



ORIGINAL ARTICLE

Incidence and Factors Related to Endodontic Flare Up - A 1-year Retrospective Study

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Received date: January 19, 2022; **Accepted date:** June 21, 2022; **Published date:** December 31, 2022

Abstract

Background: Endodontic flare up is a common complication of endodontic treatment that results from acute exacerbation of pulpal and peri-radicular pathosis; leading to unscheduled emergency visits that is disturbing for both clinicians and patients. Flare up causes are multifactorial that includes microbial, host, chemical and mechanical factors.

Objective: The aim of this retrospective study was to evaluate the incidence and identify risk factors of flare up in a multispecialty dental and maxillofacial center over a period of one year from February 2019 to February 2020.

Methods: Data was collected from 323 teeth belonging to 272 patients that completed their root canal treatment on multiple sessions during the evaluation period. The samples were classified based on inclusion criteria and variables according to teeth type; age; sex; pulpal and periapical pathosis; presence of intracanal medication between visits; and absence of coronal seal.

Results: The incidence of flare up was 122(38%), the evaluated variables did not show statistical significance in any of the evaluated parameters.

Conclusion: The incidence of flare up is widely diverse and may be due to a variety of reasons; and therefore, the management of flare up in each dental facility is different and varies according to their setup; number of clinicians and specialists available. Continuous training and skills improvement for clinician in charge of managing emergency patients with flare up is highly recommended.

Keywords: Dental Emergencies; Flare up; Infection; Inflammation; Risk factors; Root canal treatment

Introduction

Endodontic flare up is defined as pain and/or swelling that occurs as a complication of endodontic treatment after the initiation of root canal treatment resulting from acute exacerbation of pulpal and/or peri-radicular pathosis.^{1,2} It is also considered a common cause of endodontic emergencies that are

disturbing for both clinicians and patients, resulting in unscheduled emergency dental visits.³

The prevalence of flare ups is variable, ranging from as low as 0.39% up to 20%.⁴ The variance in the rate of flare-up and the incidence among studies remains challenging due to the absence of a gold standard and the diverse definitions of flare up.

The cause of endodontic flare up is multifactorial, including microbial, host, chemical and mechanical factors. Microorganisms and their byproducts play an essential role in initiating flare up, imbalance between the microflora and the defensive host factors through ejection of the infected debris and microorganisms into the periradicular tissues, insufficient micromechanical preparation of canals or insufficient asepsis during procedure leads to flare up. Therefore, it is crucial to implement an ideal antimicrobial treatment protocol to eliminate bacteria as well as microbial virulence factors to prevent periapical inflammation progression;⁵ thus, applying an efficient irrigation protocol aiming to eradicate or decrease the periapical bacterial population count is highly recommended.⁶

Flare up can also occur as a result of mechanical mishap, extrusion of debris, necrotic pulp masses, irrigative solutions and intracanal medicament leading to the inflammation of periodontal tissue and consequently postoperative pain.

There are numerous risk factors that are associated with the incidence of flare up, which are categorized as: demographics including sex and age, pulpal and periapical pathosis, subjective and objective findings, and procedural factors such as allergies to certain medications, re-treatments, over instrumentation, the use of intracanal medicaments, therapeutics (analgesics, antibiotics, steroids) and number of visits.⁷

The principal approach to adequately manage endodontic flare up is to identify the causes and risk factors that lead to flare up as well as implement changes in treatment protocols aiming to improve the quality of care provided.

The aim of this study is to evaluate the incidence of flare up in a multispecialty dental and maxillofacial center over a period of one year.

Methods

This retrospective study was conducted at the Department of Dental and Maxillofacial Center in Bahrain Defence Force Hospital, Kingdom of Bahrain. Ethical approval was obtained by the research ethics committee- Bahrain Defence Force hospital. Data collection duration was two months

from the medical database system; ALCARE by Royal medical services. Analysis of 3,306 patients records was performed. 272 patients met our inclusion criteria. 323 teeth belonging to the 272 patients were included in the study.

The patients were classified as having experienced a flare up when they attended an unscheduled emergency visit complaining of pain or swelling after the initiation of root canal treatment. The inclusion criteria consisted of patients above 10 years of age, from both sexes that started and completed their root canal in BDF hospital in the period from February 2019 to February 2020. The excluded cases were teeth that had root canal retreatments, teeth that had open apices, teeth that required surgical intervention, teeth with canal obstructions, teeth with radicular perforations and post obturation flare up.

The samples were divided into two main groups based on the presence of flare up (Figure1). In addition, the samples were further classified based on inclusion criteria and variables according to teeth type, age, sex, pulpal and periapical pathosis, presence of intracanal medication between visits, and absence of coronal seal.

