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Healing of Periradicular Lesions With Unintentional Calcium Hydroxide Over Extensions - A Case series

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Abstract

Calcium hydroxide is a widely used material in endodontic treatment, as it is an effective intracanal antibacterial dressing, mainly because of its biocompatibility and alkaline pH. The aim of the present evaluation was to evaluate the effect of accidental extrusion of (Metapex- calcium hydroxide paste containing iodoform and barium sulphate) into periapical lesions and tissues on the prognosis of periapical healing. It was seen that calcium hydroxide extrusion did not disfavor healing, radiographic examinations gave evidence of healing of periradicular lesions

Summary: Two cases with periapical lesions and calcium hydroxide extrusion are presented. Follow up after 1 year

because of pandemic situation, revealed symptom free teeth, fistulas disappeared. Periapical radiograpgh revealed healing of the periradicular lesions, Calcium hydroxide was resorbed completely in 1 year time period in all cases.

Keywords: Calcium hydroxide, calcium hydroxide extrusion, Metapex, periapical healing.

Introduction

The use of calcium hydroxide in endodontics was familiarized in 1920 by **Hermann**.[1] Calcium hydroxide is still being used widely as an intracanal medicament in cases involving pulp necrosis and periapical lesions. [2] The material is indexed chemically as a strong base; its mode of action can be explained by the ionic dissociation

of Ca2+ and OH- ions leading to the induction of hardtissue deposition.[3] The antibacterial nature along with the contribution of the addition of vehicles or other agents to aid in the antimicrobial effect of Ca (OH)₂ has been well documented. The intentional placement of calcium hydroxide beyond the confines of the root canal and into the periradicular tissues has been recommended in case of large and chronic periapical lesions. [4] It is speculated that this way periapical healing and osseous repair is accelerated as it would have a direct effect on inflamed tissue and epithelial cystic linings. However, such deliberate overextension is not widely accepted considering the detrimental effects of periapical extrusion of calcium hydroxide. Close or direct contact of the dressing materials with apical foramen nerve structures, such as nearby neurovascular bundles can lead to hypoesthesia, paraesthesia or dysesthesia as the intimate contact of Ca(OH)₂ with connective tissue causes a sustained inflammatory response, usually leading to superficial necrosis in patients receiving endodontic treatment. [5-8]

The current case reports accidental extrusion of $Ca(OH)_2$ used as intracanal dressing material during endodontic treatment, reaveled symptom free teeth, all fistulas disappeared. Periapical radiograph revealed healing of the periradicular lesions.

Case 1

A 23-year-old female patient was seen in Department of Conservative Dentistry & Endodontics, Himachal Dental College, Sundernagar, Himachal Pradesh. with the complaint of tooth discolouration of both maxillary central incisors. There was a history of a trauma 3 years back. Apical radiolucencies were present on teeth 11 and 21. No signs of an active fistula was seen. Endodontic treatment was started in tooth 11 and 21, administration of local anesthesia (2% lignocaine and adrenaline 1:200,000; Lox, Neon Laboratories, Coronal flaring was done using Gates Glidden burs (Mani Inc., Japan) and apical patency was checked with #15 K-file (Mani Inc., Japan). Working length was obtained using apex locator (Propex Pixi, Dentsply Maillefer, Switzerland) and radiographs fig (1.1) Crown-down preparation was done using Protaper Universal, Dentsply Maillefer, Switzerland. Care was taken in all cases to avoid over instrumentation and 5 ml of 3% NaOC1 (Prime Dental, India) was used in between instrumentation followed by final irrigation with 2 ml 17% ethylenediaminetetraacetic acid (Prevest Denpro, India) and final rinse was done with 5 ml of distilled water.

After the biomechanical preparation the teeth were treated with an interappointment medication with Ca(OH)₂ (Metapex, META Biomed Co. Ltd., Korea).THE paste was also unintentionally extruded into the periradicular region and into an undiagnosed sinus tract, entering the buccal fold wrt 11 (Fig. 1.2). No pain was reported during the placement of the Ca(OH)2 paste. The patient was seen again after 1 week. During the second appointment, she reported that she had experienced slight sensitivity on the day after the placement of Ca(OH)2, and that it had disappeared the next day. During this second appointment, decision was made to not change the dressing .patient returned after 12 months (due to postponement of appointments because of pandemic). and the permanent root filling of tooth11 and 21was performed. The control radiograph, reaveled the apical radiolucency associated with tooth 11 and 21 had disappeared, no remnants of the calcium hydroxide paste and the periapical lesion was seen to have healed (Fig. 1.3).













