

# Incidence of flare-ups in endodontic treatments performed in necrotic teeth in a single and in multiple sessions

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## ABSTRACT

**Objective:** At present, the literature presents many controversies when correlating the incidence of flare-ups with the approach to endodontic treatment in a single session and multiple sessions. **Methods:** The aim of this study was to make a comparative evaluation of the incidence of flare-ups in 117 patients submitted to endodontic treatment in a single session and in multiple sessions.

**Results:** The results presented by patients that are attended in a single session showed no statistically significant differences from those who were attended in multiple sessions. **Conclusion:** According to this study, it was concluded that the number of interventions necessary to conclude endodontic therapy has no correlation with the incidence of flare-ups.

**Keywords:** Pain. Endodontics. Dental caries.

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## Introduction

Endodontics undergoes a process of constant evolution, mainly stimulated by the development of increasingly efficient new instruments and materials, bringing about better results in both the technical quality of performing procedures and in their biological results.<sup>1</sup> Nevertheless, there are considerable divergences with respect to the best alternative for concluding endodontic therapy, especially in depulped teeth.<sup>2</sup> Many researchers are in favor of intervention in a single session,<sup>3,4,5</sup> while others are in favor of intervention in multiple sessions.<sup>6,7</sup> For these, the main consideration that prevents treatment in a single session is the concern about pain and failure.

In spite of judicious and careful procedures in treatment, complications such as pain, edema or both may occur. The extrusion of debris and antigenic substances through the root apex is the main cause of flare-up; that is to say, intensified acuteness of an apical pathologic process after endodontic treatment or between sessions, which requires an emergency consultation.

The researchers that defend multiple sessions affirm that intracanal medication eliminates, or at least minimizes the proliferation of the bacteria remaining after chemical mechanical preparation, acts as a physical chemical barrier against re-infection by bacteria from saliva and neutralizes the action of endotoxins (LPS, a constituent of Gram-negative bacteria cell walls).<sup>8</sup>

On the other hand, researchers who defend finalizing endodontic therapy in a single session affirm that intracanal medication has no significant influence on the endotoxins, this being the exclusive function of the chemical mechanical preparation technique and of the body itself, which results in the regression of the edematous site that would find favorable biological conditions after the infection is controlled. They also point out the antimicrobial properties found in the compositions of filling cements used at present and the capacity of an adequate filling technique to promote a physical chemical barrier that is as efficient as the intracanal medication.<sup>3,6</sup>

The argument about the number of sessions required is related mainly to the effectiveness of the methods of disinfection and their influence on the clinical results. The comparative evaluation of the clinical result of endodontic treatment in necrotic

teeth, with regard to post operative pain, when performed in a single and in multiple sessions, makes it of fundamental importance to clarify whether the number of interventions during endodontic treatment has an influence on the post-operative inflammatory response, therefore helping to make an adequate decision about the best time to perform the final filling. Therefore, the aim of the present study was to make a comparative evaluation of the incidence of flare-ups in endodontic treatments performed in a single session and in multiple sessions.

## Materials and Methods

Data were collected on the attendance provided to patients referred to the post-graduation ambulatory clinic for endodontic treatment, at the “Centro Baiano de Estudos Odontológicos (CEBEO-BA)”, in the Specialization Course in Endodontics, Salvador, Bahia, Brazil.

The inclusion criteria were established as follows:

- » Presence of pulp necrosis, diagnosed by means of anamnesis exam and performing the test of pulp sensitivity to cold, with the aid of cooling spray at -50 °C, Endo-frost Roeko® (Wilcos, Petrópolis, Rio de Janeiro, Brazil).
- » Radiolucent image compatible with periapical lesion, detected by taking periapical radiographs, as well as cases in which no images suggestive of peri-radicular lesion were shown.
- » Patients without painful symptomatology and who were not making use of any type of medication, particularly analgesics, anti-inflammatory and antibiotic medications.
- » Patients who had not undergone any type of endodontic intervention, even of an urgent nature.

