

**CLINICAL AND RADIOLOGICAL EVALUATION OF NON-SURGICAL
MANAGEMENT OF NON-VITAL TEETH WITH PERIAPICAL PATHOSIS BY
CONVENTIONAL ROOT CANAL TREATMENT: A STUDY IN SHAH ALI DENTAL
CLINIC, DHAKA, BANGLADESH**

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Abstract

Background: In most cases the etiological factors of periapical diseases are oral contaminants through the root canal or degenerative pulpal tissues. Infections of the dental pulp occur as consequence of dental caries, operative dental procedures, trauma, and involve a mixed, predominantly gram-negative, anaerobic micro-organisms. Therefore the mere surgical removal of the periapical lesions without proper root canal disinfection and obturation will not result in the healing of the periapical tissues. So successful management and repair of periapical pathosis depends on complete debridement of the root canal system, followed by three-dimensional obturation to seal both the apical foramen and coronal orifice.

Objectives: To find out clinical and radiological evaluation of non-surgical management of non-vital teeth with periapical pathosis by conventional root canal treatment.

Methods: A total number of 50 infected teeth with periapical lesions were treated by conventional root canal treatment. This Experimental study was carried out for a period of 12 months from January 2019 to December 2019 in Shah Ali Dental Clinic, Dhaka, Bangladesh. Irritants from the root canal system was removed by mechanical instrumentation (Crown down Technique), chemical irrigation with Naocl and by using Calcium Hydroxide as intra-canal medicaments and fluid tight obturation both apically and coronally resulting repairs of inflamed periapical tissues. Depending on the extension of tissue damage repair varies from a simple reduction and resolution of the inflammation to a more complex regeneration involving remodeling of bone, periodontal membrane and cementum.

Results: This study present 1 years clinical and radiological follows up period. Among 50 cases 40 cases could be treated as acceptable as their responses were good both clinically and radiologically and 7 patients came back with some complications among them 5 cases were uncertain and 2 cases were unacceptable.

Conclusion: This study suggests that conventional root canal treatment is an effective procedure for saving teeth with periapical pathosis.

Keywords: Non-Vital Teeth, Non-Surgical Management, Radiological Evaluation, Clinical Evaluation.

I. Introduction

Infections of the dental pulp occur as consequence of caries, operative dental procedures, trauma, and involve a mixed, predominantly gram-negative, anaerobic bacterial flora¹. When the pulp become necrotic its environments become suitable to allow micro-organisms to multiply and release various toxins into the periapical tissues, initiating an inflammatory reaction and leading to the formation of an periapical lesion². Several studies have been carried out to examine the role of bacteria in the formation of periapical lesions^{3,4,5}. Immunopathologic mechanisms also play a role in the initiation of periapical lesions.^{6,7} The prostaglandin and the inflammatory cytokines can activate osteoclasts, culminating in bone resorption. Radiographically these lesions appear as radiolucent areas around the portal of exit of the main canal or lateral or accessory canals. Histologically the lesion consists predominantly of granulation tissue, many fibroblast, connective tissue fibres, an inflammatory infiltrate and often a connective tissue encapsulation. This tissue, replacing the periodontal ligament, apical bone and sometimes the root cementum and dentine is infiltrated by plasma cells, lymphocytes, mononuclear phagocytes and occasional neutrophils. Occasionally cholesterol clefting is seen as are foreign-body giant cell⁸. Most periapical lesions (90%) can be classified as dental granulomas, radicular cyst or abscess⁹. It is generally accepted that periapical lesions cannot be differentially diagnosed as either radicular cyst or apical granuloma based on radiographic evidence alone.^{10,11} If the lesion is separated from the apex and with an intact

epithelial lining (apical true cyst), it may have developed into self-perpetuating entity that may not heal when treated non-surgically.^{12,13} Cystic lesion having a direct communication with the root canal system (apical pocket cyst or bay cyst) respond favorably to non-surgical treatment¹⁴. Several studies have confirmed that nonsurgical endodontic treatment with proper infection control can promote healing of large periapical lesions.^{15,16} In the past, large periapical lesions were treated by extraction or by surgical means (apicectomy)¹⁷. This was particularly true if the periapical lesion was suspected to be an apical true cyst. But by the development of endodontics teeth having periapical pathosis even large lesion or extra oral sinus can be treated successfully by non-surgical conventional root canal therapy. Successful treatment depends on effective removal of the irritants (inflamed or necrotic tissue) from the root canal system, followed by fluid tight seal of the apical foramen, total obliteration of the root canal system, so healing and repair can take place^{18,19}. The healing of periapical tissue after root canal treatment is often associated with granulation tissue formation and maturation.²⁰ The granulation tissue is infiltrated by neutrophils, lymphocytes and plasma cells, which are responsible for removal endogenous and exogenous irritants, followed by fibroblastic proliferation and collagen deposition. On the periphery of the granulation tissue, osteoblasts and osteoclast abound. With maturation, the number of cells decreases, where as collagen increases. Ultimately matured bone form from the periphery towards the centre.²¹ A variation of the abscess, sinus tract (intra oral and extra

