BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 21, Issue 11

DOI: 10.58240/1829006X-2025.21.11-291

ORIGINAL RESEARCH

RADIOGRAPHIC IMAGES FOR APICAL LESION HEALING AFTER ROOT CANAL THERAPY IN A SAMPLE FOR KERBALAIAN PATIENTS

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Received: Oct 29. 2025; **Accepted:** Nov 29, 2025;**Published:** Dec. 15, 202

ABSTRACT

This longitudinal study done in Dr.sameer Hatem private clinic by the aid of Dr.Abbas Hayder, that was collected for 93 patients who are treated in the clinic and periodic inspection and imaged radiographically during this period of time to obtain the total healing for periapical lesion (radiolucency), all these patients show no sign and symptoms of pain or swelling after root canal therapy, the patients are examined by using (woodpecker intra oral x-ray sensor and CSN x-ray machine)

This samples was selected between the age of 13 and 82 years old, 48 female and 45 male. Time required for the samples to be healed between 7 months – 1 year and 4 months for the whole samples.

General health for these patients included healthy, and some of them are medically compromised patients with some systemic disease (Hypertension, Diabetes, Angina pectoris, Atherosclerosis, Epilepsy, Hypotension and Asthma)

In this sample there was 15 diabetic patients and one of them was 18 years old and the course time required for this patient was 7 months.

This sample include 15 smoker patients, some of them are heavy smoker who smoke more than 20 cigarettes per day.

Conclusion: In this study concluded that the process of repairing endodontically treated teeth depends not only on the correct clinical approaches to promote a better RCT (such as use of good irrigant solution, intracanal dressing, and root canal filling), and in this study we highlighted the impact of the systemic factors (such as chronic diseases, hormones, and age) that can change the host's immune defenses and interfere in the outcome of root canal treatment and in the healing process and the healing time of nonsurgical root canal treatment..

***Keywords*:** Radiographic images ; apical lesion healing ; root canal therapy ; kerbalaian patients

INTRODUCTION

The endodontic treatment judged to be successful by resolving the signs and symptoms clinically and disappear of the periapical radiolucency, and the most common way to detect the elimination of the lesion after proper endodontic treatment that follows the standers protocols done by means of radiographic examination techniques which are indispensable adjunct to clinical examination in endodontic field, in this study the radiographic examination is done by digital periapical technique. The required time course for healing and disappear of the periapical lesion after the root canal treatment between 6-12 months should be considered[1,2]

Azim et al reported that the average time required to achieve healing in periapical area was 11.78 months, which was similar to previous finding[2,3]

Another study found a decrease from 45.4 mm3 to 9.9 mm3 in the first year and from 9.9 mm3 to 4.3 mm3 during the second year this study may indicate that the initial healing process is the most effective.[4]

Murphy el al stated that Anterior lesions of both the maxilla and mandible healed at a faster rate than posterior lesions of either jaw. This finding may be explained by the close proximity of the buccal and lingual plates in the anterior segments[5]. Therefore, anterior lesions are more likely to enlarge in a lateral direction because the potential for bucco-lingual expansion is limited.

MATERIALS AND METHODS

The majority of the patients had diagnosed multiple times by x-ray (woodpecker intra oral x-ray sensor and CSN x-ray machine) after complete the endodontic treatments, the number of follow-up visits to detect the resolve of the infection reached to 6 visits for some patients.
The samples were 48 of them women and 45 of them men.

The T-test was used for two
independent samples to study the differences in the rates of recovery times between males and females. Although males showed faster recovery times, the differences between them and females were not statistically significant, which means that there are no significant differences between males and females
in the duration of recovery.

Table 1. Show Healing time

variable	N	Mean	S.D	S.E	t	p.v
Male	42	9.93	3.26	.50	-.582	.562
female	51	10.25	2.11	.50	-.582	.562

The T-test was used for two independent samples to study the differences in the rates of recovery periods between smokers and non-smokers, and the results recorded a significant decrease in the rates of recovery periods among non-smokers compared to their smokers, and the differences were statistically significant at the 0.001 level of significance.

Table 2. Show the effects of smoking compare to non-smoking

variable	N	Mean	S.D	S.E	t	p.v
smoker	15	12.20	3.73	.96	3.497	.001
Non smoker	78	9.71	2.25	.25	3.497	.001

The T-test was used for two independent samples to study the differences in the rates of recovery times between those with comorbid diseases and the healthy ones. The results recorded a significant decrease in the rates of recovery times among the healthy people compared to their peers who suffer from other diseases. The differences were statistically significant at the 0.001 level of significance.

Table 3. Show the difference between healthy and injury.

Variable	N	Mean	S.D	S.E	T	p.v
Double injury	36	11.25	2.52	.42	3.456	.001
Healthy	57	9.39	2.54	.34	3.456	.001

The T-test was used for two independent samples to study the differences in the rates of dental healing periods between the upper jaw and the lower jaw.

