

## Reasons for failure of nonsurgical root canal treatment in Nepali population

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### ABSTRACT

Non surgical root canal treatment is carried out to salvage the teeth in oral cavity .Although the success rate is found to be ranging from 81-95%, for variety of reasons failure of root canal is still seen in day to day practice .This is a cross sectional study done in Nepali population to evaluate the causes for such failures. It was found that inadequate obturation ( 45%) was the major cause of failure followed by missed canal,(32%) and fractured or dislodged restoration (14%). This study shows that the basis for successful non surgical root canal treatment depends on operators knowledge on individual tooth anatomy and skill to properly clean ,shape,obturate and restore the tooth in function .

**Keywords:** Non surgical root canal treatment, inadequate obturation, missed canal, Success vs. failure, Coronal restoration, Iatrogenic errors.

### INTRODUCTION

Increased dental patient education and awareness in conjunction with technological advancements have helped to promote the view that dentition should remain throughout people's lives. As a result, the need for performing conventional non surgical root canal therapy also has increased dramatically. Hence the vast numbers of teeth are salvaged by this procedure.<sup>1</sup>

The healing rates of conventional non surgical root canal treatment have been reported to be in the range of 81-95%. However, these figures relate to controlled clinical settings such as dental schools and specialist practices, whereas the frequency of post-treatment disease in general practice setting has been reported to be as high as 36%.<sup>2</sup>

Endodontic failure still occurs for a variety of reasons, and presence of clinical signs and symptoms along with radiographic evidence of periapical bone destruction indicates the need for reintervention. The first and most important step is to determine the cause of endodontic failure. Normally, the etiologic factors of endodontic failure can be placed into four groups: (1) persistent or reintroduced intraradicular microorganism, (2) extraradicular infection, (3) foreign body reaction, and (4) true cysts.<sup>3</sup>

Among those, many studies reported that microorganisms in the root canals or periradicular lesions play a major role in the persistence of apical periodontitis lesions after a root canal treatment.<sup>4</sup> Endodontic failure related to microorganisms can be caused by anatomical difficulties such as apical ramification, isthmuses, and other

morphologic irregularities as well as procedural errors such as missed canals, root perforation, ledge formation, and separated instruments.<sup>4</sup>

The quality of coronal restoration on favorable outcome of non surgical root canal treatment has been studied upon and has been established .According to the literature, failure to place an adequate coronal restoration results in a lower success rate.<sup>5, 6, 7, 8</sup>

Based on the causes of failure decision is made by the clinician among nonsurgical endodontic re treatment, surgical treatment or extraction.

This cross sectional study is designed to examine the clinical causes of failure and the limitation of a previous non surgical root canal treatment in Nepali population.

### MATERIALS AND METHODS

Total of 450 patients who came to the department and met the inclusion criteria of our study were examined. This resulted to total number of 834 teeth.

**Case Selection:** All symptomatic conventionally root canals treated cases with or without draining sinus/gingival abscess were included in the study. Periodontally compromised and teeth with previous history of surgical retreatment were excluded.

A tooth that has been successfully treated should follow the 'success' criteria. Conversely, failure of endodontic treatment is generally defined as occurring in the 'failure' section .<sup>9</sup>

**Assessment of possible cause of failure:** All cases were examined clinically and radiographically by two

**Table-1:** Success verses failure

Success	Failure
No clinical signs or symptoms of infection or inflammation following treatment	The treated tooth is symptomatic or has abnormal appearance
No loss of function	The soft tissue responds abnormally to palpation or other examination
No radiographic signs of ongoing pathology	Radiographs reveal that a periapical lesion has appeared after endodontic treatment
A reduction in the size and density of any previously existing periapical radiolucency	A periapical lesion that was radiographically vident before treatment has failed to heal or has become larger

operators (Endodontist) for possible causes of failure.