oral) will heal following root canal treatment²². As the aim of root canal treatment is the elimination of infectious agents from the root canal and prevention of re-infection by obturation, a periapical pocket cyst is therefore, likely to heal after conventional endodontic treatment²³. In fact, most of the cases in which apical surgery have been performed based on radiographic diagnosis of the presence of cysts might have resolved by conventional root canal therapy.

Objective

To find out Clinical and Radiological Evaluation of non-surgical management of Non-Vital Teeth with periapical pathosis by Conventional Root Canal Treatment.

Materials and Methods

This Experimental study was carried out for a period of 12 months from July 2018 to June 2019 in Shah Ali Dental Clinic, Dhaka, Bangladesh. Fifty (50) patients of endodontically involved infected teeth with periapical pathosis irrespective of age, sex and teeth numbers who fulfill the inclusion criteria and gave consent in the study were selected in the study. Inclusion criteria of the patients were any age of male & female, non-vital tooth with periapical lesion (radiolucency, spontaneous pain, tender to percussion, intraoral swelling with or without discharging sinus, non-vital tooth with periapical radiolucency and endodontically treated failed tooth. Exclusion criteria were tooth with perforated palpal floor, radiographic evidence of excessive internal or external root resorption, excessive bone loss in the furcation area, non-restorable tooth having grade III mobility.

All the patients were examined thoroughly and proper history taking. Detailed clinical radiological examination and pulp vitality test

were done to confirm the diagnosis. Patients symptoms, clinical signs and radiographic evidence of periapical lesion before treatment were recorded. The presence of periapical lesion was determined by examination of X-ray with standard magnification. After isolation of the tooth a straight line access cavity was prepared and necrotic pulp was removed with barbed broach and 5.25% sodiumhypo- chloride solution. Root canal system was prepared by crown down pressure less technique and irrigated was done with 2.25% sodium hypochloride solution and normal saline alternatively and dried with paper point. Calcium hydroxide paste was placed into the root canal as intra-canal medicament followed by temporary restoration. After sub-siding the clinical manifestation, the canal was re-opened and irrigated with 2.25% Naocl and normal saline than dried with paper point and finally obturated with GP point and calcium hydroxide based sealer (Sealapex) and restored with light cured composite. All cases were evaluated after completion of treatment at 3 months, 6 months and 12 months by maintaining a standard follow-up chart. Results of the investigations were recorded and analyzed. Success, failure and doubtful were considered on evaluation criteria. A case was evaluated successful clinically by absence of pain, no tenderness no percussion and disappearance of swelling, sinus tract. Radio logically success was evaluated by disappearance or reduction of periapical lesion. On the other hand clinically failure was determined when there was no remission of pain, tenderness to percussion, swelling and sinus tract. Radio logically failure was evaluated when there was increase in size of periapical lesion. A case was evaluated doubtful when all other sign symptoms

disappeared but size of radiolucency in radiograph was same.

Results

Total 50 non-vital endodontically involved teeth with periapical pathosis were subjected to the present study. Among these all of the patients 100% were presenting mild or moderate pain and tenderness to percussion. However, out of 50 study patients swelling and sinus was found in 18 (36%) and 7(14%) patients respectively (Table-1). Table 2 shows the radiologically presentation of the study patients and ascertained that, Periapical radiolucency was present in all the patients. Table 3 shows the clinical follow-up from the study patients after 3 months, 6 months and 12 months and observed that out of 50 study patients 50, 48 and 47 of the study patients were present throughout 3rd, 6th and 12th months follow-up respectively. Pain and tenderness to percussion was observed in 6 patients after 3 months follow up and in 4 & 2

patients after 6 and 12 months follow-up period. Presence of swelling was not observed during 3rd, 6th 12th months follow-up. Sinus was observed in 2 patients during 3rd, and 6th months follow-up and 1 patient in 12th months follow-up period. (Table 4): shows the Periapical radiolucency and found that 50 teeth (100%) had periapical radiolucency during pre-operative period. After 3 months of root canal therapy periapical lesion remain increased in 4 (8%), same in 26 (52%), decreased in 20 (40%) and absent 0 (0.0%) cases. After 6 months the lesion remain increase in 2 (4.2%), same in 10(20.8%), decreased in 26(54.2%) and absent in 10(20.8%) cases. After 12 months the lesion remain increased in 2(4.2%), same in 4(8.5%), decreased in 12(25.5%) and absent in 29 (61.8%) cases. Among 47 cases treated 41(87.2%) cases were acceptable, 4(8.5%) cases were doubtful and 2(4.2%) cases were unacceptable.