Table 4. Show the effects in Jaws

variable	N	Mean	S.D	S.E	t	p.v
Upper jaw	50	9.04	1.84	.26	4.567	.000
Lower jaw	43	11.35	2.98	.45	4.567	.000

RESULTS

Correlation study has done between the age of the patients and the healing time and as a result there was a positive correlation between them reached (0.293) and it is a Statistical significance at the level of 0.004 which means the older age patients will require more time to heal

Healing time

To study the differences in the rates of recovery periods according to the level of dental care, the researcher used the one-way analysis of variance test and then used the test of the smallest moral difference to ascertain the locations of the differences. The average care approached her, while the poor care had the highest recovery period.

Table 5. SHOW heling time based on sever of effects.

	N	Mean	Std. Deviation	Std.error	F	P.V	LSD
Good	45	9.42 A	2.26	.34	3.23	0.04	1.49
Moderate	27	10.52 B A	2.50	.48	3.23	0.04	1.49
Poor	21	11.05 B	3.38	.74	3.23	0.04	1.49

To study the differences in the rates of recovery periods according to the health status, the researcher used the one-way analysis of variance test and then used the smallest moral difference test to ascertain the locations of the differences. Hypertension patients, while diabetic patients have the longest recovery time.

Table 6. Show the apical lesion healing based on the healthy status.

	N	Mean	Std. Deviation	Std.error	F	P.V	LSD
Healthy	57	9.39 A	2.54	.34	3.42	0.04	1.52
Diabetic	12	11.25 B	2.49	.72	3.42	0.04	1.52
Hypertension	10	10.6 B A	1.84	.58	3.42	0.04	1.52

DISCUSSION

Age is considered a prognostic indicator of outcome for many surgical procedures[6]. A study found that 81.3% healing was achieved in patients below 30 years of age[7].

In our study we found that the age also play an crucial role in term of healing of the lesion; the longest period we found in this study were 1 year and 4 month in 63 and 73 years old patients, and the high success rate in patients who are between 13 and 40 years old and this result is almost the same as

Kriesler et al. found a 95% success in patients between 21 to 40 years of age. Contrarily, Barone et al. reported 84% success in periapical healing in patients above 45 years of age, compared to 68% in patients below 45 years of age[7,8].

The treatment of symptomatic tooth with periapical lesion is endodontic treatment, which is aimed to terminate the microorganisms and their byproducts into the root system and periapical tissue, consequently establishing the health of the tooth. The success of the root canal treatment mainly depends on the absence of clinical sign and symptoms and disappear of the periapical lesion radiography. Many authors emphasize on multiple factors may interfere the outcome of the treatment such as systemic condition (hypertension, diabetic and osteoporosis), smoking age and gender and the location of the lesion in the jaws. And how these factors may reduce the healing time of the lesion.

Hypertentison is a chronic disease, it is manifested with increased peripheral vascular resistance to flowing of the blood. It is attributable to vascular remodeling, and elevates blood pressure in arteries[9]. The experimental studies and clinical observation shown the relationship between hypertension and calcium lose in bones[10].

It has been shown that patients with systemic disease like Hypertension may have a reduce resistance to the bacterial infection and tissue regeneration process[11]. In addition the occurrence of an inflammation due to periapical lesion along with hypertension will lead to injury to the vascular and inflammation[12].

Martins, et al.evaluated the tissue response and mineralization capacity of MTA cement in hypertensive rats. The results showed hypertensive rats had a severe inflammatory reaction and were characterized by a lower mineralization rate compared to normotensive rats; this suggested that hypertension was able to impair the tissue response and the mineralization ability of MTA[12].

Tobacco consumption is considered one of the most habitual risk factor. And it is already known that smoking is the major risk cause for systemic and oral health, smoking and even passive smoking has been identified as a strong environmental danger factors for periodontitis[13].

Smoking declined response to periodontal therapy and have approximately half as much improvement in probing depths and clinical attachment levels following nonsurgical and various surgical modalities of therapy[14]. hence the role of smoking has gained attention as it might induce a worse endodontic outcome when compared to nonsmokers[15], which in turn exerting a negative influence on the apical periodontium of endodontically compromised teeth, in order will obstruct the healing of the periapical tissue that through interfere the healing by reducing the oxygen supply in blood and nutrition to the affected area, which in turn make the area more susceptible to the invasion of the bacteria and their toxins[16]. In addition lower the defensive and reparative mechanism[17].

Aleksejuniene et al, in a cross-sectional study, they analysed radiographically, using orthopantomograms and the PAI (periapical index) score system (Ørstavik et al. 1986), the periapical status of 147 patients, concluding that smoking and AP(apical periodontitis) were significantly associated (17). Also Kirkevang & Wenzel (2003) published a cross-sectional study, carried out on 613 patients and using periapical radiographs and the PAI (periapical index) system, reported that smoking was associated statistically with apical periodontitis[18].

