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Case Report

**LONG TERM CALCIUM HYDROXIDE THERAPY FOR
TREATMENT OF TRAUMA-INDUCED EXTERNAL ROOT
RESORPTION: A CASE REPORT****Zakiyeh Donyavi¹, Mohammad Esmaeilzadeh² and Nazanin Shahsavand*¹**¹ Assistant Professor, Department of Endodontics, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran² Assistant Professor, Department of Pediatric Dentistry, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran^{1*} Resident, Department of Endodontics, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran – shndzn@gmail.com - 00988138381059**Abstract:**

Introduction: External inflammatory root resorption refers to the loss of cementum or dentin that sometimes extends to the pulp. The most common cause of this condition is trauma, but inflammatory lesions, tumors and occlusal excessive forces can contribute to it, too. The most common places for root resorption are the apical and cervical parts of the root.

Case report: This article reports four formerly-traumatized teeth in a 14-year-old boy with the diagnosis of pulp necrosis in teeth #8,9, as well as a primarily Uncertain pulpal condition of teeth #7,10, chronic apical periodontitis in all four teeth and internal and external root resorption of teeth #8,9. Long-term calcium hydroxide therapy was performed in order to stop the external resorptive process and all four teeth ultimately underwent root canal treatment.

Conclusion: Long-term calcium hydroxide therapy can be an effective treatment option for stopping the inflammatory process of external root resorption before the obturation of the resorbed teeth.

Key words: Trauma, case report, Calcium hydroxide therapy, external root resorption

Corresponding author:

Nazanin Shahsavand,
Resident of Endodontics,
Department of Endodontics, School of Dentistry,
Hamadan University of Medical Sciences,
Hamadan, Iran
E-Mail: shndzn@gmail.com – 00988138381059



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INTRODUCTION:

The term "resorption" is used when changes occur in the roots of the teeth, leading to the loss of dentine and/or cementum. Inflammatory root resorption can occur both internally and externally(1). Internal inflammatory root resorption is usually the result of chronic and prolonged chronic inflammation in the pulp and is often asymptomatic. This inflammation can be a result of stimulation or shock. Development of root resorption is usually progressive, but early treatment is often successful, and even very advanced cases can sometimes be treated(2, 3). External inflammatory root resorption refers to the loss of cementum or dentin that sometimes extends to the pulp, which can't be easily recognized in most cases. Other than trauma, inflammatory lesions, tumors and excessive occlusal forces can also contribute to it. The most common places for the resorption are the apical and cervical parts of the root(4). Changes in the color of the teeth may indicate this kind of resorption, but it is often detectable only by X-ray radiography. Forces and movements applied to the teeth during orthodontic treatments are the second most common cause of this condition. Other causes include chronic infection of the pulp or periodontal structures as well as cysts, tumors and impacted teeth which can also play a role in the development of this condition. External inflammatory root resorption occurring during the orthodontic treatment is usually mild and in most cases it is self-limiting(5). External inflammatory root resorption has several types: external surface resorption, external inflammatory root resorption and substitutional inflammatory root resorption (ankylosis)(6-8). External inflammatory root resorption in the cervical part of the root can be treated if it is detected early, but if it's located in the middle of the root (below the CEJ), it will be the most difficult type for treatment, and in most cases, extraction is considered as the only possible treatment option. The earlier the root resorption is

detected, the easier and more successful the treatment will be(9). The aim of root canal treatment in the cases of root resorption is to reduce the chance of apical periodontitis, and this goal is achieved through complete cleaning of the canal and adaptation of the filling material to the canal walls in order to maintain an appropriate seal(10). The ideal filling material in these teeth should eliminate the remaining microorganisms after cleaning and have the ability to seal the canal space through the coronal path and apical pores(11). Today, calcium hydroxide is increasingly used as an intracanal drug for disinfection and accelerating the process of periapical repair(12,13). It disinfects the root canal when left in the canal for a week. In teeth with pulpal necrosis or periapical radiolucency, calcium hydroxide can be used between therapeutic sessions(14). Early detection and eliminating the inflammation are the keys to successful treatment.

CASE REPORT:

A 14-year-old boy referred to endodontics department of Hamadan Dental School due to spontaneous vague pain in the anterior maxillary teeth. The patient had no abnormal medical history and he was not taking any medication. In terms of dental history he reported having had avulsion of teeth #8,9 two years ago. At the time of avulsion, the teeth were kept in milk for half an hour, then replanted and sutured by a general practitioner. The patient had been referred to another clinician who splinted the avulsed teeth for 1.5 months. In clinical examination mild sensitivity to cold and heat tests in teeth #7,10 was observed, but teeth #8,9 did not respond to the tests. (fig 1). Radiologically, the periapical radiolucency at the apices of the teeth showed. Furthermore, internal and external root resorption of teeth #8, 9 and PDL widening of all four teeth was detectable. (fig2).

