

Research Report

Endodontic flare-up incidence in pulp necrosis in Universitas Airlangga Dental Hospital (RSKGMP Universitas Airlangga)

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ABSTRACT

Background: Dental caries occurs as a result of demineralization of the hard tissues of the teeth followed by the destruction of the organic matter, resulting in bacterial invasion and death of the pulp which can lead to pulp necrosis. One of the treatments for pulp necrosis is endodontic treatment. Endodontic treatment includes root canal preparation techniques, root canal irrigation materials, root canal dressing materials, and also root canal obturation techniques. In endodontic treatment can experience flare-ups. An endodontic flare-up is a pain or swelling after endodontic treatment that occurs in a relatively short time. **Purpose:** To describe the incidence of endodontic flare-ups in pulp necrosis at RSMKGP Universitas Airlangga. **Methods:** Conducted descriptive observational research on patients who had endodontic treatment at UPF Dental Conservation, Dental and Oral Hospital, Faculty of Dental Medicine, Airlangga University in 2018, 2019, and 2020. **Results:** A total of 28 patients (30.1%) from 93 patients were experience pain or flare-ups after root canal treatment. **Conclusion:** From the result of this study, it can be concluded that there is still an incidence of endodontic flare-ups in pulp necrosis at RSKGMP Universitas Airlangga which is 30.1%.

Keywords: Flare-ups; Dental Carries; Pulp Necrosis; Endodontic Treatment; Dental Health

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INTRODUCTION

Dental caries occurs as a result of demineralization of the hard tissues of the teeth followed by the destruction of their organic matter, resulting in bacterial invasion and also pulp death.¹ Pulp necrosis is a root canal disease caused by the spread of bacterial infection and trauma due to untreated pulpitis, causing pulp death.² One of the treatments for pulp necrosis is root canal treatment. Endodontic treatment is a treatment procedure used to treat inflamed and necrotic pulp tissue due to caries or trauma to the teeth. The success of endodontic treatment can reach up to 97%.³ However, in some cases, endodontic treatment can also cause pain and swelling after endodontic treatment which is known as a flare-up.⁴

Flare-up can be defined as pain or swelling caused by endodontic treatment that occurs in a relatively short time that occurs within 24 hours.⁵ The cause of flare-ups can be caused by microbial factors as well as mechanical and chemical mediators.⁵ Flare-ups can occur due to several factors caused by root canal preparation techniques, root canal irrigation materials, root canal dressing materials, and also root canal obturation techniques. The incidence of flare-ups is generally still relatively low when compared to other cases.⁶ According to the research of Onay et al,

the incidence of flare-ups 3.2%.⁷ A retrospective study conducted by Nair et al, showed that 2% patient had flare-ups.⁸ A prospective study conducted by Aoun et al showed that 1.9% of 423 patients had flare-ups.⁹ Based on these data, it shows that there is still pain or flare-ups after endodontic treatment which should not occur. This study is to obtain a database regarding the incidence of flare-ups at RSKGMP Universitas Airlangga.

MATERIALS AND METHODS

The type of research used is descriptive observational research with a cross-sectional research design. The data are presented using a simple statistical test. Before conducting research, submit an ethical suitability application to the Health Research Ethics Feasibility Commission Faculty of Dentistry, Universitas Airlangga (489/HRECC.FODM/VIII/2021). Followed by submitting a research permit letter to the RSKGMP Universitas Airlangga (826/UN3.9.3/PT/2021).

Data were collected by visiting UPF Dental Conservation RSKGMP Universitas Airlangga and collecting patient status cards after root canal treatment with a diagnosis of pulp necrosis in 2018, 2019, and 2020. In this study, 93

respondents were used to view the incidence of flare-ups. Root canal treatment at RSKGMP Universitas Airlangga. The criteria for the patient sample used were male and female patients, aged 20-60 years, who had undergone root canal treatment with a diagnosis of pulp necrosis, and the patient was willing to sign the informed consent and fill out a questionnaire. Then conduct interviews with patients online.

After the patient fills out the questionnaire, the results of the data from the interview will be obtained. Then the assessment and calculation of scores and the results of direct interviews with patients were carried out. Then proceed with data processing using descriptive statistical tests. After that, the research results were presented in the form of percentages based on root canal preparation techniques, root canal irrigation materials, root canal dressings, and root canal obturation techniques.

