

# Internal root resorption: A rare complication of vital pulp therapy using platelet-rich fibrin

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## Abstract

Internal root resorption (IRR) is a specific type of pulp disease categorized by the loss of dentin as a consequence of the action of clastic cells stimulated by pulpal inflammation. It is one of the rare complications following a vital pulp therapy (VPT) procedure. Reported here is a case of IRR as a complication of VPT platelet-rich fibrin pulpotomy procedure in a mature permanent tooth. Diagnosed using cone-beam computed tomography and management of the resorptive defect using biodentine with a follow-up of 1 year.

**Keywords:** Biodentine, cone-beam computed tomography, internal root resorption, platelet-rich fibrin, pulpotomy, vital pulp therapy

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## INTRODUCTION

Resorption is a condition associated with either a physiologic or a pathologic loss of dentin, cementum and/or bone.<sup>[1]</sup> Root resorption in permanent dentition is a pathologic event, and it is largely categorized into internal and external root resorption, where internal resorption is an uncommon entity when compared with external resorption.<sup>[2]</sup> Internal root resorption (IRR) is rare phenomena which might occur after a vital pulp therapy (VPT) procedure (pulpotomy).<sup>[3]</sup> It is reflected as an unfavorable outcome, as it is seen as a sign of chronic inflammation of the remaining pulp tissue.<sup>[4]</sup> Reported here is a case of IRR as a complication of VPT (platelet-rich fibrin [PRF] pulpotomy) and its treatment.

## CASE REPORT

A 25-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in the lower right back tooth region for 1 month. The pain was dull and intermittent in nature and was aggravated on intake of cold fluid. There was no history of spontaneous pain or swelling in the same region. The patient's history showed her undergoing some treatment a day before on the same tooth, after which a temporary restoration (Cavit G, 3M ESPE, Seefeld, Germany) was placed. The tooth was not tender on percussion, had a positive response to pulp sensibility test with a lingering pain (Roeko Endo-Frost, Coltene, Langenau, Germany) and intraoral periapical radiograph (IOPA) revealed no periapical

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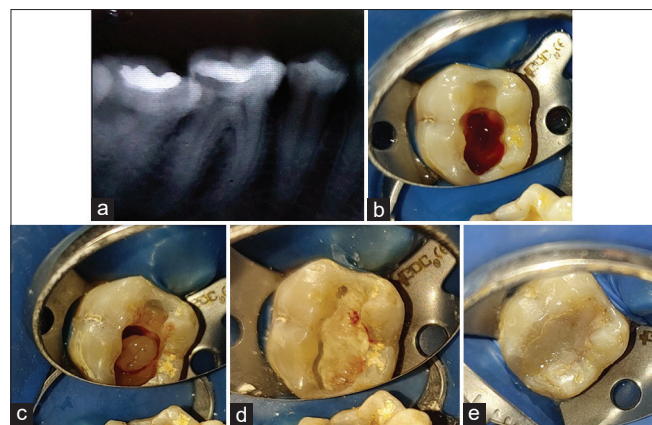
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lesion associated [Figure 1a]. Hence, the diagnosis of symptomatic irreversible pulpitis was formulated.

The treatment plan decided was pulpotomy, followed by the placement of PRF (centrifuged at  $302 \times g$  for 10 min), Biodentine (Septodont, Saint-Maur-des-Fosses, France), composite restoration (Te-Econom Plus, Ivoclar Vivadent, Mumbai) after obtaining the patient's consent. All the procedures were performed under magnifying loupes (Zumax SLF Binocular loupes). After administration of local anesthesia (Lignox 2% A, Indoco Remedies Ltd., Navi Mumbai) and rubber dam isolation, remaining caries excavation and partial coronal pulp removal were done using a Sterile Round Diamond Bur - BR40 (Mani Inc., Japan) and copious irrigation. Hemostasis was achieved within 5 min using saline-soaked cotton pellets, after which a small piece of PRF was used to cover the pulpal wound [Figure 1b and c] and a 2-mm thick layer of biodentin [Figure 1d] was placed over it, followed by composite restoration [Figure 1e]. A telephonic follow-up was carried out after 48 h, 7 days and 3 months was due to the COVID-19 pandemic situation.

