

Endodontic Flare-Ups: A Study of Incidence and Related Factors

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ABSTRACT

Background: To assess the frequency of flare-ups and recognize the risk factors comprising age, initial diagnosis, number of root canals, tooth type, gender, the type of irrigation regimen, the number of visits and treatment modality, in patients who expected root canal treatment from May 2015 to May 2017. **Materials and Methods:** Records of 454 teeth belonging to 302 patients treated by endodontics expert throughout 2-year period were kept. Tooth, patient, and treatment characteristics were assessed and the relations between these characteristics and flare-ups were studied. Statistical analysis was carried out by using Chi-square test, regression analyses, and exact test.

Results: The incidence of flare-ups was 16 (3.5 %) out of 454 teeth that had endodontic treatment. Pulpal necrosis without periapical pathosis was the most mutual symptom for flare-up (5.9 %) ($P < 0.01$). Teeth undergoing multiple visits had a higher risk of developing flare-ups compared to those with single appointments (OR: 3.27, CI: 1.21–6.91, $p < 0.01$). There were similarly no statistically significant differences in the frequency of flare-ups as regards to age, tooth type, gender, treatment modality, number of root canals, and the irrigation solutions that utilized amid the treatment.

Conclusions: The frequency of flare-up is insignificant when teeth are treated in one visit. Absence of a periapical lesion in necrotic teeth is a significant factor for flare-ups.

Keywords: Flare-up, Irrigation, Root canal treatment, Post-operative pain.

INTRODUCTION

A flare-up following a root canal treatment appointment is a significant problem. The term flare-up is utilized normally to depict the improvement of pain as well as swelling which begins a few hours or days after root canal processes and is of significant seriousness to need an unscheduled visit for emergency treatment^[1]. Absence of correct meaning of flare-up brought about assessed recurrence differences from as low as 0.39 % to 20 %^[2,3]. Iqbal *et al.* indicated that without any gold standard, and on account of the variable definitions, comparison of flare-up frequency through studies is challenging^[2].

There are various motivations to recognize hazard factors for flare-ups. An organization may wish to attempt an internal study, recognize hazard factors, and may change protocols to enhance outcomes. On the off chance that legitimately distinguished, the peri-operative indicators of flare-up combined with the specialist's experience may support to better oversee patients post-operatively^[2]. Numerous hazard factors have been studied to illustrate which factors can be correlated with the incidence of flare-ups. These incorporate the intra-canal treatment utilized^[4]; number of visits to finish the treatment^[5]; periradicular diagnosis^[6]; pulpal diagnosis^[7]; apical extrusion of debris; and whether or not apical patency was preserved through preparation^[8]. Kind of treatment, whether original treatment or retreatment^[1]; presence of irritants

inside the radicular canal system and the occurrence of preoperative pain of periapical origin^[9]; host factors, for example, age, gender, and dental group^[10]. Amid these factors, the amount of microorganisms and their outcomes entrenched^[11]. For that reason, impeccable antimicrobial treatment protocol for teeth with apical periodontitis ought to have the capacity to remove bacteria in addition to microbial virulence factors, which may add to the perpetuation of periapical inflammation procedure^[11]. Various antibacterial and chelating substances have been suggested for cleaning and forming of root channels. Amid these substances, sodium hypochlorite (NaOCl) and chlorhexidine (CHX) are two normal intracanal irrigants that have presented great antibacterial action^[12]. Harrison *et al.*^[13] studies that there was a greater rate and level of pain in individuals whose canals were either not irrigated or irrigated with saline solutions, contrasted with those irrigated with 5.25 % sodium hypochlorite and 3 % hydrogen peroxide solutions. Notwithstanding its great antimicrobial movement, NaOCl has a huge toxicity when expelled into periradicular tissues^[14]. In this manner, it is fundamental to keep away from apical expulsion amid irrigation to not add to inter-appointment uneasiness.

