MANAGEMENT OF LARGE PERIAPICAL LESIONS BY NON SURGICAL ENDODONTIC APPROACH - TWO CASE REPORTS

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ABSTRACT

Aim: To report two cases of conservative nonsurgical management of periapical lesion of odontogenic cause.

Background: Small periapical lesions of endodontic origin usually heal by conventional endodontic therapy alone. Earlier larger periapical lesions are treated by surgical intervention for complete cure, but nowadays conservative nonsurgical management of such lesions are preferred as it eliminates the possible complications of surgery and has wider patient compliance and acceptance.

Case description: In the first case, a periapical cystic lesion associated with mandibular left central incisor and in the second case, large periapical lesion (> 4mm) in relation to right maxillary lateral incisor and canine were treated conservatively by conventional endodontic therapy employing calcium hydroxide iodoform paste as intracanal medicament.

Clinical significance: These treatments were successful as evidenced by relief of symptoms and radiographic evaluation.

Conclusion: Large periapical lesions can resolve by nonsurgical endodontic therapy employing calcium hydroxide intracanal inter appointment medicament.

Keywords: Periapical lesions, Non surgical management, Calcium hydroxide.

I. INTRODUCTION

Periapical lesions occur as a result of bacterial infection of dental pulp.[1,2] Most periapical lesions occur as a direct sequelae of chronic apical periodontitis, usually after pulpal necrosis of tooth. They are generally diagnosed either by routine dental radiograph or following an acute pain in a tooth.[2,3] Most periapical lesions can be broadly categorized into granulomas, radicular cysts and abscesses. [4,5] Clinically it is proved that as the periapical lesions increase in size, the proportion of the radicular cysts increases. However, some large lesions have been shown to be granulomas.[6] Eversole [7] has described few criteria for clinical diagnosis of periapical cystic lesions which include (a) the periapical lesion is involved with one or more non vital tooth, (b) the lesion is greater than 200 sq.mm in size, (c) the lesion is seen radiographically as a circumscribed, well-defined radiolucent area bound by a thin radiopaque line and (d) it produces a straw-colored fluid upon aspiration or as drainage through an accessed root canal system.

The ultimate goal of endodontic therapy is to return the involved teeth to a healthy and functional state without surgical intervention.[8] All inflammatory periapical lesions of endodontic origin should be initially treated with conservative nonsurgical procedures.[9] If conventional endodontic therapy fails then only one should think for the
surgical procedures. [10] Different studies have shown a success rate up to 85% for nonsurgical endodontic therapy in management of periapical lesions. [11-13]

Previously, surgical intervention was the first choice for treating periapical lesions of endodontic origin, particularly when they were large in size. Even today, surgery is sometimes the preferred mode of treatment among many endodontists and general practitioners, particularly when resolution of the periapical lesion is delayed. However, advancements of scientific knowledge on the genesis, pathologic nature and clinical behavior of endodontic periapical lesions and their successful treatment in various clinical trials have started favoring non-surgical approach.[14]

Seltzer, Soltanoff and Bender [15] observed in a series of studies, that pulpo-periapical lesions have the potential for healing without surgical intervention. Cvek, Heithersay, Messer and Stock [16] have demonstrated that by using calcium hydroxide as an interim dressing large periradicular lesion can be successfully managed. Following are two cases where large periapical lesion were treated non surgically.

II. CASE REPORT-1

A 23 year old female patient had come to the Department of Conservative Dentistry and Endodontics of Guru Nanak Institute of Dental Sciences and Research, with a complain of pain and swelling in the lower anterior teeth region. On examination, it was observed that periapical sinus was present in relation to 31, and 31 was tender on percussion. IOPA radiograph showed large periapical radiolucency (> 4mm) in relation to 31. Vitality test (heat test) was done on 31, 32 and 41 was vital.

Patient was asthmatic, so during entire treatment procedure, rubber dam isolation was not done.

Access cavity was prepared and working length was determined.

Canals were cleaned and shaped using K-Files by conventional method. 2.6% sodium hypochlorite was used as the intracanal irrigant. The files were liberally coated with RC-Prep (EDTA) throughout instrumentation. The canal was enlarged to an apical size of ISO #40, step back was done upto size #55.

Calcium hydroxide dressing (Metapex) was placed in the canal as the intracanal medicament, and access cavity was closed with cavit. Patient was recalled after 3 weeks later and received a fresh dressing of calcium hydroxide (Metapex), following thorough irrigation and drying of the canal. This procedure was repeated again after 3 weeks. In the fourth visit, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to ISO #40 size. The obturation was completed by lateral condensation technique using gutta-percha and AH Plus sealer.

The access cavity restoration was done with light cure composite resin.

