

# Asymptomatic Faulty Endodontic Treatment ( Radiological and Clinical Assay)

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## ABSTRACT

**Aim:** The aim of this study is radiological assay of at least two years period of clinically asymptomatic faulty endodontic treatment among the patients sex and treated teeth location. **Materials and Methods:** A total of 447 individuals (20–60y age) from both sexes were selected, they had history of endodontic treatment for at least two years ago. They were clinically asymptomatic and radiographic examination showed they had faulty endodontic treatment. Radiographic examinations in this study was intraoral periapical projection, used bisecting angle technique, used dental x-ray machine, periapical film. Special chart was prepared for this study. The faulty endodontic treatments were radiographically categorized as under-filling, overfilling, missing root canal, perforations of the root canal, and fractured or separated instrument in the root canal. Statistically frequency distributions calculated. Chi-square test was used to calculate significance difference with the level of  $p < 0.05$ . **Results:** The results showed that the under-filling had the highest percentage of the faulty endodontic treatment and the females had a higher percentage than that of the males, and the posterior teeth had a higher percentage than that of the anterior teeth. **Conclusion:** Faulty endodontic treatment is not the direct cause of the signs and symptoms of endodontic treatment failure, there are no significant differences of the faulty endodontic treatment among the patients sex, but there is a significant difference among the location of the treated teeth.

**Key words:** faulty endodontic treatment, radiographic and clinical assay.

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## INTRODUCTION

The goal of endodontic therapy is the prevention and/or the elimination of pathosis of endodontic origin<sup>(1)</sup>. Successful restoration of an endodontically treated tooth may be a challenge procedure. It is generally accepted that correct diagnosis, proper debridement, preparation of the pulp cavity and the subsequent complete obturation of the prepared cavity are the triad essential for successful root canal therapy<sup>(1,2)</sup>.

Success or failure of endodontic treatment is determined on the basis of radiographical findings and clinical signs and/or symptoms of the treated teeth<sup>(3, 4)</sup>. Several factors were suggested as the possible causes of root canal failures. These include under-filling or over-filling, perforations

of the root canal system and instrument separation are possible complications of endodontic therapy<sup>(5, 6)</sup>. Endodontic procedure errors typically are due to several factors. Among them is a lack of understanding of the root canal anatomy, the principles of mechanical instrumentation and tissue wound healing<sup>(6)</sup>.

Aim of this study was a radiological and clinical assay of at least two years period of clinically asymptomatic faulty endodontic treatment among the patients sex and treated teeth location.

## MATERIALS AND METHODS

A total of 447 individual ( 20–60y of age ) from both sexes males and females were selected from the patients that visit the Department of Oral and Maxillofacial

Surgery/ Radiographical Section at College of Dentistry/University of Mosul and that had a history of endodontic treatment for at least two years ago<sup>(1)</sup>, with absence of clinical signs and symptoms of periradicular infection (swelling, tenderness to pressure, mobility, sinus)<sup>(7)</sup> using dental probe and mirror for clinical examination, and the intraoral radiographic examinations conducted showed there was faulty endodontic treatment. Intraoral radiographic examination should show the full length of the roots and at least 2mm of the periapical bone must be visible<sup>(4)</sup>. The intraoral radiographic examination in this study was periapical projection, used bisecting angle technique and the equipments that used were Dental x-ray machine ( Trophy, France ), periapical film

size 2 adult type. Special chart was prepared for this study including information about age, sex, general health, the number or (location) of the endodontic treated teeth, period of the endodontic treatment, clinical signs and symptoms of periapical lesion of endodontic treated tooth and x-ray examination as shown in Figure (1). The faulty endodontic treatments were radiographically categorized as the following: (1) Under-filling. (2) Overfilling. (3) Missing root canals. (4) Perforations of the root canal system. (5) Fractured or separated instrument in the root canal. Statistically the data were collected and calculating frequency distributions. Chi-square test was used to calculate significance difference with the level of  $p < 0.05$ .