The purpose of this examination was to assess the frequency of flare-ups and recognize the hazard factors comprising age, initial diagnosis, number of

root canals, tooth type, gender, the type of irrigation regimen, the number of visits and treatment modality, in patients who expected root canal treatment were examined for relationship with the occurrence of flare-ups.

MATERIALS AND METHODS

Data were collected on 454 teeth belonging to 302 patient's visits from May 2015 to May 2017. All of the teeth were treated by the same operator. Each patient's record consisted of the following data: age, gender (Table 1), pulpal and periradicular diagnosis of the tooth (Table 2), tooth type, number of root canals (Table 3), chemical agents used for irrigation (Table 4), number of sessions needed to complete the root canal treatment (Table 5).

Root canal treatment requirement for teeth with the initial diagnosis of normal pulp and periradicular status was categorized and defined as follows ^[15]:

- Prosthetic purposes: Teeth without any pulpal or periradicular pathosis; conversely, with the need of a prophylactic endodontic intervention due to prosthodontic reasons (e.g. necessity of extensive tissue removal throughout root canal treatment that will outcome in pulpal exposure).
- Deep carious lesions: Lesions lengthening to the pulp chamber without any symptoms of pulpitis; nevertheless, necessitating root canal treatment as a result of extensive pulpal exposure. The pulp is vital and there is no periapical radiolucency. Whereas classifying teeth as such, chronic apical periodontitis, acute apical abscesses and chronic apical abscesses were categorized as teeth with periapical pathology, while the outstanding necrotic cases, which were diagnosed as acute apical periodontitis were considered as teeth without periapical pathology ^[15].

Table 1: Incidence of flare-ups regarding gender and age group

Prognostic factor		Total no. of teeth	No. of flare-ups	%	p value
Age	Less than 19	3	1	33,3%	0.285
	19-30	17	4	23,5%	
	31-40	11	3	27,3%	
	40-50	11	3	27,3%	
	51-60+	17	5	29,4%	
Gender	Woman	286	9	3,1%	0.496
	Men	168	7	4,2%	

Table 2: Incidence of flare-ups regarding pulpal and periradicular diagnosis

Diagnosis	Total no. of teeth	No. of flare-ups	%	p value
Normal	10	0	0,0%	0.001
Irreversible pulpitis	277	6	2,2%	
Pulpal necrosis without periapical pathosis	17	1	5,9%	
Pulpal necrosis with periapical pathosis	150	9	6,0%	

Table 3: Flare-ups in different arches and tooth groups

Tooth group	Total no. of teeth	No. of flare-ups	%	p value
Maxillary				0.933
Anterior	74	3	4,1%	
Premolar	88	3	3,4%	
Molar	99	4	4,0%	
Mandibular				
Anterior	25	1	4,0%	
Premolar	59	2	3,4%	
Molar	109	3	2,8%	
No. of root canals				
Single-rooted	185	6	3,2%	
Multi-rooted	269	9	3,3%	

Root canal treatment was delivered to patients under controlled and standardized conditions. Every tooth was anesthetized with a local anesthetic. A rubber dam was placed, and the operative field was disinfected with 2.5 % NaOCl. Conventional straight-line access preparations were completed. The initial working length was then known with an electronic apex locator (Root ZX; J. Morita, Tokyo, Japan).

Preflaring was not completed before working length determination. Then the working length was recognized at 0.5 mm up to the radiographic apex by taking a periapical radiographic image. After the middle and coronal third was ready utilizing ISO size 050, 070 and 090 Gates-Glidden drills (Maillefer, Ballaigues, Switzerland), the root canals were ready with the step-back procedure to an apical size 35–50 depending on the size of the first file that bind at the apical portion of the canals. The preparation was carried out with manually used nickel-titanium files (Maillefer, Ballaigues, Switzerland) under thorough irrigation. For the duration of the irrigation protocol 1.25 % NaOCl, 17 % ethylenediaminetetraacetic acid (EDTA), 0.2 % CHX solutions were utilized in different mixtures. To prevent the formation of orange-brown precipitate that comprises para-chloraniline, an inter-mediate intracanal flush with distilled water was applied to remove remains of NaOCl, afore the use of CHX [16]. The irrigation protocols that utilized throughout the treatment were concise in Table 4.

