



## ORIGINAL RESEARCH ARTICLE

### NON-SURGICAL MANAGEMENT OF ENDODONTIC FAILURE - AN OBSERVATIONAL STUDY

K Prajapati<sup>1\*</sup>, N Joshi<sup>1</sup>

<sup>1</sup>Department Of Conservative Dentistry and Endodontics, People's Dental College And Hospital, Kathmandu.

\*Correspondence to: Kranti Prajapati, Department Of Conservative Dentistry and Endodontics, People's Dental College And Hospital, Kathmandu.  
Email: [kranti\\_prajapati@hotmail.com](mailto:kranti_prajapati@hotmail.com)

#### ABSTRACT

In the present study, possibility of non-surgical endodontic re-treatment for correction of symptomatic endodontic failure with and without periradicular pathosis was evaluated both clinically and radiologically. The main objective of this study was also to assess, verify and establish the non-surgical re-treatment method as primary approach to resolve endodontic failures irrespective of sex. A total 69 cases of endodontic failure with or without periapical pathosis were studied of which 24 (34.78%) were male and 45 (65.21%) were female. The mostly affected teeth were Mandibular 1<sup>st</sup> molars 19 in number (27.53%) followed by Maxillary central incisors 17 in number (24.63%). After one year follow up, the final outcome was success- 47 (75.80%), doubtful- 2 (3.22%) and failure-13 (20.96%)

**Key words:** Chitwan, Disease, Geriatrics, Health status, Life style, Morbidity.

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#### INTRODUCTION

In recent years, the number of people seeking endodontic treatment has dramatically increased because of the people's choice of root canal treatment over extraction. As the number of root canal treatment increases, unfortunately the number of failures which require re-treatment increases as well.<sup>1</sup> There are a great number of article reporting the success rates of endodontic treatment ranging between 53% to 94%.<sup>2</sup> However, even if 90% of all endodontic treatment is successful over time, the reciprocal failure rate is still 10%. When root canal treatment fails, decision has to be taken regarding the management; they may be the following - non-surgical re-treatment, surgical re-treatment or extraction.<sup>3, 4</sup> According to survey by Buckley and Spangberg at the University of Connecticut, periradicular lesions found 8-10 times more often in endodontically treated teeth than for teeth without root fillings.<sup>5</sup> Most re-treatment can be eliminated however, if adherence to the principles of root canal treatment were carried out in every step

of the initial procedure. Like wise, if re-treatment are to be eliminated and replaced with quality initial treatment, there is no room for quick or magical technique in canal cleaning, shaping and obturation.<sup>6</sup> However, clinical surveys indicate that primary root canal therapy has a considerably higher success rate than subsequent attempt.<sup>3</sup>

Non-surgical re-treatment is an endodontic procedure used to remove materials from the root canal space and if present, address deficiencies or repair defects that are pathologic or iatrogenic in origin, these disassembly and corrective procedure then allow the clinician to 3-D clean, shape and pack the root canal system.<sup>1</sup> Even with the vast improvement achieved in surgical endodontics in recent years, these techniques are restricted in their ability to eliminate pulp, bacteria and related irritants from root canal system.<sup>7,8</sup>

Many significant advantages result when failing

endodontic cases are non-surgically re-entered. Endodontic failures can be evaluated for coronal leakage, fractures and missed canals. Importantly, these root canal systems can be cleaned, shaped and packed in 3-D. In fact, many pathologic and iatrogenic events can be repaired non-surgically. Infrequently but on occasion, surgery may still be necessary; however, the clinician will have greater confidence in surgical outcome if the root canal space has been addressed in 3-D.<sup>1</sup>

