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Case Report

Calcium hydroxide induced healing of periapical radiolucency : A case series

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ABSTRACT

Background: Periapical disease may occur through an inflammatory response in a non-vital tooth. The treatment of choice for most of these periapical lesions may be a conservative non-surgical approach. An accurate diagnosis of the periapical lesion whether it is of endodontic or nonendodontic origin has to be made. Non- surgical endodontic therapy has shown a success rate of 94.4% with complete or partial healing.
Case description: The present clinical cases show two large periapical lesions in 14 year and 17-year-old male patients respectively which were healed with non- surgical approaches using different formulations of calcium hydroxide.
Conclusion: Healing was seen after few months in both the lesion without invasive treatments. As the first case revealed periapical healing within 2 months of calcium hydroxide placement whereas the second case showed a much slower rate of healing over one year.

1. Background

Periapical lesions are one of the common pathological conditions affecting periradicular tissues. The periapical lesion mostly occurs due to bacterial invasion.[1] Non- vital tooth leads to an inflammatory response at the root apex which later forms a periapical disease. Due to necrosis of the pulp, the root canal acts as an area of growth of microbes. A root canal therapy mainly depends upon eliminating of the microbial growth emerging through the apical foramen and also the penetration of further spread.[2,3] The primary aim of any treatment should be a painless and conservative approach.[4]

There are many non- surgical ways of managing a periradicular lesion namely, orthograde root canal therapy, decompression therapy, method using calcium hydroxide, aspiration- irrigation technique, lesion sterilization and repair therapy, active non- surgical decompression technique and apexum procedure.[4] Non-surgical endodontic therapy have shown a success rate of 94.4% with complete or partial healing.[5] Surgical methods have many disadvantages so they are considered as option only if the non- surgical technique fails to show signs of healing.[6]

Most of the time host defense prevents spreading of infection in the canal, to the bone. However, when the circulation is compromised, host defense mechanism cannot reach the microbes residing inside the tooth in the necrotic condition of the root canal.[7] In these cases a bacterial free canal at the time of obturation is the primary aim for a highly successful case and to achieve this calcium hydroxide is used as therapeutic medication because mechanical instrumentation alone cannot remove the microbes from the main root canal.[8–10]

It is important to note that to carry out any periapical treatment an absolute diagnosis of the lesion is required. However a primary clinical diagnosis of a radicular cyst can be approximately made in the following facts: if the periapical lesion is a cyst, it is associated with one or more non- vital teeth, the lesion size is usually greater

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than 200mm^2, the lesion is described radiographically as a circumscribed, well defined radiolucent area with a thin radiopaque lining and finally it produces a pale, brownish, yellow- colored fluid upon aspiration or when drainage is accomplished throughout the accessed root canal system.

These case reports here under describes about the management of periapical lesions associated with immature teeth using an aspiration technique followed by placement of different calcium hydroxide formulations to appreciate healing in the periapical lesions.

2. Case Description

2.1. Case 1

A 14-year-old male patient reported to the department with a chief complaint of fracture in the maxillary anterior teeth. There was no contributory medical history. On taking a detailed dental history the patient revealed trauma to the anterior teeth. There was a complete fracture in 11 which involved the pulp and was tender on percussion (Figure 1 A). The tooth 21 has an enamel fracture. Radiograph was advised for the teeth which showed a periapical radiolucent area with an open apex. Electronic pulp testing (Electric Pulp Tester, Parkell, Farmingdale, NY) was negative for 11.

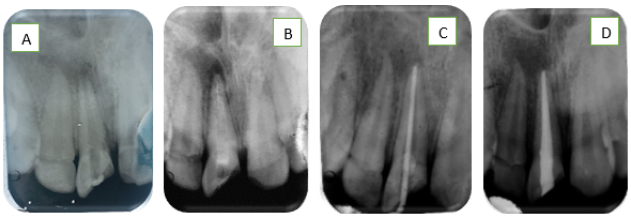

Fig. 1: A: Pretreatment periapical view; **B:** Application of calcium hydroxide; **C:** Obturation carried out after 2 months **D:** Post treatment radiograph after 6 months

Endodontic treatment was planned for the tooth 11. Following the rubber dam application, access cavity preparation was done. A large amount of drainage of purulent exudate was seen and patient was immediately relieved of pain. A 23- gauge needle attached to a 5-ml syringe (Dispovan, Hindustan syringes and medical devices Ltd., India) was inserted into the root canal past the open apex, beyond into the periapical region. The purulent discharge was aspirated out. The canal was thoroughly irrigated with 2.5% sodium hypochlorite (NaOCl) solution (Belo Dez de Ouro, Brazil). Following this working length was measured and the canal was instrumented till 80 # k-file (Dentsply Maillefer Ballaigues, Switzerland). The canal was dried with the paper point (Dentsply Maillefer Ballaigues, Switzerland) and temporized with Cavit (ESPE, Seefeld, Germany).

