

# Surgical Management of Heithersay's Class III External Cervical Root Resorption: A Case Report

Dr. Pradnya V. Bansode<sup>1</sup>, Dr. Seema D. Pathak<sup>2</sup>, Dr. M. B. Wavdhane<sup>3</sup>,  
Dr. Apurva Satpute<sup>4</sup>

<sup>1</sup>(Head of Department, Professor, Department of Conservative Dentistry and Endodontics, GDC & Hospital, Aurangabad/ MUHS, India)

<sup>2</sup>(Professor, Department of Conservative Dentistry and Endodontics, GDC & Hospital, Aurangabad/ MUHS,

<sup>3</sup>(Associate Professor, Department of Conservative Dentistry and Endodontics, GDC & Hospital, Aurangabad/ MUHS, India)

<sup>4</sup>(MDS student, Department of Conservative Dentistry and Endodontics, GDC & Hospital, Aurangabad/ MUHS, India)

---

**Abstract** - Root resorption of a permanent tooth is a pathological phenomenon that may appear internally within the tooth (internal resorption) or externally on the tooth's outer surface (external root resorption). This process can ultimately result in tooth mobility and premature tooth loss. External root resorption (ERR) is the result of damage or removal of the cementoblastic layer or other dental tissue on the surface of the root. Treatment options for ECRR include nonsurgical therapy, surgical treatment, or a combination of both. In the present case report, routine root canal treatment was performed followed by surgical management of ECR.

**Keywords** – External root resorption, surgical management, Heithersay's class III classification, Patel's 2Ap classification, MTA, Resorption defect, Bioceramics

---

Date of Submission: 25-07-2024

Date of Acceptance: 07-08-2024

---

## I. INTRODUCTION :

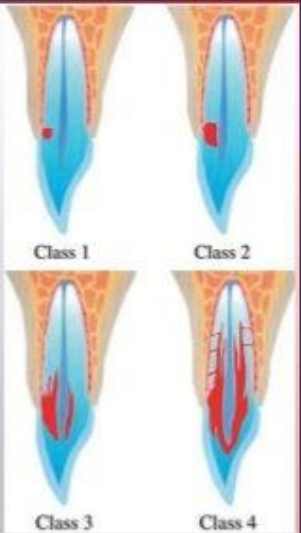
Root resorption is a physiologic process that occurs in deciduous teeth, but it becomes a problematic condition when it happens in permanent teeth. If not accurately diagnosed and effectively treated, this could lead to tooth loss<sup>1</sup>. The process of tooth resorption is a highly structured interaction amongst inflammatory cells, resorbing cells (osteoclasts, odontoclasts or dentinoclasts) and hard tissues, initiated by injury to the non-mineralized tissues covering the external surface of root (precementum) or the internal surface of the root canal (predentin). The transformation of precursor cells into clastic cells is induced by cytokines, of which interleukin-1 $\beta$  plays a pivotal role<sup>2</sup>.

Resorption can be classified as external resorption, internal resorption or both depending upon the location of the process. External root resorption more common than internal resorption and is frequently confused radiographically as internal resorption. It could be surface, inflammatory, replacement, and cervical resorption and has been linked to multiple predisposing variables, including as trauma, orthodontic therapy, parafunctional habits, occlusal dysfunction, coronal bleaching, poor oral health, periodontal treatment, developmental and eruption problems, and viral infections<sup>3</sup>. ECR has been described previously in the literature as invasive cervical, asymmetric internal, progressive intradental, peripheral cervical, and cervical external resorption<sup>4</sup>. Invasive cervical resorption (ICR) is a clinical condition characterised by a very rare and frequently aggressive kind of external tooth resorption. The cervical position and invasive nature of this condition result in a progressive and extensive deterioration of tooth structure<sup>5</sup>. Improved radiographic detection using cone-beam computed tomography (CBCT) is required in order to correctly classify and assess this entity. This provides a three-dimensional insight into the lesion, regarding the location, the size, the depth and the circumferential spread of the ECR defect. It also allows establishment of the most efficacious treatment plan and management<sup>6</sup>. The conventional method for the classification of ECR is the Heithersay classification. (TABLE NO.1). However, because of the increased use of CBCT imaging in dentistry, Heithersay's 2-dimensional classification system is being challenged by a new 3-dimensional classification system proposed by Patel et al. (TABLE NO. 2)

The diagnosis and therapy of internal cervical resorption (ICR) are determined based on the degree of dentin resorption. Possible treatment approaches involve accessing the defect and cleaning and restoring it by either using an appropriate material to fill it<sup>7</sup>. The treatment objectives focus on removing the resorbing ECR tissue, preventing its reoccurrence, retaining tooth structure and the restoration of the tooth to re-establish function and aesthetics.