## MATERIALS & METHODS

This study was done in the Department of Conservative Dentistry and Endodontics, Peoples Dental College & Hospital, Kathmandu. 69 cases of symptomatic endodontic failures with or without periapical pathosis were treated. All the patients were thoroughly interrogated about their occupation, socio-economic conditions, general health status, drug history, present and past dental history. Patients' symptoms and related clinical signs, radiographic evidence of any periapical pathosis, interval between the initial treatment and re-treatment, the type of restoration placed in those particular teeth after the initial endodontic treatment, all were recorded. Diagnosis was confirmed according to a detailed clinical and radiological examination with pulp vitality test. The magnifying glass was used to examine the IOPA X-rays to determine any periradicular lesion if present. Widening of periodontal ligament space by 1 mm or more involving at least one root was necessary to categorize the tooth having a periradicular lesion. The reasons for re-treatment were judged from patients' previous records and radiographs, if any, and noted accordingly.<sup>9</sup>

After proper selection of cases, the re-root canal treatment procedure was as follows; with all aseptic precaution, the tooth was isolated with cotton rolls and saliva ejector. If a crown was present, it was removed by trident crown remover. In filled tooth it was penetrated to gain access to the previous root filling, whereas in open cavities due to loss of coronal restoration, gutta-percha were directly accessed. Missed canals were also located and managed accordingly. In canals where gutta-percha were poorly condensed, the gutta-percha points were pulled out of the canals with flutes of a file. In this technique either reamers or K-files were used to bypass the obturation followed by H-files to retrieve it. File was

gently threaded into the root canal, excessive rotation was avoided to prevent instrument breakage.<sup>10</sup> In difficult and restricted cases, rectified turpentine oil was used as solvent for removing gutta-percha. In this sequential technique pulp chamber was filled with turpentine oil and then selecting an appropriate sized K-files to gently "pick" into the chemically softened gutta-percha. Initially a size 10 or 15 SS file was used to "pick" into the gutta-percha occupying the coronal one third of the canal. Frequent irrigation with turpentine oil in combination with "picking" action creates pilot hole and sufficient space for serial use of larger files to remove gutta-percha in this portion of canal. This method is continued until gutta-percha is no longer evident on the cutting flutes when the files are withdrawn. After removal of coronal third of the canal the technique is repeated in the middle third and finally apical one third. With the help of preoperative radiograph, approximate length of the root canal was obtained and then widening of the canals was done by gradual enlarging the canals with sequential instrumentation by "Stepdown Technique".<sup>10</sup> Copious irrigation was done after each instrumentation for the removal of dentine and organic debris from the canal by alternate irrigation with sodium hypochlorite and hydrogen peroxide. Early preparation of the coronal straight section of canal was achieved with increasing sizes of H-files followed by Gates-Glidden burs. A diagnostic radiograph was taken for every case of Re-RCT to calculate the exact root canal working length. The apical part of the preparation was started with a pre-curved, lubricated fine file (08, 10, 15) used with an apical-coronal filing motion. Increasing sizes of files were until the apical preparation had been enlarged to a minimum size of 25. The preparation was stepped back with progressively larger files to join the already enlarged coronal part. Drying of root canal was now done with absorbent paper points. As root canal dressing either 5% iodine-potassium iodide or calcium hydroxide paste was used. All cases were treated in multiple appointments. A root canal sealer (zinc oxide eugenol) was introduced in the canal by lentulo spiral filler. A master cone gutta-percha point was selected and a spreader was used to create lateral space for condensation with multiple gutta-percha points in order to obtain hermetic apical seal. Excess gutta-percha points were removed from pulp chamber by cutting and cementation done with zinc oxide eugenol cement. Silver amalgam filling was done as a final restoration. Judicious grinding was done

to prevent excessive masticatory stress. Final check x-ray was taken, and any medication if necessary was prescribed. Patients were recalled for follow-up at 3 months, 6 months, and 12 months for long term clinical and radiological evaluation. All relevant data were collected and verified accordingly and analyzed statistically. Chi square tests were performed and a value < 0.05 was considered statistically significant.

