

A Comparison of Retreatment Decisions Among General Dental Practitioners and Endodontists

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Abstract: This study compared the difference in decision making regarding retreatment of endodontically treated teeth by general dental practitioners and endodontists. Thirty radiographs of endodontically treated teeth taken from undergraduate records with their respective case descriptions were submitted to fifteen endodontists and fifteen general dental practitioners. Seven treatment alternatives were given as choices; reasons for retreatment, if chosen, were also requested and presented as choices. The results showed statistically different decisions among these two groups regarding retreatment cases. More endodontists opted for retreatment of cases, while higher percentages of general dentists decided to observe, not treat or extract. To prevent misdiagnosis and eventually mistreatment, endodontic decision making should be taught. Currently, there are no specific guidelines for management of failed root canal retreatment. It is suggested that guidelines generated by evidence-based dentistry may produce less variation in clinical decision making.

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Studies have shown that success rates of root canal therapy generally approach 90 percent.¹ When treatment fails, conventional endodontic retreatment has been suggested as preferable to surgical intervention.² Endodontic retreatment has been defined as a procedure performed on a tooth that has received prior attempted definitive treatment resulting in a condition requiring further endodontic treatment to achieve a successful result.³ According to Bergenholtz et al.,⁴ retreatment usually results in successful outcomes.

There are no general guidelines on the indications and procedures for retreatment, but there is obviously a consensus that retreatment procedures have to be performed at least in all cases with persisting pain, the presence of clinical signs such as swelling or sinus tract, and in teeth with periapical pathosis refractory to endodontic therapy.^{1,5-7} However, differences in treatment planning choices do exist and are dependent on educational background, clinical experiences, attitudes and values of involved persons, and also economic resources.⁸⁻¹¹

Hülsmann⁹ found non-intervention or further radiographic monitoring was preferred by the ma-

jority of general practitioners in ten out of nineteen cases. He found only five cases were judged to require conservative endodontic retreatment. In addition, Pagonis et al.¹⁰ found that 53.6 percent of general practitioners favored not to treat versus 26 percent of general practitioners that favored retreatment of a previously endodontically treated tooth. On the other hand, Doornbusch et al.¹¹ showed that the endodontist considered far more teeth feasible for retreatment than the general practitioner and oral surgeon, suggesting that previous training and experience influenced the decision making. The dentist's speciality had a great effect on retreatment decisions, as there was more consensus and agreement among clinicians with specialty training in endodontics. Clinical experience and the school of graduation played some role in arriving at a consensus as well.^{9,11}

Van Nieuwenhuysen et al.¹² found that when no or little radiographic evidence of periapical pathology was present, when clinical signs and symptoms were absent, or when the root filling was radiographically deficient, radiographic monitoring led to complications in only 2.8 percent of the cases.

Retreatment is clearly indicated when a periapical lesion, clinical signs, and/or symptoms are present.^{1,6,7} Dentists seem to ignore patients' symptoms and base their treatment decisions mainly on radiographic findings.¹³ However, substantial variation exists among clinicians' management of cases with periapical radiolucencies.¹⁴⁻¹⁶ The technical quality of previous endodontic treatment also played a role in the decision to retreat.¹⁶ Active treatment is seldom suggested in cases with underfilled root canals and widened periapical periodontal ligament space.¹³ Technical quality of the coronal restoration is an important factor for apical periodontal healing in endodontic treatment.¹⁷

One of the most important and relied on instruments used for treatment planning in endodontics is the dental radiograph. Yet one of the most subjective findings with regard to interexaminer differences is radiographic interpretation.^{8,18,19} Previous studies have shown significant differences in radiographic interpretation with regard to the presence of periapical disease, measurement of human periapical structures, and the success of endodontic therapy.^{8,20} These different radiographic interpretations lead to varying treatment choices. Even when retreatment is clearly indicated, a difference of opinion among clinicians may exist with regard to the kind of retreatment.

The aims of this study were:

1. To compare the endodontic treatment planning decisions of endodontists with those of general dental practitioners with regard to previously endodontically treated teeth;
2. To determine if there is any influence of place of employment, educational background, and years of experience on the decisions within the two groups; and
3. To determine the influence of several factors (clinical symptoms, periapical radiolucency, underfilled canals, overfilled canals, missed canals, inadequate flare, loss of coronal restoration, or perforation) on any significantly different decisions between the two groups (endodontists and general dentists).

