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Non-Surgical Endodontic Approach for Management of Periapical Lesions with 6 months follow up: A Case Series.

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ABSTRACT:
The success of root canal treatment depends on thorough disinfection of the root canal system, and to provide fluid impervious seal which in turn halt the progress of the periapical infection. The oral microorganisms from the degenerated pulp tissue are responsible directly or indirectly for most of the periapical lesions. For the treatment of these lesions there are surgical and non-surgical methods. Surgical removal of the periapical lesion without proper root canal disinfection and obturation will result in improper healing of lesions whereas in non-surgical root canal therapy the lesions heal if proper cleaning, shaping and obturation of root canal are done. This clinical case series highlights the follow-up results of three cases demonstrating the resolution of periapical lesion through nonsurgical approach and confirms that periapical lesions respond favorably to non-surgical treatment.
Key Words: Calcium hydroxide, Cyst, Healing, Periapical lesion, Non-surgical

1. INTRODUCTION:

The necrosed pulp, within root canal system is highly susceptible to colonization by the oral microbes. These microbes along with other cell components may trigger an inflammatory process in periapical tissues. Subsequently, immunopathological process lead to periapical infections.[1] These lesions are usually found during routine radiographic examinations or followed by patient's extreme pain sensation.[2] Most periapical lesions can be classified as radicular cysts, abscesses or periapical granulomas.[3,4] The occurrence of cysts within periapical

lesions ranges from 6% to 55%.[5] Also the occurrence of abscesses ranges from 28.7% to 70.07% and of periapical granulomas from 9.3% to 87.1%.[6]

The main aim of endodontic treatment should be to return the involved teeth to a healthy state and function without surgical intervention.[7] Primarily all inflammatory periapical lesions should be treated with conservative nonsurgical procedures. Only after failing of nonsurgical techniques, surgical intervention is suggested.[8,9] Moreover, surgery has many disadvantages, which limits its use in the treatment of periapical lesions.[10] Endodontic treatment of teeth with periapical lesions, have been reported to have a success rate of 85%.[11] A 94.4% incidence of complete and partial healing of periapical lesions after nonsurgical endodontic therapy has also been stated.[12]

Calcium hydroxide is widely used as an intracanal medicament because of its various biological properties such as antimicrobial activity, tissue dissolving ability and induction of repair by hard tissue formation. Most of its antimicrobial activity is attributed to the release of hydroxyl ion, which comes from the dissociation of calcium hydroxide into calcium and hydroxyl ion in aqueous solution, and even provides a high alkaline environment with pH value of 12, where most of the microorganisms are unable to survive.[13,14,15]

This case series describes the non-surgical management of a periapical lesion with a follow up of 6 months.

2. CASE REPORTS:

CASE 1:

Fig 1a

Fig 1b

Fig 1c

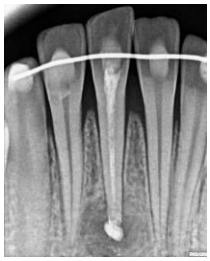

Fig 1d

Fig 1e

Fig 1f

Fig 1g

Fig 1h

Fig 1a: Pre op radiograph irt 41. Fig 1b: Splinting done. Fig 1c: Working length irt 41. Fig 1d: $Ca(OH)_2$ medicament placed irt 41. Fig 1e: Master cone selected irt 41. Fig 1f: Obturation irt 41. Fig 1g: Post Op radiograph irt 41. Fig 1h: 6 months follow up irt 41.

A 18 year old female patient came to the Department of Conservative Dentistry and Endodontics, Panineeya Dental College and Research Centre, Hyderabad, with the chief complaint of pain and swelling in the lower anterior teeth region. Patient gave a history of trauma 6 months back. Medical history was noncontributory. Thermal and electric pulp tests were performed to determine the vitality of all the anterior teeth. Mandibular right central incisor was found non-vital showing no response to thermal and electric pulp tests. Radiovisiography of the involved teeth was taken, which demonstrated a periapical lesion involving 41 (Figure 1a) and hence conventional root canal therapy was initiated. Splinting was done for 1 week to stabilize the tooth as it was having Grade II mobility (Figure 1b). Access cavity was prepared irt 41 and the working length determined (Figure 1c). Chemomechanical preparation was done using protaper gold files upto size F1. 1% Sodium hypochlorite, 0.9% Saline, Ethylenediamine tetraacetic acid was used as the intra-canal irrigants. Calcium hydroxide dressing was placed in the canal (Figure 1d) as the intra-canal medicament, and the access cavity was closed with temporary cement. In the next visit after 1 week, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to size ISO 6% GP No. 20 (Figure 1e). Obturation is done using zinc oxide eugenol sealer by single cone technique (Figure 1f) and post endo restoration is done with composite (Figure 1g). A post-operative follow-up radiograph after 6 months shows healed periapical lesion (Figure 1h).