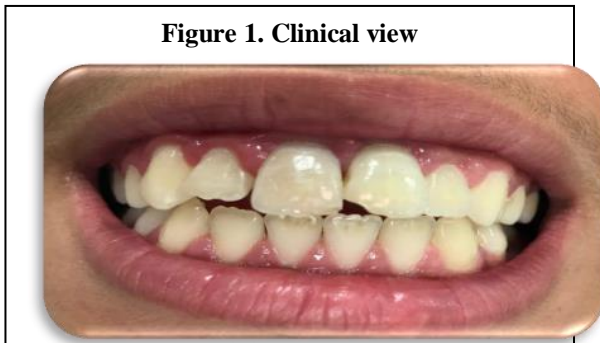
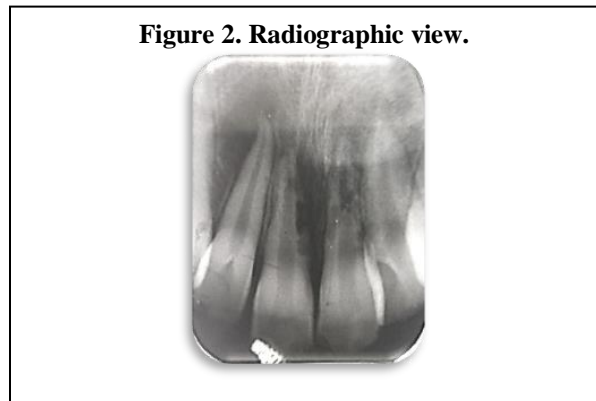
Figure 1. Clinical view**Figure 2. Radiographic view.**

Table 1: Vitality tests

test	Test tooth (#8,9)	Test tooth (#7,10)	Control teeth (#6,11)	Test tooth (#22-27)	6 anterior Mandibular teeth
EPT	-	8	6	7	
Cold test	-	++	+	+	
Heat test	-	++	+	+	

Pulpal diagnosis revealed Pulp Necrosis of teeth #8,9 And Uncertain pulpal condition of teeth #7,10; because they had periapical lesions while responding to vitality tests (suspicious of nonodontogenic lesions). In terms of Periapical diagnosis all 4 teeth had chronic apical periodontitis. Altogether, long term calcium hydroxide therapy of teeth #8,9 before their RCT and follow up of teeth #7,10 for confirmation of their definite pulpal condition were the treatment plans for him. The patient and his parents were informed about the treatment process and the questionable prognosis of teeth and informed consent was obtained.

The first Visit:

Under local anesthesia (lidocaine 2% with 1/80000 epinephrine) and isolation of teeth #8,9, access cavities were prepared, pulpectomy & minimal preparation of the canals using NaOCl 2.5 % was performed and creamy calcium hydroxide paste was put in the canals for its disinfecting activity. The teeth (#8,9) were then restored with cavit (fig3).

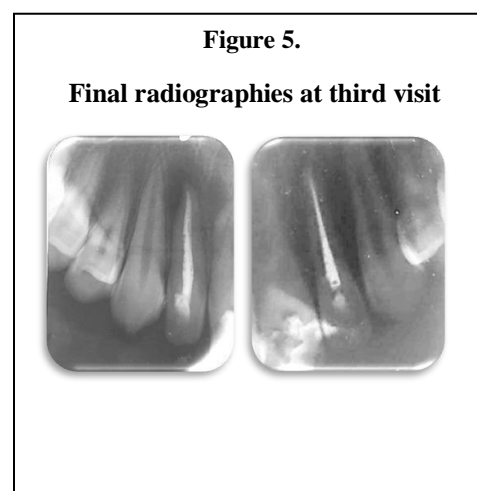
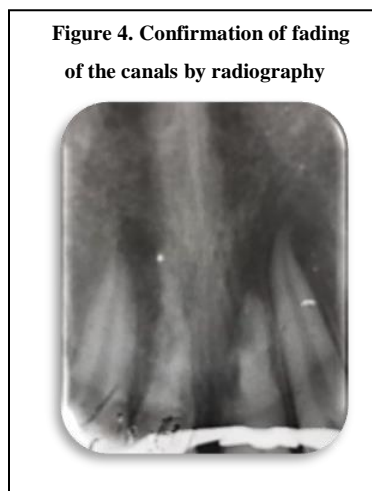
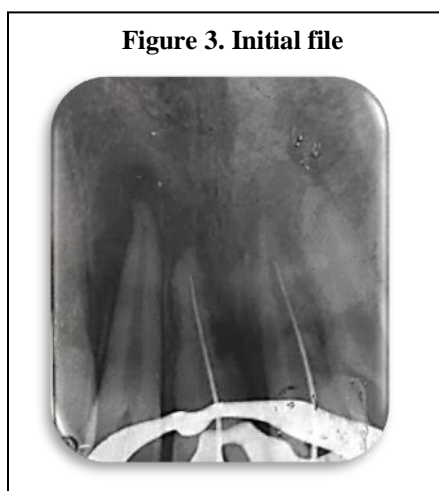
The second visit (7 days later):

