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Healing of Extensive Periapical Lesions by means of Conventional Endodontic treatment – a Report of Two Cases

Dr Vijayshankar L V [1], Dr Vinay K [2], Dr Veena Kumari R [3], Dr Suma G [4], Dr Bharathi D Deo[5]

[1](Reader, Department of Conservative Dentistry and Endodontics, M R Ambedkar Dental College and Hospital, India)
[2](Reader, Department of Orthodontics, M R Ambedkar Dental College and Hospital, Bangalore, India)
[3](Professor and Head, Department of Conservative Dentistry and Endodontics, M R Ambedkar Dental College and Hospital, India)
[4](Reader, Department of Pedodontics, Vokkaligara Sangha Dental College and Hospital, Bangalore, India)
[5](Professor, Department of Conservative Dentistry and Endodontics, Government Dental College and Research Institute, Bangalore, India)

Abstract: *Periapical lesions of endodontic origin may develop asymptomatically and become extensive. Treatment options to manage such lesions range from non-surgical root canal treatment and/or apical surgery to extraction. A high percentage of complete and partial healing of extensive perapical lesions following conventional endodontic therapy has been reported. The case reports in this article describe the management of such lesions by conventional endodontic therapy. Triple antibiotic paste and calcium hydroxide were used as intra canal medicaments. The two and three year follow up radiographs of the cases showed progressive healing of periapical lesions.*

Keywords: *Calcium Hydroxide, Conventional Endodontic treatment, Intracanal medicament, Periapical lesions, Triple antibiotic paste,*

I. Introduction

Periapical lesions are sequelae to endodontic infection caused due to dental caries or trauma and manifest itself as the host defense response to microbial challenge emanating from the root canal system. It is viewed as a dynamic encounter between microbial factors and host defenses at the interface between infected radicular pulp and periodontal ligament that results in local inflammation, resorption of hard tissues, and destruction of other periapical tissues [1, 2]. Treatment options to manage large periapical lesions range from nonsurgical root canal treatment and apical surgery to extraction [3]**.** A high percentage of 94.4% of complete and partial healing of periapical lesions following nonsurgical endodontic therapy has also been reported [4]. Surgical management of periradicular lesions can be associated with damage to vital structures, scar formation and unpleasant experience to the patient. If apicectomy is done during the periapical surgical procedure it would reduce the available length of an immature tooth. Calcium hydroxide [5] and triple antibiotic pastes [6] have been used as intra canal medicaments during the treatment of such lesions.

This article presents healing of extensive periapical lesions associated with multiple maxillary teeth in case-1 where calcium hydroxide was used as intracanal medicament and maxillary central incisor teeth in case-2 where triple antibiotic paste was used as intracanal medicament. This article suggests that surgical removal of periapical lesion of pulpal origin is not mandatory, irrespective of the size of the lesion every effort should be made to treat such lesions by conventional endodontic treatment.

II. Case Reports

1.1 Case: 1

A female patient 20 years of age, reported to the department of Conservative Dentistry and Endodontics at M R Ambedkar Dental College and Hospital, Bangalore, India, with the chief complaint of discolored upper front teeth. A history of trauma 5 years prior involving lower face region was recorded. She was asymptomatic.

Obliteration of the labial sulcus with respect to 12, 11 and 21 was present. Hard tissue examination showed composite resin restoration with respect to 11. Discoloration was present with respect to teeth 12, 11 and 21.

