

## Non-Vital Teeth Management with Periapical lesion by Conventional Root Canal Treatment – A Clinical and Radiological Evaluation

Research Article

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### Abstract

**Background:** Dental pulp infections are a result of caries, dental procedures and trauma, and consist of a mixed, predominantly Gram-negative, anaerobic bacterial flora.

**Objectives:** The study was performed to check the rate of success of non-surgical management of non-vital teeth with periapical pathosis.

**Methods:** 40 infected teeth having a periapical lesion were treated by Conventional Root Canal Treatment. The irritants from the root canal system were removed using mechanical instrumentation (Crown down Technique), chemical irrigation with NaOCl and by Calcium Hydroxide as intracanal medicament. Also, fluid tight obturation both apically and coronally was done which resulted in repairs of inflamed periradicular tissues. Depending on the extension of damage of tissue, 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 presents 2 years clinical and radiological follow up period. Out of 40 cases, 32 cases could be considered as acceptable as their responses were good both clinically and radiologically. 5 patients came back with some complications out of which 3 cases were uncertain and 2 cases were unacceptable.

**Conclusion:** It can be seen that Conventional root canal Treatment is a very effective procedure for saving teeth with periapical pathosis.

**Keywords:** Surgical and Non-Surgical Management; Non-Vital Teeth; Conventional Root Canal Treatment; Radiological Evaluation.

### Introduction

Dental pulp infections are a result of caries, dental procedures and trauma, and consist of a mixed, predominantly Gram-negative, anaerobic bacterial flora [1]. These infections lead to total pulpal necrosis and later stimulate an immune response in the periapical region. The latter is commonly referred as periapical lesion [2]. Most periapical lesions (89%) can be classified as dental granulomas, radicular cysts or abscesses [3]. It is usually considered that periapical lesions cannot be differentially diagnosed as either radicular cysts or apical granuloma based on only radiographic evidence [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 separate from the

apex and with an intact epithelial lining (apical true cyst), it may have developed into a self-perpetuating entity that may not heal when treated non-surgically [6, 7]. On other occasions, a large periapical lesion may have a direct communication with the root canal system (apical pocket cyst or bay cyst) and respond favorably to non-surgical treatment [7, 8]. Certain clinical studies have given a confirmation that simple non-surgical treatment with adequate infection control can promote healing of large periapical lesions [9, 10]. Previously, large periapical lesions were managed by root canal treatment of the involved tooth or teeth and by surgical excision. This was particularly true if the periapical lesion was suspected to be an apical true cyst. Now, more awareness of the complexities of root canal systems has led to the development of newer techniques, instruments and materials. These

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developments have greatly enhanced the clinician’s abilities [11]. Therefore, fewer patients need periapical surgery. Awareness of morphology of root canal system and a careful interpretation of preoperative radiographs are compulsory for adequate access and infection control in endodontic therapy. This is likely to have a serious effect on the treatment outcome. Mandibular incisors are often anatomically complex, with 45% displaying second canals [12]. Such teeth may fail to respond to treatment if important anatomy is missed. This paper suggests that surgical removal of periapical lesion of pulp 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 2018 to December 2019 in the Department of Conservative Dentistry and Endodontic, Faculty of Dentistry, MGMDCH, Maharashtra, India. 40 patients with periapical lesion of teeth were selected who required endodontic treatment along with a preoperative intra oral periapical radiograph. The excluding criteria were tooth with perforated pulp 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 consider both male and female patients 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 but 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 gave 40 nonvital teeth with periapical lesion treated by Conventional Root Canal Treatment. At first visit, patient’s clinical signs or symptoms and radiographic evidences were recorded. The radiographs were examined by two examiners and recorded in the data collection sheet. Teeth were first isolated with cotton roll and saliva ejector, then a straight line access cavity was prepared and necrotic pulp was removed with barbed broach and 5.25% sodium hypochlorite. Root canal system preparation was done by crown down pressureless technique with 2% tapered SS file. Irrigation was done with 2.25% sodium hypochlorite followed by drying with paper point. Mixture of Calcium hydroxide and glycerin was placed into the root canal using lentulo spiral as intracanal medicament followed by a temporary restoration. After the clinical manifestation

subsided, the canal was opened again and irrigation with 2.25% sodium hypochlorite was done. It was then dried with paper point and obturated with GP point and Calcium Hydroxide based sealer (Sealer 26). Restoration with light cured composite was done. Clinical evaluation the patients was done by clinically checking for percussion pain, swelling and discharging sinus by present or absent, and radiologically for Periradicular radiolucency by same, increased, decreased and absent. Patients evaluation was at 3, 6 and 12 months post operatively by maintaining a standard follow up chart.

