

Effect of Iatrogenic Extrusion of Calcium Hydroxide and Iodoform Paste on Periapical Tissues: A Case Report

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ABSTRACT

Background: Calcium hydroxide is one of the most commonly used intracanal medicaments. However, its placement beyond the confines of the root canal in the presence of periapical lesions has been controversial as it would directly affect the inflamed tissues & cystic epithelial linings and but may be beneficial for osteoinductive reasons. On the other hand, its deleterious effects like bone necrosis, continuing inflammatory response in repaired mechanical perforations have also been observed. This paper presents cases of iatrogenic extrusion of calcium hydroxide and Iodoform paste into the periapical area and its interference in periapical healing.

Keywords: Calcium hydroxide, Iodoform, Iatrogenic extrusion, Periapical healing.

INTRODUCTION

Endodontic treatment requires the use of intracanal medicaments that should eliminate bacteria and simultaneously prevent their growth. Calcium hydroxide is one of the most commonly and frequently used intracanal disinfection medicament. Its clinical success is mainly attributed to its alkaline pH, bactericidal effect and its ability to dissociate rapidly into hydroxyl and calcium ions.(2) Many studies have shown the action of calcium hydroxide with a combination of different materials in order to improve its properties like antibacterial, radiopacity and consistency. (3)

The placement of calcium hydroxide and iodoform paste beyond the confines of the root canal have been advocated only by few authors in literature on the basis of their clinical results regarding the use of this paste like its direct effect on the inflamed periapical tissues and epithelial cystic linings, favors the periapical healing and also

promotes the osseous repair. But deliberate overextension is not widely accepted due to its detrimental effects which have been reported like bone necrosis in repaired mechanical perforations(4) and also causes cellular damage due to early calcium hydroxide dressing of avulsed teeth.(5)

Thus, following case report describes iatrogenic extrusion of calcium hydroxide and iodoform paste into the periapical tissues and aims to evaluate the prognosis of periapical healing.

CASE REPORT 1

A 30 year female reported to the Department of Conservative Dentistry and Endodontics at Teerthanker Mahaveer Dental College and Research Centre, Moradabad with pain in her left lower back tooth region since 1month. She gave history of amalgam restoration in the same tooth

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Fig 1: IOPAR showing faulty restoration approaching pulp and the presence of radiolucency at periapex region irt 35.

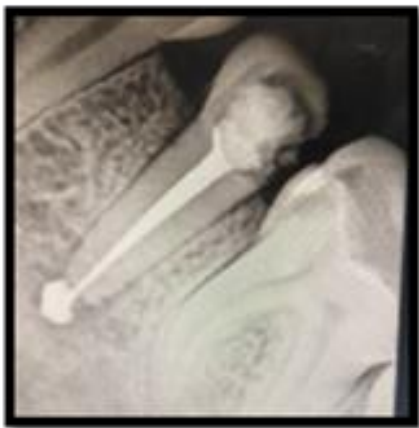


Fig 2: Iatrogenic extrusion of calcium hydroxide and iodoform paste at periapex region.



Fig 3: Follow-up radiograph shows complete resorption of calcium hydroxide and iodoform paste and resolution of periapical radiolucency after 2months.

two months back .A diagnostic intra oral periapical radiograph of mandibular second premolar revealed that amalgam restoration was approaching pulp and also the presence of a radiolucent periapical lesion(Fig.1). After administering local anesthesia, treatment was initiated under rubber-dam isolation by removal of faulty restoration from left mandibular second premolar, and access cavity was prepared using sterile burs. Initial canal working length was established by using the Propex Pixi apex locator and a #10 stainless steel file and later it was confirmed by radiograph, and chemo-mechanical preparation was performed by copious irrigation using normal saline and 3% sodium hypochlorite. Calcium hydroxide mixed with normal saline as the slurry paste was used as an intracanal medicament on the first appointment and access cavity was sealed with Cavit G.

On the second appointment, the patient complained of persistent pain, so after copious irrigation, calcium hydroxide and saline paste were placed again as intracanal medicament within the confines of the root canal. A patient was not relieved with her symptoms of the tender tooth. She reported early in the department on her third appointment. After copious irrigation with physiological saline, calcium hydroxide and iodoform paste was used as an intracanal medicament which iatrogenically gets extruded at periapex and extent was confirmed by radiograph (Fig.2). The patient was informed about the same and advised to report immediately in case of any flare-up; anti-inflammatory medication was also prescribed.