Patient was recalled after 3 days to check for any discharge from the canal. The drainage was completely ceased and the canal was absolutely dry. Calcium hydroxide paste Calcigel (Prevest DenPro) was placed as an intracanal medicament in the root canal (Figure 1B). The dressing was changed after every 15 days for 2 months. After 2 months' evidence of periapical healing and apex closure was seen. The tooth remained asymptomatic and obturation was carried out using AH- plus (Dentsply-kronstaz, Germany) sealer and gutta-percha (Dentsply Maillefer Ballaigues, Switzerland) (Figure 1C). The fractured teeth were later build by composite (3M ESPE Filtex). The patient was recalled for follow ups. After 6 months, there was significant amount of bone healing and barrier formation at root apex (Figure 1D).

2.2. Case 2

A 17-year-old male patient reported with a discolored maxillary anterior tooth. On clinical examination, the tooth 11 was not mobile and had a negative response to electric pulp testing (Electric Pulp Tester, Parkell, Farmingdale, NY). Tooth 12 was fractured and also non-vital. Radiographic examination of both teeth 11 and 12 revealed a large periapical lesion, borders of which involved both the teeth with well-defined outline, suggesting of a periapical cyst (Figure 2 A).

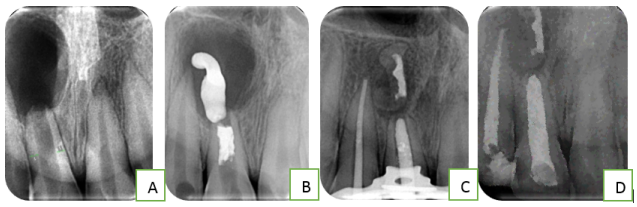

Fig. 2: A: Preoperative radiograph, **B:** Application of calcium hydroxide, **C:** Mastercone radiograph by "tailor-made Gutta-percha" after 10 months, **D:** Follow-up radiograph after 1 year

Non- surgical endodontic treatment was scheduled for 11 and 12 in the next appointment. Access opening was performed and working length was calculated. Canals were then thoroughly irrigated with copious amount of sodium hypochlorite solution and prepared till 80# in 11 and 45# in 12. Final rinse was done by 17% EDTA solution. Canals were dried with sterile paper point (Dentsply Maillefer Ballaigues, Switzerland) and temporized by Cavit (ESPE, Seefeld, Germany). In the next appointment Metapex (Meta- Biomed Co. Ltd) dressing was introduced into the canal as well as pushed beyond apex into the periapical area (Figure 2B). This was changed every 2 weeks for over a period of 10 months. Subsequently after 10 months when periapical changes were noticed, the canals were cleansed and obturated with Gutta-percha cones (Dentsply Maillefer Ballaigues, Switzerland) and AH plus sealer using the "tailor- made Gutta-percha" technique in 11 (Figure 2C).

Radiographic examination after one and a half year revealed adequate healing of the lesion (Figure 2D). The tooth also remained asymptomatic.

3. Discussion

Sudden impact involving the face or head may result in trauma to the teeth and supporting structures. It is seen in a US based study that 25% of the population who are between the age of 6 to 50 years have chance of injuries to anterior teeth.[11] There is a gender difference seen in the pattern of traumatic injuries with boys: girls' ratio varying from 2:1 to 3:1.[12] in the case reports presented both the patients are male showing a prevalence in males than females. Maxillary central incisors are the most commonly infected teeth followed by maxillary laterals and molars being posteriorly placed are the least commonly affected.[12]

In the first case a complicated crown fractured is seen i.e. involving the pulp. Ellis and Davey classified these kind of fractures as class III fractures.[13] This kind of fractures may show a pin point exposure or a total unroofing of coronal pulp. They contribute between 2 to 13% of all the dental injuries.[14] Further on taking a radiograph, both the cases showed periapical lesion. Majorly the periapical lesions can be categorized as a granuloma, radicular cyst or abscesses.[15,16] The diagnosis of the lesion can only be made through the histological nature of the lesion present periapically but a preliminary diagnosis can be made on taking a clinical and radiographic examination. These inflammatory lesions have somewhat similar treatment and can be removed only after removal of the original etiology of the lesion.[17]