Using these criteria, the sample obtained consisted of 117 patients, with 90 treatments having been performed in a single session and 27 treatments in multiple sessions. The groups of teeth involved as well as the periapical bone condition are shown in Table 1.

All patients were attended by post-graduate students in the Endodontic Specialization Course, following the same attendance protocol. Initially access surgeries were performed with a #1014 spherical diamond bur (KG Sorensen, São Paulo, Brazil). After absolute

**Table 1.** Types of teeth treated in a Single Session and in Multiple Sessions.

	Group of Teeth	With Lesion	Without Lesion
<b>Single Session</b>	Molars	22	19
	Premolars	13	10
	Anterior teeth	20	6
<b>Multiple Session</b>	Molars	12	5
	Premolars	1	1
	Anterior teeth	8	0

isolation of the operative field opening of the posterior teeth was concluded with the aid of a tapered trunk multi-bladed bur with a blind tip Endo Z (Maillefer, Ballaigeus, Switzerland) and for the anterior teeth a tapered trunk diamond bur with a blind tip 3082 (KG Sorensen, São Paulo, Brazil). After this biomechanical preparation was performed by the Segmented Preparation Technique, using Ni-Ti endodontic files of the Easy Pro Design (Easy Produtos Odontológicos, Belo Horizonte, Brazil) rotary system. The working length established by taking periapical radiographs was the same as the Patency length; that is to say 0 mm from the radiographic apex. The auxiliary irrigant solution used during the instrumentation process was 2.5% sodium hypochlorite (Água Sanitária Q-BOA® brand (sanitary solution), São Paulo, Brazil) and after concluding the preparation for smear layer removal, the entire root canal was filled with 17% EDTA (The Formula - dispensing pharmacy, Bahia, Brazil) and agitated in the root canal with the aid of a Lentulo bur #40 (Maillefer, Ballaigeus, Switzerland) driven by a micromotor, for 30 seconds. This solution remained at rest in the canal for 5 minutes. After this procedure, the root canals were again irrigated with 2.5% sodium hypochlorite (sanitary solution Q-BOA® brand) and then irrigated with physiological solution. The root canals were dried with absorbent paper cones (Tanari - Tanariman Industrial, Ltda., Amazonas, Brazil).

The technique used for filling was the vertical condensation of gutta percha heated by means of Thermopack Easy (Easy Produtos Odontológicos, Belo Horizonte, Brazil), together with the filling cement Sealer 26® (Dentsply Indústria e Comércio Ltda., Rio de Janeiro, Brazil).

The teeth treated in multiple sessions were filled with calcium hydroxide-based intracanal medication,

Calen (S.S. White/Duflex, SP - Brazil), for the period of 30 days, using an ML syringe (S.S. White/Duflex, São Paulo - Brazil).

After the treatment, a single professional called all the patients by telephone, at the following time intervals: 24 hours, 48 hours and 1 month after the first and second sessions, in the cases of multiple sessions. In the treatments performed in a single session, the same time intervals were used right after filling. The participants in the research were asked about the presence or absence of post-operative pain; pain intensity (light, moderate or severe); use of analgesic and/or anti-inflammatory medications. In this study flare-up was considered the presence of severe pain and/or swelling which required a consultation outside of treatment planning, of an urgent nature.

Data were collected on all the incidences of post-operative discomfort and expressed as a percentage of the total number of teeth evaluated. The incidence of pain was evaluated for each studied variable.

## Results

After the experimental period, the data were tabulated and it could be observed that there was no occurrence of flare-up in any of the tested groups. Nevertheless, there was presence of light to moderate pain 24 hours after the endodontic treatment in 63% of the patients treated in a single session, diminishing to 51% on the second day; 78% of the patients submitted to therapy in multiple sessions reported painful symptomatology 24 hours after the first intervention, diminishing to 66% after 48 hours. In the second session, 24 hours after the conclusion of treatment, 18% still complained of some type of symptomatology that persisted in only

8% after 48 hours (Fig 1). These data were evaluated statistically by the Chi-square test, in which there was no statistically significant difference between the treatments in a single session and the first session of treatments in multiple sessions, both in the first 24 hours ( $p=0.224$ ) and in the 48 hours after treatment ( $p=0.249$ ). It was also observed that there was no statistically significant difference 30 days after treatment.