<u>Patient name :</u>	<u>Sex :</u>	<u>Age:</u>
<u>Occupation :</u>	<u>Tel. no :</u>	<u>Date:</u>
<u>Medical state :</u>		
<u>Dental history :</u>		
No. of endodontic treated tooth :		
Period of treatment :		
Present of illness :		
<u>Clinical examination :</u>		
Tender to percussion		
Swelling		
Mobility		
Fistula ( sinus )		
<u>Radiographical examination :</u>		
Endodontic treatment errors		
Under-filling		
Over-filling		
Missing root canal		
Perforation		
Fractured ( separated ) instrument		
Periapical lesion		
Periodontal space widening		
Periapical radiolucency		
Dr. name :		
Signature		

Figure (1) : Special chart for the clinical and radiographical examinations to determine the clinically asymptomatic faulty endodontic treated teeth.

## RESULTS AND DISCUSSION

Table (1) showed the frequency distribution of faulty endodontic treatment among clinical asymptomatic patients after at least 2 years of treatment. The highest percentage of the faulty was of under-filling root canal (82.55 %), missing root canal in a lower percentage of (8.054 %), over-filling root canal in percentage of (4.698 %), fractured instrument in a percentage of (3.356 %), and perforation in the lowest percentage (1.342 %). Table (2) showed the frequency distribution of

clinically asymptomatic faulty endodontic treatment among patients sex and the location of the endodontic treated teeth. The higher percentage was that of females (58.389 %) while that of the males was (41.611 %), The posterior teeth have the higher percentage (81.308 %), while the anterior teeth have (18.792 %). The higher percentage of faulty endodontic treatment of the posterior teeth is related to the anatomic complexities of the root canal system of the posterior teeth<sup>(8)</sup>.

Table (1) : Frequency distributions of at least 2 years period of clinically asymptomatic faulty endodontic treatments.

Errors	No.	%
<b>Under filling</b>	369	82.55%
<b>Missing canal</b>	36	8.054%
<b>Over filling</b>	21	4.698%
<b>Fractured instrument</b>	15	3.356%
<b>Perforation</b>	6	1.342%
<b>Total</b>	447	100%

No: Number of the faulty endodontic treatments.

Table (2) : Frequency distributions of at least 2 years period of clinically asymptomatic faulty endodontic treatments among sex and location of the treated teeth

Sex	Errors		Location of the teeth	Errors	
	No	%		No	%
<b>Male</b>	186	41.611 %	<b>Anterior teeth</b>	84	18.792 %
<b>Female</b>	261	58.389 %	<b>Posterior teeth</b>	363	81.208 %
<b>Total</b>	<b>447</b>	<b>100 %</b>	<b>Total</b>	447	100 %

No: Number of the faulty endodontic treatments.

The result of Chi-square test in Table (3) showed that there was no significant difference of the faulty endodontic treatment between the two sexes males and females at a level of  $p < 0.05$  when Chi-square value was ( $\chi^2 = 1.386$ ) at degree of freedom (DF = 4) and ( $p$ -value = 0.847).

The result of Chi-square test in Table (4) showed that there was a highly significant difference of the faulty endodontic treatment between anterior and posterior teeth at a level of  $p < 0.01$  when Chi-square value was ( $\chi^2 = 34.578$ ) at degree of freedom (DF = 4) and ( $p$ -value = 0.000).

Table (3) :Chi-square test of the faulty endodontic treatments between males and females.

Errors	Male	Female	Total
	No*	No*	
<b>Under filling</b>	150	219	369
<b>Missing canal</b>	18	18	36
<b>Over filling</b>	9	12	21
<b>Fractured instrument</b>	6	9	15
<b>Perforation</b>	3	3	6
<b>Total</b>	186	261	447

No: Number of the faulty endodontic treatments; ( $\chi^2$ ) = 1.386; DF = 4;  $p$  = 0.847

Table(4): Chi-square test of the faulty endodontic treatments between anterior and posterior teeth.

Errors	Anterior teeth	Posterior teeth	Total
	No*	No*	
Under filling	66	303	369
Missing canal	0	36	36
Over filling	9	12	21
Fractured instrument	9	6	15
Perforation	0	6	6
Total	84	363	447

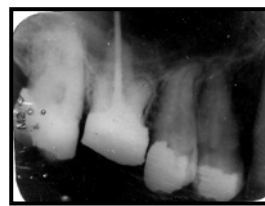
No : Number of the faulty endodontic treatments; ( $\chi^2$ ) = 34.578; DF = 4  
 $p = 0.000$