RESULTS

The data of the Table 1 shown that as many as 28 respondents (30.1%) experienced pain after root canal treatment (flare-up) with a diagnosis of pulp necrosis within 24 hours after treatment, while 65 respondents (69.9%) did not experienced pain after root canal treatment (flare-up) with a diagnosis of pulp necrosis within 24 hours after treatment. Table 2 also showed that as many as 28 patients experienced flare-ups, 9 patients (32.14%) were male and

Table 1. Distribution of respondent answers to the flare-up questionnaire on root canal treatment for pulp necrosis at RSKGMP Universitas Airlangga

Questions	Total (N)	Percentage (%)
Was there any pain after root canal treatment within 24 hours?		
Yes	28	30.1
No	65	69.9
Total	93	100

Table 2. Distribution of patient flare-ups incidence by gender, age, and the number of patient visits on pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga

The incidence of flare-up	Number (N)	Percentage (%)
Gender		
Male	9	32.14
Female	19	67.86
Total	28	100
Age		
20-30 years	18	64.28
31-40 years	3	10.72
41-50 years	4	14.28
51-60 years	3	10.72
Total	14	100
Patient Visits		
One Visit	14	50
Multiple Visit	14	50
Total	28	100

19 patients (67.86%) were female. Then as many as 18 patients (64.28%) aged 20-30 years, 3 patients (10.72%) aged 31-40 years, 4 patients (14.28%) aged 41-50 years, and 3 patients (10.72%) aged 51-60 years. It is also known that the number of patients who experienced flare-ups who came to UPF Dental Conservation RSKGMP Universitas Airlangga with one visit was 14 patients (50%) and multiple visits were 14 patients (50%).

From the results of the Table 3 can be seen that flare-ups can occur due to the root canal preparation technique when performing root canal treatment for pulp necrosis is known that as many as 28 patients (100%) of flare-ups occurred due to the Crown Down Pressure-less preparation technique

Table 3. Distribution of the incidence of patient flare-ups based on technical indicator root canal preparation when performing root canal treatment in pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga

The incidence of flare-up	Number (N)	Percentage (%)
Root Canal Preparation Technique		
Crown Down Pressure-less	28	100
Gender		
Male	9	32.14
Female	19	67.86
Total	28	100
Age		
20-30 years	18	64.28
31-40 years	3	10.72
41-50 years	4	14.28
51-60 years	3	10.72
Total	14	100
Patient Visits		
One Visit	14	50
Multiple Visit	14	50
Total	28	100

Table 4. Distribution of the incidence of patient flare-ups based on material indicator 2% NaOCl root canal irrigation when performing canal treatment root in pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga

The incidence of flare-up	Number (N)	Percentage (%)
Root Canal Irrigation		
NaOCl 2%	2	100
Gender		
Male	-	-
Female	2	100
Total	2	100
Age		
20-30 years	1	50
31-40 years	-	-
41-50 years	-	-
51-60 years	1	50
Total	2	100
Patient Visits		
One Visit	1	50
Multiple Visit	1	50
Total	20	100

with a distribution of 9 patients (32.14%) were male and 19 patients (67.86%) were female. Then as many as 18 patients (64.28%) aged 20-30 years, 3 patients (10.72%) aged 31-40 years, 4 patients (14.28%) aged 41-50 years, and 3 patients (10, 72%) aged 51-60 years. Then as many as 14 patients (50%) came with one visit and 14 patients (50%) came with multiple visits.

From the Table 4 it is known that as many as 2 patients experienced flare-ups due to this irrigation material with a distribution of 2 patients (100%) were female. Then as many as 1 patient (50%) aged 20-30 years and 1 patient (50%) aged 51-60 years. Then as many as 1 patient (50%) came with one visit and 1 patient (50%) came with multiple visits.

From the Table 5 it is known that as many as 15 patients experienced flare-ups due to this irrigation material with a

Table 5. Distribution of the incidence of patient flare-ups based on material indicator 2.5% NaOCl root canal irrigation when performing canal treatment root in pulp necrosis at UPF Dental Conservation RSGM Universitas Airlangga.

The incidence of flare-up	Number (N)	Percentage (%)
Root Canal Irrigation		
NaOCl 2.5%	15	100
Gender		
Male	4	26.67
Female	11	73.33
Total	15	100
Age		
20-30 years	11	73.33
31-40 years	-	-
41-50 years	3	20
51-60 years	1	6.67
Total	15	100
Patient Visits		
One Visit	7	46.67
Multiple Visit	8	53.33
Total	15	100

Table 6. Distribution of patient flare-ups incidence based on root canal irrigant indicator NaOCl 2.5% + EDTA 17% when performing root canal treatment for pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga.