In order to investigate the pain intensity presented in the different groups, a more specific evaluation was made, and it was found that of the 63% patients who were treated in a single session and presented painful symptomatology after the first 24 hours, 40% had pain of light intensity and 23% of moderate intensity. After 48 hours, 36% reported light intensity, 16% moderate intensity and 11% no longer reported the presence of pain. After one month, there was absence of pain in the total number of patients treated (Figs 2 and 3).

## Treatments

In the therapy performed in multiple sessions, of the 78% of patients who presented painful symptomatology

24 hours after the first intervention, 48% reported pain of light intensity and 30% moderate intensity. After 48 hours, 63% reported light intensity, 7% moderate intensity and 8% no longer reported the presence of pain. After one month, there was absence of pain in the total number of patients treated.

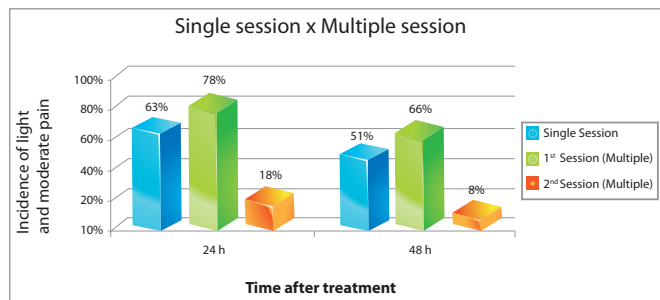
For statistical analysis, the Chi-square test was used, in which it was shown that there was statistically significant difference between the light symptomatology after 48 hours. However, there was no statistically significant difference between the light symptomatology after 48 hours and between moderate after 24 and 48 hours.

When correlating the treatments performed in a single session with the presence or absence of periapical lesion, it was seen that the incidence of pain was higher in the patients that presented a radiographic image compatible with periapical lesion (Fig 4).

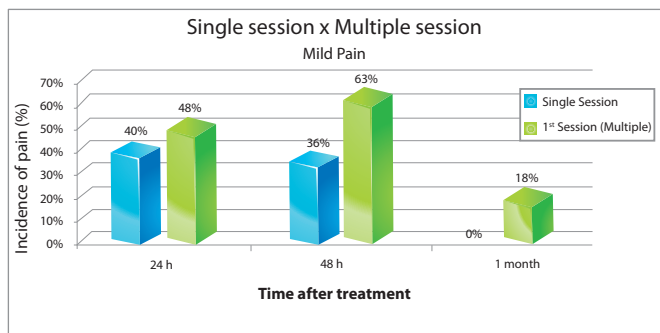
Similarly, in the treatments performed in multiple sessions there was also an incidence of pain after the first session, higher in patients who did not present a radiographic image compatible with periapical lesion (Fig 5).

Statistical analysis to evaluate the symptomatology between a single session and the first of the treatments in multiples sessions, the Chi-square test was used, revealing that there was statistically significant difference between the symptomatology 24 hours ( $p=0.003$ ) and 1 month ( $p=0.000$ ) after the treatments performed in the cases in which there was no radiolucent periapical image compatible with lesion. Whereas, after 48 hours, there was no statistically significant difference.

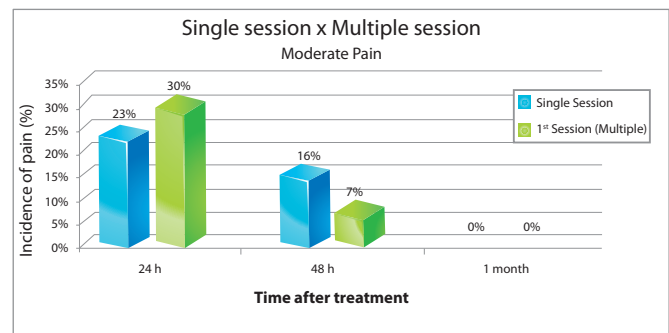
In the treatment performed in teeth that presented a radiolucent periapical image compatible with lesion, no statistically significant difference was presented after



