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Healing of Large Periapical Lesions by Non-surgical Approach - Case Reports

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Authors' contributions

This work was carried out in collaboration between both authors. Author BP carried out the clinical procedure on first case, wrote the protocol, and wrote the first draft of the manuscript. Author KD carried out clinical procedure on second patient and managed the literature searches. Both authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Introduction: Periapical lesions generally develop as a sequel to pulpal infection. When there is a large periapical tendency visible on the radiograph, clinicians tend to have a surgical approach towards treatment. However a non- surgical approach with appropriate use of intracanal medicaments should be attempted to salvage teeth. This paper demonstrates healing of large periapical lesions in two cases by non – surgical Endodontic treatment

Case Presentation: This report describes Endodontic treatment of a mandibular first molar and maxillary incisors. Calcium hydroxide in an aqueous vehicle was placed as intracanal medicament, the dressing changed every fifteen days for a period of three months. Continued follow ups demonstrated radiographic healing and the patients were asymptomatic.

Conclusion: The case reports presented in this article showed healing of large periapical lesions following endodontic treatment. Isolation with rubber dam, thorough chemo mechanical debridement of the root canal space with use of calcium hydroxide as intracanal medicament is emphasized.

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1. INTRODUCTION

One of the most common reasons for a periapical lesion to develop is pulpal disease. Microorganisms, their toxins, tissue debris, products of tissue necrosis from the pulp reach the periapical area through the foramina of the root canals initiating an inflammatory and immunelogic response. A periapical response in fact represents a protective response to the bacteria in the necrotic pulp and root canal system. If the microorganisms are virulent, the response is likely to be active otherwise chronic [1].

A sequence of immunologic mechanism is activated; some which act to primarily protect the pulp and periapical region, while others mediate tissue destruction, mainly resorption of hard tissue. Periapical immune response may be viewed as a second line of defense, mainly trying to localize the infection within the confines of the root canal system and prevent its spread and systemization [2].

Most periapical lesions can be classified as abscess, granuloma or cysts. There is no way to differentiate between cyst and granuloma except by histopathologic study of a biopsy material. Whenever endodontic treatment is performed to accepted clinical standards, a success rate of approximately 90% can be expected [3]. In the past large periapical lesions were usually treated by endodontic treatment of the involved tooth followed by surgical excision. This would be justified if the periapical lesions were truly apical cysts [4].

In recent years, better knowledge of the complexities of the root canal system, newer techniques, better instruments and materials have greatly improved clinicians abilities allowing patient to be treated by endodontic non-invasive treatment [5].

This report demonstrates considerable resolution of large periapical lesions after orthograde endodontic treatment suggesting that surgical treatment is not always necessary.

2. PRESENTATION OF CASE

2.1 Case Report

A 45 year old male patient around with a non contributory medical history was referred to the Department of Conservative dentistry and Endodontics, with severe pain associated with his lower left first molar from past 2 days. Clinical examination revealed a full metal crown prosthesis covering the tooth in question. The prosthesis was in function for more than ten years. An orthopantamograph (OPG) and a periapical radiograph was recorded and it revealed a huge periapical lesion with irregular margins associated with the same tooth (Fig. 1). Vitality testing initiated no response in the same tooth and the tooth was slightly tender to vertical percussion. It was provisionally diagnosed as a case of total pulp necrosis with chronic alveolar abcess and non-surgical endodontic treatment was advised. After obtaining an informed oral and written consent, the metal crown was removed and endodontic treatment was initiated after isolating the tooth with a rubber dam. The canal lengths were measured using apex locater (ROOT ZX: MORITA) and confirmed by radiographs. The canal orifices were widened using gates glidden drills (MANI) and the middle and apical third were instrumented using flexofiles (Denstply Maillefer). The canals were irrigated with normal saline and 3% sodium hypochlorite solution. The canals were widened to size 30 apically. The canals were dried with absorbent points and calcium hydroxide dressing was placed as intracanal medicament. The access cavity was sealed with a temporary dressing (Cavit G). At the recall visit after 7 days the patient was asymptomatic. The patient was then recalled regularly for a period of 3 months. The calcium hydroxide was changed every fifteen days. After three months the master cones were selected and the canals were obturated with gutta percha cones and AH plus (Dentsply) sealer using lateral condensation technique. A radiograph was taken to evaluate the obturation (Fig. 2). The patient was recalled after fifteen days and was asymptomatic. Regular recalls at three months, six months and twelve months showed reducing size of the lesion and positive evidence of periradicular healing (Fig. 3).