Table 1: Shows clinical presentation of the study patients (n=50).

Clinical variable	n	%
Pain present	50	100%
Percussion pain	50	100%
Swelling	18	36%
Sinus	7	14%

Table 2: Shows Radiological presentation of the study patients (n=50).

Periapical radiolucency	n	%
Present	50	100%
Absent	0	0%

Table 3: Shows clinical follow-up of the study patients (n=50).

Clinical variable		After 3 months		After 6 months		After 12 months	
		n	%	n	%	n	%
Pain	Present	6	12	4	8.3	2	4.2
	Absent	44	88	44	91.7	45	95.8
	Present	6	12	4	8.3	2	4.2

Percussion tenderness	Absent	44	88	44	91.7	45	95.8
	Present	0	0	0	0	0	0
Swelling	Absent	50	100	48	100	47	100
	Present	2	4	2	4.1	1	2.1
Sinus	Absent	48	96	46	95.9	46	97.9
	Present	2	4	2	4.1	1	2.1

Table 4: Shows radiological presentation of the study patients (n=50).

Size of radiolucency	After 3 month		After 6 month		After 12 month	
	n	%	n	%	n	%
Increased	4	8	2	4.2	2	4.2
Same	26	52	10	20.8	4	8.5
Decreased	20	40	26	54.2	12	25.5
Absent	0	0	10	20.8	29	61.8

Table 5 Final radiological outcome of the cases in the study patients (n=47).

Evaluation parameter	n	%
Acceptable	41	87.2
Doubtful	4	8.5
Unacceptable	2	4.2

Discussion

The present study was conducted to evaluate post operative clinical and radiological outcome after 3,6 and 12 months in the management of periapical pathosis by non-surgical conventional root and treatment. Removal of irritants from the root canal system and its total obturation results in repair of inflamed periapical tissue²⁴. Depending on the extent of tissue damage, repair varies from a simple reduction and resolution of inflammation to a more complex regeneration, involving remodeling of bone, periodontal ligament and cementum. Repair of the lesion, therefore, may take days to years. In this study after 12 months clinical and radiological evaluation showed endodontic treatment of periapical pathosis outcome was favorable or acceptable in 87.2%, doubtful or uncertain is 8.5% and failure or unacceptable 4.2%. In a similar type of study Suchina JA et al¹⁷ found in clinical

and radiological evaluation endodontic treatment outcome was successful in 88% and 80%, questionable in 10% and 15% failure in 2% and 5% respectively. In most cases, the etiological factors of periapical diseases are oral contaminants through the root canal or degenerating pulpal tissues. Therefore, the mere surgical removal of the lesions of pulpal origin without removing the causes through proper cleaning, shaping and obturation, will not result in healing of the periapical tissues. So successful treatment of periapical pathosis caused by infected pulpal tissue, complete removal of infected pulpal tissue, biomechanical preparation of the root canal and finally proper obturation is mandatory. Calcium hydroxide-based paste was used in this study as an antibacterial dressing. It is suggested that the action of calcium hydroxide beyond the apex may be four fold: (a) anti-inflammatory activity (b) neutralization of acid products, (c) activation

of the alkaline phosphates and (d) antibacterial action²⁵. It has also been reported that treatment with calcium hydroxide resulted in a high frequency of periapical healing, especially in young patients²⁶. The present study showed doubtful outcome may be possibly be due to lack of proper biomechanical preparation or failure to achieve hermetic obturation of root canal system. Also may possibly be due to the comparatively short observation time used. The 12 months follow-up may not have been enough for large lesion to heal.

Conclusion

It may be concluded from this study that endodontically involved teeth with periapical pathosis can be managed by non-surgical conventional root canal therapy in promoting the healing of a periapical lesion for non-vital tooth. Though the study performed clinically and radiologically, a histological evaluation with a large sample size and longer follow-up period is necessary to reach a sound conclusions.

