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Nonsurgical calcium hydroxide endodontic treatment of a maxillary lateral incisor with a periapical radiolucent lesion resulting in complete healing of the periapical lesion

KEYWORDS
Calcium hydroxide;
Periapical lesion;
Root canal therapy;
Osseous repair

Apical periodontitis is an inflammatory response that tries to limit the expulsion of the bacteria from the root canal and prevent their spread to the adjacent bone marrow tissues and distal sites. The untreated apical periodontitis may further develop into a periapical granuloma, a radicular cyst, or a periapical abscess. Radiologically, these three histopathological entities all show a radiolucent lesion at the periapical bone area. However, if the diseased tooth receives an appropriate root canal treatment, the radiolucent lesion may be resolved and subsequently result in complete healing of the periapical radiolucent lesion.[1,2]

Calcium hydroxide is widely used as an intra-canal medicament in endodontics. It has applications in various clinical situations, such as enhancing the root apex formation, repairing the tooth perforation, promoting the healing of the periapical lesions, and controlling the root resorption and exudation in teeth with persistent periapical inflammation.[3] We reported a right maxillary lateral incisor with a periapical radiolucent lesion which was treated with calcium hydroxide as the intra-canal medicament. The periapical radiolucent lesion finally healed after 26 months of repeated treatment with calcium hydroxide as the intra-canal medicament.

This 24-year-old female patient came to the dental clinic with the chief complaint of pain at the periapical region of the right maxillary lateral incisor. The oral examination revealed a large decay at the mesial crown portion of the right maxillary lateral incisor. The periapical radiography showed a restoration in the mesial crown portion and the filling materials in the root canal of the right maxillary lateral incisor. Moreover, a radiolucent lesion was noted at the periapical area of the right maxillary lateral incisor (Fig. 1A). The dentist decided to perform the endodontic retreatment on this diseased tooth. After removing the old filling materials, the root canal was irrigated with the sterile saline solution. The calcium hydroxide paste was placed in the root canal as the intra-canal medicament. The access cavity was sealed with the intermediary restorative material. Afterwards, the calcium hydroxide paste was refreshed at 2- or 3-month interval till the periapical radiography demonstrated evidence of healing of the periapical radiolucent lesion (Fig. 1B–D). The right maxillary lateral incisor showed the satisfactory radiographic bone healing after 26 months of repeated calcium hydroxide endodontic treatment. Then, the calcium hydroxide paste was removed by the normal saline irrigation, followed by a hermetic root canal filling. The

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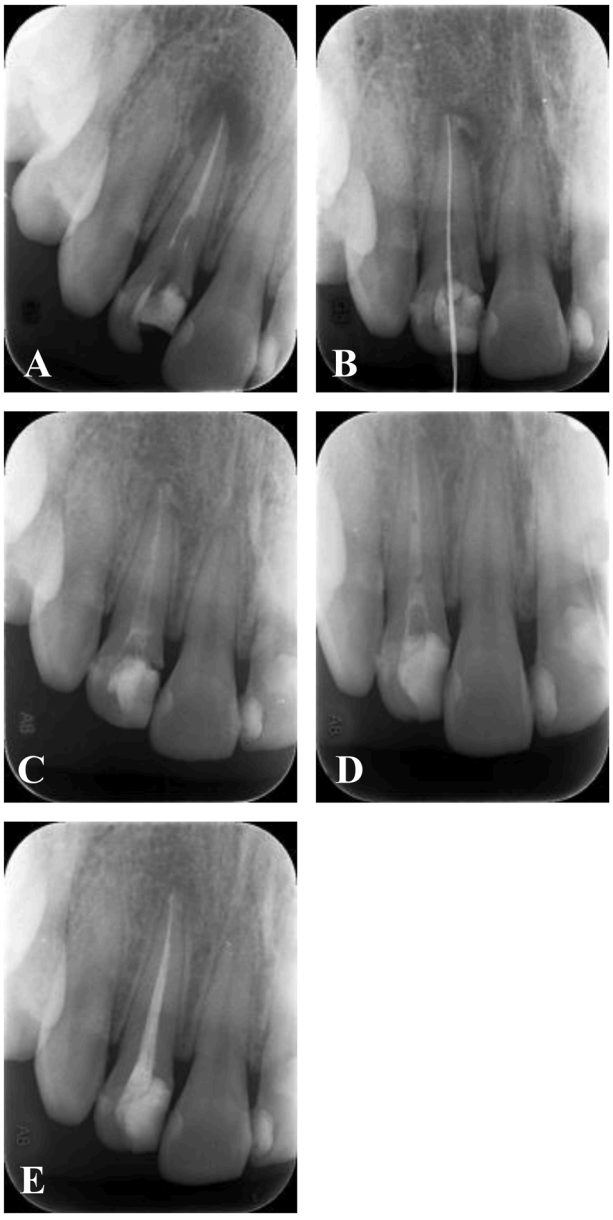

