

## Original Research

### Evaluation of different Causes for Root Canals Failures in a known population

Asma Altaf<sup>1</sup>, Nuzhat Mir<sup>2</sup>, Mansha Jeelani<sup>2</sup>

<sup>1</sup>Private consultant (MDS, Endodontist), J & K, <sup>2</sup>Private Consultant (BDS), J & K

#### ABSTRACT:

**Background:** The primary goal of endodontic treatment is to eliminate or reduce the microbes from root canal space by chemo mechanical preparation and to prevent re-infection and promote periapical healing by hermetically sealing the root canal space. Hence; the present study was undertaken for assessing and evaluating different Causes for Root Canals Failures in a known population.

**Materials & Methods:** A total of 100 patients were included in the present study. Inclusion criteria included: Patients who underwent root canal therapy and reported with postoperative pain, Patients with negative history of any other systemic illness. Intra-oral Periapical (IOPA) radiographs were taken. All patients were informed regarding the study and written consent was obtained. IOPA radiographs were assessed for presence of presence or absence of periapical radiolucency, quality of obturation, missed canal, dislodged/fractured restorations, iatrogenic problems: perforation, file separation, ledges etc. **Results:** Incomplete obturation was the cause of root canal failure in 53 percent of the cases. Missed canals were found to be present in 24 percent of the cases. Significant results were obtained while assessing the different causes of root canal therapy failure. In the present study, we observed that, out of 24 patients with missed canals, in 19 patients, molar was involved while in the remaining 5 patients, premolars were involved. While assessing distribution of various causes of root canal failure according to tooth type, significant results were obtained. **Conclusion:** Root canal failure can occur due to a number of reasons with most common being missed canal, inadequate obturation and fractured coronal obturation.

**Key words:** Pulp, Root canal, Restoration

**Corresponding author:** Dr. Nuzhat Mir, Private Consultant (BDS), J & K

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#### INTRODUCTION

The primary goal of endodontic treatment is to eliminate or reduce the microbes from root canal space by chemo mechanical preparation and to prevent re-infection and promote periapical healing by hermetically sealing the root canal space. This treatment has a high rate of success, when the highest standards are followed during the procedure. The literature reported 90–95% of success rate of root canal treatment.<sup>1-3</sup>

Despite all these root canal treatment can fail for various reasons. Majority of the studies determine the endodontic treatment failure on the basis of radiographic findings and clinical signs / or symptoms of the treated teeth. The quality of root canal treatment is mainly based on radiographic evaluation. Radiographic evaluation provides contrast, density, taper and homogeneity of the quality of root canal filling. Periapical health and healing depend on the quality of root canal filling. The research has proved a direct relationship between low quality of root canal

filling and periapical changes. These studies reported high prevalence of periapical lesions in endodontically treated teeth with inadequate root canal fillings.<sup>4,5</sup> Causes of endodontic failure can be classified into biological and technical factors. Failures related to microorganisms can be caused by anatomical difficulties such as isthmus, apical ramification, and other morphological irregularities. The complexity of C-shaped canals makes them difficult to clean, shape, and obturate effectively. Failures also can be caused by procedural errors such as root perforation, separated instruments, or missed canals. The thin dentinal wall of the buccal or lingual groove may lead to strip perforation, which poses a considerable threat to tooth prognosis.<sup>6-8</sup> Hence; the present study was undertaken for assessing and evaluating different Causes for Root Canals Failures in a known population.

**MATERIALS & METHODS**

The present study was commenced with the aim of assessing the different causes of root canal failure. A total of 100 patients were included in the present study. Inclusion criteria included:

- Patients who underwent root canal therapy and reported with postoperative pain
- Patients with negative history of any other systemic illness

After meeting the inclusion criteria, complete demographic details of all the patients were obtained. Complete clinical examination of all the patients was carried out and intra-oral Periapical (IOPA) radiographs were taken. All patients were informed regarding the study and written consent was obtained. IOPA radiographs were assessed for presence of presence or absence of periapical radiolucency, quality of obturation, missed canal, dislodged/fractured restorations, iatrogenic problems: perforation, file separation, ledges etc. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test and student t test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

**RESULTS**

In the present study, a total of 100 patients who reported with root canal therapy failure were enrolled. Mean age of the patients was found to be 47.1 years. 40 percent of the patients belonged to the age group of 30 to 50 years. 68 percent of the patients were males while the remaining were 32 percent were females. 25 percent of the patients belonged to the age group of less than 30 years. Incomplete obturation was the cause of root canal failure in 53

percent of the cases. Missed canals were found to be present in 24 percent of the cases. Significant results were obtained while assessing the different causes of root canal therapy failure. In the present study, we observed that, out of 24 patients with missed canals, in 19 patients, molar was involved while in the remaining 5 patients, premolars were involved. While assessing distribution of various causes of root canal failure according to tooth type, significant results were obtained.