CASE 2:

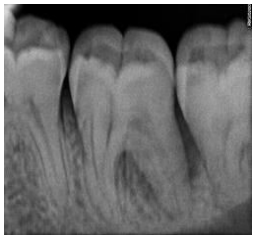

Fig 2a

Fig 2b

Fig 2c

Fig 2d

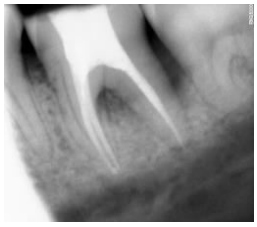

Fig 2e

Fig 2f

Fig 2a: Pre op radiograph irt 37. Fig 2b: Working length irt 37. Fig 2c: Master cone selected irt 37. Fig 2d: Obturation irt 37. Fig 2e: Post op radiograph irt 37. Fig 2f: 6 months follow up irt 37.

A 25 year old male patient came to the Department of Conservative Dentistry and Endodontics, Panineeya Dental College and Research Centre, Hyderabad, with the chief complaint of pain in the lower left back posterior teeth region. On radiographic examination there was a periapical lesion irt 37 (Figure 2a). Thermal and electric pulp tests were performed to determine the vitality of the involved teeth. It was found non-vital showing no response to thermal and electric pulp tests. Access cavity was prepared irt 37 and the working length determined (Figure 2b). Chemomechanical preparation was done using protaper gold files upto size F2. 1% Sodium hypochlorite, 0.9% Saline, Ethylenediamine tetraacetic acid was used as the intra-canal irrigants. Calcium hydroxide dressing was placed in the canal as the intra-canal medicament, and the access cavity was closed with temporary cement. In the next visit after 1 week, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to size ISO 6% GP No. 25 (Figure 2c). Obturation is done using zinc oxide eugenol sealer by single cone technique (Figure 2d) and post endo restoration is done with composite (Figure 2e). A post-operative follow-up radiograph after 6 months shows healed periapical lesion (Figure 2f).

CASE 3:

Fig

Fig 3a

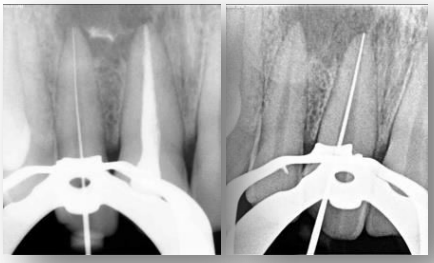

Fig 3b

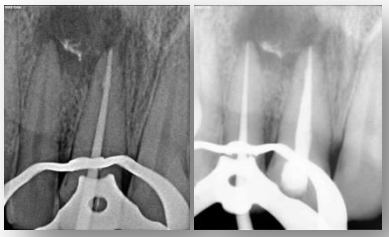

Fig 3c

Fig 3d

Fig 3e

Fig 3a: Pre op radiograph irt 11, 12. Fig 3b: Working length irt 11, 12. Fig 3c: Master cone irt 11, 12. Fig 3d: Obturation irt 11, 12. Fig 3e: 6 months follow up irt 11,12.

A 23 year old male patient came to the Department of Conservative Dentistry and Endodontics, Panineeya Dental College and Research Centre, Hyderabad, with the chief complaint of pain and swelling in the upper anterior teeth region. Patient gave a history of trauma 6 months back. Medical history was noncontributory. Thermal and electric pulp tests were performed to determine the vitality of all the anterior teeth. Maxillary right central and lateral incisor was

found non-vital showing no response to thermal and electric pulp tests. Radiovisiography of the involved teeth was taken, which demonstrated a periapical lesion involving 11, 12 (Figure 3a) and hence conventional root canal therapy was initiated. Access cavity was prepared irt 11, 12 and the working length determined (Figure 3b). Chemomechanical preparation was done using protaper gold files upto size F3 irt 11 and F2 irt 12. 1% Sodium hypochlorite, 0.9% Saline, Ethylenediamine tetraacetic acid was used as the intra-canal irrigant. Calcium hydroxide dressing was placed in the canal as the intra-canal medicament, and the access cavity was closed with temporary cement. In the next visit after 1 week, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to size ISO 6% GP No. 30 irt 11 and 25 irt 12 (Figure 3c). Obturation is done using zinc oxide eugenol sealer by single cone technique (Figure 3d) and post endo restoration is done with composite. A post-operative follow-up radiograph after 6 months shows healed periapical lesion (Figure 3e).