Clinical and radiographic assessments were done as per the guidelines by Abott<sup>9</sup> (Table-1). Intraoral Periapical (IOPA) radiograph was used for assessment of presence or absence of periapical radiolucency, quality of obturation, missed canal, dislodged/fractured restorations, iatrogenic problems: perforation, file separation, ledges etc.

The causes of failures, in our study, were broadly categorized as:

1. Inadequate obturation: Assessed the quality of obturation, with radiograph , which further includes;
  - a. Under obturation : Obturation material <2mm from the apex,
  - b. Over obturation: Surplus obturation material past the apex,
  - c. Inadequate condensation: Presence of voids in between obturation material /in between root and obturation material,
2. Missed canal: Unobtured root canal space (verified by 2 angled radiographs)
3. Dislodged/fractured restorations: Any defect in tooth –restoration interface/absence of any coronal restoration
4. Others (Iatrogenic problems: perforation, file separation, ledges etc).

All the data were tabulated and subjected to statistical analysis (SPSS 15.0).

**RESULTS**

Among the different causes for failure, inadequate obturation was found to be the major cause of failure of non surgical root canal treatment of all the posterior teeth of maxillary and mandibular arches except maxillary molars in which the missed canal was the prime cause. Similarly fracture /dislodged coronal restoration was third common cause of failure of non surgical root canal treatment of all the posterior teeth of maxillary and mandibular arches except maxillary premolars in which others (Iatrogenic errors) was the cause (Table-2).

The difference was found to be significantly higher in mandibular teeth compared to maxillary teeth in cases of inadequate obturation but reverse was found in others (Iatrogenic errors) (p <0.005). However there was no significant difference between maxillary and mandibular teeth in cases of missed canal and dislodged /fractured coronal restoration (Table-3). Frequency distribution is as depicted by pie chart (Fig. 1).

**DISCUSSION**

Conventional non surgical root canal treatment has predictable success rate due to our increased knowledge of root canal system along with technological advancement although various studies done around the world shows significant failure rates.<sup>10-15</sup> The underlying reason for the failure of endodontic treatment is almost invariably due to bacterial infection.

Inadequately obturated canals (under obturation/, over obturation, /inadequate condensation) which were found in this study to be the most common cause of failure .Dr. Schilder described the overextension or the under extension of a root canal filling as being solely a matter of its vertical dimension: beyond or short of the root apex. The overfilled canal was one that was well filled in three dimensions but exhibited surplus filling material past the apex. The under filled root canal fails to seal the circumference of the apical foramen in one or more dimensions, leaving reservoirs for stagnation of fluids, recontamination and persistence of infection.<sup>16</sup>

Commonly found inadequacy was under obturation most frequently in curved canal cases. This may be due inadequate attention to preoperative radiograph and also less attention given to negotiate the curved canal. Due to inability to develop apical stop over obturation and over extension was found. Correct determination of working length and maintaining the length throughout the procedures cannot be less emphasized. Single cone 2% gutta percha was found to be used for obturation led to failure due to inadequate sealing of the root canal .This emphasizes the need of adequate shaping and cleaning while maintaining the proper working length followed by adequate obturation for proper sealing of the apex which leads to successful healing .Meticulous length determination

Table- 2

	Maxillary			Mandibular		
	Anterior	Premolar	Molar	Anterior	Premolar	Molar
Inadequate obturation	22	33	92	27	60	139
Missed canal	2	28	103	2	12	120
Dislodged/fractured Coronal restoration	8	12	30	11	18	38
Others	4	20	25	2	11	15

and an adequate condensation technique are the crucial factors in determination of success and failure.

It is generally accepted that an inability to recognize the presence of and to adequately treat all of the canals of the root canal system may be a major cause of the failure of root canal therapy.<sup>17-20</sup> The frequency and risk of missed canal anatomy are strictly linked with the complexity of the root canal system; good knowledge of the potential aberrant canal morphology in maxillary and mandibular teeth will help clinicians to successfully recognize, clean and shape and obturate these difficult cases.<sup>21</sup> In this study the second most common cause of failure of root canal treatment was due to clinicians inability to locate the canal, this frequency may be due to persistent microorganism in uncleaned canal system which in due time will lead to failure. More missed canals were seen in posterior teeth this may be due to lot of anatomical variations and aberrancy.

