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Post-Endodontic Treatment Flare-Up of Patients Treated By General Dentists and Endodontic Specialists

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Abstract

Objective: This study aims to determine post-endodontic flare-up incidence for patients treated by endodontic specialists and general dental practitioners.

Methods: The investigators measured the postoperative pain using a visual analog scale after 24 and 48 hours for patients treated endodontically by specialists and general dentists. The patient factors and operative variables were documented for every patient. The data was then analyzed using SPSS. A Chi-square test was used to evaluate a relationship between categorical variables, where a $P < 0.05$ was taken to indicate statistical significance.

Results: In total, 143 participants were included in this study (male: n=62, 43.3%; and female: n=81, 56.7%). The incidence of post-endodontic treatment flare-ups was 14.8%. The incidence of 48 hours postoperative pain was higher (29%) with the endodontic specialists compared to the general practitioners. The factors that were associated with a higher postoperative flare-up include; patient age, smoking, preoperative pain, and periapical lesion size.

Conclusion: Post-endodontic flare-up incidence in this study was within the reported range of flare-up. Patient factors are associated with the occurrence of the postoperative flare-up more than the operative factors.

Keywords: Post Endodontic Flare-Up; Pain Scale; Root Canal Treatment

Abbreviations: CONSORT: Consolidated Standards of Reporting Trials.

Introduction

Post-endodontic treatment flare-up is not an uncommon complication that bothers both the patient and the treating dentist [1,2]. According to the American Association of Endodontics, flare-up could be defined as an acute exacerbation of an asymptomatic pulpal and/or periradicular pathosis after initiation or continuation of root canal treatment [3].

The reported incidence of the post-endodontic flare-up in the literature range from 2%-20%, with an average, reported incidence of 8.4% [1,2]. The differences could be

correlated to the various research protocols, such as the sample's inclusion criteria or pain stage evaluation criteria. Furthermore, this difference might be due to the difference in definitions of a post-endodontic flare-up between the studies. The post-endodontic flare-up is a multifactorial complication where multiple variables play roles in its occurrence and intensity. Various studies have investigated different factors that can be correlated to the occurrence of this condition [4,5]. It has been found that microbial, host, and treatment procedure factors could affect the incidence and severity of post-endodontic pain [5].

The visual analog scale is one of the most frequently used instruments for measurement of pain intensity. Pain scores are based on patient-self measurement of symptoms that are recorded with a handwritten mark placed at one point along the length of a 100-mm line that represents a continuum between the two ends of the scale "no pain" on the left end (0 mm) of the scale and the "worst pain" on the right end of the scale (100 mm). Measurements from the left starting point to the patients' marks are recorded in millimeters and are interpreted as their pain intensity. The values can be used to track pain intensity for a patient or to compare pain between patients with similar conditions [6].

Evidence has shown that postoperative endodontic pain was associated with patients' dental phobia from a dental public health perspective [7]. However, reducing dental phobia level could be achieved by providing those patients with sufficient information regarding the expected endodontic pain before, during, and after the therapy. Therefore, this clinical study aims to determine the incidence of post-endodontic flare up and the associated effect of operative and patient factors on patients treated by endodontic specialists and general dental practitioners.

Material and Methods

The study and informed consent forms were approved by the research and ethics committee (Ethical Approval #1002320). Patients were scheduled from the waiting. Medically compromised patients were excluded from the study. Teeth with severe periodontitis were excluded as well.

All patients were informed of the study's aims and design and written informed consent was obtained from each participant before their inclusion. The patients were randomly assigned to two general dentists and two endodontists as shown in the Consolidated Standards of Reporting Trials (CONSORT) flow diagram in Figure 1. All patients received endodontic treatment at the Specialty Dental Center. Patients were assessed for the level of discomfort or pain before and after receiving an endodontic therapy according to a standardized visual analog pain scale and specific time interval. Moderate and severe levels of pain and/or swelling were considered as an endodontic flare-up. A second examiner has followed up with every patient to calibrate the pain and swelling 24 hours and 48 hours after the endodontic treatment.

