

Original Research

Prospective Observational Study of Factors Associated With Endodontic Flare Ups

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ABSTRACT:

Aims and Objectives: The aim and objective of the study was to determine the incidence of flare-ups during endodontic treatment and to identify the risk factors associated with flare-ups. **Subjects and Methods:** A total of 1523 patients who were treated during one year time period were included in study. Incidence of flare-up, patients' age, gender, status of pulp, tooth position, number of roots, and treatment provided were recorded. Relationship between these factors and flare-ups was examined. Statistical analysis was done using Chi-square test. **Results:** A total of 6.69% incidence of endodontic flare-ups was seen. Patient's gender, diagnosis and type of operator had a significant effect on the development of flare-ups ($P < 0.05$). **Conclusions:** Diagnosis plays an important role in predicting the incidence of flare-ups. Patients with preoperative pain and apical periodontitis had a higher risk of developing flare-ups.

Key words: Apical Periodontitis, Flare Ups, Retreatment.

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INTRODUCTION:

An endodontic flare-up is characterized by the development of pain and/or swelling both during or after endodontic therapy that is of sufficient severity to require an unscheduled visit for emergency treatment.¹ Flare-ups are undesirable and cause great discomfort to patient due to pain and swelling. Although the exact reasons for flare-up are not clearly understood, it is most definitely multifactorial.^{2,3} The prevalence of flare-ups has been examined with respect to patients' age, gender, tooth position, pulp and periapical conditions, preoperative signs and symptoms, operator skills, number of appointments and treatment protocol, and a positive correlation has been found.^{4,5}

Incidence of flare-ups and associated risk factors reported in studies vary widely. Risk factors may differ depending on the population, treatment modalities, and protocol followed. Hence, it is desirable for an institution to do its own study to identify risk factors and thus be prepared to avoid flare-ups. A prospective study involving a large

number of teeth can clarify the factors related to the presence of post-treatment sequelae.

This study aims to evaluate the incidence of flare-ups following an endodontic appointment and identify its associated risk factors in cases treated during a period of one year at Govt. Dental College and Hospital, Srinagar.

MATERIALS AND METHODS:

Patients reporting to the department of conservative dentistry and endodontics, Govt. Dental College and Hospital, Srinagar were examined clinically and radiographically for the treatment needs. Patients requiring endodontic treatment in anterior teeth and premolars were allotted to interns for root canal treatment. Simple posterior cases were allotted to junior residents, while as posterior teeth of moderate to difficult endodontic needs were allotted to postgraduates for management. Data on a total of 1523 teeth receiving either non-surgical primary RCT or retreatment in the Department of Endodontics was collected. Each patient's demographics, the tooth position, presenting symptoms, and the presence or absence of

preoperative pain (spontaneous or percussion pain) were obtained at the patient’s first visit. The pulpal diagnosis and periapical diagnosis of each treated tooth were also recorded. Only those patients who presented with severe pain and swelling after the initiation/completion of endodontic treatment and who needed an unscheduled visit were included in this study and again examined clinically and radiographically to determine risk factors associated with flare up. The overall incidence of endodontic flare-ups was calculated. The correlations between the incidence of flare-ups and various related factors was analyzed. Simple descriptive statistics were used to describe study population followed by analysis of relationship between risk factors and flare ups by the Chi-squared test. A p value of ≤ 0.05 was considered statistically significant.

RESULTS:

1523 teeth were included in the study out of which 102 needed emergency treatment yielding flare-up incidence of 6.69%. Table 1 summarizes demographic and clinical/radiographic data of 1523 teeth treated by different operators. Statistically significant associations were obtained between flare ups and patients’ gender, tooth type, pulpal diagnosis, periapical diagnosis, preoperative pain and type of operator. There were no significant correlations between the incidence of endodontic flare-ups and patients’ age or type of treatment (primary/retreatment). Among the intra-operative variables, the quality of debridement and instrumentation technique also showed significant association with incidence of flare ups (Table 2).

Table 1: Incidence of endodontic flare-ups and patients’ demographic, clinical and radiographic data

Patient age (year)	Total No. of Cases	Cases of flare-ups		P Value
		n	%	
13-20	153	13	8.5%	0.396
21-30	276	14	5%	
31-40	392	23	5.8%	
41-50	384	31	8%	
51-64	232	19	8.2%	
>65	86	02	2.3%	
Gender				
Male	921	35	3.8%	0.00001
Female	602	67	11.1%	
Tooth Type				
Anteriors	412	39	9.4%	0.003
Premolars	653	47	7.2%	
Molars	435	16	3.6%	
Pulpal Diagnosis				
Normal	16	01	6.2%	0.00001
Reversible Pulpitis	53	04	7.5%	
Irreversible pulpitis	1069	42	3.9%	
Pulpal Necrosis	322	51	15.8%	
Previously Treated	63	04	6.3%	
Periapical diagnosis				
Normal	306	11	3.6%	0.00001
Acute apical periodontitis	542	23	4.2%	
Chronic apical periodontitis	652	68	10.4%	
Preoperative Pain				
Present	1153	87	7.5%	0.036
Absent	347	15	4.3%	
RCT				
Primary	1460	98	6.7%	0.05
Re-RCT	63	04	6.3%	
Type of operator				
Intern	712	65	9.1%	0.001
Junior Resident	518	28	5.4%	
Post graduate	270	09	3.3%	

