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Radiographic study of endodontic treatment in adult population after period of time

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Abstract

The purpose of this study was to assess the treatment results following endodontic therapy of teeth filled with gutta-percha A total of 340 patients were used in this study referring to Al-Mustansirya University, 400 periapical radiographs of previously endodontic treated teeth were evaluated from patients were aged from 19-49 years old selected amongst subjects referred to Al- Mustansirya dental collage, these patients had been root filled for 12 months or greater.

After samples selection, Radiographic examination was performed using the parallel technique with one periapical radiograph was taken for each tooth. Standardized exposure processing was used in order to obtain optimal diagnostic quality of the radiographs.

Radiographs were assigned according to patient's sex and age, time elapsed since placement of the root fillings, distance of root filling from radiographic apex which measured directly from the radiographic categorized according to whether the root filling was less than 2 mm from the radiographic apex , or over filled teeth also pain and presence or absence of radiolucency was recorded. In conclusion, teeth with root canal fillings material placed to within 2 mm of the radiographic apex were associated with higher success rates than fillings that were 2 mm or greater from radiographic apex.

Introduction

Pulp infection mainly results from dental caries, trauma and restorative Procedures and commonly proceeds to pulp necrosis and apical periodontitis with localized bone destruction. Apical periodontitis is the main indication for root canal therapy and is the most common evidence of an inadequate or failed endodontic treatment. Therefore, diagnosing chronic apical periodontitis is extremely important to settle an effective treatment plan involving endodontic treatment, retreatment or endodontic surgery, or even a combination of them. [1,2] The major goal of a root canal filling is to prevent any interchange between the oral cavities, the root canal system and the periradicular tissue providing a barrier to canal infection and re-infection. Not all teeth with positive bacterial cultures fail, nor do all teeth with negative cultures succeed .Thus, entombing residual microorganisms and irritants by sealing them within the root canal system may have a major influence on the clinical outcome.[3,4]

It is important to know the factors that can influence the outcome .These are patients age, general status of his/her health initial diagnosis of the tooth under treatment, peculiarities of the morphology of the canal of the root, clinical complications quality of

chemo mechanical root canal preparation, microbiological status of the root canal, clinical complications, materials and methods of the root canal filling technical complications.[5] Such a wide range of factors explains the results of studies which indicate that the successful outcome of endodontic treatment can be expected in 40 to 90% of all cases.[6]

Several clinical studies representing various techniques, report the success rate of endodontic therapy ranges from 87% to 94%. One of the prerequisites for successful endodontic therapy is the complete filling of the root canal system, which provides a biological environment for healing of the periradicular tissues. Gutta-percha is the most widely used obturating material, and cold lateral condensation of gutta–percha has been the most commonly technique at dental schools.[7,8]

Aim of study

The aim of radiographic investigation was to assess the treatment results following endodontic therapy of teeth after a period of time.

Materials & methods

Four hundred periapical radiographs taken between March 2007 - April 2009 from 340 patients over 19 years of age in Al-Mustansirya University. Baghdad, Iraq was used in this study. All of the images presenting good diagnostic conditions. Radiographs with cuts, distortion, and poor fit of the apical region, images suggestive of end, periodontal disease or root end surgery were excluded. The use of magnifying glass was limited to the cases of doubtful diagnosis that could benefit from image amplification. After samples selection, the radiographs were assigned to the following groups; according to patient's sex and age, 19-29, 30-39 and more than 40 years old detailed in ‘table 1’.Only teeth that had been root filled for 12months or greater were selected for this study. The samples were grouped according to the time elapsed since placement of the root fillings either 1-2 years, 3-5 years and more than 6 years and presence or absence of radiolucency detailed in 'table 2’.

Distance of root filling from the radiographic apex was measure directly from the post obturating radiograph categorized according to whether the root filling was less than 2 mm from radiographic apex , 2 mm or greater from the radiographic apex over filled with presence or absence of radiolucency detailed in' table 3’

The length of time elapsed since placement of the root filling was grouped as either less than 2 years or greater than two years with presence or absence of pain detailed in' table 4’. Information on endodontic treatment and radiographic were taken from patients records. Pain, tenderness and periapical radiolucency were recorded at the recall examination. Radiographic examination was performed using the parallel technique with one periapical radiograph was taken for each tooth. Standardized exposure processing was used in order to obtain optimal diagnostic quality of the radiographs. Treatment was considered successful when the contours, width and structure of periodontal margins were normal or the periodontal contours were widened adjacent to an excess of the filling materials. All cases in which those criteria were not fulfilled were judged as unsuccessful. The level of the root filling in relation to the root apex was also recorded as in ’table 4’.

In evaluating the treatment outcomes, the radiographs were analyzed by the same observer to avoid the intra observer variable using a view

or with variable illumination& a viewer with 3.5x magnification.

Statistical analysis

Statistical analysis was performed using statistic 5.1 soft ware (Microsoft Corporation Redmond, WA, USA). It was calculated by regarding the total number of individuals, total number of teeth, sex, age group and endodontic treatment was analyzed by chi-square non-parametric test at 0.05 significance levels.