The clinical impact of missed canal anatomy can be clearly demonstrated with the large number of case reports available in the literature; in the majority of these cases, failure of non surgical root canal treatment is associated with untreated canal space.<sup>21</sup> Localization and treatment of the missed anatomy typically leads to complete clinical and radiographic healing.

Commonly missed canals as of the study were MB2 in maxillary molars, distolingual as well as mesiolingual canals in mandibular molar, palatal canal in case of maxillary premolars, lingual canal in mandibular premolar, lingual canal in incisors. Two angled radiographs will help clinicians to appropriately locate the extra canal if present. This emphasizes the need of giving due attention to the root canal system with consideration for presence of anatomical variations.

Table- 3

	% maxillary	% mandibular	P value
Inadequate obturation	39	50	0.001
Missed canal	35	29	0.06
Dislodged/fractured Coronal restoration	13	14	0.67
Others	13	7	0.001

Loss of coronal restoration or fractured restoration was the third common cause of failure. Several researchers have found strong correlation between coronal seal and survival of root canal treatment.<sup>22-24</sup> Most commonly loss of coronal seal was found in posterior teeth (Table-1), this may be due to many cases being restored with GIC, Zinc Phosphate cement, Miracle mix which do not have sufficient compressive strength as Composite or Amalgam to take the masticatory load.<sup>25,26</sup> Researches have found a strong association between crown placement and the survival of endodontically treated teeth.<sup>27,28</sup> Tronstad *et al*<sup>29</sup> found the quality of the coronal restoration only to be of significant influence on outcome when combined with adequate endodontic treatment. This stress upon the fact that coronal coverage of endodontically treated tooth has to be given adequate attention to ensure the success of non surgical root canal treatment.

In other causes of failure includes iatrogenic error and its complications. Not all procedural problems lead to a reduced prognosis, but any error that compromises microbial control is likely to increase the risk of a poor outcome. The failure is mainly due to inability of the operator to properly shape and clean the canal. However, the removal procedure might result in loss of considerable tooth structure and clinical complications such as root perforation.<sup>30,31</sup> So clinician should be well trained to reduce the iatrogenic error.

The data collected in this study is less in relation to the amount of root canal treatment being done. This study also have not included multiple factors as preoperative status, pulpal and periapical status, size of periapical lesion preoperatively, irrigant used, intra canal medicaments, presence or absence of post and many other factors that might cause failure of non surgical root canal treatment. So detail prospective study with controlled cases is required to definitely establish the more intricate details on the cause of failure. This study is first of its kind done in Nepali population and can act as a basis for detailed researches in time to come.

To conclude anatomical aspect of teeth have to be studied upon and given due attention to along with proper technique should be followed by clinician to properly shape,



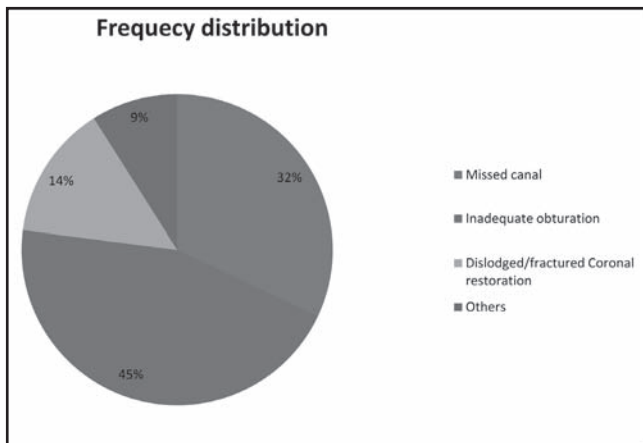


Fig. 1. Frequency distribution

clean, obturate and restore the tooth in function. Also need of continuing education in endodontics for the clinicians cannot be less emphasized.