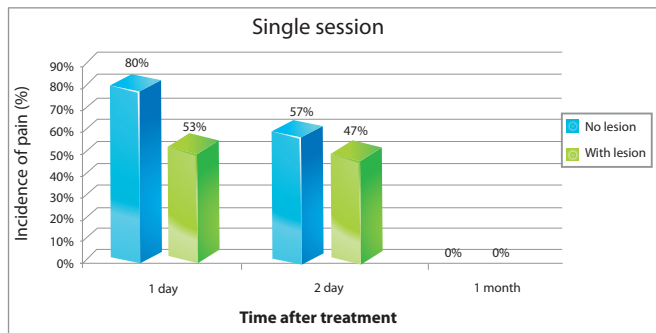
**Figure 1.** Incidence of light-moderate pain 24 hours and 48 hours after endodontic treatments in a single and in multiple sessions.



**Figure 2.** Incidence of mild pain at 24 hours, 48 hours and 1 month after root canal treatments in one session and multiple session.



**Figure 3.** Incidence of moderate pain at 24 hours, 48 hours and 1 month after root canal treatments in one session and multiple session.



**Figure 4.** Comparison of the incidence of pain among teeth with and without lesion treated in a single session.

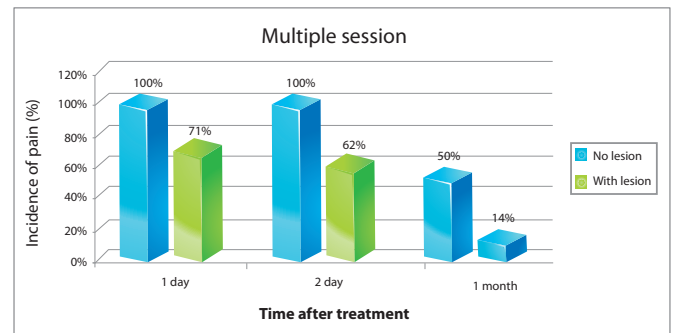
24 hours ( $p=0.245$ ), and 48 hours (0.361). However, a statistically significant difference was found 1 month ( $p=0.030$ ) after the intervention.

## Discussion

The number of sessions required for concluding endodontic treatment is still a much-debated matter. Many professionals prefer an intervention in two sessions to ensure a post-operative period with the absence of symptoms before filling. Whereas others are in favor of intervention in a single session.

In this study, the incidence of flare-up both in a single and in multiples sessions was 0%. DiRenzo et al<sup>9</sup> in a similar manner, obtained 0% flare-up in cases in a single session and in cases of multiple sessions a minimum incidence of 1.3% was obtained. Although there are not many studies in the literature showing this value (0%), more recent findings, generally speaking, point towards relatively low values of the occurrence of flare-up. Al-Negrish and Hababbeh<sup>10</sup> reported an occurrence of 3.7% for teeth treated in a single session and 5.2% in multiple sessions; Oginni and Udoye<sup>11</sup> reported 8.1% in a single session; Alaçam and Tinaz<sup>12</sup>, 7.1% in multiple sessions; Siqueira Jr. et al<sup>18</sup>, 1.9% in multiple sessions; Eleazer and Eleazer<sup>13</sup>, 3% in a single session and 8% in multiple sessions.

As regards pain intensity, it was seen that after treatments performed in a single session light and moderate pain intensity values were significantly reduced from 24 hours to 48 hours, attaining complete absence of symptomatology after the time of 1 month. Whereas in treatments performed in multiple sessions, light pain intensity present after the first 24 hours of the first session (48%), increased in the time interval of 48 hours (63%) after which its values diminished to



**Figure 5.** Comparison of the incidence of pain among teeth with and without lesion treated in multiple sessions.

18% after 1 month. This increase in values observed represents a regression in intensity, whereas the moderate symptomatology after 24 hours fell from 30% to only 7% in the 48 hours subsequent to treatment. This means that a portion of the patients that were feeling pain of moderate intensity in the first 24 hours of treatment performed in multiple sessions had a reduction in intensity to a light degree, which led to an increase in these values presented after 48 hours. Similarly, Glenon et al,<sup>14</sup> Menhinick et al<sup>15</sup> and Walton et al<sup>16</sup> verified that the intensity of pain is always more frequent in the first 24 hours after the endodontic intervention, and tends to diminish as the days pass, until complete absence of symptoms is attained.

