Case Report

DOI: 10.17354/ijss/2015/136

Non-Surgical Endodontic Approach for Management of Periapical Lesions

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Abstract

Due to pulp tissue necrosis the pulp chamber is transformed into unprotected environment. This unprotected environment becomes susceptible to colonization by numerous microorganisms. Development of periapical lesions is associated with the presence of microorganisms in the root canal system. To treat such cases there are surgical and non-surgical methods and the healing of periapical lesions will not be achieved through surgical removal of the periapical lesion without proper root canal disinfection and obturation. Through proper cleaning, shaping, asepsis, and proper obturation of the root canal system aids in the success of non-surgical endodontic treatment. This clinical case reports highlights follow-up results of two cases demonstrating the resolution of periapical lesion through nonsurgical approach, confirms that periapical lesions respond favorably to non-surgical treatment.

Keywords: Calcium hydroxide, Healing, Periapical lesion

INTRODUCTION

Periapical lesions of endodontic origin are produced by an inflammatory response at the root apices of teeth with nonvital pulps.[1,2] After pulp necrosis, the root canal system becomes increasingly susceptible to colonization by the microorganisms. Due to close physiopathological relationship between the pulp and the periapical region, bacteria, fungi, and cell components may trigger an inflammatory process in periapical tissues, progressively affecting them through the resorption phenomenon. Subsequently, immunopathological mechanisms lead to the formation of abscesses, granulomas, and periapical cysts.[2-5] Seltzer, Soltanoff, and Bender[6] observed in a series of studies, that pulpo-periapical lesions have the potential for healing without surgical intervention. Cvek, heithersay, messer, and stock have demonstrated successful clinical management of large periradicular lesion by the use of calcium hydroxide used as an interim dressing. Only when there are persistent signs and symptoms and/or no radiographic evidence of healing of periapical lesion, a surgical method of treatment should be considered.[7]

Access this article online

IJSS

www.ijss-sn.com

Month of Submission : 01-2015
Month of Peer Review : 02-2015
Month of Acceptance : 02-2015
Month of Publishing : 03-2015

CASE REPORTS

Case 1

A 19-year-old male patient was reported to the Department of Conservative Dentistry and Endodontics, Mamata Dental College, Khammam with discolored fractured mandibular incisors. Patient gave a history of trauma 5 years back. Medical history was noncontributory. Thermal and electric pulp tests were performed to determine the vitality of all the anterior teeth. Both the mandibular central incisors were found non-vital showing no response to thermal and electric pulp tests. On intra-oral periapical radiograph of the involved teeth was taken, which demonstrated a periapical lesion involving 31 and 41 (Figure 1) and hence conventional root canal therapy was initiated. Access cavity was prepared on the mandibular central incisors and the working length determined (Figure 2).

Canals were cleaned and shaped using K-files by the conventional method. 3% sodium hypochlorite was used as the intra-canal irrigant. The canal was enlarged to an apical size of ISO #40. Calcium hydroxide dressing was

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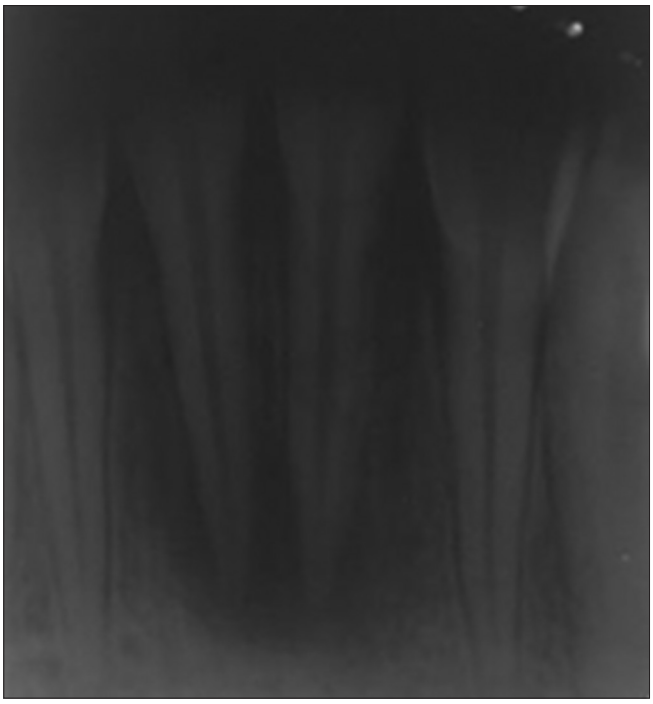

Figure 1: Intraoral periapical radiograph showing periapical lesions in relation with 31 and 41

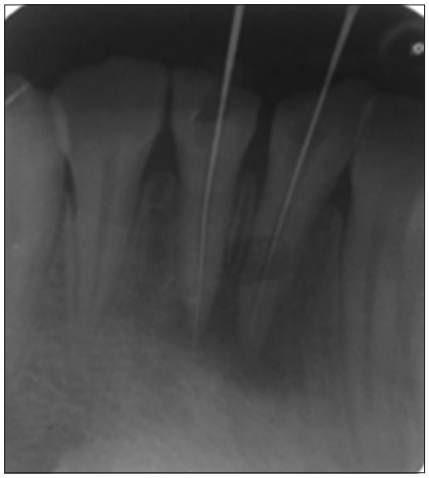

Figure 2: Working length determination

placed in the canal as the intra-canal medicament, and the access cavity was closed with temporary cement. Patient was recalled a week later and received a fresh dressing of calcium hydroxide, following thorough irrigation, and drying of the canal. This procedure was repeated again after 1 week. In the fourth visit, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to ISO #40 size. The obturation was completed by lateral condensation technique using gutta-percha and zinc oxide eugenol root canal sealer (Figure 3). A post-operative follow-up radiograph after 14 months showing complete healing of periapical lesion (Figure 4).