**DISCUSSION**

The purpose of root-canal treatment (RCT) is thorough mechanical and chemical cleaning of an infected root-canal system, followed by its complete obturation with a filling material. Removal of infected substances and avoidance of further intraoperative/postoperative infection are crucial for successful RCT. Failure of RCT can be because of infected substances inside the root canal or at extraradicular areas. It has been reported that extraradicular infection associated with apical periodontitis does not respond well to RCT according to culture-based and molecular studies. Morphologic studies by our research team have shown that biofilms develop on root surfaces outside apical foramens of the teeth extracted for refractory periapical periodontitis and that gutta-percha points extrude in extraradicular areas removed during endodontic treatment for chronic periapical periodontitis.<sup>8-10</sup> Hence; the present study was undertaken for assessing and evaluating different Causes for Root Canals Failures in a known population.

**Table 1:** Age and gender-wise distribution

Parameter		Number	Percentage
Age group (years)	Less than 30	25	25
	30 to 50	40	40
	More than 50	35	35
Gender	Males	68	68
	Females	32	32

**Table 2:** Different causes of root canal therapy failure

Causes of failure	Number of patients	Percentage of patients	p-value
Incomplete obturation	53	53	0.018 (Significant)
Missed canals	24	24	
Features coronal restoration	15	15	
Other	8	8	

**Table 3:** Distribution of various causes of root canal failure according to tooth type

Causes of failure	Incisors & canines	Premolars	Molars	Chi square value	p-value
Incomplete obturation	15	19	19	252.88 (Significant)	0.001
Missed canals	0	5	19		
Features coronal restoration	3	3	9		
Other	3	3	2		

In the present study, a total of 100 patients who reported with root canal therapy failure were enrolled. Mean age of the patients was found to be 47.1 years. 40 percent of the patients belonged to the age group of 30 to 50 years. 68 percent of the patients were males while the remaining were 32 percent were females. 25 percent of the patients belonged to the age group of less than 30 years. Incomplete obturation was the cause of root canal failure in 53 percent of the cases. Missed canals were found to be present in 24 percent of the cases. Significant results were obtained while assessing the different causes of root canal therapy failure. Akbar I in a previous study, determined radiographically the different reasons and problems of endodontic treatment failure. The periapical radiographs of 100 patients with one hundred teeth (130 root canals) were examined to identify the problems and failures of endodontic treatment. The various reasons of failure that is under filling, poor filling, over filling and presence of procedural errors were recorded for each root filled canal. Chi square test was used to determine statistical significance between different parameters. Under fillings were found in 46.9% of the root canals. The percentage of poor fillings and over fillings were 28.5% and 13% respectively. Separated instruments and strip perforations were present in 4% and 3% of the teeth, while the presence of furcal perforation and coronal leakage was observed in one case each (1%). Endodontic problems and failures were most commonly observed in molars compare to anterior and premolar teeth. Mesio Buccal, mesiolingual and distobuccal root canals were the most frequently canals with endodontic problems and failures. The relationship between mesio Buccal, mesiolingual and distal canals in mandibular molars and mesio Buccal, distobuccal and palatal canals in maxillary molars in terms of endodontic failures were statistically significant by chi square analysis ( $P \leq 0.05$ ). The most common cause of endodontic treatment failure was under filling followed by poor filling and over filling and first molar was the most frequently involved tooth with endodontic problems and failures.<sup>11</sup>

In the present study, we observed that, out of 24 patients with missed canals, in 19 patients, molar was involved while in the remaining 5 patients, premolars were involved. While assessing distribution of various causes of root canal failure according to tooth type, significant results were obtained. Yamaguchi M et al identified the factors causing endodontic failures in general practices. Patients diagnosed as having refractory periapical periodontitis by general practitioners and who requested endodontic treatment at Osaka University Dental Hospital were selected by checking medical records from April 2009 to March 2013. Factors causing endodontic failures were identified. A total of 103 teeth were selected, and 76 teeth completed root-canal treatment. Tooth extractions were required for 18 teeth after or without endodontic treatment. Six teeth required apicoectomy after endodontic treatment. One tooth needed hemisection. One tooth needed intentional replantation. One tooth needed adhesion and replantation. The main causes of treatment failure were open apices (24 teeth), perforation (18 teeth), and root fracture (13 teeth). In six teeth with open apices that required apicoectomy or extraction, extraradicular biofilms may have been related to

endodontic failure. Most endodontic cases diagnosed with refractory periapical periodontitis by general practitioners were compromised by any other factors rather than extraradicular biofilms.<sup>12</sup>

## CONCLUSION

From the above results, the authors concluded that root canal failure can occur due to a number of reasons with most common being missed canal, inadequate obturation and fractured coronal obturation. However; further studies are recommended.

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