Current case report shows Heithersay's Class III external cervical root resorption and Patel's 2Ap classification treated surgically by raising flap and restoration of defect with MTA.

Heithersay's Classification (Invasive Cervical Resorption)	
<b>Class I</b>	Small, invasive resorptive lesion near the cervical area with shallow penetration into the dentin
<b>Class II</b>	Well defined, invasive resorptive lesion that has penetrated close to the coronal pulp but with little or no extension into the radicular dentin
<b>Class III</b>	Deeper invasion of root dentin by resorbing tissues that extend into the coronal third of the root
<b>Class IV</b>	Large, invasive resorptive process that extend beyond the coronal third of the root.



Resorption - Dr. Nithin Mathew 25

**TABLE NO. 1 ( Credit- GS Heithersay Management of tooth resorption)**

**Table 1: 3D classification for external cervical resorption of teeth<sup>8</sup>**

Height (H)	Circumferential spread (Circ)	Proximity to canal (p)
1. Supracrestal /CEJ level	A. $\leq 90^\circ$	d: lesion in dentin
2. Subcrestal / Extends into coronal 1/3rd	B. $> 90^\circ$ but $\leq 180^\circ$	p: lesion in pulp
3. Extends into mid one-third	C. $>180^\circ$ to $\leq 270^\circ$	
4. Extends into apical one-third	D. $> 270^\circ$	

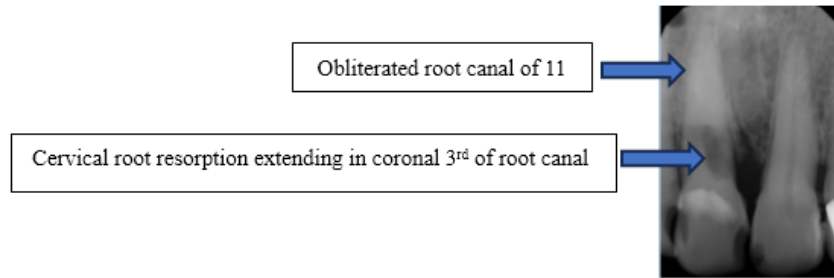
**TABLE NO. 2 ( Credit- wCohen's Pathways of the Pulp )**

## II. CASE REPORT :

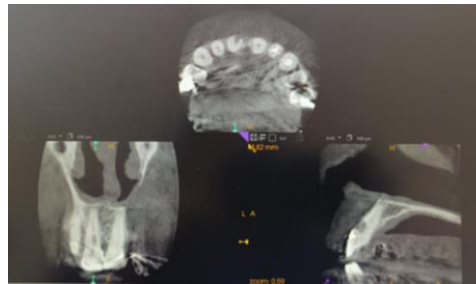
56 yrs old female reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in upper front region of jaw since 8-9 months. Medical history revealed history of angiography 6 months back. Clinical examination showed proximal caries with upper anteriors. ( Figure -1 ) Vertical and horizontal tenderness was present with 11. Tooth 11 had slight gingival inflammation apical to gingival margin. Pulp vitality testing showed negative response with 11. Radiographic examination was done in order to check the periapical region. Routine IOPA showed cervical radiolucency involving coronal 3<sup>rd</sup> of root. ( Figure - 2 ) CBCT was advised to see the extent of lesion. with obliterated root canal seen apical to resorptive lesion. ( Figure - 3 ) Based on clinical/radiographic examinations, diagnosis were asymptomatic pulpitis with class 3 ICRR. As the oral hygiene was poor tooth extraction or a conservative surgical approach with a poor prognosis was told to the patient but she wanted to save the tooth.