2.2 Case Report 2

A 55 year old female patient with a non contributory medical history reported to the Department of Conservative dentistry and Endodontics, with pulsating pain and a mild swelling in her upper right incisors from the past three days. Clinical examination revealed a discolored maxillary right central incisor. She related to a trauma fifteen years back and was

asymptomatic till present. A radiographic examination revealed a huge periapical lesion with irregular margin associated with maxillary right central incisor and lateral incisor (Fig. 4).

Fig. 1. OPG pre operative

Fig. 2. Obturation

Fig. 3. Post operative after 12 months

Vitality testing with dry ice (R C ice, Prime Dental) showed no response in central incisor and a delayed response in lateral. A provisional diagnosis of total pulp necrosis with chronic alveolar abcess was made and hence it was decided to carry out multi visit endodontic treatment in both the incisors. After administering 2% lidocaine the teeth were isolated with rubber dam. An access cavity was prepared in both the teeth. The canal lengths were measured with an apex locater (ROOT ZX: MORITA) and confirmed by radiographs. Biomechanical preparation was performed by crown down technique using gates glidden drills (Mani) in cervical thirds. The middle and apical third was instrumented using flexofiles (Denstply, Maillefer). Irrigation was carried out using normal saline and 3% sodium hypochlorite solution. As in the earlier case after drying the canals an intracanal dressing of calcium hydroxide was placed and the access opening sealed with a temporary dressing (Cavit G). The patient was asymptomatic thereafter and was regularly recalled for a period of 3 months with a change of calcium hydroxide every fifteen days. After three months it was decided to go ahead with the obturation. The master cone was selected and lateral condensation technique using AH plus sealer was followed to obturate the canals. A radiograph was taken to evaluate the obturation (Fig. 5) and the patient was recalled after a week. The patient was found to be asymptomatic and a permanent resin composite restoration was done followed by full coverage crowns. At 6 months recall appointment, the patient was asymptomatic and reduced size of lesion suggestive of periapical healing (Fig. 6).

Fig. 4. Pre-operative radiograph

Fig. 5. Obturation

Fig. 6. Post operative after 6 months

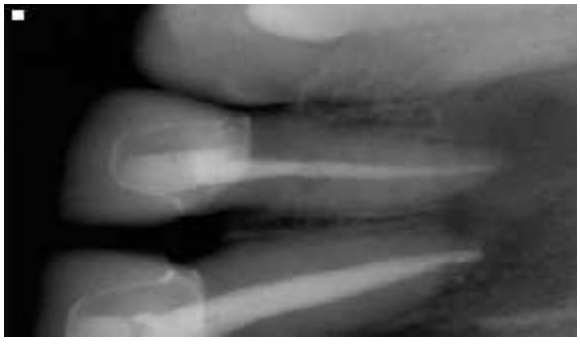

Fig. 7. Post operative after 15 months

3. DISCUSSION

The precise pathologic mechanism involved in the formation of periapical lesions is still unclear. However, it is generally agreed that once the pulp becomes necrotic, it becomes an unprotected environment favourable for colonization of numerous microorganisms that inhabit the oral cavity. These microorganisms and their toxins enter the periapical tissue. The response of host defense against microorganisms and their toxins causes various histologic and clinical images such as acute and chronic periapical infection, chronic suppurative periapical inflammation, acute periapical abcess/ cellultitis, periapical oeteomyelitis, granuloma and cyst [5,6].