At the 6 month follow-up period, an IOPA was taken in which a radiolucent lesion in the coronal third of the mesial root and also a radiolucency in the periapical area of the same tooth could be seen as shown in Figure 2a. For the confirmation whether it is an internal or an external root resorption, a cone-beam computed tomography (CBCT) ( $4 \times 4$  fields of view sectional scan settings in Veraviewepocs three dimensional) was advised for the same, after which it was confirmed that it was nonperforating IRR associated with the coronal third of the mesiolingual canal of the mesial root [Figure 2b-d]. Furthermore, there was periapical radiolucency associated with both the roots. Hence, the diagnosis of asymptomatic



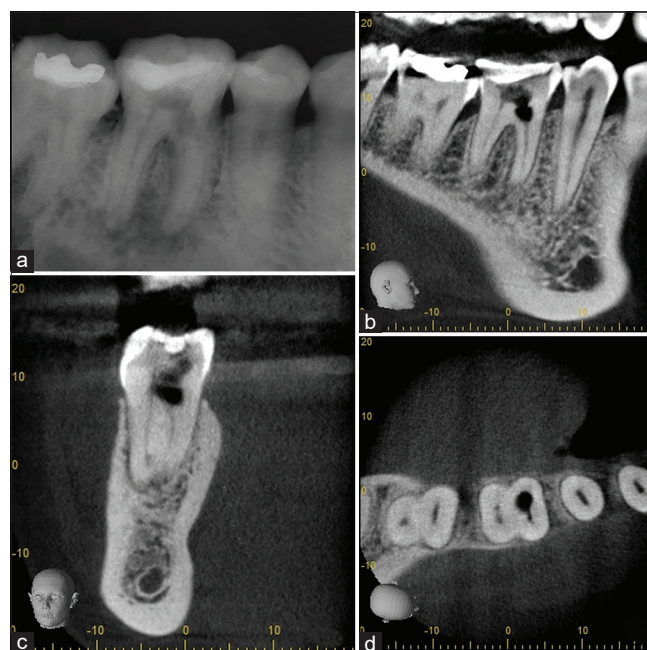
**Figure 1:** (a) Preoperative radiograph, (b) vital pulp showing bleeding (c) placement of PRF, (d) placement of approximately 2-mm thick layer of biodentin, (e) after final composite resin restoration

apical periodontitis with IRR was made for 46. A multi-visit root canal treatment (RCT) was planned, followed by sealing of the resorptive defect with Biodentine followed by coronal composite resin restoration.

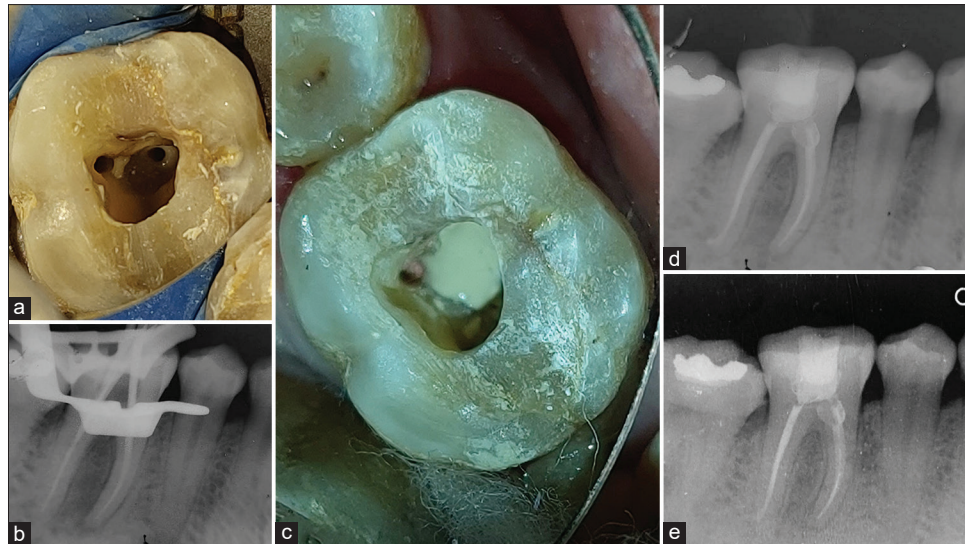
Access opening was initiated under rubber dam isolation after administration of local anesthesia. The internal resorption was seen clearly under magnification [Figure 3a]. Biomechanical preparation was completed after working length determination using Apex locator (J Morita Root ZX Mini, Tokyo, Japan) and calcium hydroxide (RC-Cal, Prime Dental Ltd., India) placed as an intracanal medicament. Obturation was done after 14 days, and the resorption defect was restored with Biodentine [Figure 3b and c]. Composite resin was then placed as a postendodontic restoration [Figure 3d], and a 6-month [Figure 3e] and 1-year follow-up was taken [Figure 4].

