



Original Article

Evaluation of Conventional Root Canal Treatment for Healing of Periapical Pathosis of Nonvital Teeth

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Abstract

Background: Root canal Therapy is one of the procedures for the management of nonvital tooth with periapical lesion. The principle of this therapy is the complete sterilization of the total pulp canal space thereby healing of the periradicular lesion.

Objectives: This experimental study assessed the clinical and radiological outcome of root canal treatment for nonsurgical management of nonvital teeth with periapical lesion.

Materials and Methods: A total number of 40 infected teeth with periapical lesion were treated by conventional root canal treatment. Irritants from the root canal system was removed by mechanical instrumentation(Crown down Technique), chemical irrigation with NaOCL and by using Calcium Hydroxide as intracanal medicaments and fluid tight obturation both apically and coronally resulting repairs of inflamed periradicular tissues. The protocol for follow up examination will be 3, 6 and 12 months post operatively. At the time of follow up examination a standard follow up chart will be maintained.

Results: Among 40 cases 32 cases could be treated as acceptable as their responses were good both clinically and radiologically and 5 patients came back with some complications among them 3 cases were uncertain and 2 cases were unacceptable.

Conclusion: It was concluded that conventional root canal treatment reduced clinical signs and symptoms successfully in teeth with periapical lesion and radiologically.

Key words: Periapical pathosis, Root canal treatment, Calcium hydroxide

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Introduction

Infections of the dental pulp occur as consequence of caries, operative dental procedures and trauma, and involve a mixed, predominantly Gram-negative, anaerobic bacterial flora.¹ These infections cause pulpal necrosis which stimulates an immune response in the periapical region which is commonly referred to as a periapical lesion.²

Most periapical lesions (90%) can be classified as dental granulomas, radicular cysts or abscesses.³ Periapical lesions cannot be differentially diagnosed radiographic as radicular cysts or apical granuloma.^{4,5} Various studies have shown that with a radiographic lesion size of 20 mm or larger, the incidence of cysts is equal to or greater than 92%. If the lesion is separated from the apex and

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with an intact epithelial lining (apical true cyst), may not heal when treated non-surgically.^{6,7} A large periapical lesion that have a direct communication with the root canal system (apical pocket cyst or bay cyst) and respond favorably to non-surgical treatment.^{7,8} Some clinical studies have confirmed that simple non-surgical treatment with proper infection control can promote healing of large periapical lesions.^{9,10} In the past, large periapical lesions were generally managed by endodontic surgery or and by extraction. This was particularly true if the periapical lesion was suspected to be an apical true cyst. In recent years, development of visibility of the complexities of root canal systems with newer techniques, instruments and materials prognosis of conventional root canal treatment for the management of nonvital teeth with periapical lesion is increasing day by day.¹¹ Therefore, fewer patients need periapical surgery. A thorough knowledge of the anatomy of teeth regarding internal and external morphology is essential for successful debridement, infection control and obturation of the root-canal system in endodontic therapy. Some teeth have lateral canals, accessory canals, apical delta branching and rejoining within the root canal system that make root canal treatment complicated and fail to respond to treatment if important anatomy is missed.¹² This paper suggests that surgical removal of periapical lesion of pulpal origin is not mandatory, and that, irrespective of the size of the lesion, every effort should be made to treat such lesions by conservative means.

Materials and Methods

This experimental study was carried out for a period of 24 months from January 2009 to December 2010 in the Department of Conservative Dentistry and Endodontic, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbagh, Dhaka in Bangladesh.