( Figure -1 )



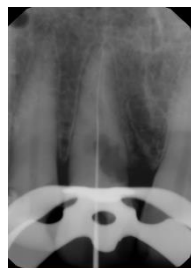
(Figure - 2 )



( Figure - 3 )

**CLINICAL PROCEDURE :**

Rubber dam isolation was performed. Access opening was made with round end bur followed by safe end bur. Triangular access was made. Canal was fully negotiated with no.10 k file. Due to presence of granulation tissue in resorption area Electronic Apex Locator was showing incorrect working length hence radiographic method was chosen to interpret exact working length ( Figure - 4 ). Canal was cleaned and shaped. Irrigation was done with diluted 5.2 % Sodium Hypochlorite. Calcium Hydroxide medicament was given for 21 days to stop resorptive process ( Figure - 5 ). Cavity was temporarily sealed and patient was sent home. In the next visit , access cavity was re-entered intracanal dressing was removed. Thorough irrigation was done with normal saline. Master cone fit checked and obturation apical to resorption area done by single cone technique using bioceramic sealer ( Figure – 6,7 ). Coronal to the obturation canal was filled with MTA and permanent restoration with composite resin was done ( Figure - 8 ). Patient was advised to take an antibiotic course for 3 days before surgery to reduce oral microflora. 0.12% Chlorhexidine mouthwash was prescribed to overcome microbial load.



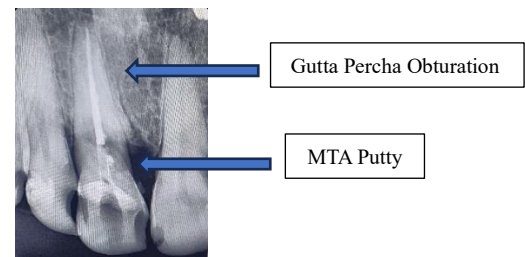
( Figure - 4 )



( Figure - 5 )



( Figure - 6 )



( Figure - 7 )



( Figure - 8 )

**SURGICAL PROCEDURE :**

Patient's informed consent and fitness certificate was obtained on the day of surgery as she had undergone Angiography 6 months back. Analgesic tablet was given to reduce pain during procedure. Patient was asked to rinse her mouth with 0.12% Chlorhexidine mouthwash for 30 seconds before surgery. 1:100000 lignocaine **without adrenaline** local anesthesia was given.

After retraction of cheek, horizontal incision and vertical releasing incision outline were marked and incision was given with no. 15C BP blade ( Figure – 9,10 ). Full thickness flap was raised 2-3 mm apical to crestal bone to expose the defect and apically till mucogingival junction partial thickness flap was given to coronally advance the flap ( Figure - 11 ). The resorptive tissue was removed with a round bur and treated with 90% TCA on a cotton pellet. Hemostasis was achieved by pressure with a cotton pellet impregnated with ferrous sulphate. Irregular borders of defect were smoothed with diamond bur ( Figure – 12 a and 12 b ). Irrigation was done with normal saline to remove the remnants of granulation tissue & to hydrate the flap. MTA mixed with distilled water and placed in the defect ( Figure - 13 ). Condensed well. Moist cotton was placed over MTA for 5 min to get initial set mass. All the procedure was performed under surgical loupes with 3.5X magnification. Radiograph was taken to confirm proper placement of MTA ( Figure - 14 ). Surgical site sutured with absorbable sutures ( Figure - 15 ) , COE pack was given for 7 days ( Figure - 16).



( Figure – 9 )



( Figure - 10 )



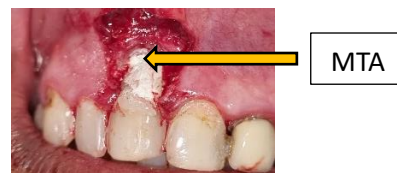
( Figure - 11 )



( Figure – 12 a )



( Figure – 12b )



( Figure - 13 )