All of the cases were seen as emergency dental walk-ins where emergency endodontic treatment was provided by dental residents based on diagnosis and radiographic evaluation; then the patients were referred to the endodontic clinic to continue the treatment.

Statistical analysis

Statistical analysis was carried out by a statistician using the Pearson Chi-Square test to determine the significance between the analyzed categorical variables.

Sampling Design

Non-random convenience sample from the patients who attended the dental clinic in Bahrain Defence Force Hospital during the period from February 2019 to February 2020.

Sample size

$$n = \frac{N}{1 + N \times e^2}$$

Where $N = 3306$ is the population of patients who attended the dental clinic in Bahrain Defence Force Hospital during the period from February 2019 to February 2020, and e denotes the allowed probability of committing an error in selecting a sample from the population. Therefore, the sample size is

$$n = \frac{3306}{1 + 3306 \times 0.05^2} = 357$$

In our study only 272 patients met our inclusion and exclusion criteria, and the others were excluded.

Results

The incidence of flare up was 122 (38%) teeth out of 323 teeth that had root canal treatment done in multiple sessions during the evaluation period. There was no statistically significant difference noted in flare up incidence according to tooth type (Figure 2), age and gender (Table 1). The highest value of flare up was noted in mandibular molars (31%) and the lowest number of flare up was seen in mandibular incisors (4%) as seen in (Figure 2). Pulpal and periapical pathosis showed statistical insignificance in relation to flare up with a P-value of .864 (Table 2). Also using intracanal medicament between visits showed no statistically significant difference. Likewise, the absence (20.4%) or presence (79.5 %) of provisional restoration showed no statistical significance in the occurrence of flare up (Table 3).

Table 1: Occurrence of flare ups according to sex and age

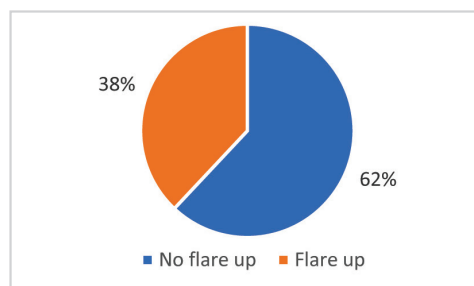


Figure 1: Incidence of flare up

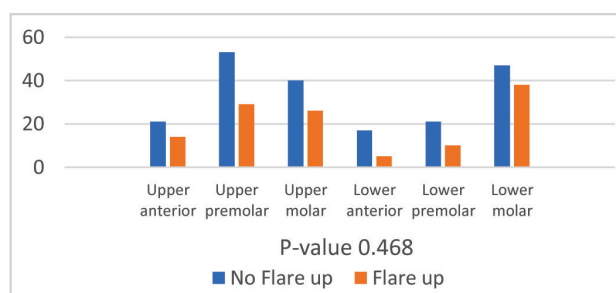


Figure 2: Occurrence of flare up according to teeth groups

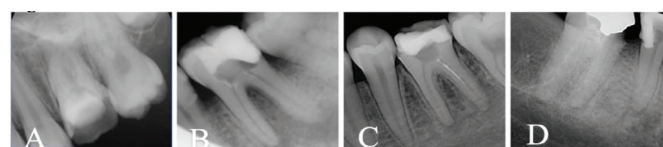


Figure 3: A: Intraoral periapical radiograph (IOPA) of an upper first molar that root canal treatment was previously initiated with a defective restoration, insufficient coronal seal leads to re-infection of root canal system and therefore causes interappointment flare up. **B:** IOPA showing lower first molar that is previously accessed the periapical radiolucency the flare up in this case is due to contamination from the periapical region. **C-D:** IOPA of a lower first molars with defective coronal seal and periapical lesion.

		No flare up		Flare up		P-value
		n	%	n	%	
Sex	Male	95	63.3	55	36.7	0.643
	Female	104	60.8	67	39.2	
Age	11 - 30	77	61.6	48	38.4	0.307
	31 - 50	76	58.5	54	41.5	
	>50	46	69.7	20	30.3	

Table 2: Occurrence of flare ups according to pulpal and periapical pathosis

	No flare up		Flare up		P-value
	n	%	n	%	
Deep carious lesion without periapical pathosis	112	61.9	69	38.1	0.864
Deep carious lesion with apical pathosis	84	61.8	52	38.2	

Occurrence of flare ups according to usage of Intracanal medication in between visits in teeth with periapical pathosis

Calcium hydroxide Intracanal medicament	No flare up		Flare up		P-value
	n	%	n	%	
Medicament	37	64.9	20	35.1	0.521
No medicament	47	59.5	32	40.5	