Figure 3: Radiograph showing obturation of 31 and 41

Figure 4: 14 months post-operative radiograph showing complete healing of periapical lesion

Case 2

A 30-year-old female patient was reported to the Department of conservative dentistry and endodontics, Mamata Dental College, Khammam with swelling and discolored mandibular incisors. Patient gave a history of trauma about 7 years back. Medical history was noncontributory. Thermal and electric pulp tests were performed to determine the vitality of all the anterior teeth. The mandibular central incisors and a lateral incisor were found non-vital showing no response to thermal and electric pulp tests. Intraoral periapical radiograph of the involved teeth was taken which demonstrated a periapical lesion involving 31, 32 and 41 (Figure 5) and hence conventional root canal therapy was initiated. Following the isolation with a rubber dam, the access cavity was prepared on the mandibular central incisors, and a lateral incisor, and the working length determined (Figure 6).

Canals were cleaned and shaped using K-Files by the conventional method. 3% sodium hypochlorite was used

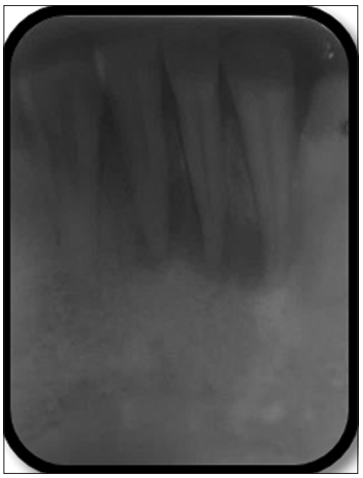

Figure 5: Intraoral periapical radiograph showing large periapical lesions in relation with 31, 32 and 41

Figure 7: Master cone selection

Figure 6: Working length determination

Figure 8: Radiograph showing obturation of 31, 32 and 41. 12 months post-operative radiograph showing healing of periapical lesion

as the intra-canal irrigant. The canal was enlarged to an apical size of ISO #45. Calcium hydroxide dressing was placed in the canal as the intra-canal medicament, and the access cavity was closed with temporary cement. Patient was recalled a week later and received a fresh dressing of calcium hydroxide, following thorough irrigation and drying of the canal. This procedure was repeated after 1 week. In the 5th visit, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to ISO #45 size. The obturation was completed by lateral condensation technique using gutta-percha and zinc oxide eugenol root canal sealer (Figure 7). After 12 months of post-operative follow radiograph showing complete healing of periapical lesion (Figure 8).

DISCUSSION

Root canal treatment primarily aimed at the elimination of bacteria as completely as possible. To manage large periapical lesions treatment options range from non-surgical root canal treatment and/or apical surgery to extraction.[8] When root canal treatment is not successful in resolving the periapical lesion, then additional treatment in the form of surgical intervention should be carried out. Necrotic pulps harbors pathogenic bacteria, necrotic pulp provide nutritional supply for these bacteria which leads to the development of periapical lesion. Conventional root canal treatment is primarily based on the removal of this microbial infection from the root canal system. Irrigants and intra-canal medicaments aid in reducing the microbial flora of infected root canals. In the present case reports, calcium hydroxide was used as the intra-canal medicament. Use of calcium hydroxide as dressing for 1 week has been shown efficiently eliminates bacteria from the root canals.[9]

It has also been reported that especially in young patients treatment with Ca (OH) 2 resulted in a high frequency of periapical healing.[10] It may takes many months for

healing of lesions. Caliskan and Sen[4] have reported that high frequency of periapical healing showing completed resorption of the periapical defect is observed with the treatment of calcium hydroxide. The exact mechanism of action of calcium hydroxide is still speculative. The efficacy of calcium hydroxide, owing to its antiseptic, anti-exudative, and mineralization inducing properties depends on the sustained release of calcium and hydroxyl ions to the root canal and periapical region. Regular renewal of the root canal dressing is fundamental in reducing the intensity of the periapical inflammatory process as they are progressively resorbed by the periapical fluids. Root canal dressing transforms the inflammatory granulation tissue into reparative granulation tissue, and simultaneously the differentiation of undifferentiated mesenchymal cells into reparative cells.[5]

Ghose *et al.*[11] have advocated that for osteoinductive reasons there should be direct contact between the calcium hydroxide and the periapical tissue. It is suggested that if calcium hydroxide is confined to the root canal, it is possible that the inflammation created by the diffusion of calcium hydroxide through the apical foramen may be sufficient to cause breakup of the cystic epithelial lining, thereby allowing a connective tissue invagination into the lesion with ultimate healing.

CONCLUSION

The clinical cases showed excellent healing of periapical lesions through a non-surgical approach. It is achieved through debridement, disinfection and three dimensional obturation of the root canal system. Healing of periapical lesion is effectively achieved through calcium hydroxide interim dressing. It is necessary to observe and monitor the prognosis of periapical lesions.

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How to cite this article: Dharavath R, Veeramachaneni C. Non-Surgical Endodontic Approach for Management of Periapical Lesions. Int J Sci Stud 2015;2(12):193-196.

Source of Support: Nil, **Conflict of Interest:** None declared.