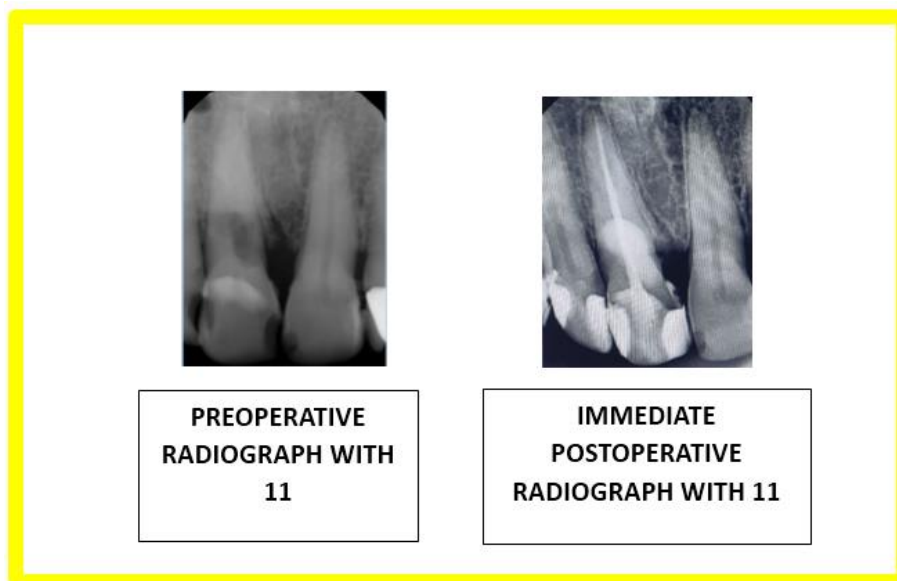
( Figure – 14 )



( Figure - 15 )



( Figure - 16 )



### III. DISCUSSION :

External root resorption (ERR) is the most often observed form of root resorption that can develop in different regions of the tooth root. External Root Resorption, is a type of resorptive lesion that occurs as a result of trauma, orthodontic treatment, or periodontal infection caused by microorganisms resulting in deep resorptive defects that affect and penetrate both dentine and cementum. This process can potentially expose the dentinal tubules<sup>8</sup>. The latter could facilitate bacterial infiltration and the introduction of microbial endotoxins into the dental pulp from the periodontal ligament (PDL) and vice versa, resulting in detrimental effects on the tooth's vitality and sensitivity, as well as on PDL<sup>9</sup>. The prevalence of ICR is relatively uncommon, and the incidence in the general population ranges from 0.02% to 0.08%<sup>10</sup>. The majority of articles suggest that ICR often affects only one tooth. However, there have been several case reports of individuals who have three or more affected teeth, which is referred to as multiple cervical resorption<sup>11</sup>.

ERR is identified and observed through radiographic examination, it is essential to promptly manage the condition by treating the infected and non-vital root canal system. Failure to do so may result in the deterioration of dental structure and eventual premature tooth loss if not accurately diagnosed and promptly controlled or treated<sup>12</sup>. Radiographs are not effective for diagnosing ECR due to the masking effect generated by the relative radiodensity of the remaining tooth structure and underlying alveolar bone. The irregular and uncertain form of the resorptive pattern might also lead to a delay in recognising the lesion until substantial resorption has already taken place<sup>13,14</sup>. 3D imaging by CBCT has helped in assessment of the resorptive defects by predicting the treatment complexity and expected outcome based on the location and extension of the defect.

Treatment options for ECRR include nonsurgical therapy, surgical treatment, or a combination of both. The decision to treat surgically or nonsurgically is largely dependent on whether the lesion is in an accessible location, and whether surgical treatment would require removing a large quantity of bone, which would jeopardize adjacent teeth. If the root canal system is involved, root canal treatment should be performed<sup>15</sup>. In H2 and H3 defects, the treatment reported most often was external surgical (58% and 60%, respectively). Flap surgery can be used in conjunction with an external approach when the lesions extend beyond the gingival margin<sup>16</sup>. Whereas H4 lesions were mostly managed via an internal access (61%), followed by external surgical access (26%).

Treating advanced ICR is difficult and has a poor prognosis. Once the resorptive tissue has been removed, the resorptive defect should be restored with either a resin-modified glass ionomer (RMGI) material, bioceramic material, or composite resin

In the present case report, routine root canal treatment was performed followed by surgical management of ECR. 90% TCA was used for coagulative necrosis of any remaining resorptive tissue without harming the periodontium. During chemical debridement with TCA, care was taken to avoid contact with the oral mucosa because inadvertent contact can result in a chemical burn. Resorption defect was filled with MTA (calcium silicate based material) due to their sealing ability and biocompatibility.