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## Spectrum of Pediatric dermatoses in tertiary care center in Nepal

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### ABSTRACT

Children with dermatological problems constitute a major group presenting to the Outpatient Department. This study was done to see the pattern of skin disorder among the pediatric age group in a tertiary care center in Nepal. To determine the pattern of skin disorders among children visiting the Department of Dermatology and Pediatrics in a tertiary care center in Nepal. All the patients visiting the Dermatological Out patient Department in the age group 0-14 years were enrolled in the study during the time period of 3 years (2009-2011). The cases were diagnosed based on the detailed clinical history and clinical examination, and the patients were investigated as needed. A total of 1086 (22.64%) patients out of 4795 patients were having skin disorder and among them 584 (53.77%) were males and 502 (46.23%) were females. The age range was 0-14 with the mean age of 7 years. Dermatitis and eczema were the most frequently encountered disease 298 (26.46%), followed by bacterial infections 156 (16.13%), urticarial 190 (15.71%), viral infection (14.12%), fungal infection 76 (7.3%), scabies 54 (5.03%), miliaria 25 (2.75%), vitiligo 27 (2%) and others 87 (6.53%). Nutritional disorders, vascular, pigmentary, nevi, drug eruptions had a comparatively low incidence.

**Keywords:** Dermatoses, children, impetigo, eczema.

### INTRODUCTION

Pediatric dermatology is a separate entity in the developed nations. Skin diseases are among the most frequent diseases of school children in many developing countries. Skin diseases in the pediatric age group can be transitory or chronic and recurrent. The chronic dermatoses are associated with significant morbidity and psychological impact. Dermatological problems constitute at least 30% of all outpatient visits to a pediatrician and 30% of all visits to a dermatologist involve children.<sup>1,2</sup>

The prevalence of skin diseases amongst children in western Nepal was 13.46%.<sup>3</sup> Pediatric dermatoses requires a separate view from adult dermatoses as there are important differences in clinical presentation, treatment and prognosis. The school environment makes children vulnerable to cross transmission of communicable skin diseases among themselves and their families.

Cutaneous infections are common in children during school going years. Most of the cutaneous diseases which result from intrinsic genetic abnormalities also have onset in the pediatric age-group.

We undertook this study to determine the extent and pattern of common dermatoses in children presenting to a tertiary care center in Nepal.

### MATERIALS AND METHODS

This study was conducted in Departments of Dermatology and Pediatrics at our Institute, The

climate of this region is typical of a tropical area with high temperature and humidity. All children, 14 years and below, attending the dermatology outpatient department with any dermatoses from January 2009 to December 2011 were enrolled in the study. The diagnosis was made by a dermatologist based on detailed history, clinical features and appropriate investigations such as KOH examination, Tzanck test, Gram's stained smear, hematological and biochemical investigations, skiagrams, VDRL test, skin biopsy *etc.* The diseases were tabulated based on the etiology and results were analyzed.

### RESULTS

Out of 4795 patients, a total of 1086 (22.64%) patients belonged to the pediatric age group of 0-14 years. Among them 584 (53.77%) were males and 502 (46.23%) were females. The age range was 0-14 with the mean age of 7 year. 1086 children had only one dermatosis while 20 children had more than one dermatosis. 196 (20.33%) of the children belonged to age <1 years, 298 (27.9%) of the children belong to the age group of 1-4 years, 371 (35.06%) children belong to the age group of 5-9 years, and 221 (16.76%) of the children belong to the age group of 10-14 years (Fig. 1).

**Spectrum of Dermatoses:** Dermatitis and eczema were the most frequently encountered disease in 298 (26.46%), followed by urticarial 190 (17.33%), bacterial infections 156 (16.13%), viral infections