**RESULTS**

Non-surgical endodontic re-treatment were performed in 69 cases of symptomatic endodontic failures with or without periapical pathosis, irrespective of sex. The highest affected teeth were Mandibular first molars 19(27.53%), and next highest affected teeth were Maxillary central incisors 17(24.63%) (Table I). 56 (81.15%) had incomplete obturation, 3 (4.34%) had broken instrument as cause of failure of previous root canal filling (Table II).

Out of 69 cases 62 were available for follow-up, thereby evaluated for result of non-surgical re-treatment. After 3 months, 6 months and 12 months, number of asymptomatic cases were 45(72.58%), 48(77.41%) and 48(77.41%) respectively whether 17(27.41%), 14(22.58%) and 14(22.58%) had complications accordingly (Table III).

Regarding periapical pathosis In this study, after a period of 12 months, In group without periapical radiolucency successful were 20(95.23%), failure was 1(4.76%) and in group with periapical radiolucency successful were 27(65.85%), doubtful were 2(4.87%), failure were 12(29.26%) The outcome in both groups is not similar and there is statistically significant (P<0.05) difference of success between the two groups (Table IV). Outcome of non-surgical re-treatment after long-term clinical and radiographic evaluation of study subjects, Out of 62 patients 47(75.80%) were successful, 2(3.22%) were doubtful, 13(20.96%) were failure (Table V).

**Table I: Distribution of the patients by affected teeth. (n=69)**

Teeth	MaxillaryNo(%)	Mandibular No(%)
Central Incisors	17(24.63)	3(4.34)
Lateral Incisors	7(10.14)	2(2.89)
Canines	0(0)	0(0)
First Premolars	3(4.34)	0(0)
Second Premolars	3(4.34)	3(4.34)
First Molars	3(4.34)	19(27.53)
Second Molars	2 (2.89)	6(8.69)
Third Molars	0(0)	1(1.44)

**Table II: Distribution of patients by cause of failure of previous root canal filling (n=69)**

Cause	Number	Percentage
Incomplete obturation	56	81.15
Broken instrument	3	4.34
External root resorption	2	2.89
Unfilled canals	2	2.89
Missed canals	2	2.89
Coronal perforation	2	2.89
Over obturation	1	1.44
Adjacent pulp less tooth	1	1.44

**Table III: Postoperative long term clinical findings (n=62)**

Clinical findings	Number	Percentage
At 3 months		
Asymptomatic	45	72.58
Complications	17	27.41
At 6 months		
Asymptomatic	48	77.41
Complications	14	22.58
At 12 months		
Asymptomatic	48	77.41
Complications	14	22.58

**Table IV: Outcome in groups without periapical radiolucency and with periapical radiolucency after 12 months**

Outcome	Without periapical radiolucency (n=21)		With periapical radiolucency (n=41)		P Value
	No.	(%)	No.	(%)	
Success	20	95.23	27	65.85	0.037 S
Doubtful	0	0	2	4.87	
Failure	1	4.76	12	29.26	