#### IV. CONCLUSION :

ECR is a complex, aggressive, and uncommon form of external resorption. Cervical root resorption can begin and progress asymptotically without the presence of any of the known etiological factors. Due to the variable speed of progression, the management of these cases is difficult when trying to save any affected teeth. The most effective therapy usually involves the exposure of the resorption lacunae, followed by the removal of granulation tissue. Endodontic therapy should be carried out when pulpal involvement is evident. Successful management of these patients should involve long-term monitoring of preexisting and restored lesions as well as attempting early diagnosis of new lesions through regular clinical and radiographic assessments. The long-term success of the treatment is predictable but strictly related to careful case selection and operative skill.

#### REFERENCES :

- [1]. Tooth resorption. Ne RF, Witherspoon DE, Gutmann JL. [http://ntendo.com/wp-content/uploads/2016/07/article\\_18.pdf](http://ntendo.com/wp-content/uploads/2016/07/article_18.pdf). Quintessence Int. 1999;30:9–25.
- [2]. Clinical management of two root resorption cases in endodontic practice. Mincik J, Urban D, Timkova S. Case Rep Dent. 2016;2016:5.
- [3]. Heithersay GS. Clinical, radiologic, and histopathologic features of invasive cervical resorption. Quintessence Int. 1999; 30(1): 27–37.
- [4]. Patel S, Kanagasingham S, Ford TP. External cervical resorption: a review. Journal of endodontics. 2009 May 1;35(5):616–25.
- [5]. Minimally invasive treatment of class 4 invasive cervical resorption with internal approach: a case series. Shemesh A, Itzhak JB, Solomonov M. Journal Endod. 2017;43:1901–1908.
- [6]. Talpos-Niculescu RM, Nica LM, Popa M, Talpos-Niculescu S, Rusu LC. External cervical resorption: Radiological diagnosis and literature (Review). Exp Ther Med. 2021 Oct;22(4):1065. doi: 10.3892/etm.2021.10499. Epub 2021 Jul 27. PMID: 34434279; PMCID: PMC8353645.
- [7]. Management of a perforating internal resorptive defect with mineral trioxide aggregate: a case report. Altundasar E, Demir B. J Endod. 2009;35:1441–1444.
- [8]. Aidos H., Diogo P., Santos J. M. Root resorption classifications: a narrative review and a clinical aid proposal for routine assessment. *European Endodontic Journal* . 2018;3(3):134–145. doi: 10.14744/eej.2018.33043.
- [9]. Abbott P. V. Prevention and management of external inflammatory resorption following trauma to teeth. *Australian Dental Journal* . 2016;61:p. 82. doi: 10.1111/adj.12400.
- [10]. Chen Y, Huang Y, Deng X. A review of external cervical resorption. J Endod. 2021;47:883–894.
- [11]. Llavayol M, Pons M, Ballester ML, Berastegui E. Multiple cervical root resorption in a young adult female previously treated with chemotherapy: a case report. J Endod. 2019;45:349–353.
- [12]. Mohammadi Z., Cehreli Z. C., Shalavi S., Giardino L., Palazzi F., Asgary S. Management of root resorption using chemical agents: a review. *Iranian Endodontic Journal* . 2016;11(1):1–7. doi: 10.7508/iej.2016.01.001.
- [13]. Bernardes RA, de Paulo RS, Pereira LO, Duarte MA, Ordinola-Zapata R, de Azevedo JR. Comparative study of cone beam computed tomography and intraoral periapical radiographs in diagnosis of lingual-simulated external root resorptions. Dent Traumatol. 2012 Aug;28(4):268–72. doi: 10.1111/j.1600-9657.2011.01113.x. Epub 2012 Jan 11. PMID: 22233265.
- [14]. Kamburoğlu K, Kurşun S, Yüksel S, Oztaş B. Observer ability to detect ex vivo simulated internal or external cervical root resorption. J Endod. 2011 Feb;37(2):168–75. doi: 10.1016/j.joen.2010.11.002. PMID: 21238797.
- [15]. Schwartz RS, Canakapalli V, eds. Best Practices in Endodontics: A Desk Reference. Batavia, Ill: Quintessence Publishing; 2015.
- [16]. Rotondi O, Waldon P and Kim SG: The disease process, diagnosis and treatment of invasive cervical resorption: A review. Dent J (Basel) 8: 64, 2020.