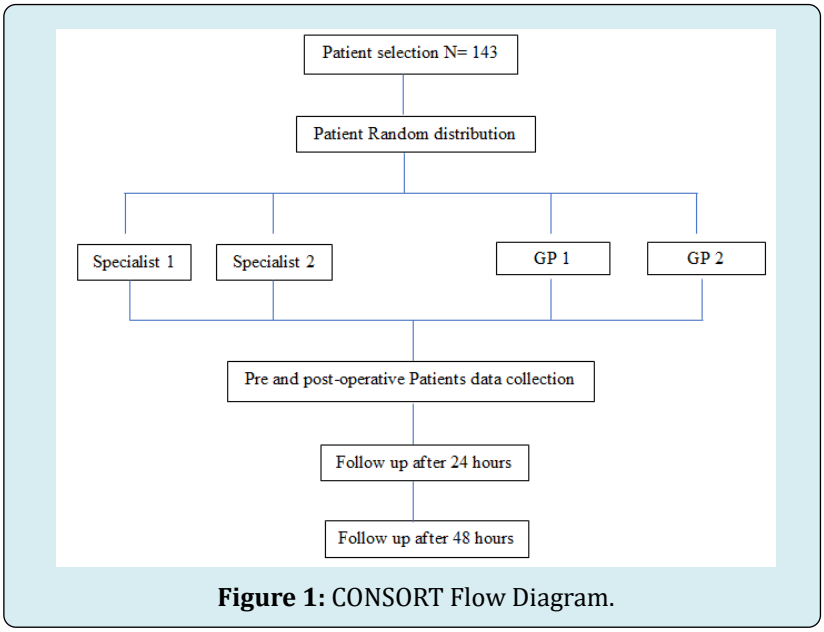

Figure 1: CONSORT Flow Diagram.

Each patient's record consisted of the following data: gender; age; smoking history; tooth category; pulpal and periradicular diagnosis; the intensity of preoperative pain if present; the size of the periapical lesion; type of treatment procedure; the number of visits utilized; whether the calcium hydroxide was used as an intracanal medicament or not and

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whether or not apical patency was maintained.

Statistical Analysis

The data were collected, and the significance level was chosen as 0.05. SPSS Version 22, (Armonk, New York, U.S.A.) was used to analyze the data. A Chi-square test was used to evaluate a relationship between categorical variables, where a $P < 0.05$ was taken to indicate statistical significance.

Results

A total of 143 patients (62 male and 81 female) were included in this study. The incidence of post-endodontic treatment flare-up was 14.8% of the treated cases (Table 1).

	Post-endodontic Flare-up	
	Yes	No
Pain in 24hours	14.80%	85.20%
Pain in 48 hours	14.10%	85.90%
Swelling	6.70%	93.30%

Table 1: Overall incidence of post-endodontic Flare-up.

Patient Factors and Postoperative Flare-Up (Table 2)

- Although the postoperative pain was slightly higher with male patients (17.8%) compared to the female patients (12%), the difference was statistically insignificant.
- The 48 hours postoperative pain of the patient with the age group of 20-40 was high (24.1%) compared to the other age groups, and the difference was a statistically significant P value (0.043).
- There was no statically significant difference in the incidence of postoperative pain between the patient with good, fair, or poor oral hygiene.
- The incidence of 48 hours postoperative pain for smokers was significantly high (33.4%).
- Also, the postoperative swelling was remarkably high with smoker patients (26.7%).
- The reported 24-48 hours postoperative pain was increased with the upper posterior teeth (19.2%-17.5%) and the lower anterior teeth (33.3%). However, only three lower anterior teeth were included in this study (Table 2).