Table 4: Incidence of flare-ups regarding different irrigation protocols

Irrigation regimen	Total no. of teeth	No. of flare-ups	%	p value
NaOCl	323	9	2.8%	0.142
NaOCl + CHX	43	2	4.7%	
NaOCl + EDT A + NaOCl	37	1	2.7%	
NaOCl + EDT A + NaOCl + C HX	10	1	10.0%	
CHX	37	2	5.4%	
EDTA + CHX	4	0	0.0%	

In the multiple-visit group, further periods were necessary in the event of an abscess, retreatment, when there was lack of time, when the patient felt

exhausted, or in cases of complication. Under these conditions, a calcium hydroxide paste (Merck, Darmstadt, Germany) was utilized to fill the canals, and a temporary seal (Cavit, ESPE, Seefeld/Oberbay, Germany) was positioned. Root canal filling was made by consuming a cold lateral condensation or warm vertical condensation methods that combined gutta-percha points with AH Plus (Dentsply, De Trey, Konstanz, Germany) sealer using finger spreader.

In the analysis, flare-up was utilized as a singular result variable. Patients considered to have undergone flare-up when they reported for an unscheduled visit and active treatment suffering from severe pain and/or swelling after initiation or continuation of root canal management. Simply comforting the patient without prescribing treatment did not constitute a flare-up. Patients who stated severe pain or swelling but rejected an unscheduled visit were not included. Patients who reported pain on generally scheduled second appointment were not categorized as flare-ups. Statistical analysis was carried out by using Pearson Chi-square test, Fisher's Exact test, and Binary Logistic regression analyses.

The study was done after approval of ethical board of King Abdulaziz university.

RESULTS

The frequency of flare-ups was 16 (3.5 %) out of 454 teeth that expected endodontic treatment. There were no statistically significant variances in the frequency of flare-ups concerning the following factors: age and gender; tooth type and the number of root canals; chemical agents used for irrigation ($p > 0.05$).

There was similarly no difference concerning the frequency of flare-up between the initial treatment group and retreatment group ($p > 0.05$). Pulpal necrosis without periapical pathosis was the greatest mutual sign for flare-ups (5.9 %) followed by pulpal necrosis with periapical pathosis (5.3 %) and irreversible pulpitis (2.2 %) ($p < 0.01$; Table 2). Teeth undergoing multiple visits had a greater danger of increasing flare-ups compared to those with single visits (OR: 3.27, CI: 1.21–6.91, $p < 0.01$; Table 5).

Table 5: Incidence of flare-ups regarding number of visits

Sessions	Total no. of teeth	No. of flare-ups	%	Odds ratio	95 % CI	p value
Single	148	2	1,35%	3,27	1.21–6.91	0.001
Multiple	306	14	4,58%			

DISCUSSION

Analysis with respect to the impact of a patient gender, age, the tooth and curve under thought, and additionally of the quantity of root canals, did not demonstrate measurably noteworthy contrasts in the flare-up rates. These results prove the finds of different authors^[16,17]. On the other hand, a study by Torabinejad et al. demonstrated a positive relationship between flare-up rates and gender, age, and jaw area^[10]. For some patients flare-up is an obnoxious practice, which achieves incredulity their dental practitioner aptitudes. Hargreaves et al. showed that each clinician who gives root canal treatment needed to manage this misinterpretation and the clinician's expertise is regularly fundamentally judged by the achievement or disappointment of agony control^[18]. Regardless of reasonable and watchful treatment techniques, complexities, for example, pain, swelling or both can happen. Similarly as with emergencies happening before root canal treatment, these inter appointment emergencies are unwanted and troublesome occasions and ought to be settled instantly. Infrequently flare-ups are sudden, in spite of the fact that they can frequently be anticipated by certain patient showing factors^[19].

