biomechanical preparation was carried out in similar manner to case 1 except the sodium hypochlorite irrigation was replaced by 2% chlorhexidine solution irrigation.Ca(OH)<sub>2</sub> medicament was placed.(Fig 9) After 4 weeks ,the tooth was obturated.(Fig 10) Periodic follow up revealed reduction in the periapical radiolucency on intraoral periapical radiograph.(Fig 11)



**Case 3**

A 23-year-old male patient reported to the Department with a chief complaint of discoloured front tooth. The patient met with a trauma around 5 years back. clinical examination revealed tooth no 21 had a yellowish brown hue. The tooth was not mobile but on percussion the tooth 21 gave a metallic sound as compared to adjacent teeth. The tooth 21 gave no response to thermal and electric pulp testing. Intra-oral periapical radiograph revealed the replacement of apical root structure of the tooth with alveolar bone & rest of the root length is persisting (Fig 12).Very thin ribbon like canal space was evident in the tooth & there was no area of bone rarefaction seen periapically. Therefore It was planned to assess the progression of resorption with periodic follow up & clinical as well as radiographic evaluation.(Fig 13)



## DISCUSSION

External root resorption can seriously jeopardize the longevity of a tooth causing its early loss. Therefore, early diagnosis is extremely crucial in the management of ERR because sooner the treatment is done, less severe will be the long-term consequences of resorption.<sup>8</sup> ERR can exist as a single individual entity or in combination with internal resorption involving the same tooth. Both of them can appear simultaneously as separate or joined defects.<sup>3</sup> External inflammatory root resorption usually exhibits no clinical signs & symptoms and constitutes a major part of the periapical pathology associated with apical periodontitis.<sup>9</sup> The root resorption takes place in two phases: injury and stimulation.<sup>10</sup> The injury can be due to dental trauma, surgical procedures<sup>11,12</sup> and excessive pressure from an impacted tooth, neoplasm or orthodontic treatment<sup>12</sup>. It can also occur due to chemical irritation (like use of 30% hydrogen peroxide during bleaching procedures).<sup>13</sup> After injury the repair with cementum-like tissue usually occurs within 2 to 3 weeks if the damaged surface does not cover a large surface area. But after injury the active resorption of the root takes place chiefly due to stimulation factor which is either infection or pressure. When these stimulating factors are identified it is possible to interrupt the resorptive process by removing the etiological factor. The most common stimulation factor for root resorption is pulpal infection.<sup>14</sup> The pulpal infection, bacterial byproducts and tissue breakdown products from within the root canal system stimulate an inflammatory response in the adjacent periodontal tissues which lead to aggressive inflammatory resorption of the root surface which is damaged due to injury (most commonly trauma).<sup>15</sup> External root resorption can be efficiently managed by treating the underlying etiology.<sup>12</sup> As in both of the present cases the resorption was mainly due to pulpal necrosis, non-surgical endodontic therapy was performed. However, complete elimination of microorganisms from the root canal system is not possible simply with biomechanical preparation of the root canal.<sup>16,17</sup> Hence Ca(OH)<sub>2</sub> was used as intracanal medicament in both cases as it exerts a profound antimicrobial action by virtue of its high alkaline pH,<sup>18,19</sup> dissolves the remaining necrotized tissue,<sup>20</sup> inhibits tooth resorption<sup>10</sup> & induces repair by hard tissue formation.<sup>21</sup> In case report 2, the apical constriction of the tooth's distal root was destroyed due to the resorptive process. In such a case, the sodium

hypochlorite, if used as an irrigant, can easily flow beyond the apex and can cause irritation of the periradicular tissues. So the Na OCL was replaced by 2% chlorhexidine for irrigation. Chlorhexidine is relatively non-toxic, exhibits substantivity & possesses antimicrobial action even against *Enterococcus fecalis*.<sup>22</sup> Considering the present cases of inflammatory external root resorption, the differential diagnosis for case -1 mainly includes internal root resorption which is an internal form of pathological root resorption.<sup>5</sup> These two types of resorptions can be easily differentiated radiographically by changing the horizontal angulation of X-ray exposure.<sup>5</sup>

In internal root resorption the root canal outline is completely distorted in resorption area. In contrast the current case presents a resorptive lesion where the canal outline can be seen running undistorted through the defect area. (Fig 1 & 2) Unlike internal root resorption, in the present case [case-1] the lesion not only moves in opposite direction with change of the horizontal angulation of X-ray exposure but also it's associated with surrounding bone loss which is evident radiographically. (Fig 2) Replacement resorption is characterised by gradual replacement of the tooth with bone.<sup>3</sup> Trauma was probably the etiologic factor in the present case (case-3) of replacement resorption although the most common cause suggested for this kind of resorption is luxation injuries<sup>10</sup>. Replacement resorption usually progresses at a slow rate.<sup>12</sup> A typical metallic percussion sound is the characteristic of replacement resorption<sup>3,23</sup> & it was observed in this case. A 1 year follow up of the case revealed no significant diversion in clinical signs & symptoms and radiographically slightly more resorbed root.

## CONCLUSION

External root resorption on itself produces no clinical signs & symptoms. Although non-surgical endodontic therapy can hamper the resorption progress, early diagnosis is the key to improve overall prognosis of the affected tooth. Newer & newer research work in field of resorption is a need of time to understand the exact nature of this pathologic condition and thereby device newer preventive measures as well as highly efficient & predictable treatment modalities for this ill-understood condition.

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