Figure (2) showed the results of periapical radiographical examination in this study, it shows the faulty endodontic treatment without periapical lesion after at least 2years of treatment with absence of clinical signs and symptoms that indicate the success of the endodontic treatment<sup>(3)</sup>. Clinical success was indicated by the absence of signs and symptoms and the radi-

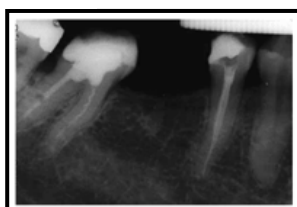
ographic success determined by (1) no periapical lesion (2) periapical lesion present at time of obturation disappeared completely or was noticeably diminished in size<sup>(1)</sup>. This result come in agreement with the finding of Louis *et al.*,<sup>(6)</sup> in that endodontic procedure errors are not the direct cause of treatment failure.



(a): upper left canine was endodontic treated before(4 )years ago, root canal under-filled



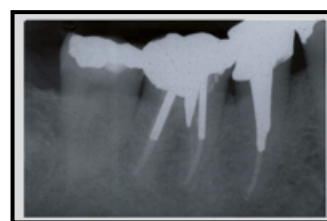
(b) : upper right first molar was endodontic treated before (3) years ago, palatal canal overfilled



(c): lower right first molar was endodontic treated before(3) years ago, separated instrument in the mesio- lingual root canal



• (d) : lower left first molar was endodontic treated before(3) years ago, mesio- lingual root canal unfilled



Lower right first molar was endodontic treated before (2) years ago, perforation at bifurcation

Figure (2): Faulty endodontic treatments, teeth were clinically asymptomatic and had no periradicular lesion

Under-filling of the root canals Figure (2: a ) often occurs as the result of incomplete instrumentation or ledge formation of the root canal during mechanical instrumentation<sup>(9)</sup>. However, if the unfilled canal does not contain irritants, such as bacteria or contaminated necrotic tissue, under-filling by itself would not cause periradicular inflammation<sup>(10-12)</sup>.

Overfilling of root canals Figure (2: b) occurs as a result of instrumentation through the apical foramen resulting from inaccurate measurement of the working length. In such cases, creating an apical stop becomes more difficult, thus leading to overfilling. Approximately, 76 percent of overfilled teeth heal satisfactorily after proper endodontic therapy<sup>(11, 13)</sup>. Bergenholtz and colleagues<sup>(14)</sup> reported that root filling material was not the immediate cause of unsuccessful treatment; rather, treatment failures were caused by a persistent root canal infection or by re-infection in the apical area resulting from over-instrumentation<sup>(13)</sup>.

Instrument separation or breakage Figure (2:c) usually is caused by improper use or overuse of the instruments, as well as by the excessive force applied to the instruments in curved or calcified canals during instrumentation. Torabinejad and Lemon<sup>(9)</sup> concluded that the instrument separation is not the primary cause of endodontic therapy failure rather, the separated instrument impedes the mechanical instrumentation of the infected root canal apical to the instrument, is the primary cause of treatment failure.

Missing root canal Figure (2: d ). Several clinical studies have shown that if the root canals were completely debrided of necrotic tissue and micro-organisms, the diseased periradicular tissues were capable of healing even without root canal fillings provided that the coronal seal could prevent entry of oral microorganisms into the canal<sup>(15, 16)</sup>. Root canal infection—not unfilled canal space—is the cause of periradicular inflammation<sup>(5, 17)</sup>.

Root canal walls perforation Figure (2: e). Perforations can be caused either by lack of attention to the details of the internal anatomy of the root canal system, or from excessive removal of canal dentin from excessive enlargement of the coronal third

of small curved canals, or by an inability to maintain canal curvature because of ledge formation<sup>(18, 19)</sup>. Root perforations are not cause the endodontic treatment failure, rather the primary cause of periradicular inflammation is the remaining infected tissue in the un-instrumented portion of the canal apical to the perforation<sup>(20,21)</sup>.

## CONCLUSIONS

The results in this study appeared that the clinically asymptomatic faulty endodontic treatment indicate that the faulty endodontic treatment is not the direct or the primary cause of endodontic treatment failure. The result also appeared that there is no significant differences of the faulty endodontic treatment among the patients sex but there is a significant difference among the location of the endodontic treated teeth, the posterior teeth have the higher percentage.

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