References:

1. Sundqvist G. Taxonomy, ecology, and pathogenicity of the root canal flora. *Oral Surg Oral Med Oral Pathol* 1994; 78:522–30.
2. Yanagisawa S. Pathologic study of periapical lesions. Periapical granulomas: clinical, histopathologic and immunohistopathologic studies. *J Oral Pathol* 1980; 9: 288–300.
3. Nair PN. Light and electron microscopic studies of root canal flora and periapical lesions. *J Endod* 1987; 13: 29–39.
4. Walton RE, Ardjmand K. Histological evaluation of the presence of bacteria in induced periapical lesions in monkeys. *J Endod* 1992; 18: 216–27.
5. Ricucci D, Pascon EA, Ford TR, Langeland K. Epithelium and bacteria in periapical lesions. *Oral Surg Oral Med Oral Pathol* 2006; 101: 239–49.
6. Torabinejad M, Bakland LK. Immunopathogenesis of chronic periapical lesions. *Oral Surg* 1978; 46: 685–9.
7. Ninomiya J, Nakanishi K, Takemoto T et al. Cellular immuno-competence of infected root canal contents in pathogenesis of periapical lesions. *J Endod* 1997; 23: 213–16.
8. Fish EW. Bone infection. *J Am Dent Assoc* 1939.26:691.
9. Bhaskar SN. Periapical lesion-types, incidence and clinical features. *Oral Surg Oral Med Oral Pathol* 1966; 21: 657–71
10. Lalonde ER. A new rationale for the management of periapical granulomas and cysts. *J Endod* 1970; 80: 1056–9.
11. Caliskan MK. Prognosis of large cyst-like periapical lesions following nonsurgical root canal treatment. *IntEndod J* 2004; 37: 408–16.
12. Zain RB, Roswali N, Ismail K. Radiographic evaluation of lesion sizes of histologically diagnosed periapical cysts and granulomas. *Ann Dent* 1989; 48: 3–5.
13. Nair PNR. New perspectives on radicular cysts: do they heal? *IntEndod J* 1998; 31: 155–60.
14. Simon JHS. Incidence of periapical cysts in relation to the root canal. *J Endod* 1980; 6: 845–8.
15. Leonardo MR, Silveria FF, Silva LA, TanomaruFilho M, Utrilla LS. Calcium hydroxide root canal dressing. Histopathological evaluation of periapical repair at different time periods. *Braz Dent J* 2002; 13: 17–22.

16. Weiger R, Rosendahl R, Löst C. Influence of calcium hydroxide intracanal dressings on the prognosis of teeth with endodontically induced periapical lesions. *IntEndod J* 2000; 33: 219–26.
17. Suchina JA, Levine D, Flaitz CM, Nichois CM, Hicks MJ. Retrospective clinical and radiologic evaluation of nonsurgical endodontic treatment in human immunodeficiency virus (HIV) infection. *J cContemp Dent Pract* 2006; 15(1): 1-8.
18. Bal CS, Sikri VK, Agrawal R. Efficacy of various eugenol and non-eugenol root canal sealers in the treatment of teeth with periapical radiolucent area-A clinical and radiological study. *Indian J Dent* 1990; 1: 133-138.
19. GreenTL. Radiographic and histologic periapical findings of root canal treated teeth in cadaver. Repair after endodontic treatment. *Oral Surg* 1997; 83: 707
20. Torabinejad M, Walton RE. Periradicular lesions. In: Ingle JJ, Bakland LK, editors. *Endodontics*. Hamilton Ontario: BC Decker; 2002. p. 175-201
21. Amler MH. The time sequence of tissue regeneration in human extraction wounds. *Oral Surg* 1969; 27:309.
22. Johnson BR, Remeikis N, Vancura J. Diagnosis and treatment of cutaneous facial sinus tracts of dental origin. *J Am Dent Assoc* 1999; 130: 832.
23. Nair PNR, Sjogren U, Schumacher F, Sundqvist G. Radicular cysts affecting a root-filled human tooth: A long-term post treatment follow-up. *Int Endod J* 1993; 26: 225.
24. GreenTL. Radiographic and histologic periapical findings of root canal treated teeth in cadaver. Repair after endodontic treatment. *Oral Surg* 1997; 83: 707.
25. Farhad A, Mohammadi Z. Calcium hydroxide: a review. *Int Dent J* 2005; 55: 29301.
26. Caliskan MK, Türkün M. Periapical repair and apical closure of a pulpless tooth using calcium hydroxide. *Oral Surg Oral Med Oral Pathol* 1997; 84:683-6.