Figure 1 A series of periapical radiographs showing nonsurgical calcium hydroxide endodontic treatment of a right maxillary lateral incisor with a periapical radiolucent lesion, finally resulting in complete healing of the periapical lesion. (A) The initial periapical radiograph showed a restoration in the mesial crown portion and the filling materials in the root canal of the right maxillary lateral incisor. Moreover, a radiolucent lesion was noted at the periapical area of the right maxillary lateral incisor. (B) After 5 months of the root canal therapy with calcium hydroxide as the intra-canal medicament, the periapical radiograph revealed the evidence of partial healing of the periapical radiolucent lesion. (C) After 9 months of the root canal therapy with calcium hydroxide, the periapical radiograph demonstrated the persistent healing of the periapical radiolucent lesion. (D) After 24 months of the root canal therapy with calcium hydroxide, the periapical radiograph exhibited the nearly complete bone filling into the periapical radiolucent lesion. (E) After 26 months of the root canal therapy with calcium hydroxide, the root canal filling was performed and the periapical radiograph showed the complete healing of the radiolucent lesion at the periapical area of the right maxillary lateral incisor.

final result showed complete healing of the radiolucent lesion at the periapical area of the right maxillary lateral incisor (Fig. 1E).

Microorganisms are the main cause of the apical periodontitis. The removal of the necrotic tissue during the root canal therapy may also remove the microorganisms from the root canal space, and the healing of the apical lesions can be expected. However, it is unlikely that the bacteria can be completely eliminated by the instrumentation alone. In addition, the residual pulp tissue may hinder the removal of the microorganisms. Therefore, a proper instrumentation, irrigation, and calcium hydroxide disinfection are required to kill the microorganisms and dissolve the residual pulp tissue and debris in the root canal system.[3]

Since the introduction of calcium hydroxide to dentistry, it has been shown to promote healing of the peri-radicular lesion in many clinical situations.[4] Calcium hydroxide creates a high pH environment that inhibits enzyme activity essential for the microbial life, thereby disrupting their metabolism, growth, and cell division and finally resulting in the death of the microorganisms. Calcium hydroxide also has the effect on promoting hard tissue formation. For larger chronic periapical lesions, the use of calcium hydroxide as a temporary dressing can create an environment more conducive to the periapical bone healing and promote the osseous repair.[5]

The periapical lesions limit the spread of the bacteria through an inflammatory response. Understanding the mechanisms of periapical lesion formation and the factors that affect the healing of the periapical lesion is essential for treatment of the periapical lesions. Proper disinfection of the root canal system can eliminate the source of infection and is the pivotal key leading to the successful healing of the periapical lesions. Calcium hydroxide has important value in endodontics and can be used in a variety of clinical conditions. In this case, we used calcium hydroxide as the main intra-canal medicament to treat a right maxillary lateral incisor with a periapical radiolucent lesion and proved that the endodontic treatment with calcium hydroxide as the intra-canal medicament can finally result in the successfully healing of the radiolucent lesion at the periapical area of the right maxillary lateral incisor.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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