## DISCUSSION

In the present case, initially, there was no history of spontaneous pain. Pulp sensibility tests showed the tooth was vital, and the radiograph showed no evidence of apical lesion with the tooth 46. The above signs and symptoms indicated that there was a vital pulp which would be worthy to preserve. As per the literature, in teeth with clinical diagnosis of symptomatic/asymptomatic irreversible pulpitis, the pulp continues to preserve potential stem cell



**Figure 2:** (a) A 6-month follow-up radiograph showing a radiolucent lesion in the coronal third of the mesial root and radiolucency in the periapical area, (b-d) CBCT confirming a nonperforating internal root resorption associated with the coronal third of the mesiolingual canal of the mesial root and periapical radiolucency associated with both the root



**Figure 3:** (a) Internal resorption seen clearly under magnification, (b) master cone radiograph, (c) resorption defect filled with biodentine after obturation, (d) immediate postoperative radiograph after the placement of composite resin postendodontic restoration, (e) follow-up radiograph after 6 months



**Figure 4:** One-year follow-up radiograph

properties, VPT can be considered a favorable treatment approach.<sup>[5,6]</sup> Another factor indicating the presence of healthy pulp was the attainment of hemostasis in <5 min. Hence, ascertaining the intrinsic healing potential of the remaining pulp, partial pulpotomy was performed as Ricucci *et al.* through their study concluded that the clinical diagnosis of reversibility/irreversibility of pulp inflammation was related completely to the presence/absence of bacterial penetration; no relationship was demonstrated between clinical symptoms and the extent of pulp degeneration.<sup>[7]</sup>

PRF, when placed over the severed pulp, supports healing of the pulp tissue with the release of cytokines such as interleukin (IL)-4, growth factors such as platelet-derived growth factor and transforming growth factor  $\beta$  (TGF- $\beta$ ). It also inhibits the stimulation of matrix metalloproteinase-1 and 3 by IL-1b.<sup>[8,9]</sup>

Biodentine is a calcium silicate-based material with important properties of forming mineralized foci early by escalating the secretion of TGF B1 from pulpal cells after its implementation. Biodentine was chosen over MTA due to its setting time of 12 min, facilitating its use in immediate coronal restoration, greater push-out bond strength than MTA ( $P < 0.5$ ), ease of manipulation and better consistency.<sup>[10,11]</sup>

There is often a dilemma between IRR and external cervical resorption. Precise diagnosis is important as both of them have different etiology, pathogenesis and treatment procedures. CBCT scan allowed accurate diagnosis and treatment plan as it revealed the anatomic extent of this nonperforating resorptive defect.<sup>[12]</sup>

Internal resorption after pulpotomy may be suggestive of inflammation of the remaining pulp tissue. Hence, it is very important to discuss regarding the pulpotomy treatment outcomes, about the state of the pulp while performing the procedure and the aspects that may have an impact on the pulpal tissue to treatment. Studies are done earlier also proposed that the leading cause for internal resorption is the presence of undiagnosed chronically inflamed remaining pulp tissue, as only in the presence of inflammation will there be osteoclastic activity occurring and not in the healthy pulp.<sup>[4]</sup> The etiology of internal resorption in the present case after performing pulpotomy and obtaining hemostasis could be linked to preexisting inflammation of the remaining pulp tissue. However, a confirmatory etiopathogenesis cannot be stated through this case report.



After the diagnosis of IRR, the prognosis of the tooth had to be considered. The tooth was considered to be restorable and had a good prognosis; hence, the treatment chosen was RCT. The aim of RCT is to eradicate any pulp tissue, vital or necrotic, that might stimulate the resorbing cells odontoclasts through their blood supply and to chemo-mechanically debride and obturate the root canals.<sup>[13]</sup> As the structure of the tooth gets weakened and thin in the resorptive defect, a bioactive material Biodentine, was used to strengthen the tooth as it does not necessitate another appointment for the placement of postendodontic restoration.<sup>[14]</sup>

In the above case, the extent of the resorption could have been limited if frequent follow-ups were performed. However, owing to restrictions imposed by the pandemic, the patient failed to report at frequent intervals.

## CONCLUSION

This case highlights the importance of frequent follow-up visits after performing pulpotomy on mature permanent teeth diagnosed with irreversible pulpitis to avoid any loss of cervical or root dentin owing to complications like IRR. CBCT plays a pivotal role in the diagnosis and treatment planning of such cases.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/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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## Conflicts of interest

There are no conflicts of interest.

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# PRICE 2020 Flowchart



\*From: Nagendrababu V, Chong BS, McCabe P, Shah PK, Priya E, Jayaraman J, Pulikkotil SJ, Setzer FC, Sunde PT, Dummer PMH (2020) PRICE 2020 Guidelines for reporting case reports in Endodontics: A consensus -based development. International Endodontic Journal doi: 10.1111/iej.13285.

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