A success rate up to 85% is seen in these periapical lesions after endodontics treatment.[18–20] In the past, it was considered that large periapical lesions would not respond to root canal treatment alone and that surgery was always required. However, in recent years there is greater awareness of the root canal morphology and the development of newer instruments techniques and materials has greatly enhanced the clinician's ability.[21] Thus non-surgical endodontic treatment was planned for both the cases. This kind of treatment aids in a less invasive and more patient compliant procedure. When planning a non-surgical endodontic treatment two things have to be kept in mind, first is the sufficient chemo- mechanical cleaning of the root canal system and second, disinfection of the canal by use of a medicament. The irrigant used in the cases was sodium hypochlorite. This irrigant is most commonly used in endodontic treatment.[22]

For the disinfection of the canal calcium hydroxide was used. Calcium hydroxide is an antibacterial paste which is most commonly used intracanal medicament.[23] Calcium hydroxide is considered gold standard for root canal disinfection.[24] The mechanism of action is not clearly known but due to its alkaline nature it promotes periapical healing, notably in young adults.[25,26] It is seen that long term use of calcium hydroxide from 6 to 24 months may cause hard tissue barrier formation.[27,28] Thus it is used for apexification of non- vital immature tooth.[29]

In the present cases calcium hydroxide was used in both the cases with different formulation. In the first case Calcigel was used, which is a plain calcium hydroxide paste in a syringe form. The use of Calcigel was confined only to the root canal. In the second case Metapex (Meta-Biomed Co. Ltd) was used. Iodoform being antiseptic due to iodine release in the nascent state.[30] Barium Sulphate is used as an opacifier. This formulation (Metapex) was intentionally pushed into the periapical region. Mode of action of calcium hydroxide beyond apex may be due to its antibacterial, anti- inflammatory which cause hard tissue barrier formation.[31] Few studies advocated that pushing calcium hydroxide beyond apex may prevent early healing and take time to repair.[32,33] However this was seen in the cases presented, as the first case revealed periapical healing within 2 months of calcium hydroxide placement whereas the second case showed a much slower rate of healing over one year. Moreover, barium sulphate present along with calcium hydroxide can obscure the apex, making the judgement of the radiographic apex quite difficult.

A study by Srindberg and Sjogren[34] showed no significant difference in healing rate between lesion larger than 5mm and those smaller than 5mm. A success rate of 73.8% was seen in 42 non- surgically treated teeth with large cystic lesions.[35]

4. Conclusion

The periapical lesions in the above cases were large but resolved after non- surgical therapy. Due to a good blood supply, lymphatic drainage and abundant undifferentiated mesenchymal cells, periapical lesions have an excellent potential for healing.[36]

5. Source of Funding

None.

6. Conflict of Interest

None.

References

1. Croitoru IC, Craitoiu S, Petcu CM, Mihailescu OA, Pascu RM, Bobie AG, et al. Clinical, imagistic and histopathological study of chronic apical periodontitis. *Rom J Morphol Embryol*. 2016;57(2):719–28.
2. Spangberg LSW, Haapasalo M. Rationale and efficacy of root canal medicaments and root filling materials with emphasis on treatment outcome. *Endod Top*. 2002;2(1):35–58.
3. Haapasalo M, Udnaes T, Endal U. Persistent, recurrent, and acquired infection of the root canal system post-treatment. *Endod Top*. 2003;6(1):29–56.
4. Lin LM, Huang GTJ, Rosenberg PA. Proliferation of Epithelial Cell Rests, Formation of Apical Cysts, and Regression of Apical Cysts after