The patient was again recalled after 3 weeks and IOPA radiograph was taken. IOPA radiograph revealed the complete resolution of periapical lesion.

Total 12 weeks were taken for complete resolution of the lesion.
III. CASE REPORT -2

A 23 year old female patient had come to the Department of Conservative Dentistry and Endodontics of Guru Nanak Institute of Dental Sciences and Research, with a complain of discoloured tooth and loosely fitted crown in the upper anterior teeth region. On examination, it was observed that periapical sinus was present in relation to 22. 22 and 23 was tender on percussion. 23 was discoloured. IOPA radiograph showed 22 was endodontically treated and large periapical radiolucency ( > 4mm) in relation to 22 and 23. Vitality test (heat test) was done on 23, 23 were non vital.

Re treatment was advised in 22 and root canal treatment in 23.

Access cavity was prepared in 23 and working length was determined. Canals were cleaned and shaped using K-Files by conventional method. 2.6% sodium hypochlorite was used as the intracanal irrigant. The files were liberally coated with RC-Prep (EDTA) throughout instrumentation. The canal was enlarged to an apical size of ISO #45, step back was done upto size #60. Calcium hydroxide dressing (Metapex) was placed in the canal as the intracanal medicament, and access cavity was closed with cavit. Then retreatment of 22 was started with the removal of gutta percha. Working length was determined in 22. Canal was cleaned and shaped using K-Files by conventional method. 2.6% sodium hypochlorite was used as the intracanal irrigant. The canal was enlarged to an apical size of ISO #40, step back was done upto size #55.

Calcium hydroxide dressing (Metapex) was placed in the canal as the intracanal medicament in 22, and access cavity was closed with cavit. Patient was recalled after 3 weeks later and received a fresh dressing of calcium hydroxide.
(Metapex) in both 22 and 23, following thorough irrigation and drying of the canal. This procedure was repeated again after 3 weeks. In the fourth visit, the canals were cleaned and dried using paper points. Master cone selection was done corresponding to ISO #40 and # 45 size. The obturation was completed by lateral condensation technique using gutta-percha and AH Plus sealer.

The access cavity restoration was done with light cure composite resin in 23 and with Glass ionomer cement in 22. The patient was again recalled after 3 weeks and IOPA radiograph was taken. IOPA radiograph revealed the complete resolution of periapical lesion.

Then post endodontic treatment was done in 22, post space was prepared for custom cast post, then cast post was cemented and metal fused to ceramic crown was luted in 22 and in 23 metal fused to ceramic crown was luted. Total 12 weeks for complete resolution of the lesion.

Fig-1: Working length determination of 23 and periapical radiolucency around 22 and 23

Fig-2: Metapex placed in 23

Fig-3: Gutta Percha removed and working length determined in 22

Fig-4: Metapex placed in 22

Fig-5: Obturation done in 23 and metapex removed from 22

Fig-6: Redetermination of working length in 22
IV. DISCUSSION

Periradicular lesions are usually endodontic in origin. Bacteria and bacterial by-products within the root canal and its ramifications bring out the inflammatory response in the periradicular tissue. The microbial cause of cyst-like periapical lesions or inflammatory apical true cysts can be effectively reduced by proper cleansing and disinfection of the root canal system.[17]

Treatment options to treat large periapical lesions range from non-surgical root canal treatment and/or apical curettage to extraction. Nonsurgical management of periapical lesions should be preferred in comparison to surgical methods in all cases. Possible damage to adjacent vital teeth, damage to anatomic structures in the vicinity of the lesion, pain and discomfort associated with surgical procedures can be eliminated by nonsurgical methods. Patient acceptance and apprehension towards the surgical procedure, age and medical conditions are the limitations of surgical procedures and these factors favour the nonsurgical approach.[17] When non surgical treatment is not successful in resolving the periradicular pathosis, additional treatment in the form of surgical intervention (curettage with root end filling) is used.

Different methods are used to manage the periapical lesion - Conservative root canal treatment without adjunctive therapy, Decompression technique, Active nonsurgical decompression technique, Aspiration and irrigation technique, Use of intracanal medicaments, Lesion sterilization and repair therapy (triple antibiotic paste of ciprofloxacin, metronidazole, and minocycline), Apexum procedure. Other than all these conventional methods, nowadays some new materials are also tried for the treatment of periapical lesions – Simvastatin, Epigallocatechin-3-gallate etc.[2]

Recent studies have shown that the application of intracanal medicaments prior to the completion of endodontic therapy may produce highly favorable results when followed by conventional therapy, even when the periapical area is very large. The use of chlorhexidine gluconate and calcium hydroxide is good for infection control - causes substantial healing of a large periapical lesion.[18] Periodic application and renewal of calcium hydroxide over a year’s time (four applications over a 12-month period), has been shown to represent a nonsurgical approach to resolving even extensive inflammatory periapical lesions[19].