NS = Not Significant at > 0.05 level

**Table V: Outcome of non-surgical re-treatment after 12 months. (n=62)**

Outcome	Number	Percentage
Success	47	75.80
Doubtful	2	3.22
Failure	13	20.96

## DISCUSSION

In total 69 cases of endodontic failures with or without periapical pathosis were studied and treated by non-surgical endodontic re-treatment method. The success rate in the study for re-treatment was 75.80%, which is comparable to success obtained by other researchers for this mode of treatment. The re-treatment with no periapical lesion had success of 95.23%, whereas with periapical lesion had success of 65.85%, which is well matched within the range of previous published result. The factors associated with endodontic failures and re-treatment is multivariant. Overfilling seems significantly less of a problem than incomplete or poor obturated canals. Excessive overfilling were noted in 1.44% of teeth in this study, 4% of Washington<sup>3</sup> Study failure and 3% of the teeth evaluated by Hoen et al.<sup>11</sup> and 12% of the teeth evaluated by Peterson et al.<sup>12</sup> Incomplete obturation observed in the Washington study<sup>3</sup> was 59%, in Peterson study<sup>12</sup> 50%, in Hoen study<sup>11</sup> 65%, and in present study poor obturation quality was seen in 81% cases. Over four-fifth of all of the endodontic failures in this study were related to inadequate performance of two points of the endodontic triad, "canal instrumentation and canal obturation". The lack of appropriate canal shaping only increases the clinical difficulty of subsequent cleaning and obturation procedure<sup>13</sup> According to Washington study<sup>3</sup> broken instrument was the cause of failure in 1% cases, in this study broken instrument was the cause of failure in 4.34% cases. The highest affected teeth were the Mandibular first molars 27.53% in this study but in the study by Allen et al.<sup>3</sup> the highest affected teeth were the Maxillary central incisors 19.20%. In this study retreated 30% teeth had no periapical lesion; In the present study 90% patients were available for follow-up, where as 10% patients were not available for follow-up. In the present study at the end of 12 months 77% patients were asymptomatic where as 23% had complications. In this study complete apical healing was seen in 66% of cases. The final outcome after 12 months of non-surgical re-treatment was successful in 75.80% cases, doubtful in 3.22% cases and failure in 20.96% cases. Many researchers compared surgical and non-surgical re-treatment method and concluded that non-surgical method has slight more success rate than surgical method though the difference is not statistically significant. According to a study by Allen et al.<sup>3</sup> comparing surgical and non-surgical re-treatment cases, non-

surgical re-treatment had a success rate of 72.70% and surgical re-treatment had 60% success rate after 12 months. Bergenholtz et al.<sup>14</sup> reported 73% success of non-surgical re-treatment after 2 year. Hepworth and freidman<sup>15</sup> tried to estimate the success rate for re-treatment by a weighted average calculation and reported 59% and 66% for surgical and non-surgical approach. Kvist et al.<sup>16</sup> failed to show any systemic difference in the outcome of surgical and non-surgical re-treatment after 4 years final examination. Thus from a scientific point of view the length of follow-up period is imperative and may strongly influence the conclusion made. In this study the group with no periapical lesion had 95.23% success rate and 4.76% failure, and group with periapical lesion had 65.85% success, 29.26% failure and 4.87% doubtful cases. Friedman et al. claimed 100%, Strindberg 95%, Grahnon and Hansson 94%, Engstrom et al. 93%, Bergenholtz et al. 94%, Molven and Halse 89%, Allen et al. 96%, Sjogren et al. 98% success in group with no periapical lesion.<sup>3</sup> Strindberg claimed 84%, Grahnon and Hansson 74%, Engstrom et al. 74%, Bergenholtz et al. 48%, Molven and Halse 71%, Sjogren et al. 62%, Friedman et al 56%, Sundqvist et al. 74% success in group with periapical lesion.<sup>3</sup> The present study showed lower rate of success with periapical lesion, may possibly be due to the comparatively short observation time used. The 1year follow-up may not have been enough for larger lesion to heal. It seems reasonable to assume that during a longer observation period more lesions might have healed completely. On the other hand a periapical rarefaction, which persist after treatment all though reduced in size, may itself reflect a response to infectious products emanating from the root canal system. Therefore such cases should be regarded suspicious and classified as doubtful.

## CONCLUSION

The success rate of non-surgical re-treatment reinforces our belief that re-treatment procedures are worthwhile. Non-surgical re-treatment of endodontic failure is a valid alternative to extraction or surgical re-treatment. Success rate can be considered as good, however additional information is needed to more accurately predict the outcome of this treatment. A study in which multifactorial analysis could be performed would be extremely valuable. These include individual operator's ability, degree

of difficulty of the cases, variation in techniques, and difference in criteria for success and failure when dependent upon radiographic interpretation. As a result of this study it can be concluded that non-surgical endodontic re-treatment method in the management of endodontic failure was found to be safe, effective and practical. The success of this method shows that it can be used primarily for the management of endodontic failure.

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