Materials and Methods

Thirty case presentations of previously endodontically treated teeth were presented in printed form to fifteen endodontists and fifteen general dental practitioners. The endodontist group in the sample included clinicians who had obtained postgraduate

training in endodontics in the form of a two-year certificate of postgraduate endodontics and a master's degree. Their experience ranged from two to twenty years. The group included specialists from academic institutes, ministry of health (MOH), armed forces hospitals (AFH), and private practice. The general practitioner group in the sample included clinicians that had not received postgraduate training in endodontics nor any advanced general dentistry programs or courses that included endodontics beyond their basic undergraduate training. The group included practitioners from the same institutes as the endodontists (academics, MOH, AFH, and private). They ranged in experience from one to twenty years, and they rated their exposure to endodontic treatment in their clinics as moderate (some emergency case, simple endodontic treatment). No attempt was made to match the endodontists or general practitioners regarding their years of experience, school of graduation, or place of employment.

All clinicians were approached personally and handed a questionnaire and a transparent file containing all cases with their corresponding radiographs. The demographic data requested was the years of experience, school of graduation, and place of employment. The clinicians were given an endodontic viewer to review the radiographs and enough time to answer all the questions.

The case histories were obtained from the files of existing cases treated in the student clinics of the College of Dentistry, King Saud University. All patients treated in the college sign a consent form when opening the file for the first time in the college, allowing faculty to use their cases and radiographs in teaching or publication. The cases were chosen to include a wide variety of clinical cases such as clinical symptoms (eleven cases), chronic apical periodontitis (twenty-three cases), underfilled canals (six cases), overfilled canals (three cases), missed canals (two cases), inadequate compaction (thirteen cases), silver cones (four cases), fractured instruments (four cases), inadequate flare (twelve cases), loss of coronal restorations (two cases), and perforations (three cases). The cases included case description in the form of patient age, gender, age of root canal filling, and patient's complaints such as swelling or sinus formation or pain. Dental history of the tooth was mentioned, and pain was described fully (severity, continuity, duration, initiation, and time since pain began after obturation). The results of a clinical examination (percussion, mobility, and furcation involvement) were also presented. The present and

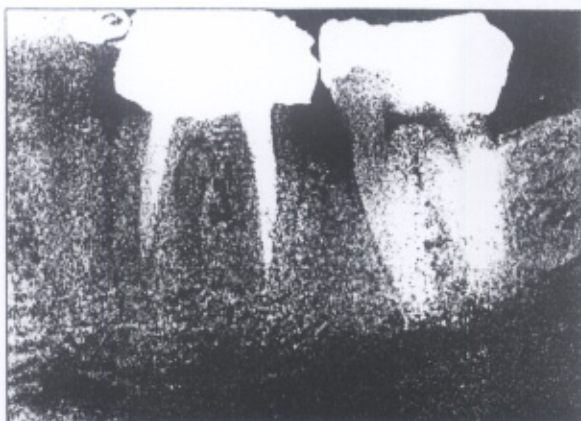


Figure 1. Tooth #36 in thirty-six-year-old female; age of root canal filling is five years; there is bleeding and discoloration of the gingival, but otherwise no complaint; crown has to be renewed.

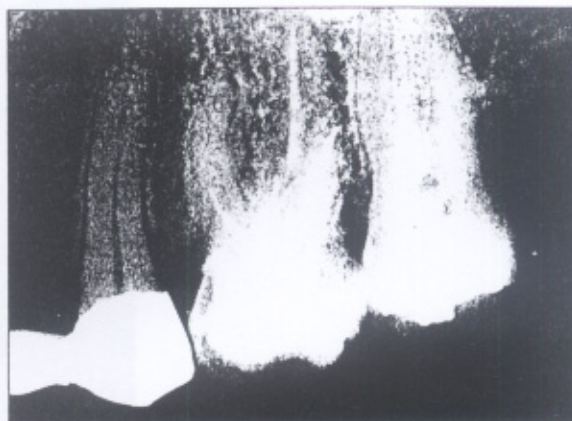


Figure 2. Tooth #26 in thirty-eight-year-old female; age of root canal filling is two years; no complaints; new restoration is planned.

planned restorations were mentioned. Radiographs of the root canal treatment from three angulations were included. Samples of the cases are shown in Figures 1-7.

The clinicians in the two groups were provided with seven different treatment alternatives: 1) no treatment, 2) observation (wait and see), 3) conventional retreatment, 4) apical surgery, 5) conventional retreatment and apical surgery, 6) resection, or 7) extraction.

A list of possible reasons for the decision chosen for each case was presented. The respondent was asked to tick the reason as well as state other reasons

if not included in the list. The list included clinical symptoms, chronic apical periodontitis, underfilled canals, overfilled canals, missed canals, inadequate compaction (voids), silver cones, fractured instruments, inadequate flare, loss of coronal restorations, and perforations.