The patient reported being completely asymptomatic for the next 2week. The follow-up radiograph shows partial resorption of calcium hydroxide and iodoform paste from periapical tissues. The canal was then cleared with H-files and was irrigated with 3% sodium hypochlorite and normal saline.The root canal was then obturated, and access cavity was sealed with composite restoration at the same appointment. The follow-up radiograph after 2months shows complete healing of periapical tissues and resorption of the extruded paste with, with no signs and symptoms (Fig.3).

CASE REPORT 2

A 35 years female reported to the Department of Conservative Dentistry and Endodontics at Teerthanker Mahaveer Dental College and Research Centre, Moradabad with pain in her lower right back tooth region for ten days. The patient gave a history of previously initiated root canal therapy 5days back in the same tooth. A diagnostic intraoral periapical radiograph of right mandibular first molar revealed radiolucency at periapex of mesial-root (Fig. 4). After administration of local anaesthesia, treatment was initiated under rubber-dam isolation, and root canal therapy was initiated with an access opening, and working length determination was done with apex locators followed by radiovisiography. The biomechanical preparation was performed, and irrigation was done with normal saline and 3% sodium hypochlorite. Calcium hydroxide with saline as a vehicle paste was used as an intracanal medicament on the first appointment and access cavity was sealed with Cavit G. On follow-up patient turned with severe pain, so copious irrigation was done, and calcium hydroxide and iodoform paste dressing were placed as an intracanal medicament, and an intraoral periapical radiograph was taken to see the extent of the intracanal dressing which revealed extrusion of the paste into the periapex (Fig. 5). The patient was informed about the same, and anti-inflammatory medication was advised. In case of any flare-up, the patient was asked to report immediately.

After 3weeks patient reported to the department to be completely asymptomatic and follow-up radiograph reveals partial resorption of calcium hydroxide and iodoform paste. The canal was cleared with H-files, and the root canal was then obturated, and access cavity was sealed with composite restoration at the same appointment. The follow-up radiograph after 2 months shows complete resorption of periapically extruded paste and healing of periapical tissues with the completely asymptomatic tooth (Fig.6).

DISCUSSION

The effective chemomechanical debridement during root canal preparation is recognized as one of the crucial steps in its disinfection. There are various steps performed during endodontic therapy, and it

is difficult to examine which specific step may improve outcomes. These steps include irrigation, instrumentation and intracanal medication. (1)

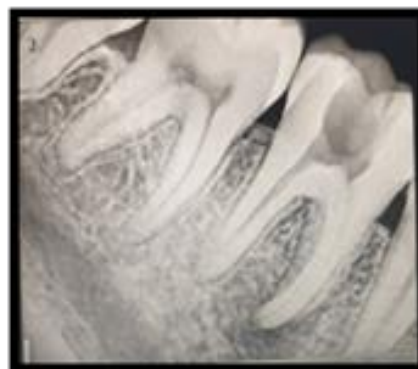


Fig 4: Periapical radiograph radiolucency at periapex region irt 36.

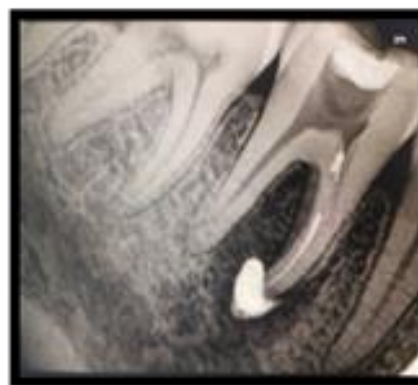


Fig 5: Iatrogenic extrusion of calcium hydroxide and iodoform paste at periapex region.



Fig 6: Follow-up radiograph shows complete resorption of calcium hydroxide and iodoform paste after 2months.