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Case 2

A 65-year-old man was seen in Department of Conservative Dentistry & Endodontics, Himachal Dental College, Sundernagar, Himachal Pradesh. with complain of pain in left upper maxillary posterior teeth since three weeks. Careful intraoral examination revealed a sinus tract found on the buccal gingiva of the left upper second premolar. Radiographic examination revealed the presence of large irregular radiolucency suggestive of chronic abscess with bone resorption associated with left maxillary premolar teeth [Fig-2.1]. The presence of sinus tract with periapical radiolucency indicative of chronic periapical abscess confirmed the necrosis of pulp. Pulpal necrosis confirmed the non vitality of the tooth. Hence, the need of giving local anesthesia was excluded. Access opening was done ,Due to exudation of pus from the canal, the access cavity was left open. In next appointment the biomechanical preparation was done using Protaper Universal, Dentsply Maillefer, Switzerland. Care was taken in all cases to avoid over instrumentation and 5 ml of 3% NaOCl (Prime Dental, India) was used in between instrumentation followed by final irrigation with 2 ml 17% ethylenediaminetetraacetic acid (Prevest Denpro, India) and final rinse was done with 5 ml of distilled water. In the same sitting calcium hydroxide and iodoform combination (Metapex, META Biomed Co. Ltd., Korea) was placed in the canal which was accidentally extruded into the periapical lesion [Fig-2.2]. pain was reported during the placement of the Ca(OH)2 paste. The excess of calcium hydroxide paste was removed using a moistened gauze and the soft tissues were vigorously rinsed with saline. The patient was then recalled after two weeks. The healing of sinus and history of no pain was evident in the recall appointment.At 1-year recall, the patient was completely asymptomatic and intraoral periapical

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radiograph of the same tooth revealed complete resolution of the lesion and metapex [Fig-2.3]



Fig.: 2.1



Fig.: 2.2





Discussion

The therapeutic effect of calcium hydroxide can be explained due to its ability to break down into calcium and hydroxyl ions. Hydroxyl ions show an affinity to various biologically active substances [1]. Hydroxyl ion by forming a potent alkaline medium causes the destruction of lipids which eventually leads to the damage of bacterial proteins and nucleic acids [9]. Tissue restoration through mineralization occurs due to ability of calcium hydroxide to activate tissue enzymes [10]. The activation of alkaline phosphatase can be attributed to the high pH of Calcium Hydroxide [8,9]. Upon activation of this hydrolytic release of inorganic phosphate from the esters of phosphate takes place which accounts for the process of mineralization [10]. These phosphate ions on reacting with calcium ions from the blood stream forms calcium phosphate, the molecular unit of hydroxyapatite. Various substances have been incorporated with an aim to improve the properties like radiopacity, flow, and consistency of calcium hydroxide such as in Metapex. The presence of oily vehicles in Metapex considerably lowers the solubility and enhances the diffusion of the paste within the tissues [11]. The incoroporation of Iodoform improves the antibacterial properties of the material and BaSO4 as radiopaque agent in Ca(OH)2 pastes. The presence of BaSO4 and iodoform in the paste accounts for the incomplete resorption of paste. BaSO4 was found to conceal the apex and its slow resorption over time may prolong the healing property of the paste when extruded past the apex [12]. BaSO4 demonstrates a residual radiopacity as well. By making ratio of BaSO4:Ca(OH)2 to 1:8 residual radiopacity at the root apex can be reduced as observed by Webber et al. [13]. In a study conducted by De Moor and De Witte [14] on the effect of voluminous Ca(OH)2 overextrusion into periradicular lesions and tissues on the prognosis of periapical healing it is concluded that substantial Ca(OH)2

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overextrusion lead to the delayed repair by more than six months and that complete resorption of the paste including BaSO4 failed to occur, even after the disappearance of the periradicular radiolucency. Vernieks & Messer in 1978 suggested that calcium hydroxide extrusion beyond the apex may be a cause for not much evident early healing of periapical lesions.[15] Other investigators contradicts this by advocating that direct contact between calcium hydroxide and periapical tissues is favourable for osseoinduction to occur. [16] In our cases time taken for resorption of metapex was approximately 12 months which is in line with the findings of other researchers. Therefore, the present case highlights the longer healing period which might be due to the consistency of paste, the amount of extruded paste and the dimension of the lesion as well. cases has shown that when Ca(OH)2 paste containing silicone oil and Iodoform was applied as an intracanal medicament and accidentally extruded into the periradicular lesion there was no detrimental effect, throughout the period after the Ca(OH)2 paste was extruded, the tooth was continuously free of symptoms.

Conclusion

Despite the high alkalinity of calcium hydroxide pastes, overextensions into periradicular lesions, in general, result in mild and transient tissue reactions. Moreover, extensive extrusion of calcium hydroxide into the periapical tissues does not appear to comprise ultimate periapical healing. However, deliberate overextension is not advocated.

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