The present examination have demonstrated the sort of irrigation solution utilized has no effect in the occurrence of postoperative distress, which likewise substantiates the discoveries of different authors^[20] who demonstrated that neither the individual utilize nor the joined utilization of water system arrangements are related with expanded interappointment pain. The commitment of antimicrobial treatment convention to the frequency of erupt stays questionable. The enlistment of agony in root canal treatment is multifactorial; it is hard to quality a lower torment frequency particularly to the utilization of a specific irrigation solution. The connection between the primary diagnosis and flare-up was assessed and the nonattendances of periapical injury in necrotic teeth observed to be a critical indicator of erupt. Our outcomes were reliable with the investigation carried out by **Torabinejad et al.**^[10] who connected the overcome upon the insufficient space accessible for the dispersal of the weight because of acute periradicular irritation. Conversely, **Iqbal et al.**^[2], **de Olivera**^[16], and **Tanalp et al.**^[15] demonstrated cases with a periapical lesion had a higher danger of creating torment and flare-ups contrasted with those with no periapical inclusion. In any case, different scientists^[21] were not ready to discover a connection amongst radiolucency and acute exacerbation. The explanation behind the distinction can't be promptly disclosed, however, could identify with various patient populace, which just comprises of necrotic

teeth, differing treatment modalities, and different techniques for evaluation.

Examination of the sort of treatment performed whether introductory treatment or retreatment demonstrated no measurably huge contrast with respect to the occurrence of flare-ups. This was reliable with the investigation completed by **Iqbal et al.**^[2], **Siqueira et al.**^[7], and **de Oliveira**^[16]. Strangely, Trope^[22] found an 8- fold higher (13.6 %) frequency of flare-ups in retreatment cases including teeth with periapical periodontitis treated in single arrangements. This may be a consequence of the specimen sort, incorporation and prohibition criteria, and institutionalization of clinical variables controlled by administrators or those assessed by the patients. Single vs. numerous visits root canal treatment has been the subject of long-term headed discussion in the endodontic group^[23]. The statistically noteworthy incidences of more flare-ups in the numerous visits assemble than in the single-visit aggregate in the present investigation concurs with the reports of different authors^[7,15]. The lower rate of agony in the single-visit gathering might be ascribed to quick obturation, which dispenses with bacterial entrance from a broken reclamation^[24]. In any case, another conceivable reason might be the more noteworthy inclination of treating fundamental and non-problematic cases in a single visit [8]. On the other hand, there is a typical conviction that numerous visits with inter-appointment medicament application could limit the rate of flare-ups in teeth with periapical pathology and a necrotic mash. A positive connection between single visit and erupt has been beforehand revealed^[5,25]. Then again, a dominant part of creators contrasting these two methodologies did not discover any distinction with respect to the frequency of flare-ups^[2,6,17,26].

Numerous examinations have led studies on the antibacterial adequacy of CHX in various fixations. It has been shown that the antibacterial adequacy and substantivity of CHX obviously relies upon its fixation level^[27]. Then again, on the grounds that high centralizations of irrigants can't be pervasively conveyed to all locales in the root trench because of weakening and the intricacy of the root waterway framework, Ma et al. tried low fixation (0.2 %) of CHX versus 2 % CHX. They expressed that the 2 and 0.2 % CHX medicines altogether diminished the plaktonic and biofilm *Enterococcus faecalis* survival rates in the alkaline conditions. In the present investigation 0.2 % CHX was utilized as a water system arrangement^[28]. Additional examinations are important to look at the adequacy of 2 % CHX on the occurrence of flare-ups contrasted with different conventions in patients with comparative pulpal and periradicular conditions. Nevertheless, the study plan with most noteworthy power is the randomized-

controlled trial since it can limit confounders; maximize control over condition, and providing the most convincing easygoing relationship^[29]. Future randomized-controlled trials with well-defined inclusion criteria are needed to fully define all of the factors contributing to flare-ups associated with root canal treatment.

CONCLUSIONS

From the present study, it could be concluded that the occurrence of flare-up is insignificant when teeth are treated in one visit. Nonappearance of a periapical lesion in necrotic teeth is a significant hazard factor for flare-ups.

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