Result

Out of the used 400 periapical radiographs represent active of 340 patients, 400 teeth were examined. (Table 1) show the distribution of patients teeth by age and sex groups it show that females have higher percentage of teeth with root canal treatment in all age 30.8% (n= 105) comparing with percentage of root canal treated teeth in male in all age 14.4% (n=49).

While (table 2) show the relation between time, periapical radiolucency and quality of root canal filling. It shows that root canal treatment with out radiolucency have a higher percentages 25% (n=100) 21.5% (n=86) in adequate and inadequate root canal treatment when time of root canal treatment was more than 6 years.

While (table 3) show relation between periapical radiolucency and quality of root canal filling It shows highly percentage of teeth with out radiolucency when quality of root canal treatment was 0-2 mm 44% (n=176) while 2% (n=8) of teeth with radiolucency when the quality of root canal treatment was beyond the apex .

While (table 4) show the differences in success rate in terms of the distance of the root canal filling from the radiographic apex of the teeth by follow up period. It shows that teeth reviewed three years or more after placement of a root canal filling have a higher success rate in teeth that were root filled within 2 mm of the radiographic apex 30% (n=120). Means it show significant than teeth with root canal treatment after 1-2 years of placement of root canal filling material.

Discussion

Patients selected differ from the general population with regards to demographic characteristics or disease severity therefore; they may not be representative of general population. [9]

A successful outcome for root canal treatment relies on adequate removal of micro-organism from the canal system and prevention of recolonisation or propagation of residual micro-organism through the placement of a root filling that obturates the space entirely, combined with a restoration that produce satisfactory coronal seal.[10,11]

Molven and Halse [6] examined root canal treatment performed by dental students and found success ratio of 68% for teeth with pre-existing periapical radiolucencies and 91% in teeth without pre-existing radiolucency.

The technical quality of root canal treatment was assessed indirectly by measuring the distance of the root filling from the radiographic apex of the tooth (table 3). Sjogren et al [12] showed that canals filled to within 2mm of the radiographic apex were associated with higher success rate ; that is when the whole root canal system had been cleaned to eliminate microorganisms, and shaped to facilitate three dimensional obturating in order to inhabit reinfication. In agreement with others [6, 10] some of the lowest failure rates were noted in teeth that had root fillings within 2 mm of the radiographic apex. This probably

implies that the canals were also cleaned and shaped more effectively because of enhanced canal flare required as well as being filled more completely.

Inferior technical quality of root filling is considered to be the main cause of clinical fauiler. Incomplete obturating of the root canal leaves residual space for microbial colonization and proliferation and may also imply that cleaning was incomplete.[13,14]

Saunders et al [10] found that 39% of root filling were greater than 2 mm from the radiographic apex and stressed the need to improve quality of root canal treatment. In general dental practice they confirmed that root fillings judged to be adequate radio graphically were associated with a reduced incidence of periapical radiolucency.

Conclusion

The study shows root fillings that were within 2 mm of the radiographic apex were more successful than root fillings that were 2 mm or greater from the apex or over filled.

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Table 1: Teeth with root canal treatment in relation to sex &age group

Age	Male	Female	Total patient	Teeth with root R.C.t
19-29	28(8.2%)	42(12.3%)	70(20.5%)	80(20%)
30-39	32(9.4%)	105(30.8%)	137(40.2%)	160(40%)
40-49	49(14.4%)	84(24.7%)	133(39.1%)	160(40%)

Table 2: Relation between time, periapical radiolucency &quality of R.C. filling (according to time)

Time	Adequate R.C.T without radiolucency	Adequate R.C.T with radiolucency	Inadequate R.C.T without radiolucency	Inadequate R.C.T with radiolucency
1-2 years	30(7.5%)	4(1%)	26(6.5%)	8(2%)
3-5 years	46(11.5%)	6(1.5%)	40(10%)	14(3.5%)
more than 6 years	100(25%)	10(2.5%)	86(21.5%)	30(7.5%)

Chi square: 14.246 p=0.01 Chi square: 37.52 p=0.000 Chi square for total: 56.07 p=0.000

Table 3: Relation between periapical radiolucency & quality of R.C. filling

Quality of R.C.t.	Teeth with out radiolucency	Teeth with radiolucency
0-2mm	176(44%)	20(5%)
more than 2mm	131(32.7%)	44(11%)
beyond the apex	21(5.2%)	8(2%)

Table 4:- According to the pain

me	**Quality**	**Without pain**	**With pain**	**Chi square**	**P value**
1-2 years	0-2mm	24(6%)	3(0.75%)	3.152	0.027
	more than 2mm	25(6.25%)	8(2%)		
	beyond 2mm	5(1.25%)	3(0.75%)		
3-5 years	0-2mm	42(10.5%)	3(0.75%)	8.755	0.013
	more than 2mm	38(9.5%)	13(3.25%)		
	beyond 2mm	6(1.5%)	4(1%)		
more than 6 years	0-2mm	120(30%)	4(1%)	11.031	0.01
	more than 2mm	81(2.25%)	10(2.5%)		
	beyond 2mm	8(2%)	3(0.75%)		