Pulp sensitivity testing using Endo-frost (Roeko,-50 0 C) on12, 11 and 21 gave a negative response. Radiographic analysis indicated the presence of a large periapical radiolucency approximately 2cmx2cm in dimension, involving the root apex of 12, 11 and 21(Fig: 1A, 1B and 1C).The condition was diagnosed as

periapical cyst secondary to trauma. Treatment plan was decided and informed consent was obtained from the patient. Access cavity preparations were done on 12, 11 and 21 under rubber dam isolation. Mild discharge of clear, straw colored fluid from the canals was present. Working length of each tooth was determined using Root ZX II (J Morita) apex locator and confirmed with radiographs. Cleaning and shaping was done using hand K files (Sybron Endo). 5.25% sodium hypochlorite and saline were used as intra canal irrigants. Calcium Hydroxide paste (RC Cal-Prime Dental) was placed as intracanal medicament. The canal filling was replaced with calcium hydroxide after 15 days and patient was recalled after one month. Following radiographic examination, obturation was completed on 12, 11 and 21 with gutta percha and AH Plus (Dentsply) sealer using lateral condensation technique after ensuring that the canals were dry (Fig: 1D). Marked reduction in the size of the periradicular radiolucent lesion was found during the 3 year follow up visit (Fig: 1E and 1F). Patient was asymptomatic.

1.2 Case: 2

A 24 year old female patient reported to the department of Conservative Dentistry and Endodontics at M R Ambedkar Dental College and Hospital, Bangalore, India, with the chief complaint of pain and swelling in the palatal aspect of upper front teeth since two weeks. There was a history of trauma 1 year back. Clinical examination revealed a swelling in the palatal region of tooth numbered 11. Radiographic analysis showed a moderate periapical radiolucency of approximately 2 cm x 2cm in dimension (Fig: 2A). Pulp sensitivity testing using Endofrost (Roeko,-50 0 C) showed a negative response with 11. The condition was diagnosed as infected periapical cyst secondary to trauma. Treatment plan was decided and informed consent was obtained from the patient. An access cavity preparation of the tooth 11 was done under rubber dam isolation. A clear, straw-colored fluid was exuded from the canal. Working length of the tooth was determined using Root ZX II (J Morita) apex locator and confirmed with radiographs. Cleaning and shaping was performed to the apical file size of 70 using hand K files (Sybron Endo). The canal was copiously irrigated with 5.25% sodium hypochlorite and saline. Triple antibiotic paste made up of Metronodazole, Ciprofloxacin and Minocycline was placed as an intracanal medicament and the coronal part was sealed with Cavit (3M ESPE). Patient was recalled after two months and triple antibiotic paste was removed using 5.25% sodium hypochlorite. After ensuring that the canal was dry, obturation was done on tooth 11 with gutta percha and AH Plus (Dentsply) sealer using cold lateral condensation technique (Fig: 2B). Resolution of periapical radiolucency was observed on radiographs at two year (Fig: 2C) follow up visit. Patient was asymptomatic.

Case 1:

Fig. 1 A, 1B and Fig. 1C: Preoperative radiograph of 11, 12 and 21 showing periapical radiolucency

Fig. 1D: Radiograph of 12, 11 and 21 immediately after obturation

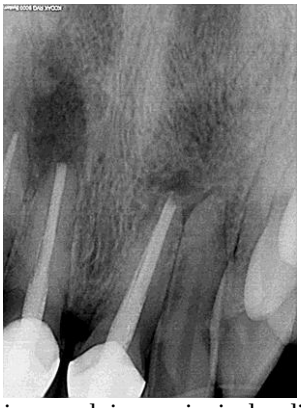

Fig. 1E and Fig. 1F: 3 year follow up radiograph of 12, 11 and 21 showing resolving periapical radiolucency

Case 2:

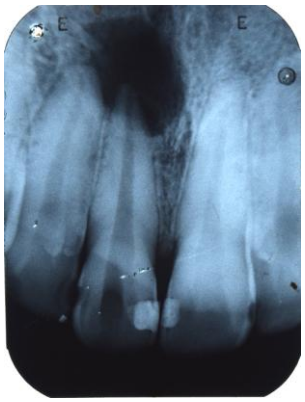

Fig. 2A: Preoperative Radiograph showing periapical radiolucency in relation to 11

Fig. 2B: Radiograph of 11 immediately after obturation

Fig. 2C: 2 year follow up radiograph of 11 showing reduction in periapical radiolucency

II. Discussion

The definitive diagnosis of the type of periapical lesion can only be made by a histological examination [7].