Krall et al, carried out a longitudinal study with 2–28 years follow-up, including 811 dentate male participants. Radiographic evaluation demonstrated a dose response relationship between cigarette smoking and the frequency of RCT (root canal therapy). The risk amongst cigarette smokers increased with greater number of years of exposure and decreased with length of abstinence. Compared with never smokers, current cigarette smokers were 1.7 times as likely to have RFT (root failing treatment)[19].

In a retrospective study (15), assessed clinically and radiographically the outcome of 196 nonsurgically treated RFT (root failing treatment), and reported that RCT in smokers had fewer successes and more failures than in nonsmoker patients[20]. In a case–control study (Lopez-L opez et al. 2012) including 79 smoker and 79 nonsmokers, age- and sex-matched, tobacco smoking was strongly associated with the presence of radiographically diagnosed PLs (periapical lesions) [21].

In general the smoking have various effects on periapical area biologically, smoking induce impaired function of the leukocytes, macrophages, and T-cell, beside that decrease antibodies levels[22]. In contrast

increase the levels of pro-inflammatory mediators, such as TNF-α, IL-6, and C-reactive protein[23].

Another effect of smoking is decreasing migration of fibroblast to damaged periapical area and induce the function of the osteoclast cell, which activate bone resorption[24]. And cause morphological alteration in the microvasculature, which will lead to depression in the oxygen and nutrients in the damaged periapical area[25].

Diabetes mellitus is one of the most common metabolic disorders, affecting 537 million people of all ages in 2021. Diabetes mellitus can be defined as heterogeneous group of metabolic diseases that are characterized by chronic hyperglycemia with defects in the secretion of insulin and/or impairment of its action, in order will lead to disturbances in carbohydrates, fat, and protein metabolism[26]. Diabetes is frequently associated with high susceptibility to infection, impaired healing of the wounds, and increased morbidity and mortality associated with disease progression[27].

Studies showed that DM may be a modulating factor of endodontic infections, and that it may compromise the healing process of periapical tissues[28] ,and one of the chronic complication of DM, microangiopathy, would lead to decrease the blood flow which will lead to depress the nutrients and oxygen supply to the periodontal tissues, accelerated the progression of periodontitis, loss of support, increasing the possibility of periodontal pockets, mobility and poorer response to periodontal treatment[29]. And lower success rate of 43% in the type 2 DM group than the nondiabetic group 80% regarding the healing periapical tissue[30]. Also systemic inflammation, which is promoted by DM can lead to a prolonged healing time[31].In a cross-sectional study by Segura-Egea et al. (2005) [32], the prevalence of AP (apical periodontitis) was determined using periapical radiographs and the periapical index, in patients with and without type 2 DM. Results demonstrated that AP (apical periodontitis) in one or more teeth was significantly more frequent in diabetic patients (81%) compared to healthy control patients (58%); moreover, the percentage of teeth with AP (apical periodontitis) was significantly higher in diabetics (7%) compared to controls (4%).

A Multivariate logistic regression analysis concluded that the likelihood of having AP (apical periodontitis) was almost four times higher in diabetic patients compared to nondiabetic subjects[33]. The results of studies conducted so far are inconclusive, but suggest an association between DM and a higher prevalence of AP (apical periodontitis), odontogenic infections and greater size of PLs.

in regard the relation between AP(apical periodontitis) with the prevalence of RFT (root failing treatment)[34]. investigated endodontic treatment outcome data in 140 patients, 73 with DM, finding that patients with diabetes had a reduced likelihood of success (assessed clinically and radiographically) following RCT in cases with preoperative periradicular lesions and increased flare-ups during treatment.

The result of the studies are suggest an association between DM and AP.

High glucose levels can inhibit macrophage function, resulting in an inflammatory state that impairs host cellular proliferations and delays wound healing. Also, high glucose levels in the inflammatory response can be associated with a reduction in IL-4 and osteoprotegerin, up-regulation of proinflammatory cytokines, and differentiated osteoclast cells, suggesting increased bone resorption[34].

Influence of the jaws

There was an interesting facts that we notice related to the healing time associated with the jaws. The maxilla in this current study shows fast healing time compared to the mandible and the injury was high with minor shift in maxilla. These result are the same in Murphy WK et al [5].

CONCLUSION

In summary, the process of repairing endodontically treated teeth depends not only on the correct clinical approaches to promote a better RCT (such as use of good irrigant solution, intracanal dressing, and root canal filling), and in this study we highlighted the impact of the systemic factors (such as chronic diseases, hormones, and age) that can change the host's immune defenses and interfere in the outcome of root canal treatment and in the healing process and the healing time of nonsurgical root canal treatment.

DECLARATIONS

Funding

This research did not receive any specific grant or financial support.

Competing Interests

The authors have no competing interests to declare.

Informed Consent

Not applicable.

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