		Post-Operative Pain In 24hours		P value	Post-Operative Pain In 48 Hours		P value	Swelling		P value
Patient Factors		No	Yes		No	Yes		No	Yes	
SEX	M	52(83.8%)	10(16.2%)	0.709	51(82.2%)	11(17.8%)	0.274	58 (93.2%)	4(6.8%)	0.839
	F	69(84.1%)	12(14.9%)		72(88%)	9(12 %)		75(92.3%)	6(7.7%)	
AGE	<20	38(92.7%)	4(7.3%)	0.194	39(95.1%)	2(4.8%)	0.043	40(97.6%)	1(2.4%)	0.252
	20-40	41(75.8%)	13(24.2%)		41(75.9%)	13(24.1%)		48(89%)	6(11%)	
	>40	41(86.7%)	6(13.3%)		43(89.5%)	5(10.5%)		45(92.4%)	3(7.6%)	
OH	GOOD	33(84.6%)	6(15.4%)	0.961	36(92.3%)	3(7.7%)	0.465	36(92.3%)	3(7.7%)	0.809
	FAIR	70(84.3%)	17(15.7%)		68(82%)	15(18%)		78(94%)	5(6%)	
	POOR	17(85%)	3(15%)		17(85%)	3(15%)		18(90%)	2(10%)	
SMOKING	YES	13(86.7%)	2(13.3%)	0.591	10(66.6%)	5(33.4%)	0.034	11(73.3%)	4(26.7%)	0.002
	NO	108(84.3%)	20(15.7%)		112(87%)	16(13%)		122(95.3%)	6(4.7%)	
TOOTH CATEGORY	UP/ POST	51(80.8%)	12(19.2%)	0.384	52(82.5%)	11(17.5%)	0.032	59(93.8%)	4(6.2%)	0.351
	UP/ ANT	15(88.1%)	2(11.9%)		15(88.2%)	2(11.7%)		1694.7%)	1(5.3%)	
	L/ANT	2(66.6%)	1(33.3%)		2(66.6%)	1(33.3%)		2(66.6%)	1(33.3%)	
	L/ POST	53(88.3%)	7(11.6%)		53(88.3)	7(11.7%)		56(93.4%)	4(6.6%)	

Table 2: Patient factors and the postoperative flare up.

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Diagnostic Factors and Postoperative Flare-Up (Table 3)

- No statistically significant difference was reported regarding the postoperative pain and swelling with the pulpal diagnosis as shown in Table 2.
- The reported incidence of postoperative pain and swelling was higher in patients with the periapical diagnosis of an acute and chronic apical abscess, as shown in Table 2.
- The postoperative swelling was more increased (27.3%) and statistically significant in patients with periapical lesion size more than 5mm.
- The postoperative swelling was associated more with moderate preoperative pain (22.7%), and the difference was a significant P value (0.023).

