

## Calcium hydroxide in management of large periapical lesion

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### Abstract

The success of root canal treatment is based on total elimination of root canal content, thorough cleaning and shaping of canal and obturation of root canal system. Calcium hydroxide is recommended as intra-canal medicament because of its antibacterial properties, tissue dissolving ability, inhibition of tooth resorption and indication of tissue repair by hard tissue formation. Here we present a case report, where calcium hydroxide was used as an inter appointment endodontic dressing for management of large periapical radiolucency for six months. Follow up after six months of treatment completion revealed complete bone regeneration in the areas where there was extensive bone loss.

**Key words:** Calcium hydroxide, Periapical lesion

### Introduction

Periapical lesions in most of the cases can be classified as periapical granuloma, periapical abscess and periapical cysts and it cannot be differentiated from each other based on radiograph alone, although there is a trend towards increased incidence of cysts among larger lesions<sup>1</sup>. Dental trauma is often associated with the disruption of pulp blood supply, leading to pulp necrosis. This circulatory breakdown causes tissue necrosis and anaerobic conditions for the growth of opportunistic microorganisms<sup>2</sup>. The success of root canal treatment is based on total elimination of root canal content, thorough cleaning and shaping of canal and obturation of root canal system. There are various armamentariums, irrigants and medicaments available to perform root canal therapy. One of the medicaments is Calcium hydroxide which was first used in dentistry in 1930 by Herman<sup>3</sup>. Though calcium hydroxide is not a restorative material by itself it is used in various clinical situations and often forms a part of restoration. Calcium hydroxide is advocated as an inter-appointment endodontic therapeutic dressing because of its antibacterial effect on most of the microorganisms identified in the root canal system<sup>4</sup>. The antimicrobial properties of calcium hydroxide are directly related to its pH<sup>5</sup>.

### Case Report

A 12 year old patient reported to dental department of Kathmandu Medical Teaching Hospital with a complaint

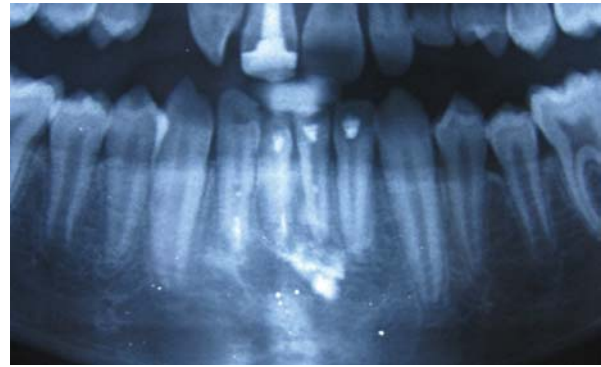
of swelling on the anterior region of lower jaw. Patient gave a history of trauma on lower anterior teeth two years back. On clinical examination there was swelling and pus discharge around the lower incisors. Orthopantomogram (OPG) was advised which revealed a well defined large radiolucency in relation to 31, 32, 41, & 42 (Fig. 1) Treatment planning was discussed with the patient and his family before starting the procedure. Access was opened, pus was drained from 31, 32, 41 & 42, canals were irrigated with normal saline and closed dressing was placed. In the following appointment, working length was determined, canals were cleaned & shaped using K and H files (MANI, Inc. Japan) and a closed dressing was placed in all the involved teeth. Patient was recalled after one week, canals were irrigated with 3% sodium hypochlorite (Novo Dental Pvt. Ltd., India) & saline, dried with paper points, and calcium hydroxide (RC Cal, Prime Dental, India) dressing was placed after which the canals were filled with temporary cement (Cavition GC Corporation, Japan). This procedure was repeated once every month for five times (Fig 2). Patient was advised to report to the hospital if he experienced pain or discomfort and/or the temporary restoration came out. After five months, the canals were obturated using AH plus (Dentsply Maillferfer, Switzerland) sealer and gutta percha (Dentsply, France SAS) and the access cavities were restored with GIC (GC Corporation, Japan). Patient was recalled after 6 months for follow up. IOPA was made which showed bone formation around the

### Correspondence

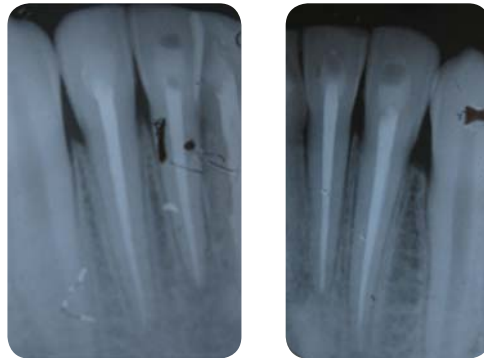
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**Fig 1:** Large radiolucency involving lower incisors



**Fig 2:** Recall visit after 3 months with calcium hydroxide dressing



**Fig 3:** Follow up after after 6 months, healed periapical radiolucency with bone formation

periapical areas of all the four root canal treated incisors where there was extensive bone loss seen, initially (Fig 3).

### Discussion

Various studies have shown that root canals in teeth with pulp necrosis and chronic periapical reactions have predominance of anaerobic microorganisms, especially the gram negative<sup>5,6</sup>. Gram negative microorganisms not only contains virulent factors and produces toxic products in periapical tissues, but contain endotoxin in their cell wall<sup>7</sup>. Endotoxin in root canal may induce radiographically visible apical reactions, show intense inflammatory infiltrate, increase in the thickness of periodontal ligament and resorption of cementum and alveolar bone<sup>8</sup>. Therefore management of the teeth with pulp necrosis and chronic periapical reaction should not only be concerned with bacterial death, but also the inactivation of endotoxin. Study by Assed S et al<sup>8</sup> shows that Calcium hydroxide detoxifies bacterial endotoxin. Calcium hydroxide is not categorized as a conventional antiseptic, but is clinically effective in eliminating microorganisms from root canal space. Calcium hydroxide is recommended as intra canal medicaments because of antimicrobial properties<sup>4</sup>, tissue dissolving ability<sup>9</sup>, inhibition of tooth resorption<sup>10</sup>, and induction of

tissue repair by hard tissue formation<sup>11</sup>. Lethal action of calcium hydroxide on bacterial cells are probably due to damage to the bacterial cytoplasmic membrane, protein denaturation and damage to DNA<sup>12</sup>.

When endodontic failure occurs, endodontic retreatment is advised either with or without periapical surgery. Theoretically it is better to do retreatment without periradicular surgery. It is better to remove the old filling material and reprepare and refill the root canal system than to perform periradicular surgery<sup>13</sup>. The success rate for periradicular surgery is lower than that of root canal retreatment has already been shown<sup>14</sup>. Whether it is root canal therapy or retreatment, infection control lies at the heart of endodontics.

Calcium hydroxide for endodontic use comes as a paste form which can be easily introduced into the canal. It is a strong alkaline substance, which has a pH of approximately 12.5. In an aqueous solution, calcium hydroxide dissociates into calcium and hydroxyl ions. The antimicrobial action of calcium hydroxide is related to the release of hydroxyl ions in an aqueous environment<sup>15</sup>. Calcium hydroxide, with its long acting antimicrobial and tissue solvent properties plays important role in endodontics<sup>16</sup>.

## Conclusion

Total elimination of microorganism from the canals is the main key to success of endodontic treatment. Use of calcium hydroxide as an intra-appointment dressing may help to eliminate surviving bacteria in the canal and help to achieve a successful endodontic treatment.

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