Results

Total 40 non vital teeth with Periapical pathology were subjected to this study. Table I shows the clinical presentation of the study patients and observed that, pain and percussion pain was present in all of the study patients. However, out of 40 study patients, swelling and sinus was found 14 (35.0%) and 6 (15.0%) patients respectively. Table II shows the radiological presentation of the study patients and observed that, Periapical radiolucency was present in all of the study patients. Table III shows the clinical follow up of the study patients after 3, 6 and 12 months and observed that, out of 40 study patients, 40, 33

Forty patients with periapical lesion of teeth was selected requiring endodontic treatment along with a preoperative intra oral periapical radiograph considering excluding criteria like tooth with perforated pulpal floor, Radiographic evidence of excessive internal resorption, Excessive bone loss in the furcation area, Non restorable tooth, Tooth having grade III mobility the. Inclusion criteria of patient selection were include both male and female patient of any age, patient willing to give consent to take part in the study, nonvital tooth with Spontaneous pain, tender to percussion, swelling and sinus, nonvital tooth with periradicular radiolucency and endodontically treated failed tooth. After collection of data, these were screened by checking consistency, edited and were finally analyzed by software SPSS methods. The non-randomization procedure allocated 40 nonvital teeth with periapical lesion managed by Conventional Root Canal Treatment. After gaining access to the pulp chamber the root canal system was prepared by crown down technique with 2% tapered SS file and irrigation was done with 5.25% sodium hypochlorite, calcium hydroxide was placed into the root canal with lentulospiral as intracanal medicament for sterilization of the root canal system. After subsiding the clinical manifestation, the canal was reopened and irrigated with 2.25% sodium hypochlorite and dried with paper point and obturated with GP point and Calcium Hydroxide based sealer (Sealer 26) and restored with Light cured composite and crown fabrication. On the initial evaluation the patients were examined clinically for percussion pain, swelling and discharging sinus by present or absent and radiologically for widening of the periodontal ligament space by present or absent and periradicular radiolucency by same, increased, decreased and absent. The patients were evaluated at 3, 6 and 12 months post operatively by maintaining a standard follow up chart.

and 37 of the study patients were present during 3rd, 6th, and 12th months follow up respectively. Pain and percussion pain was observed in 4 patients after 3rd months follow up and in two patients after 6th and 12th months follow up period. Presence of swelling was not observed during 3rd, 6th and 12th months follow ups. Sinus was observed in one patient during 3rd, 6th, and 12th months follow up period. Table IV shows the Periapical radiolucency and found that 40 teeth (100%) had periapical radiolucency during pre-operative period. After 3 months of Root Canal therapy periradicular lesion remain increased in 2 (5%), same in 22 (55%), decreased in 16 (40%) cases. After 6 months the lesion remain increased in 2 (5.2%), same in 8 (21%), decreased in 20 (52.8%) and absent in 8 (21%) cases. After 12 months the lesion remain increased in 2(5.4), same in 3 (8.1%), decreased in 14 (37.8%) and absent in 18 (48.7%) cases. Among 37 cases treated with Root Canal therapy 32 (86.5%) cases were acceptable, 3 (8.1%) cases were uncertain and 2 (5.4%) cases were unacceptable.

Table I: Distribution of the study patients according to clinical presentation (n=40)

Clinical presentation	Frequency	Percentage
Pain	40	100
Percussion pain	40	100
Swelling	14	35
Sinus	6	15

Table II: Distribution of the study patients according to the radiological presentation (n=40)

Radiological presentation	Frequency	Percentage
Periradicular radiolucency	40	100
Widening of the periodontal membrane space	40	100

Table III: Distribution of the study patients according to clinical follow up (n=40)

Clinical Parameters	After 3 months			After 6 months			After 12 months		
	Sign/ symptoms	n	%	Sign/ symptoms	n	%	Sign/ symptoms	n	%
Pain	Present	4	10	Present	2	5.5	Present	2	5.4
	Absent	36	90	Absent	36	94.5	Absent	35	94.6
Percussion pain	Present	4	10	Present	2	5.5	Present	2	5.4
	Absent	36	90	Absent	36	94.5	Absent	35	94.6
Swelling	Present	0	00	Present	0	00	Present	0	00
	Absent	40	100	Absent	38	100	Absent	37	100
Sinus	Present	1	2.3	Present	1	2.6	Present	1	2.7
	Absent	39	97.5	Absent	37	97.4	Absent	36	97.3

Table IV: Distribution of the study patients according to Periapical radiolucency (n=40)