The incidence of flare-up	Number (N)	Percentage (%)
Root Canal Irrigation		
NaOCl 2.5%+EDTA 17%	9	100
Gender		
Male	4	44.44
Female	5	55.56
Total	9	100
Age		
20-30 years	7	77.78
31-40 years	2	22.22
41-50 years	-	-
51-60 years	-	-
Total	9	100
Patient Visits		
One Visit	4	44.44
Multiple Visit	5	55.56
Total	9	100

distribution of 4 patients (26.67%) male and 11 patients (73.33%) female. Then as many as 11 patients (73.33%) aged 20-30 years, 3 patients (20%) aged 41-50 years, and 1 patient (6.67%) aged 51-60 years. Then as many as 7 patients (46.67%) came with one visit and 8 patients (53.33%) came with multiple visits.

From the results of the Table 6 it is known that 9 patients experienced flare-ups due to this irrigation material with the distribution of 4 patients (44.44%) male and 5 patients (55.56%) female. Then as many as 7 patients (77.78%) aged 20-30 years and 2 patients (22.22%) aged 31-40 years. Then as many as 4 patients (44.44%) came with one visit and 5 patients (55.56%) came with multiple visits.

From the results of the Table 7 it is known that as many as 2 patients experienced flare-ups due to this irrigation

Table 7. Distribution of patient flare-up incidence based on root canal irrigant indicator NaOCl 2.5% + EDTA 17% + CHX 2% when performing root canal treatment for pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga

The incidence of flare-up	N	%
Root Canal Irrigation		
NaOCl 2.5% + EDTA 17% + CHX 2%	2	100
Gender		
Male	-	-
Female	2	100
Total	2	100
Age		
20-30 years	1	50
31-40 years	1	50
41-50 years	-	-
51-60 years	-	-
Total	2	100
Patient Visits		
One Visit	2	100
Multiple Visit	-	-
Total	2	100

Table 8. Distribution of the incidence of flare-ups of patients based on indicator of root canal dressing material Calcium Hydroxide (Ca(OH)₂) when performing root canal treatment for pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga.

The incidence of flare-up	N	%
Root Canal Dressing		
Calcium Hydroxide (Ca(OH) ₂)	28	100
Gender		
Male	9	32.14
Female	19	67.86
Total	28	100
Age		
20-30 years	18	64.28
31-40 years	3	10.72
41-50 years	4	14.28
51-60 years	3	10.72
Total	28	100
Patient Visits		
One Visit	14	50
Multiple Visit	14	50
Total	28	100

material with a distribution of 2 patients (100%) were female. Then as many as 1 patient (50%) aged 20-30 years and 1 patient (22.22%) aged 31-40 years. Then as many as 2 patients (100%) came with one visit.

From the Table 8, it is known that 28 patients (100%) experienced flare-ups due to this dressing material with a distribution of 9 patients (32.14%) male and 19 patients (67.86%) female. Then as many as 18 patients (64.28%) aged 20-30 years, 3 patients (10.72%) aged 31-40 years, 4 patients (14.28%) aged 41-50 years, and 3 patients (10.72%) aged 51-60 years. Then as many as 14 patients (50%) came with one visit and as many as 14 patients (50%) came with multiple visits.

From the results of the Table 9, it can be seen that flare-ups can occur due to the single cone obturation technique.

Table 9. Distribution of the incidence of patient flare-ups based on indicator of single cone root canal obturation technique when performing root canal treatment for pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga

The incidence of flare-up	N	%
Root Canal Obturation Technique		
Single Cone	27	100
Gender		
Male	9	33.33
Female	18	66.67
Total	27	100
Age		
20-30 years	18	66.67
31-40 years	2	7.4
41-50 years	4	14.82
51-60 years	3	11.11
Total	27	100
Patient Visits		
One Visit	13	48.15
Multiple Visit	14	51.85
Total	27	100

Table 10. Distribution of the incidence of flare-ups of patients based on indicator of the Warm Vertical Compaction root canal obturation technique when performing root canal treatment for pulp necrosis at UPF Dental Conservation RSKGMP Universitas Airlangga.

The incidence of flare-up	N	%
Root Canal Obturation Technique		
Warm Vertical Compaction	1	100
Gender		
Male	-	-
Female	1	100
Total	1	100
Age		
20-30 years	-	-
31-40 years	1	100
41-50 years	-	-
51-60 years	-	-
Total	1	100
Patient Visits		
One Visit	1	100
Multiple Visit	-	-
Total	1	100

It is known that 27 patients experienced flare-ups due to this obturation technique with a distribution of 9 patients (33.33%) male and 18 patients (66.67%) female. Then as many as 18 patients (66.67%) aged 20-30 years, 2 patients (7.4%) aged 31-40 years, 4 patients (14.28%) aged 41-50 years, and 3 patients (11.11%) aged 51-60 years. Then as many as 13 patients (48.15%) came with one visit and as many as 14 patients (51.85%) came with multiple visits.