According to some authors,<sup>2,17</sup> it is difficult to compare the results of different studies on account of the great differences, such as, for example: Study model, treatment protocol, scale used to measure pain, pre-operative condition of the tooth, and instrumentation and filling techniques.

The instrumentation techniques are considered responsible for the apical extrusion of contaminated debridement debris, and consequently have direct influence on the occurrence of flare-ups.<sup>18</sup> In the present study the automated instrumentation technique was used, in which the file design and dynamics significantly diminish the extrusion of debris to the periapical region. This makes comparison with other studies unfeasible, due to the scarcity of researches that compare the incidence of flare-ups with the use of motor driven rotary systems.

A factor that has been well discussed with respect to this subject is the relationship existent between pre-operative and post-operative pain. While some opinion formers affirm that there is no correlation whatever,<sup>9,12,19</sup> others agree that the symptomatologic conditions prior

to treatment have a direct influence on the post-operative results.<sup>10,11,18,20</sup> With the purpose of making this study as faithful as possible, only asymptomatic patients were included, who had not used any type of medication before endodontic treatment.

Another point to be evaluated is the correlation between the presence of a radiographic image compatible with peri-radicular lesion and painful post-treatment symptomatology. The results of this study showed that in the presence of periapical lesion the symptomatology was less frequent and less intense than in the cases in which there was no peri-radicular lesion. These data are compatible with the findings of Polycarpou et al,<sup>20</sup> Glennon et al,<sup>14</sup> Alaçam and Tinaz.<sup>12</sup> This could be due to the lack of space for internal pressure generated when there is no presence of re-sorbed bone.<sup>18</sup>

When speaking of multiple sessions, authors who defend this line of treatment allege that the calcium hydroxide-based intracanal medication between sessions is capable of diminishing the number of remaining bacteria during biomechanical preparation of teeth with pulp.<sup>21</sup> In contradiction with this, other authors<sup>2,19</sup> affirm that calcium hydroxide has limitations and does not appear to interfere significantly in the remaining endodontic microbiota. With reference to pain, there are studies such as that of Fava<sup>22</sup> and Ehrman, Messer and Adams,<sup>23</sup> that have proved that calcium hydroxide-based medication is capable of reducing the painful symptomatology. DiRenzo et al,<sup>9</sup> Walton, Holton and Michelich<sup>16</sup> have affirmed that this type of medication has no influence

whatever on pain control. Whereas Mickel et al<sup>24</sup> affirmed that calcium hydroxide medication between sessions, increases the painful symptomatology and Silva, Almeida and Sousa<sup>25</sup> point out calcium hydroxide as being a potent tissue irritant, suggesting natural medications as an efficient alternative.

Other factors, such as for example, the pre-operative condition of the tooth and the instrumentation technique used appear to have more influence on the occurrence of symptomatological exacerbations, irrespective of the number of sessions in which treatment is performed. Further studies are necessary, particularly with the use of automated instrumentation systems, to seek to obtain greater predictability of the post-operative symptomatology, and consequently, offer patients greater comfort.

## Conclusion

According to the results of this study, it could be concluded that the number of interventions necessary to conclude endodontic therapy does not appear to have any correlation with the incidence of flare-ups.

Other factors, such as the pre-operative condition of the tooth and the instrumentation technique used appear to have more influence on the occurrence of these exacerbations, irrespective of the number of sessions in which treatment is performed. Further studies are necessary, particularly with the use of automated instrumentation systems, to seek to obtain greater predictability of the post-operative symptomatology, and consequently, offer patients greater comfort.

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