The apical extent in endodontics is a topic that has resulted in many controversies, and for these different concepts have been proposed. Moreover, the apical constriction is usually considered as the anatomic reference point, where the root canal instrumentation and obturation should end. (2) Several studies have also investigated the influence of the working length on treatment success as well established working length prevents over-instrumentation or over-filling of the root canal and favours the repair process of the apical tissues. It has also been observed that establishment of the actual length of the canal especially in teeth with apical lesions and apical root resorption; it becomes difficult to rely only on a two-dimensional radiographic image (3). The use of electronic apex locators in conjunction with verifying radiographs aids in facilitating length determination and is considered to be an accurate tool for determining working length with accuracies of greater than 90%. (4) Under clinical conditions, the apex locators identified the minor foramen with a high degree of accuracy and were more accurate compared with radiographs with the potential to greatly reduce the risk of instrumenting and filling beyond the apical foramen. (5)

Intracanal medicaments are considered to be an integral part of endodontic treatment as it curtails bacterial regrowth and possibly even improve bacterial suppression. (6) Calcium hydroxide has been the prototype of many intracanal medicaments with its high pH and antibacterial properties and is considered to be one of the most appropriate and effective, especially in teeth with periapical lesions. It promotes repair of tissues by controlling the inflammatory action by its varying mechanism of actions including hygroscopic action, calcium proteinate bridge formation, neutralizing osteoclasts acid products, inducing cellular differentiation and destruction of the epithelium thereby allowing the connective tissue invagination into the lesion. (7) The use of calcium hydroxide in the treatment of pulpless teeth with associated pathology and implantation of calcium hydroxide into connective tissues, other than the pulp, had been carried out in experimental animal has been the subject of some clinical reports and investigations. (8) When calcium hydroxide was placed in direct contact with host tissue, they

observed fibrosis and occasional structures similar to immature bone. (22, 23, 24) However, when direct contact with host tissue was prevented by placing calcium hydroxide in Millipore filters, no significant reactions occurred, indicating that the material did not have a stimulating action through diffusion over a distance. (25, 26, 27)

In the present case report, calcium hydroxide, iodoform and silicone-oil pre-mixed paste were used as an intermediate medicament in root canals associated with periapical lesions. While placing the paste within the canal it got iatrogenically extruded in periapical region. Although, the extrusion of calcium hydroxide and iodoform paste into periradicular region isn't widely accepted some authors have suggested that there were no detrimental effects throughout the period after the $\text{Ca}(\text{OH})_2$ paste was extruded, and the tooth was continuously free of symptoms because of its anti-inflammatory activity and activation of the alkaline phosphatase. Tronstad et al. suggested that calcium hydroxide in the root canals promoted an increase in pH on the external root surface, causing alkalization at resorption areas by diffusion of hydroxyl ions through the dentinal tubules. (28)

The follow-up radiographs in present cases report also show complete resorption of $\text{Ca}(\text{OH})_2$ and iodoform paste in the duration of just two months with almost complete resolution of periapical radiolucency and patient being completely asymptomatic throughout the period. It might be due to antiseptic action of iodoform and iodine release in the nascent state, which improves radiopacity as well. (9)

This finding resembles the findings of Ghose et al. (1987) have advocated the direct contact between calcium hydroxide, and periapical tissues are beneficial for osteoinductive reasons. (10) Cvek 1972 (11) and Caliskan & Sen 1996 (12), suggested that treatment with calcium hydroxide as an interim dressing in the presence of large and chronic periapical lesions can create an environment more favourable to healing and encourage osseous repair. Anantula K and Yadav S (2017) also suggested that there was no detrimental effect; throughout the period after the $\text{Ca}(\text{OH})_2$ paste was extruded, the tooth was continuously free of symptoms. The $\text{Ca}(\text{OH})_2$ paste resorbed completely in 8 months and the periradicular lesion healed. (29)

However, deliberate overextension is not widely advocated, since periapical extrusion of calcium hydroxide may have damaging effects like the neurotoxic effects, bone necrosis, continuing inflammatory responses, necrosis of buccal gingiva and mucosa after periradicular overextension due to alkaline burn. (18,20) Moor and De Witte reported 11 cases of extensive $\text{Ca}(\text{OH})_2$ over extrusion, despite the flare-ups all cases showed successful periradicular repair. The repair was associated with complete resorption of the extruded paste and ultimate periapical healing in more than half of the cases. (15)

CONCLUSION

In the present case report, the iatrogenic extrusion of calcium hydroxide into the periapical tissues did not show any adverse clinical signs and symptoms, and it does not appear to compromise ultimate periapical healing. Despite this, deliberate overextension into periradicular lesions, in general, is not advocated as it might cause mild and transient tissue reactions.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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