However, a preliminary clinical diagnosis of a periradicular cyst is reasonable if all of the following conditions exist: (a) the periradicular lesion involves one or more teeth with necrotic pulps; (b) the lesion is greater than 200 mm2 in size; (c) a straw-colored fluid is produced upon aspiration or on drainage through an access; and (d) the fluid contains cholesterol crystals [8]. Cholesterol crystals are encountered in 29 to 43% of dental cysts [9]. In these case reports, radiographs revealed that the involved teeth had large periradicular lesion with uniformly dense radiolucency. The teeth had necrotic pulps. A straw-colored fluid discharge was present from the canals. Hence the cases were diagnosed as periapical cyst.

The periapical tissues have a rich blood supply, lymphatic drainage and abundant undifferentiated cells that afford good healing potential [10]. The first choice of treatment of periapical lesions should aim to eliminate microbial infection through treatment of the canals, in order to establish an environment favorable to healing [10]. Conventional nonsurgical root canal therapy is the treatment of choice in managing teeth with large periapical lesions [11]. Hence conventional endodontic treatment was the first choice of treatment in our cases.

Irrigating solutions help reduce the microbial flora of the infected canals, and the use of a tissue-dissolving formulation can help eliminate the necrotic tissue [12]. In our patients, the canals were irrigated with 5.25% of sodium hypochlorite, which contributed to improved bacterial elimination.

Caliskan and Sen have reported that high frequency of periapical healing showing completed resorption of the periapical defect is observed with the treatment of calcium hydroxide [13]. Calcium hydroxide paste as intra canal medicament affords a series of properties: anti-inflammatory activity, neutralization of acid products, activation of alkaline phosphatase, antibacterial action and radiopacity [14]. In our cases calcium hydroxide was used as an intra canal medicament for a prolonged period of time in order to afford an environment favorable to periapical bone regeneration. Regular renewal of the intra canal medicament should be done as they are progressively resorbed by the periapical fluids. Hence in case-1, replacement was carried out after 15 days.

In recent years, The Cariology Research Unit of the Niigata University has developed the concept of 'Lesion sterilization and tissue repair LSTR' therapy [15, 16] that employs the use of a combination of antibacterial drugs for disinfection of oral infectious lesions, including dentinal, pulpal, and periradicular lesions.

Research with topical antibiotics has shown that a combination of metronidazole, ciprofloxacin and minocycline is effective in killing common endodontic pathogens from necrotic/infected root canals in vitro [17]. This antibiotic combination is also an effective disinfectant in vivo [6]. Furthermore the triple antibiotic paste has been used successively in regenerative endodontic treatments [18] and in healing of large periradicular lesions [19]. The second case report describes the endodontic treatment of an infected periapical cyst using a triple antibiotic paste. The volumes of the drugs applied in this case report is small and there were no side effects reported. However, care should be taken if patients are sensitive to chemicals or antibiotics.

Radiological signs such as changes in lesion density, trabecular formation and the formation of lamina dura are indicative of healing, particularly when associated to asymptomatic teeth and healthy soft tissues [10]. Estrela and Figueiredo found that the clinical and radiographic determinants evaluated after periods of over two years are able to establish treatment outcome [20]. Two and three years follow-up radiographs in the cases mentioned in this article, showed reduction in the size of the periapical lesions and the patient were symptom free. This indicated progressive healing of the lesions.

III. Conclusion

Extensive periapical lesions exhibiting clinical and radiographic characteristics compatible with periapical cysts were exclusively treated by conventional endodontic treatment in combination with intracanal medicaments and this mode of treatment contributed effectively in healing of periapical lesions. Calcium hydroxide and Triple antibiotic paste used for a prolonged period of time afford an environment favorable to periapical bone regeneration. Longer follow-up periods are recommended to ascertain that complete healing has taken place. Surgical option should be considered when conventional endodontic treatment has not resulted in restoring the integrity of the periapical tissue.

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