Table 3: According to absence of coronal seal in flared up teeth

Coronal seal	n	%
Not intact	25	20.5
Intact	97	79.5
Total	122	

Discussion

Flare up is an unpleasant emergency experienced by patients undergoing root canal treatment, resulting in an unexpected emergency visit to the dentist. It also brings skepticism of the dentist's ability and skills to properly treat and alleviate the patients' symptoms. From a patients' prospective;

a clinician's capabilities are judged by his ability to control pain, as stated by Hargreaves et al.⁸

In the present study, the incidence of flare up was found in 38% of teeth that underwent root canal treatment. Age, gender, type of tooth and usage of intracanal medications did not affect the occurrence of flare up. These results confirm the diversity and multifactorial etiology of flare up. The increased number of flare up in this study may be due to the type of cases selected that required multiple visits due to persistent symptoms and the presence of pulpal and periapical pathosis such as teeth with infected root canal system; persistent pus or bleeding; diffuse swelling or sinus tract.

Identifying the risks which increases the chances of flare up in multiple visits, RCT is important to help dentists predict such cases and manage them adequately. In the present study, 38% of patients undergoing multiple visits RCT encountered flare up during the period of their treatment.

Single visit RCT were excluded from this study to focus on variables which might influence the chances of flare up in multiple visits RCT. The cases that are completed in a single visit are usually simple uncomplicated RCT, without periapical pathosis and those which require intentional RCT for prosthetic reasons. Studies such as that by Tanalp et al, Onay et al,^{9,4} proved that single visit RCT has lower incidence of flare up compared with multiple visit RCT; the reason was the ability to properly provide radicular and coronal seal, which prevents further bacterial ingress and consequently recurrent infection. In controversy, other researches showed no difference regarding the possibility of flare up in multiple and single visits RCT.¹⁰ A meta-analysis by Schwendicke F, et al concluded that there are higher chances of flare up in single visit RCT compared with multiple visits and therefore recommends to undergo multiple visit RCT in teeth with periapical lesions, which have higher chances of flare up.¹¹

In this study, the incidence of flare up was not affected by age, gender and tooth type; other researchers also reported similar results.^{4,12} On the other hand, Torabinejad et al¹³, showed a positive relation to age. According to his study, patients under the age of 20 experienced less chances of

flare up due to lack of past experience and more tolerance to pain. Also, positive relation attributed to gender supporting that hormonal changes in females lead to higher incidence of flare up. Moreover, mandibular teeth were associated with higher frequency of flare up owed to their diverse root canal configuration. However, in this study, mandibular molars accounted for (31%) of flare up and the lowest incidence of flare up were seen in mandibular incisors (4%) but the results were not statistically significant.

The relationship between periapical pathosis and the incidence of emergency flare up has always been controversial. According to this study, periapical pathosis had no effect on the incidence of flare ups; these results are consistent with other researchers such as Mulhern JM et al and Alacam T et al that had similar outcomes.^{14,15} In contrast, Torabinejad found that there is a higher incidence of flare up in teeth without periapical pathosis and lower incidence in teeth with large periapical lesions due to the availability of space for dispersal of the pressure caused by acute peri-radicular inflammation. Meanwhile, a study by Morse et al, confirmed a higher incidence of flare up in teeth with periapical lesions. The contradiction in these results is difficult to explain and can only be related to the diversity of the population, varying pain threshold, different methods of assessment and treatment modalities.

In the present study, the relation between the application of intracanal (IC) medicament calcium hydroxide and the reduction of flare up was insignificant in teeth that had periapical pathosis, suggesting that IC medication had no role in reducing the chances of flare up occurrence. In agreement, a systematic review by Anjaneyulu K et al, also concluded that there is no clear evidence of the effect of calcium hydroxide on the post-treatment pain.¹⁶

In similarity to other authors, this study showed that 20% of the evaluated flare up cases were related to loss of coronal seal, which allowed for reinfection of the canals and periapical area by new microorganism strains, resulting in an increase in the bacterial population and strains variation inside the canal and the periapical area. These authors also stated that reinfection of the canal system with

new microorganism strains was the main reason of endodontic intra-appointment flare up.¹⁷

Incidence of flare up is widely diverse and may be due to a variety of reasons. Therefore, the management of flare up in each dental facility is different and varies according to available clinicians, materials, and the setup. The clinicians in charge of managing flare up should be able to reach a proper diagnosis by correlating clinical and radiographic findings to allow proper case management and pain alleviation.

Conclusion

Within the limitations of this study, it is recommended that each establishment should tailor their root canal procedure according to their setup; number of clinicians; and specialists. Also, continuous training and skills improvement for clinicians in charge of managing emergency patients with flare up is highly recommended.

Ethical statement

The study was approved by the research ethics committee- Bahrain Defence Force hospital.

Declaration of competing interest

The authors have no conflict of interest to declare, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for – profit sectors.

Acknowledgement

The authors are grateful to the dental and maxillofacial department of - Bahrain Defence Force hospital- Kingdom of Bahrain.

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