Table 2: Distribution of flare ups and associated intra-operative variables			
Total number of cases = 1523		Total number of flare up cases =102	
	No. of flare up cases		P value
Type of operator	n	%	
Intern	65	63.7	0.00001
Junior resident	28	27.4	
Post graduate	09	8.8	
Coronal Seal status			
Adequate	53	52	0.313
Inadequate	49	48	
Instrumentation Technique			
Hand Instrumentation	93	91.2	0.00001
Rotary Instrumentation	09	8.8	
Debridement			
Under Instrumentation	66	64.7	0.00001
Over Instrumentation	23	22.5	
Missed canals	13	12.7	

DISCUSSION:

This study revealed a 6.69% incidence of flare-ups during endodontic treatment. The rates reported in the literature range from 1.4% to 16%. This could be attributed to the fact that each study follows a particular protocol, thus using different samples and criteria to evaluate the stage of pain and/or swelling. Analysis regarding the influence of a patient's age did not show statistically significant differences in the flare-up rates. These results corroborate the findings of other authors.⁶ Conversely, a retrospective study carried out by Torabinejad et al.⁵ found a positive correlation between flare-up rates and age, gender, and dental arch. Similar relation was found in our study with strong correlation between gender of patient and type of tooth with incidence of flare ups. Present study showed almost three times more flare up incidence in females (11.1%) as compared to males (3.8%). In general, female patients have more-sensitive responses to RCT than male patients, it may be easier for female than male patients to feel and remember the discomfort after RCT even when they undergo the same treatment. This might have led to more female cases of flare-ups being reported by this prospective study.

Higher incidence of flare up in anterior teeth and premolars may be attributed to the fact that majority of anterior teeth and premolars were treated by interns and junior residents. Lower incidence of flare ups in patients treated by postgraduates can possibly be explained by the fact that operators with sufficient RCT experience using sound biological principles and contemporary techniques can achieve good endodontic outcomes after RCT.

The initial diagnosis is an important factor when evaluating painful exacerbations after an endodontic intervention. In the present study, there was a statistically significant difference in the occurrence of flare ups in cases presenting with pulpal necrosis and chronic apical periodontitis. An increased incidence of pain in these teeth may be explained by the presence of bacteria and their by-products within the root canals. Iqbal et al.⁴ concluded that the presence of a periapical lesion was the most important factor for occurrence of flare up during root canal treatment. An important diagnostic factor is the presence of preoperative pain when evaluating acute exacerbations after RCT. Many studies⁵⁻⁷ showed higher frequencies of flare-ups in patients with preoperative pain. In this study, we also found a significant relationship of the presence of preoperative spontaneous pain (87/102) with higher incidence of flare-ups. It appears that the presence of preoperative complaints is an excellent predictor for flare-ups.

Analysis of the type of treatment performed, whether initial treatment or retreatment showed no statistically significant difference regarding the incidence of flare ups. This finding was in agreement with those of Walton and Fouad¹ and Siqueira⁸. Removal of the inflamed contents and administration of appropriate medications may account for the lower incidence of flare-ups. In contrast, Trope et al⁹

and Imura and Zuolo⁶ showed a significantly higher incidence of flare-ups in retreatment cases than in the initial treatment cases.

Results of this study also showed statistically significant association between the instrumentation technique and quality of debridement. Mechanical irritation, including over-instrumentation and root canal overfilling, can cause periradicular inflammation³. Apical extrusion of debris during gutta-percha point removal may cause acute exacerbation of chronic inflammatory conditions.² Therefore, apical over-instrumentation and overfilling can disrupt normal periapical healing, and lead to the development of new periapical lesions¹⁰. Clinically, extrusion of filling materials beyond the root apex can occur in teeth with an unsatisfactory apical stop as with an over-instrumented apex as found in a study by Georgopoulou et al.¹¹

It is likely that the instrumentation technique used during NSRCT may play a role in the development of a flare-up as found in the present study with lesser number of flare up cases in teeth prepared with rotary instruments. This can be because post - graduates complete the majority of cases with crown-down techniques, utilizing the latest generation of apex locators and NiTi rotary instruments. Anatomical¹² and microbiological evidence¹³ have indicated certain advantages of enlarging canals to larger sizes. Therefore, thorough instrumentation of root canals¹⁴ and proper length control^{3,15} may be important factors in reduction of incidence of post-operative flare-ups.

CONCLUSION:

Within the limitations of this study, it can be concluded that incidence of flare ups is associated with the presence of preoperative pain and apical periodontitis with higher incidence in female patients.

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