The responses to vitality tests in teeth #7,10 hadn't changed and they still responded to the tests. Patient

received local anesthesia and teeth #8,9 were isolated. Cavit was removed and the canal was irrigated with normal saline and NaOCl 2.5%. Thick calcium hydroxide paste was placed within the canals and fading of the canals was confirmed by radiography. The teeth were restored with light cured Glass Ionomer (GI) (fig 4).

The third visit (one month later):

Vitality tests of teeth #7,10 revealed their necrosis, so it was concluded that the periapical lesions were odontogenic and the pulpal condition of teeth #7,10 had been partial necrosis which had ultimately led to complete necrosis. Radiographic examination of teeth #8,9 revealed some wash-out of calcium hydroxide. Under local anesthesia & isolation, temporary restorations of teeth #8,9 were removed, the canals were irrigated and thick calcium hydroxide paste was placed in the canals; then fading of the canals was confirmed by radiography and the teeth were temporarily restored with light cured GI. Then conventional root canal treatment of teeth #7,10 was performed and they were temporarily restored with cavit and then referred for permanent restoration (fig 5).

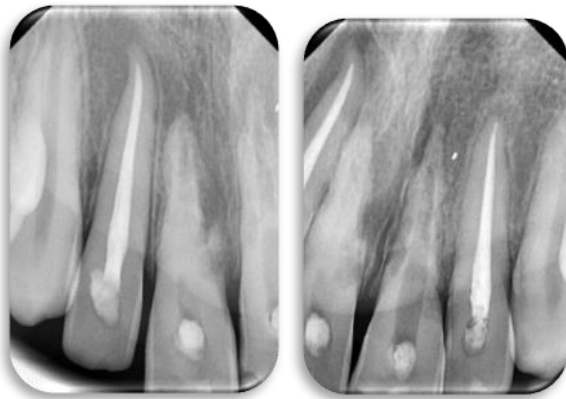


The Forth visit (3 months follow up):

At the 3 months follow up radiograph, the periapical lesions showed healing, but complete washout of the calcium hydroxide paste in tooth #9 and partial washout in tooth #8 was detectable.(fig 6); so the teeth were re-entered and irrigated and thick calcium hydroxide paste was placed in the canals again by the same protocol described in third visit, and the teeth were restored with light cured GI (fig 7).

The Fifth visit (6 months follow up):

The resorptive process seemed to have ceased and PDL formation could be observed in the radiograph and the periapical lesions showed more healing(fig 8). Teeth #8,9 were locally anesthetized, isolated and the remnants of calcium hydroxide paste were removed by irrigation. The canals were minimally shaped by chemomechanical preparation, they were dried with paper points and obturated using Gutta Percha and Sealer (AH 26) by lateral condensation technique. The teeth were then restored using cavities and referred for permanent restoration. (fig 9).

Figure 6. Three months follow up**Figure 7. Radiograph at the end of forth visit****Figure 8. 6 months follow up****Figure 9. After obturation and permanent restoration of teeth #8,9**

DISCUSSION:

Some microorganisms remain in the canals of teeth with root resorption even after active cleaning and debridement, so maintaining the apical seal is crucial for their elimination. Studies have shown that calcium hydroxide can be useful for treatment of root resorption(15-18). In the study of Haqqani, the highest level of inflammatory root resorption was observed in maxillary central and lateral incisors (19 & 20). Stopping the resorptive process can be achieved by curettage, but this method is aggressive and has a relatively high failure rate. The use of calcium hydroxide is more helpful to cease external resorption(21). Hiremath used calcium hydroxide in teeth with root resorption and then restored the teeth with Glass Ionomer. After two months, the glass ionomer was replaced with composite resin, and at 3 months the follow-up, they were completely healed (22). In the study of Jafari and his colleagues for the treatment of root resorption, access cavity was prepared and cleaning and shaping was performed and then calcium hydroxide was placed by file in the canal(23).

CONCLUSION:

Long-term calcium hydroxide therapy can be used to stop the external inflammatory root resorption, which can stop the inflammatory resorptive process and improve it to some extent, so the conventional root canal treatment can be done afterwards. If the lesion is timely diagnosed and properly treated, many concerns of dental practitioners and patients will be moderated.

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