A disadvantage of the triple antibiotic paste is tooth discoloration which is induced by minocycline. Cefaclor and fosfomycin are proposed as possible alternatives for minocycline, in terms of their antibiotic effectiveness, but further clinical studies are needed to demonstrate their efficacy in the root canal.[2,20] The antibiotic paste may cause bacterial resistance.[21,22,23]
Simvastin and EGCG are the materials under research, they are not widely used for treating periapical lesion in our day to day practice.[2]

In the present cases, we have used K files for biomechanical preparation for better preparation of apical 1/3 rd of the root canal. According to Chow TW (1983) Irrigants are unable to reach the apical portion of the root if the canal is not enlarged to a size #35 or #40 file.[24,25,26] According to Orstavik D et al. (1991) the larger preparation sizes have been shown to provide adequate irrigation and debris removal as well as significantly decreasing the number of microorganisms.[27,28,29,30] Thus there appears to be a relationship between increasing the size of the apical preparation and canal cleanliness and bacterial reduction till a limit. Instrumentation techniques that advocate minimal apical preparation may be ineffective at achieving the goal of cleaning and disinfecting the root canal space.[31,32]

In the present cases, we have used calcium hydroxide (metapex) as intra canal medicaments as it is easily available and most commonly used intracanal medicaments and it has been used since long and its effect has been well tested.

In Case 1, a large periapical lesion was present in relation to 31, and in Case 2, large periapical lesion was present in relation to 22 and 23, after access cavity preparation biomechanical preparation was done with 2.6% NaOCl and calcium hydroxide (Metapex) was used as the intracanal medicament. Metapex, a silicone oil-based calcium hydroxide paste containing 38% iodoform is very popular.[33] Metapex contains radiopaque component barium sulfate which can help to control the deposition of material when seen radiographically. Iodoform is incorporated to improve the antibacterial properties of the material. Silicone oil acts as a vehicle.[33] Calcium hydroxide is widely used as an intracanal endodontic material due to its high alkalinity (Tronstad et al.1981),[34] tissue dissolving effect. Calcium hydroxide causes induction of repair by hard tissue formation and bactericidal effect (Sjogren et al. 1991, Siqueira & Lopes 1999).[29,35] The antibacterial actions of Calcium hydroxide is due to its effect on bacterial cytoplasmic membranes, protein denaturation, damage to DNA, carbon dioxide absorption, its action on lipopolysaccharides and its hygroscopic action forming calcium-proteinate bridges, phospholipase inhibition, neutralization of acidic products, activation of alkaline phosphatase and antibacterial action.[35] The placement of intracanal calcium hydroxide in presence of large periapical lesions -have a direct effect on inflamed tissue and epithelial cystic linings and in this manner it would favour periapical healing and encourage osseous repair (Tronstad et al.1981). Significant bone formation was seen at the periapical region on periodic recall visits.

In the present cases, obturations were done after 9 weeks, within this period, the teeth were symptom-free and the root canals were dry and a continuous decrease in the size of the periapical radioluencies was observed. Some authors have recommended obturation of the canals before healing of periapical pathology, whereas others prefer to wait till the periapical pathology has healed.[36,37]

The efficacy of calcium hydroxide depends on the sustained release of calcium and hydroxyl ions to the root canal system and periapex. As they are progressively resorbed by the periapical fluids, regular renewal of the canal dressing is fundamental in decreasing the intensity of the periapical inflammatory process.[38] For a more predictable result in large periapical lesions, the calcium hydroxide would have to be changed routinely at the first follow-up visit after 6 weeks.[39] Webber suggested that the calcium hydroxide dressings should be changed as often as necessary. If the patient redevelops a sinus tract and/or symptoms in the early months of treatment, then the dressing needs to be changed.[39] Once the active infection subsides, the body’s natural defense mechanisms start acting and bring about the healing of the periapical pathology.[37]

In these two cases, the reduction in size and almost total disappearance of periapical radiolucancy confirmed the role of Calcium hydroxide. Long term follow up is needed for a period of 5 years or more.

V. CONCLUSION

With proper case selection and proper root canal preparation, disinfection, irrigation and intracanal medicaments- endodontic surgeries are slowly reducing in number (if patients have time in their side).
The two cases reported in this article showed excellent healing of large periapical lesion achieved through a non surgical approach. Emphasis was laid on thorough debridement, disinfection, Calcium hydroxide as the intracanal medicaments and three dimensional obturation of the root canal system.

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