Periapical lesion of endodontic origin may develop asymptomatically and become large. Treatment options for large periapical lesions vary from nonsurgical conventional endodontic treatment with or without periapical surgery to extraction. However the current philosophy in treatment of large periapical lesions is adequate cleaning and shaping followed by calcium hydroxide medication reviewing periodically over a period of time [7].

Calcium hydroxide has been used in dentistry for almost a century. Its use in endodontics as an intracanal medicament has been associated with periradicular healing and few adverse reactions. The exact mechanism of calcium hydroxide is still doubtful however its use beyond the apex has resulted in successful nonsurgical management of many large periapical lesions [8-13]. Souza [8] suggested that the action of calcium hydroxide beyond the apex may be four fold (1) anti-inflammatory activity (2) neutralization of acid products (3) activation of the alkaline phosphatase and (4) anti bacterial action. Treatment with calcium hydroxide resulted in a higher frequency of periapical healing especially in young patients.

Although the overall mechanism of action of calcium hydroxide is not fully understood, its antimicrobial activity is influenced by its speed of dissociation into calcium and hydroxyl ions in a high pH environment which inhibits enzymatic activities that are essential to microbial life, that is, metabolism, growth, and cellular division. Ca(OH)2 is often used to effect periapical healing by combination of its antimicrobial activity and its ability to promote hard tissue formation and periodontal healing [14].

A series of studies by Seltzer, Soltanoff and Bender showed that pulpo-periapical lesions have the potential for healing without surgical intervention [15,16]. Caliskan & Sen reported a high frequency of periapical healing with complete resolution of periapical defect after treatment with calcium hydroxide [13]. They even stated that lesions over 5mm in diameter showed a higher rate of complete healing when the calcium hydroxide paste extruded out of the canal. Also, intentional extrusion of calcium hydroxide paste has been advocated in non surgical treatment of extra oral sinus tracts from which anaerobic bacteria were isolated and associated with symptomatic apical periodontitis [17]. Successful treatment of large periapical lesion with calcium hydroxide have been demonstrated by Cvek, Heithersay, Messer and Stock [18]. Ghose et al. [19] have advocated that direct contact between the calcium hydroxide and periapical tissue is beneficial for osseoinductive reasons.

Torabinejad et al. [20] during comparison of two retreatment techniques (surgical and nonsurgical) showed a significantly higher success rate for endodontic surgery (77.8%) at 2-4 years in comparison to non surgical endodontics (71.9%), and an equally significant role reversal at 4-6 years, with non surgical retreatment showing a much higher success rate of 83% compared to surgical results (71.8%). Non-surgical endodontics showed a significant rise in success with time, whereas endodontic surgery showed an obvious decline (to 62.9% at 6 years and above) [21]. Calcium hydroxide has been for long associated with periapical healing. However, its long-term use has shown to affect the fracture strength of teeth. Rosenberg et al. [22] studied the micro tensile fracture strength wherein teeth were treated with Calcium hydroxide at intervals of 7, 28 and 84 days. Calcium hydroxide significantly reduced micro tensile fracture strength after 84 days. Yassen and Platt systematically reviewed the effect of non-setting Calcium Hydroxide on fracture strength and mechanical properties of root dentine. They concluded that the majority of in vitro studies showed reduction in the mechanical properties of radicular dentine after exposure to Calcium hydroxide for 5 weeks or longer [23].

4. CONCLUSION

The case reports presented in this article showed healing of large periapical lesions following endodontic treatment. Isolation with rubber dam, thorough chemo mechanical debridement of the root canal space with use of calcium hydroxide as intracanal medicament is emphasized. It is recommended to monitor radiographically the prognosis of a large periapical lesion following an orthograde endodontic therapy before the decision of performing a periapical surgery is contemplated.

CONSENT

All authors declare that written informed consent was obtained from the patients for publication of this case report and accompanying images.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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