Diagnostic Factors		Post-Operative Pain In 24 Hours		P value	Post-Operative Pain In 48 Hours		P value	Swelling		P value
		No	Yes		No	Yes		No	Yes	
Pulp Dx	Normal	1(100%)	0	0.692	1(100%)	0	0.793	1(100%)	0	0.835
	R.P.	5(83.3%)	1(16.7%)		4(66.7%)	2(33.3%)		6(100%)	0	
	SIP	33(89.2%)	4(10.8%)		35(94.6%)	2(5.4%)		36(97.3%)	1(2.7%)	
	AIP	6(100%)	0		6(100%)	0		6(100%)	0	
	N.E.C.	16(80%)	4(20%)		17(85%)	3(15%)		18(90%)	2(10%)	
	PREV.I	41(80%)	10(20%)		40(78.4%)	11(21.6%)		45(88.2%)	6(11.8%	
	P R.C.T.	15(83.4%)	3(16.6%)		15(83.4%)	3(16.6%)		17(94.4%)	1(5.6%)	
P.A. Dx	Normal	21(84%)	4(16%)	0.733	22(88%)	3(12%)	0.961	25(100%)	0	0.277
	SAP	73(85.5%)	16(14.5%)		59(85.5%)	10(14.5%)		63(91.3%)	6(7.7%)	
	A.A.P.	22(88%)	3(12%)		21(84%)	4(16%)		24(96%)	1(4%)	
	AAA	8(80%)	2 (20%)		9(90%)	1(10%)		8(80%)	2(20%)	
	CAA	9(81.8%)	2(18.2%)		9(81.8%)	2(18.2%)		10(90.9%)	1(9.1%)	
PAI	normal	67(82.8%)	14(17.2%)	0.168	65(80%)	16(20%)	0.494	77(95.1%)	4(4.9%)	0.01
	<5mm	30(85.7%)	5(14.3%)		33(94.3%)	2(5.7%)		34(97.1%)	1(2.9%)	
	>5mm	9(81.9%)	2(18.2%)		9(81.8%)	2(18.2%)		8(72.7%)	3(27.3%)	
PREOP. PAIN	NON	40(85%)	7(15%)	0.167	40(85.1%)	7(14.9%)	0.527	45(95.7%)	2(4.3%)	0.023
	MILD	17(81%)	4(19%)		18(85.7%)	3(14.3%)		20(95.2%)	1(4.8%)	
	M.O.D.	19(86.3%)	3(13.7%)		18(81.8%)	4(18.2%)		17(77.3%)	5(22.7%)	
	S.E.V.	42(84%)	8(16%)		43(86%)	7(14%)		48(96%)	2(4%)	

Table 3: Diagnostic factors and the postoperative flare up.

Operative Factors and Postoperative Flare-Up (Table 4).

- Although the 24-48 hours postoperative pain was reported more in obturation cases (20%-25%), the difference between the reported postoperative pain and swelling of the variable treatment procedures was insignificant, as shown in Table 3.
- The reported rate of 24-48 hours postoperative pain in cases with maintained patency was (24%-26%) respectively.
- In the 24 hours, postoperative pain incidence was slightly higher in cases with calcium hydroxide (16.9%).
- However, the postoperative pain was higher in the 48 hours in cases without calcium hydroxide (19%).
- The postoperative swelling was significantly higher in patients that were treated in multiple visits (21.4%). The incidence of 48 hours postoperative pain was higher (29%) with one of the endodontic specialists compared to the other specialist and the general practitioners (Table 4).

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Operative Factors		Post-Operative Pain In 24hours		P value	Post-Operative Pain In 48 Hours		P value	Swelling		P value
		No	Yes		No	Yes		No	Yes	
TX PROCEDURE	P CAP	3(100%)	0	0.674	2(66.7%)	1(33.3%)	0.259	3(100%)	0	0.408
	P EXT	61(87.1%)	9(12.9%)		64(91.4%)	6(8.6%)		66(94.3%)	4(5.7%)	
	RC. PREP	23(82.2%)	5(17.8%)		24(85.7%)	4(14.3%)		24(85.7%)	4(14.3%)	
	O.B.T.	32(80%)	8(20%)		30(75%)	10(25%)		38(95%)	2(5%)	
PATENCY FILE	YES	38(76%)	12(24%)	0.552	37(74%)	13(26%)	0.719	45(90%)	5(10%)	0.638
	NO	1(50%)	1(50%)		1(50%)	1(50%)		2(100%)	0	
C.A. (OH)2	YES	59(83.1%)	12(16.9%)	0.774	63(88.7%)	8(11.3%)	0.411	65(91.5%)	6(8.5%)	0.542
	NO	59(85.5%)	10(14.5%)		56(81%)	13(19%)		65(94.2%)	4(5.8%)	
NO. OF VISIT	SINGLE	29(82.7%)	6(17.3%)	0.215	27(77%)	8(23%)	0.871	34(97.1%)	1(2.9%)	0.032
	MULTIPLE	9(64.3%)	5(35.7%)		11(78.6%)	3(21.4%)		11(78.6%)	3(21.4%)	
OPERATOR	SP1	22(88%)	3(12%)	0.298	23(92%)	2(8%)	0.068	22(88%)	3(12%)	0.459
	SP2	28(73.7%)	10(26.3%)		27(71%)	11(29%)		35(92.1%)	3(7.9%)	
	GP1	19(90.5%)	2(9.5%)		19(90.5%)	2(9.5%)		21(100%)	0	
	GP2	52(88%)	7(12%)		53(90.1%)	6(9.9%)		55(93.2%)	4(6.8%)	