Differences between the two groups regarding endodontic decisions and reasons for their treatment options were analyzed using χ^2 -McNemar test for multiple dependent variables. Differences within the groups and differences regarding reasons for their treatment options were analyzed using nominal regression test.

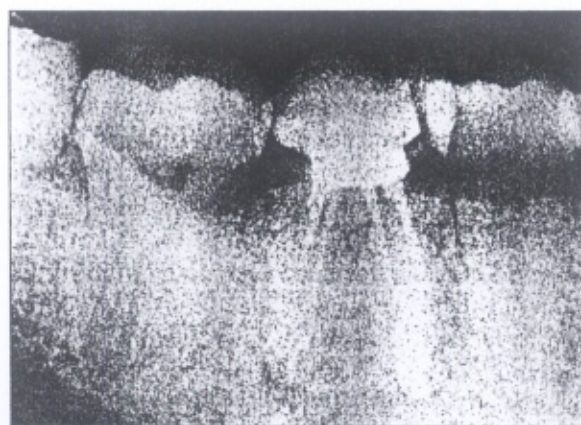


Figure 3. Tooth #46 in twenty-nine-year-old female; age of root canal filling is nine months; patient presents with severe, spontaneous pain; replacement of the restoration is planned.

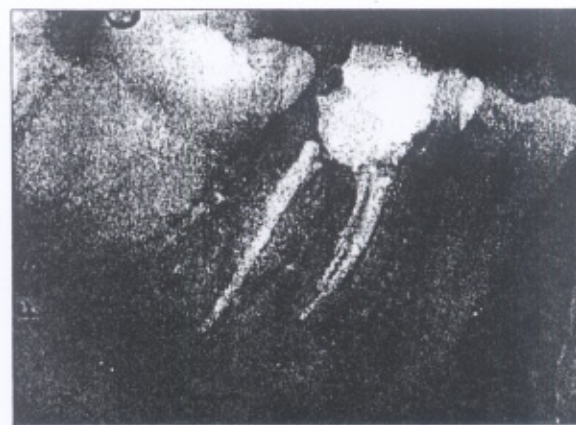


Figure 4. Tooth #46 in eighteen-year-old female; age of root canal filling is one year; mild pain triggered by chewing; permanent restoration is planned.

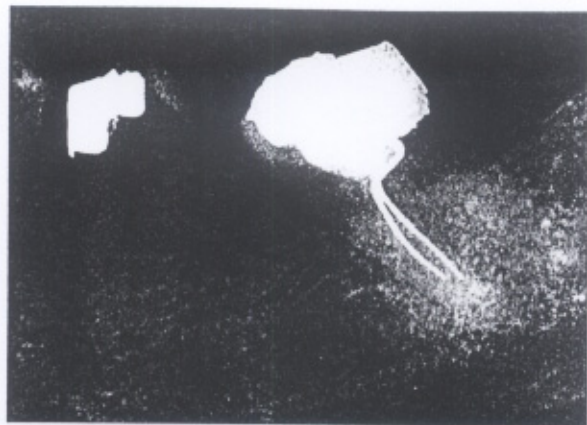


Figure 5. Tooth #37 in thirty-eight-year-old female; age of root canal filling is five years; no complaints; grade I mobility; restoration with a crown is planned.

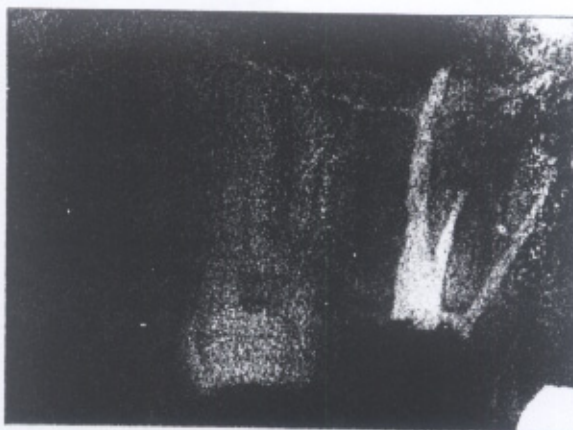


Figure 6. Tooth #16 in forty-year-old female; age of root canal filling is four years; no complaints; no coronal seal since six months ago; restoration with a crown is planned.