Periapical Wound Healing. *J Endod*. 2007;33(8):908–16.
5. Murphy WK, Kg, Collet WK, Dodds RN. Healing of periapical radiolucencies after nonsurgical endodontic therapy. *Oral Surg Oral Med Oral Pathol*. 1991;71:620–4.
6. Sood N, Maheshwari N, Gothi R, Sood N. Treatment of Large Periapical Cyst Like Lesion: A Noninvasive Approach: A Report of Two Cases. *Int J Clin Pediatr Dent*. 2015;8(2):133–7.
7. Sjogren U, Figdor D, Persson S, Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis. *Int Endod J*. 1997;30(5):297–306.
8. Engstrom B. The significance of enterococci in root canal treatment. *Odontol Revy*. 1964;15:87–106.
9. Bystrom A, Claesson R, Sundqvist G. The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals. *Dent Traumatol*. 1985;1(5):170–5.
10. Katebzadeh N, Sigurdsson A, Trope M. Radiographic evaluation of periapical healing after obturation of infected root canals: an in vivo study. *Int Endod J*. 2000;33(1):60–6.
11. Kaste LM, Gift HC, Bhat M, Swango PA. Prevalence of Incisor Trauma in Persons 6 to 50 Years of Age: United States, 1988–1991. *J Dent Res*. 1996;75(2):696–705.
12. Andreasen JO, Andreasen FM. Classification, etiology and epidemiology of traumatic dental injuries. In: Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Munksgaard; 1993. p. 151–77.
13. Ellis GE, Davey KW. The classification and treatment of injuries to the teeth of children. Chicago: Year Book Medical; 1970.
14. Andreasen JO, Andreasen FM. Crown fractures. In: Textbook and color atlas of traumatic injuries to the teeth. Copenhagen: Munksgaard; 1993. p. 219–56.
15. Lalonde ER, Luebke RG. Acute salpingitis in sterilized women. *Oral Surg Oral Med Oral Pathol*. 1987;25:861–8.
16. Bhaskar SN. Periapical lesions-types, incidence, and clinical features. *Oral Surg Oral Med Oral Pathol*. 1966;21(5):657–71.
17. Broon NJ, Bortoluzzi EA, Bramante CM. Repair of large periapical radiolucent lesions of endodontic origin without surgical treatment. *Aust Endod J*. 2007;33(1):36–41.
18. Fernandes M, Ataide ID. Non-surgical management of a large periapical lesion using a simple aspiration technique: a case report. *Int Endod J*. 2010;43(6):536–42.
19. Soares J, Santos S, Silveira F, Nunes E. Nonsurgical treatment of extensive cyst-like periapical lesion of endodontic origin. *Int Endod J*. 2006;39(7):566–75.
20. Al-Kandari AM, Al-Quoud OA, Gnanasekhar JD. Healing of large periapical lesions following nonsurgical endodontic therapy: Case reports. *Quinttessence Int*. 1994;25:115–9.
21. Saatchi M. Healing of large periapical lesion: A non-surgical endodontic treatment approach. *Aust Endod J*. 2007;33(3):136–40.
22. Spencer HR, Ike V, Brennan PA. Review: the use of sodium hypochlorite in endodontics — potential complications and their management. *Br Dent J*. 2007;202(9):555–9.
23. Hauman CHJ, Love RM. Biocompatibility of dental materials used in contemporary endodontic therapy: a review. Part 1. Intracanal drugs and substances. *Int Endod J*. 2003;36(2):75–85.
24. Portenier I, Haapasalo H, Rye A, Waltimo T, Orstavik D, Haapasalo M, et al. Inactivation of root canal medicaments by dentine, hydroxylapatite and bovine serum albumin. *Int Endod J*. 2001;34(3):184–8.
25. Caliskan MK, Turkun M. Periapical repair and apical closure of a pulpless tooth using calcium hydroxide. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1997;84(6):683–7.
26. Saatchi M. Healing of large periapical lesion: A non-surgical endodontic treatment approach. *Aust Endod J*. 2007;33(3):136–40.
27. Fuss Z, Tsesis I, Lin S. Root resorption - diagnosis, classification and treatment choices based on stimulation factors. *Dent Traumatol*. 2003;19(4):175–82.
28. Laux M, Abbott PV, Pajarola G, Nair PNR. Apical inflammatory root resorption: a correlative radiographic and histological assessment. *Int Endod J*. 2000;33(6):483–93.
29. Frank AL. Therapy for the divergent pulpless tooth by continued apical formation. *Jam Dent Assoc*. 1966;72:87–93.
30. Pallotta RC, Machado MEL, d Reis NS, Martins GHR, Nabeshima CK. Tissue inflammatory response to implantation of calcium hydroxide and iodoform in the back of rats. *Revista Odonto Ciência (Online)*. 2010;25(1):59–64.
31. Tronstad L, Andreasen JO, Hasselgren G, Kristerson L, Riis I. pH changes in dental tissues after root canal filling with calcium hydroxide. *J Endod*. 1981;7(1):17–21.
32. Vernieks AA, Messer LB. Calcium hydroxide induced healing of periapical lesions: a study of 78 non-vital teeth. *Int Endod J*. 1978;11(2):61–9.
33. Moor RJGD, Witte AMJCD. Periapical lesions accidentally filled with calcium hydroxide. *Int Endod J*. 2002;35(11):946–58.
34. Wu MK, Sluis LWM, Wesselink PR. The capability of two hand instrumentation techniques to remove the inner layer of dentine in oval canals. *Int Endod J*. 2003;36(3):218–24.
35. Mk, Cak. Prognosis of large cyst-like periapical lesions following nonsugical root canal treatment: A clinical review. *Int Endod J*. 2004;37:408–16.
36. Harty FJ. Endodontic in Clinical Practice. Bristol, England: Wright; 1982. p. 195.

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