Table 4: Operative factors and the postoperative flare up.

Discussion

This study showed that postoperative flare-up was comparable to the reported postoperative flare-up in other studies (2%-20%) [8,9]. In contrast to another study, postoperative pain has been reported slightly more in men than women in this study [10]. However, the difference was not significant between the genders. This study result contradicts other study findings that reported gender as a factor that significantly influenced postoperative pain [11,12]. Yet, the reason for the slightly higher frequency of postoperative pain in male patients is not completely clear.

Another factor contributing to the higher frequency of postoperative pain in the present study is the patient's age. A higher incidence of postoperative pain was noticed in the middle age group patient than the teens and elderly patient's age groups. In contrast, a retrospective study showed a significant positive correlation of flare-ups with patients aged between 40 and 59 years [13]. However, the impact of patient age on postoperative flare-up incidence was not significant in many studies [8,14]. Interestingly, in this study, smoking was associated with a significantly higher incidence of postoperative pain and swelling. The association between smoking and endodontic disease has been shown in several studies [15].

The tooth category was not associated with a significantly higher incidence of postoperative pain in the first 24 hours. Other studies reported similar results [16,17]. Yet, this study's findings showed that posterior maxillary teeth had a greater frequency of postoperative pain than mandibular posterior teeth. These results are different from other research that reported more significant pain in the lower posterior teeth than upper posterior teeth. This finding could be linked to the complexity of the anatomy of the upper molars [17].

This study demonstrated that teeth with pulp necrosis and previously treated pulps had more significant postoperative pain. These results are similar to many other studies that reported higher postoperative pain incidence with necrotic pulps [18-22]. The discrepancy could be attributed to the criteria used to evaluate the postoperative pain or different treatment procedures.

This study's results also contradict previous studies that reported statistically significant correlations between the presence of periapical lesions and rates of postoperative pain after root canal treatments. However, the periapical lesion with a size larger than 5 mm was associated with a significantly higher incidence of postoperative swelling.

The result of this study showed that preoperative pain is significantly related to postoperative flare-up. Similar results

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were reported in another study [23].

Unlike many studies that reported insignificant differences in a postoperative flare-up between multiple visits and single visit appointments, this study showed that multiple visit treatment was associated with a significantly higher incidence of postoperative swelling [24,25]. Despite the insignificant results regarding the effects of the various obturation techniques on the incidence of the flare up, this study showed higher frequency of postoperative pain after obturation compared to cases treated by pulp extirpation only [24].

Surprisingly enough, the frequency of postoperative pain was higher in patients treated by the specialists than those who the general dental practitioners treated. This could be attributed to the level of difficulty and complexity of the cases seen by the specialist which was not considered in this study.

The complexity of the included cases in this study was not part of the inclusion criteria. Moreover, the treatment procedures were not standardized among the operators as shown in some researches [24,25]. These previously mentioned limitations that could negatively affect some of the association results. Future randomized controlled trials with well-defined inclusion criteria are recommended to identify post-endodontic flare-ups' contributing factors.

Conclusion

Despite the reported high incidence of post-operative pain with one of the specialist, the overall incidence of a post-endodontic flare-up in this study was within the reported range of flare-up. Patient age group, smoking, preoperative pain, and size of the periapical lesion were the most determinant factors associated with higher postoperative flare incidence rates.

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