Results

A total of 899 responses were generated from the two groups (30 dentists x 30 cases). The return rate was 100 percent. Table 1 shows the percentage of retreatment decisions among endodontists and general dental practitioners. The choice to retreat in general was higher than the other choices (65.8 percent). Although most dentists chose to retreat the cases, there was a significant difference ($p=0.042$) between the percentage of endodontists who chose to retreat and the percentage of general dentists (53.9 percent and 41 percent respectively). The result of this study also showed that although not statistically significant, extraction was preferred by general practitioners (8.2 percent) as compared to endodontists (3.3 percent). In addition, root resection was preferred twice as much (2 percent) by general practitioners than endodontists (1.1 percent).

Table 2 shows the factors that dentists indicated influenced their decision when their choice was retreatment for the case. Significantly more endodontists found periapical lesions, missed canals, and loss of coronal restoration to influence their choice of retreatment than did general dentists.

Table 3 shows the retreatment decisions among endodontists with different places of employment, educational backgrounds, and years of experience. No significant differences were found within the endodontic group.

Table 4 shows the retreatment decisions among general practitioners with different places of employment, educational background, and years of experience. Significant differences were found for general practitioners working in the armed forces hospitals regarding the decision to observe (wait and see).

Discussion

The use of radiograph-based clinical cases to evaluate practitioners' attitudes towards root canal treated teeth is not new. The thirty cases used in this



Figure 7. Tooth #14 in fifty-two-year-old female; age of root canal filling is more than twenty years; no complaints; restoration with a crown is planned.

study were carefully selected to represent a wide range of clinical situations of endodontically treated teeth with or without radiographic evidence of periapical lesions, clinical symptoms, and with varying quality of root canal fillings and coronal restorations. In this study, there was considerable variability in the clinical management of endodontically treated teeth. Significantly more endodontists chose to retreat the cases compared to general dentists. This indicated that the treatment option for endodontic retreatment might be underestimated by general dentists despite the success rate of 60-90 percent for retreatment as shown by several investigators.^{2,4} Our results disagree with Pagonis's findings that endodontic postgraduate students also favored no treatment (69.7 percent) versus retreatment (22.6 percent).¹⁰

The greatest influencing factor in endodontic decision making was specialization. Endodontists

showed more agreement with their retreatment decisions regardless of their places of employment, educational background, or years of experience. This is in agreement with Heinikainen et al.,¹³ who reported that treatment decisions by general dentists and dental teachers were quite similar for a given case and in most cases independent of the dentist's work and practice-related characteristics. General dentists did not agree with endodontists regarding some of their decisions (this is not to say that consensus means they are correct).

Reit and Gröndahl¹⁵ showed the mere diagnosis of a periapical lesion usually did not appear to be sufficient reason for retreatment. In addition, Engstrom et al.²¹ showed that success of retreatment of cases with no radiolucency reaches 88.2 percent, whereas cases with a radiolucency of less than 5-mm reach 75.1 percent and cases with a radiolucency larger than 5-mm reach 50 percent. Bergenholtz et al.⁴ also found that for teeth with a radiolucency a success rate of 48 percent to 81 percent was obtained depending on the ability to regain full length of the root canal. In the present investigation, both general dentists and endodontists agreed on the need for treating teeth with a radiolucency and roots with deficiency of root filling as appeared on the radiograph. On the other hand, they differed on the importance of signs and symptoms. General dentists regarded clinical symptoms as relevant to their treatment decision, so in the absence of signs and symptoms they decided not to treat or to observe as in agreement with Van Nieuwenhuysen et al.¹² Endodontists on the other hand disregarded clinical signs and symptoms

Table 1. Percentage of votes for treatment options among the endodontists and general practitioners

Decision	Endodontists	General Practitioners
No treatment	7.6	13.6
Observation	12	18.3
Retreatment*	53.9	41
Apical surgery	10	7.3
Retreatment and apical surgery	12	9.6
Resection	1.1	2
Extraction	3.3	8.2

* $p < 0.05$

Table 2. Percentages of votes for factors affecting the choice to retreatment decisions among the endodontists and general practitioners

Reasons for treatment options	Endodontists	General Dentists	P-value
Clinical symptoms	27.7 percent	29.3 percent	0.745
Periapical lesion*	31.8 percent	17.4 percent	0.001
Underfilled canals	59.1 percent	63 percent	0.424
Overfilled canals	5.4 percent	7.6 percent	0.423
Missed canals*	25.6 percent	14.7 percent	0.006
Inadequate filling (voids)	33.5 percent	32.6 percent	0.917
Silver cones	13.6 percent	9.2 percent	0.175
Fractured instrument	2.5 percent	1.6 percent	0.738
Inadequate flare	43.4 percent	35.9 percent	0.135
Loss of coronal restoration*	12.8 percent	4.3 percent	0.003
Perforation	2.5 percent	1.6 percent	0.738

