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Successful Non Surgical Management of Large Periapical Abscess: A Case Report

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Abstract

Microbial invasion and subsequent infection of the root canal systems play a decisive role in the initiation and progression of periapical lesions, which are the common pathological conditions affecting periradicular tissues. A well planned and executed access, biomechanical preparation of root canal system followed by three-dimensional obturation contributes to successful treatment outcomes. The complete elimination of microorganisms and their by-products from within the canal system and preventing reinfection are of utmost importance in the management of periapical pathology of endodontic origin. The primary objective of endodontic therapy should be to restore involved teeth to a state of normalcy using nonsurgical management techniques. All inflammatory periapical lesions should be initially treated with conservative procedures. When radicular infections are persistent and the periapical pathology fails to resolve after nonsurgical endodontic management protocols, only then a surgical option should be consideredIn the present case, endodontic therapy using chlorhexidine, copiously as a canal disinfectant and calcium hydroxide as an antibacterial dressing has been reported to be successful in healing the large periapical lesion.

Keywords: calcium hydroxide, chlorhexidine, conservative endodontics, healing, non surgical management, periapical.

Introduction

Bacterial infection of the dental pulp may lead to periapical lesions which are generally diagnosed either

during routine dental radiographic examination or following acute dental pain.1,2 Most periapical lesions (>90%) can be classified as dental granulomas, radicular cysts or abscesses.3,4 The incidence of cysts within periapical lesions varies between 6 and 55%.5 The occurrence of periapical granulomas ranges between 9.3 and 87.1% and of abscesses between 28.7 and 70.07%.6

The ultimate goal of endodontic therapy should be to return the involved teeth to a state of health and function without surgical intervention.7 All inflammatory periapical lesions should be initially treated with conservative nonsurgical procedures.8 Surgical intervention is recommended only after nonsurgical techniques have not been successful.9

Various studies have reported a success rate of up to 85% after endodontic treatment of teeth with periapical lesions.10-12 A high percentage of 94.4% of complete and partial healing of periapical lesions following nonsurgical endodontic therapy has also been reported.13

This implies that most periapical lesions including abscess respond to endodontic therapy alone.14 This is explained by the effect of biomechanical preparation on intracanal microbiota, enzymatic and immunological mechanisms involving neutralization of antigenic toxins and breakdown of epithelial lining with involvement of macrophages, non-killer T lymphocytes and langerhans cell. Therefore, conventional endodontics should be the first line of treatment.15.

Case Description

A 34 year old male patient reported to the Department of Conservative Dentistry and Endodontics, with the chief complaint of swelling and difficulty in mastication in right lower front region of mouth (Fig. 1).

Fig.1: Abscess seen intraorally

The swelling was present since 15 days. Intraoral examination revealed generalized attrition w.r.t. lower anteriors. Intraoral periapical radiograph revealed periapical radiolucency w.r.t. 31, 41, 42, 43. There was absence of any sinus tracts and no tenderness to percussion. Cold test (roeko Endo-Frost, Coltene Whaledent) and EPT (Gentle Pulse Analog Pulp Tester, Parkell) showed negative response w.r.t. 31, 41, 42, 43. Based on the findings, diagnosis of pulpal necrosis with asymptomatic apical periodontitis was made. Customary endodontic therapy was planned for the same.

Emergency treatment included drainage of the abscess and access openings w.r.t. 31, 41, 42, 43. Working length was established by electronic apex locator (Root ZX mini, J Morita,Tokyo, Japan). Bio mechanical preparation was performed using ProTaper File system (Dentsply-Maillefer, Ballaigues, Switzerland) using crown down technique. A 2.5% solution of sodium hypochlorite and 17% EDTA were used alternatively as irrigants at every change of instrument. The canals were thoroughly irrigated with 2% chlorhexidine (CHX) and closed dressing was given.

During second visit, intraoral healing was observed (Fig. 2) and canals were again irrigated with CHX. This was followed by intracanal $Ca(OH)_2$ placement and the patient was discharged.

Fig.2: During second visit: Gradual healing observed

After one week, during third visit, complete healing was observed intraorally (Fig. 3).

Fig.3: During third visit: Complete healing observed

Master cone radiograph was taken (Fig. 4) and obturation was done (Fig. 5).