Flare-ups can occur due the warm vertical compaction obturation technique when performing root canal treatment for pulp necrosis (Table 10). It is known that 1 patient (100%) experienced flare-ups due to this obturation technique with the distribution of patient being female, aged 31-40 years, and came with one visit.

DISCUSSION

In general, flare-ups are pain or swelling after root canal treatment that occurs within a relatively short time of 24 hours after treatment.⁵ From the results of this study, it was found that flare-ups most often occurred in patients of the female, aged 20-30 years, with the same number of visits at one visit and multiple visits. This is following research by El Mubarak et al (2010) which stated that flare-ups were more common among patients aged between 18 and 33 years¹⁰. Women tend to experience flare-ups more often than men, this can be caused because women are more susceptible to psychosomatic disorders in their emotions such as easily anxious, afraid, and stress. It can also be caused by changes in hormone levels in women during menstruation, hormone therapy, and the use of contraception where it can change serotonin and noradrenaline hormone levels so that it can cause a decrease in the pain threshold.^{6,8} The comparison of the number of patient visits to the clinic, either one visit or multiple visits cannot be a benchmark for the occurrence of flare-ups. According to research by Nair et al (2017) and Sevekar and Gowda (2017), there was no significant difference between one visit and multiple visits in causing flare-ups.^{8,11}

According to Shahi et al (2016), pain after root canal treatment (flare-up) can be caused by several factors.¹² The results of the research data indicate that flare-ups can occur due to the root canal preparation technique using the Crown Down Pressure-less technique. This can be caused by operator error in determining the working length so that it can cause over-instrumentation which causes extrusion of debris to the periapical.¹⁰ It is also known that flare-ups can be caused by the irrigation material used when performing root canal treatment. NaOCl irrigation can be caused by the higher concentration of NaOCl, the higher the level of toxicity.¹³ NaOCl is also less effective in eliminating persistent and toxic bacteria so that its use can be combined with other irrigation materials.¹⁴ NaOCl can also cause serious tissue damage if the solution is extruded during the application³ of the NaOCl material to the periapical tissue. If NaOCl extrudes into the periapical tissue, it can cause pain,

swelling, and redness.^{13,15} EDTA only dissolves dentin so that it will cause peritubular and intratubular dentin erosion which causes the dentin structure to become irregular and reduces density and adaptation between sealer and dentin. EDTA causes dentin erosion through the demineralization process and excessive opening of dentinal tubules so that it can harm the bonding and sealing process.^{16,17} CHX irrigation material also has drawbacks, namely, it cannot dissolve the remnants of necrotic tissue and is also toxic if CHX is extruded outside the root canal which can cause inflammation.¹⁸

Then it was also known that flare-ups could be caused by root canal dressing material, namely Calcium Hydroxide ($\text{Ca}(\text{OH})_2$). This could be because $\text{Ca}(\text{OH})_2$ has limited effectiveness in eliminating endodontic pathogenic bacteria such as *E. Faecalis* and *Candida* species which can cause various incidences of recurrent infections and flare-ups.^{19,20} Flare-up can also occur due to residual $\text{Ca}(\text{OH})_2$ which is still present in the apical third of the root canal, so before performing obturation permanently, $\text{Ca}(\text{OH})_2$ must be removed completely from the root canal. Otherwise, the residual $\text{Ca}(\text{OH})_2$ in the root canal will react chemically with the sealer material which can reduce the flowability and working time of the sealer so that it will lead to a poor prognosis of root canal treatment which can lead to periapical extrusion and treatment failure. root canal that can cause pain (flare-up).²¹

Flare-ups can also be caused by obturation of the root canal technique. In this study, it was found that flare-ups can occur due to root canal obturation using the Single Cone and Warm Vertical Compaction techniques. Flare-ups due to the Single Cone obturation technique can be caused because in this technique does not use compaction forces in filling the root canal material so that the sealer material does not fill the last apical millimeter of the root canal where this can cause periapical leakage which can cause flare-ups.²² Then the Warm Vertical Compaction had disadvantage of this technique, is that there is a risk of vertical root fracture due to excessive force and pressure when the operator fills the root canal material so that the gutta-percha extrudes apically and can cause pain after root canal treatment.²³ In conclusion, from the 93 patients who underwent root canal treatment at the RSGM Universitas Airlangga with a diagnosis of pulp necrosis, there were 28 patients (30.1%) who experienced flare-ups.

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