CASE 4:

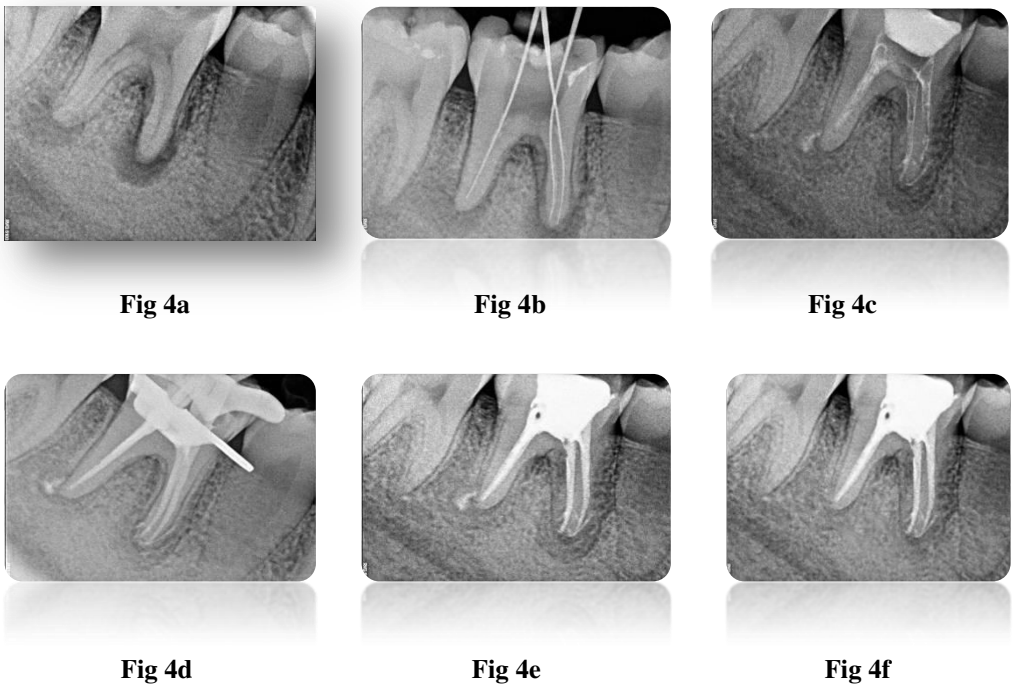

Fig 4a **Fig 4b** **Fig 4c**

Fig 4d **Fig 4e** **Fig 4f**

Fig 4a: Pre-operative radiograph irt 36. Fig 4b: Working length irt 36. Fig 4c: $Ca(OH)_2$ medicament placed irt 36. Fig 4d: Master cone irt 36. Fig 4e: Obturation irt 36. Fig 4f: 6 months follow up irt 36.

A 29 year old male patient came to the Department of Conservative Dentistry and Endodontics, Panineeya Dental College and Research Centre, Hyderabad, with the chief complaint of pain in the lower left back posterior teeth region. On radiographic examination there was a periapical lesion irt 36 (Figure 4a). Thermal and electric pulp tests were performed to determine the vitality of the involved teeth. It was found non-vital showing no response to thermal and electric pulp

tests. Access cavity was prepared irt 36 and the working length determined (Figure 4b). Chemomechanical preparation was done using protaper gold files upto size F2. 1% Sodium hypochlorite, 0.9% Saline, Ethylenediamine tetraacetic acid was used as the intra-canal irrigant. Calcium hydroxide dressing was placed in the canal as the intra-canal medicament (Figure 4c), and the access cavity was closed with temporary cement. In the next visit after 1 week, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to size ISO 6% GP No. 25 (Figure 4d). Obturation is done using zinc oxide eugenol sealer by single cone technique (Figure 4e) and post endo restoration is done with composite (Figure 4e). A post-operative follow-up radiograph after 6 months shows healed periapical lesion (Figure 4f).

3. DISCUSSION:

The main aim of endodontic treatment is to eliminate microorganisms as completely as possible from root canal spaces. The mechanism involved in the formation of periapical lesions is not fully understood. It is generally agreed that if the pulp becomes necrotic, its environment becomes suitable to allow microorganisms to multiply and release various toxins into the periapical tissues, initiating an inflammatory reaction, and leading to the formation of the periapical lesion.[16] The treatment options range from non-surgical root canal treatment and/or apical surgery to extraction for the management of periapical lesions.[17]

Conventional root canal treatment is primarily based on the removal of 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.[18] Caliskan and Sen et al have reported that high frequency of periapical healing showing completed resorption of the periapical defect is observed with the treatment of calcium hydroxide.[19]

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.[20]

Ghose et al 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.[21]

The periapical lesions in the above cases were resolved after non-surgical therapy. Periapical tissues have rich blood supply, lymphatic drainage, and abundant undifferentiated

mesenchymal cells and therefore have good potential for healing. Thus, treatment should be directed at removing the causative factors.[22]

4. CONCLUSION:

Excellent healing of periapical lesions with the non-surgical approach achieved through proper debridement, disinfection and three dimensional obturation of the root canal system. Calcium hydroxide interim dressing achieved effective healing of periapical lesions. It is necessary to follow up root canal treated teeth with periapical lesions for better prognosis.

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