**Result**

Total 40 non vital teeth with Periapical pathology were considered for 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. Out of total 40 study patients, swelling and sinus was found in 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 on intervals of 3, 6 and 12 months and it was seen that, out of 40 study patients, 40, 33 and 37 of the patients were present at 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 3<sup>rd</sup>, 6<sup>th</sup> and 12<sup>th</sup> months follow ups. A sinus was seen in one patient during 3<sup>rd</sup>, 6<sup>th</sup>, and 12<sup>th</sup> months follow up period. Table IV depicts the Periapical radiolucency and shows that 40 teeth (100%) had periapical radiolucency during pre-operative period. On completion of 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.

**Discussion**

As pulp necrosis is completed, its environment becomes allows microorganisms to multiply and release a variety of toxins into

**Table 1. Shows the clinical presentation of the study patients.**

Clinical Presentation	n	%
Pain Present	40	100
Percussion Pain Present	40	100
Swelling Present	14	35
Sinus Present	6	15

**Table 2. Shows the radiological presentation of the study patients.**

Periradicular Radiolucency	N	%
Present	40	100
Absent	0	0

Table 3. Shows the clinical follow up of the study patients.

Clinical Parameters	After 3 Months			After 6 Months			After 12 Months		
	Status	n	%	Status	n	%	Status	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	0	Present	0	0	Present	0	0
	Absent	40	100	Absent	38	100	Absent	37	100
Sinus	Present	1	2.5	Present	1	2.6	Present	1	2.7
	Absent	39	97.5	Absent	37	97.4	Absent	36	97.3

Table 4. Shows the Periapical radiolucency during different follow up of the studypatient.

Description of radiolucent area	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	0	8	21	18	48.7

Table 5. Final outcome of the cases in the study (n= 37).

Evaluation parameters	n	%
Acceptable	32	86.5
Uncertain	3	8.1
Unacceptable	2	5.4

the periapical tissues, which causes an inflammatory reaction and leads to the formation of a periapical lesion [15]. Several studies have been carried out to examine the role of bacteria in the formation of periapical lesions [14-16]. Immunopathologic mechanisms also cause the initiation of periapical lesions [17, 18]. 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 intra- canal irritants [7, 8]. Whereas the tissue dynamics of a true cyst are self-sustaining because 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]. Because it is clinically and radiographically impossible to differentiate a bay cyst from a true cyst, as it is likewise between a cyst and a granuloma [20], judicious treatment planning should favor a conservative approach to treatment [5]. Periapical tissues have a rich blood supply, lymphatic drainage and plenty undifferentiated cells. All these structures are involved in the process of inflammation and repair. Hence, as the periapical tissues are capable of to healing, the first treatment of periapical lesions should be directed only towards the removal of causative factors. Root canal treatment concentrates mainly on the removal of microbial infection from the complex root canal system. Bhaskar suggests that if extension of instruments is 1 mm beyond the apical foramen, the inflammatory reaction that develops results in destruction of the cyst lining and converts the lesion into a granuloma. Once the causa-

tive factors are eliminated, the granuloma heals spontaneously [12]. Bender said that penetration of the apical area to the centre of the radiolucency can help in resolution by forming a drainage and relieving pressure [22]. However, the additional trauma of the minimal over-instrumentation may improve epithelial proliferation and cystic expansion, and not cause a resolution [22, 23]. Seltzer added that over-instrumentation would lead to drainage of the cystic fluid, which would then allow the degeneration of the epithelial cells by strangulation because fibroblastic and collagen proliferation squeeze 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 paste of calcium hydroxide-base was used as an antibacterial dressing in this case. It is said that the effect of calcium hydroxide beyond the apex has multiple effects: (i) anti-inflammatory activity; (ii) neutralisation of acid products; (iii) activation of the alkaline phosphatase; and (iv) antibacterial action [25]. Treatment with calcium hydroxide results in a high frequency of periapical healing, especially in young patients [26] has also been reported. Similarly, in this study, periapical healing appeared to be happening 6 months after the root canal obturation, and was seen continuing 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 rootsurface. 2 years after

obturation Complete healing with bone formation.

Radiographic evidence like density change in the lesion, trabecular reformation and lamina dura formation confirmed healing, specially when associated with clinical finding that the tooth was asymptomatic and the soft tissue was healthy.

## Conclusion

The conclusion from this study is that Root canal therapy is an effective technique of endodontic treatment in promoting the healing of a periapical lesion for nonvital tooth to save teeth subjected to surgical treatment or extraction.

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