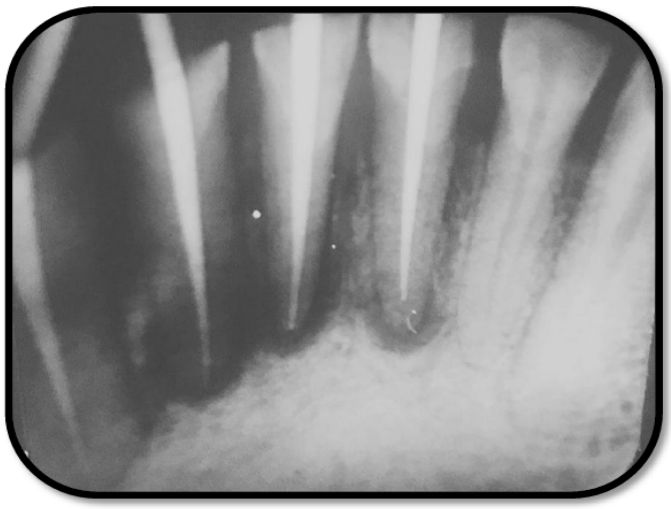

Fig.4: Master cone radiograph

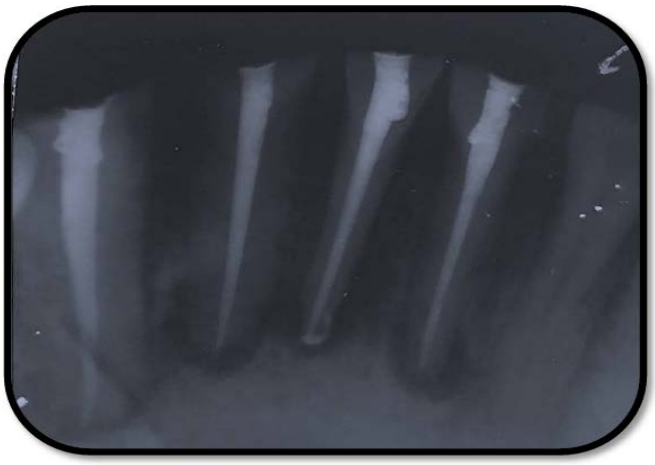

Fig.5: Obturation

Seven months follow-up showed complete healing of the periapical lesion with formation of trabecular bone (Fig. 6).

Fig.6: Seven months follow-up

Discussion

The preliminary diagnosis of a chronic periapical lesion is based on clinical symptoms and subsequent radiological investigations. A histological examination of the lesion is done to confirm the exact nature of the lesion.16

All inflammatory periapical lesions should be initially treated with conservative nonsurgical management techniques. This includes conservative root canal therapy, method using calcium hydroxide, aspiration-irrigation technique, decompression technique, lesion sterilization and repair therapy, active nonsurgical decompression technique, apexum procedure and use of injectable scaffolds. Periodic monitoring of healing process of the periapical lesion post nonsurgical management is mandatory. The selection of the nonsurgical methodology should be based on the type of the periapical lesion present.17

Based on conservative endodontic treatment there are various intracanal medicaments like calcium hydroxide, antibiotics, steroids, etc. for the management of periapical abscess whereas calcium hydroxide based intracanal medicaments are considered as the gold standard.18

According to Siqueira and Lopes (1999)19, the antimicrobial activity of $Ca(OH)_2$ is dependent on the release of hydroxyl ions in an aqueous environment. Hydroxyl ions are highly oxidant free radicals that cause damage to the bacterial cytoplasmic membrane, denaturation of proteins or damage to the DNA.

In the present case, canals were copiously irrigated with 2% CHX and intracanal dressing of $Ca(OH)_2$ was placed. It is suggested that if calcium hydroxide is confined to the root canal, it is possible that the inflammation created by the diffusion of the calcium hydroxide through the apical foramen may be sufficient to cause break-up of the abscessic epithelial lining, thereby allowing a connective tissue invagination into the lesion with ultimate healing. This suggested that the action of calcium hydroxide beyond the apex may be fourfold: (i) anti-inflammatory activity; (ii) neutralization of acid products; (iii) activation of the alkaline phosphatase, (iv) antibacterial action.20

Efficacy of CHX is due to the interaction of positively charged molecule and negatively charged phosphate groups on the microbial cell walls, thereby altering the cells' osmotic equilibrium. This increases the permeability of the cell wall, which allows the CHX molecule to penetrate into the bacteria. CHX at lower concentration (0.2%), is bacteriostatic causing leak out of low molecular weight substances specifically potassium and phosphorous. On the other hand, at higher concentration (2%), CHX is bactericidal causing precipitation of cytoplasmic contents resulting in cell death.21

The rationale for the combined use of $Ca(OH)_2$ and 2% CHX was to provide an intracanal dressing that is more effective against drug resistance micro-organisms such as Enterococcus faecalis and Candida albicans, which are often present in persistent periapical lesions of endodontic origin.

Cook et al. (2007)22 showed that 2% CHX treatment followed by canal filling was more effective in removing the DNA of E. faecalis than placement of $Ca(OH)_2$ or immediate canal filling.

Oztan MD (2002)23 found that root canal treatment proved successful in promoting healing of a large periapical lesion with inter-appointment calcium hydroxide dressing.

Evans MD et al. (2003)24 found that calcium hydroxide paste with 2% chlorhexidine was significantly more effective at killing E. faecalis in the dentinal tubules than calcium hydroxide with saline.

Al-Nazhan and Al-Obaida (2008)25 showed that growth of C. albicans was completely inhibited when exposed to 2% CHX alone or when mixed with calcium hydroxide.

CHX is a broad-spectrum antimicrobial agent that has been reported to be an effective antiseptic in endodontic therapy owing to its unique ability to bind to dentin and its substantivity in the root canal system. It is also effective against strains resistant to calcium hydroxide.

Conclusion

A nonsurgical approach should always be adopted before resorting to surgery. The decompression and aspiration–irrigation techniques can be used when there is drainage of cystic fluid from the canals as they decrease the hydrostatic pressure within the periapical lesions. When there is no drainage of fluid from the canals, $Ca(OH)_2$ can prove beneficial and along with CHX has synergistic action to combat periapical lesion, as reported in this case. $Ca(OH)_2$ and CHX together in endodontics also proves to be a cost effective option in treating such lesions. Periodic follow-up examinations are essential to monitor the periapical lesions.

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