Size of radiolucency	After 3 months		After 6 months		After 12 months	
	n	%	n	%	n	%
Increased	2	5	2	5.2	2	5.4
Same	22	55	8	21	3	8.1
Decreased	16	40	20	52.8	14	37.8
Absent	0	00	8	21	18	48.7

Table V: Final outcome of the cases in the study (n= 37)

Evaluation parameter	Frequency	Percentage
Acceptable	32	86.5
Uncertain	3	8.1
Unacceptable	2	5.4

Discussion

Necrotic pulp provides suitable environment for microorganisms to multiply and release various toxins into the periapical tissues that initiate an inflammatory reaction and leading to the formation of a periapical lesion.¹³ Several studies have been carried out to examine the role of bacteria in the formation of periapical lesions.^{14,15,16} Immunopathologic mechanisms also play a role in the initiation of periapical lesions as immunologically competent cells and various immunoglobulins present within the lesion.^{17,18} As the lumen of a 'bay' or 'pocket' cyst is open to the root canal, it is likely to heal after conventional root canal treatment due to the removal of intracanal irritants.^{7,8} In contrast, the tissue dynamics of a true cyst are self-sustaining by virtue of its independence of the presence or absence of irritants in the root canal. True cysts, particularly large ones, containing cholesterol crystals are less likely to be resolved by conventional root canal treatment.^{19,20} As it is clinically and radiographically impossible to differentiate a bay

cyst, a true cyst or granuloma²⁰, treatment planning should favor a conservative approach to treatment.⁵ The periapical tissues have a rich blood supply, lymphatic drainage and abundant undifferentiated cells. All these structures are involved in the process of inflammation and repair. Therefore, because the periapical tissues have the potential to heal, the first treatment of periapical lesions should be directed only towards the removal of the causative factors. Root canal treatment is based primarily on the removal of microbial infection from the complex root canal system therefore complete sterilization of the root canal treatment. Once the causative factors are eliminated, the granuloma heals spontaneously.²¹ Bhaskar suggested that if instruments are extended 1 mm beyond the apical foramen, the inflammatory reaction that develops destroys the cyst lining and converts the lesion into a granuloma. Bender added that penetration of the apical area to the centre of the radiolucency might help in resolution by establishing the drainage and relieving pressure.²² However, the added trauma of the minimal over-instrumentation may enhance

epithelial proliferation and cystic expansion, not a resolution.^{22,23} Seltzer suggested that over-instrumentation allowed the drainage of the cystic fluid, which then allowed the degeneration of the epithelial cells by strangulation because fibroblastic and collagen proliferation squeezed the capillary supply to the cystic lining.²³ The over instrumentation technique was based on the assumption that the periapical lesion could be a cyst. Although the reasons these techniques might work are only theoretical, clinical success was claimed.²⁴ A calcium hydroxide-based paste was used as an antibacterial dressing in this case. It is suggested that the action of calcium hydroxide beyond the apex may be fourfold: (i) anti-inflammatory activity; (ii) neutralisation of acid products; (iii) activation of the alkaline phosphatase; and (iv) antibacterial action.²⁵ It has also been reported that treatment with calcium hydroxide resulted in a high frequency of periapical healing, especially in young patients.²⁶ Similarly, in the present study, periapical healing appeared to be occurring 6 month after the root canal obturation, and continued during the 12-month observation period. 1 year after obturation bony trabeculae seen in the lesion. 18 months after obturation bony trabeculae extending inwards from the walls of the lesion towards the root surface. Two years after obturation Complete healing with bone formation. Radiographic signs such as density change within the lesion, trabecular reformation and lamina dura formation confirmed healing, particularly when associated with the clinical finding that the tooth was asymptomatic and the soft tissue was healthy.

Conclusion

It can be concluded from this study that Root canal therapy is an effective technique of endodontic technique in promoting the healing of a periapical lesion for nonvital tooth with periapical lesion for saving teeth subjected to surgical treatment or extraction especially in the perspectives of Bangladesh.

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