*Statistically significant

Table 3. Retreatment decisions within the endodontist group with regards to place of employment, years of experience, and educational background

Endodontists		No. of Endo.	1	2	3	4	5	6	7	Total
Place of Employment	Acad	5	20	17	67	23	20	1	2	150
	Private	1	0	4	9	4	10	2	1	30
	MOH	3	5	22	47	7	5	0	4	90
	AFH	6	8	10	121	12	19	2	7	179
Years of Experience	>5	6	17	21	87	24	25	1	5	180
	5-9	5	0	10	95	11	23	4	6	149
	10-14	1	5	2	18	2	3	0	0	30
	15	3	13	15	52	6	4	0	0	90
Educational Background	USA	7	15	20	107	26	33	2	6	209
	KSU	6	13	22	104	15	18	3	5	180
	Others	2	5	11	33	5	3	0	3	30
	Percentages		7.6	12	53.9	10	12	1.1	3.3	

Table 4. Retreatment decisions within the general dentist group with regards to place of employment, years of experience, and educational background

General Dentists		No. of GP	1	2	3	4	5	6	7	Total
Place of Employment	Acad	2	8	17	26	2	4	0	3	60
	Private	1	7	2	13	2	1	3	3	60
	MOH	1	5	14	4	4	0	0	3	30
	AFH	11	43	48	142	25	38	6	28	330
Years of Experience	>5	14	14	19	71	12	18	7	9	150
	5-9	32	32	34	58	15	19	2	20	180
	10-14	9	9	11	30	4	2	0	4	60
	15	8	8	17	26	2	4	0	3	60
Educational Background	USA	0	0	0	0	0	0	0	0	0
	KSU	52	52	71	165	25	39	9	29	390
	Others	11	11	10	20	8	4	0	7	60

and decided to retreat on the bases of technical or pathologic reasons. Follow-up studies on root canal treatment²²⁻²⁴ have suggested that the quality of the root canal filling impacts on the prognosis of root canal treatment.

More endodontists regarded obturation with silver points, missed canals, and loss of coronal restoration as relevant to their treatment decision.

One of the reasons for the unusually high failure rate of all endodontic cases reported in retrospective studies of surgeries performed may very well be due to the inclusion in those studies of large numbers of failing silver point cases.²⁵ Since the cause of

root canal treatment failure is bacterial in nature,²⁶ bacteria present in a missed canal or uninstrumented areas of the canal may reach the periradicular tissues via lateral canals or apical foramina, and thereby jeopardize the outcome of root canal treatment. In addition, bacteria may originate from the oral cavity, contaminate the root filling, in the case of an inadequate coronal restoration, and eventually irritate the periapical tissue.²⁷

Fractured instruments and inadequate flare of the canal were regarded as decision-influencing factors for the endodontists. Endodontists may recognize these as problems that might compromise suc-

cess, while general dentists may not regard these factors as problems that require correction. Hommez et al.²⁸ concluded that the technical quality of both coronal restoration and root filling had an influence on the periapical status.

Various factors mentioned by the two groups were said to be influential in their decision making; among them were the quality of the coronal restoration and whether the tooth would be used as a bridge abutment. It is well known that a poorly constructed restoration may be associated with endodontic failure.^{7,29}

General practitioners working in the armed forces hospitals favored not to treat and observe only compared to those working in other institutes. This is in agreement with the findings of Hülsmann⁹ and Pagonis et al.¹⁰ This could be due to the fact that general practitioners working in the armed forces hospitals deal with a large number of patients. Consequently, they may have to be more selective in retreating cases. In addition, patients treated in the armed forces hospitals are more likely to relocate, which in turn could lead the dentist to be less inclined to embark on any complicated treatment.

The input of various factors, including clinical experience, disparate training, and specialty philosophies to treatment, may contribute to differences in decision-making processes amongst groups of clinicians. Variation among dentist treatment recommendations for the same and/or similar patients signals a lack of consensus concerning diagnosis and treatment.³⁰ Specialization may lead to greater expertise in radiographic diagnosis or to greater consensus of thought through increased experience in the field or through intensive training. Consistency, however, does not imply that the decision is correct.³¹ To prevent misdiagnosis and eventually mistreatment, endodontic decision-making should be taught. Currently there are no specific guidelines for management of failed root canal retreatment. It is suggested that guidelines produced by evidence-based dentistry may produce less variation in clinical decision making.

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