

# Incidence of postoperative pain after instrumentation of the cemental canal in teeth with necrotic pulp

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## ABSTRACT

**Introduction:** Once infection control is considered key for endodontic treatment success, instrumentation of the cemental canal has been recommended for cases of pulp necrosis. However, it is believed that this procedure may result in postoperative pain. **Objective:** The aim of this study was to analyze the incidence of postoperative pain following endodontic treatment with cemental canal instrumentation of necrotic teeth. **Methods:** After treatment with cemental canal instrumentation of 90 necrotic pulp root canals, post-operative pain was evaluated by means of

a visual analog scale. Data were processed and subjected to statistical analysis using chi-square test with significance level set at 5%. **Results:** There was absence of pain in 86 patients (95.5%) and presence of mild pain in 4 patients (4.5%), with statistically significant difference ( $P < 0.05$ ). **Conclusion:** The incidence of postoperative pain following cemental canal instrumentation during endodontic treatment of necrotic teeth is very low. When present, pain is of mild intensity.

**Keywords:** Root canal instrumentation. Cemental canal. Postoperative pain.

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## Introduction

It seems reasonable to assume that in cases of pulp necrosis, instrumentation of the root canal in its entire extension, including the cemental canal, promotes better removal of necrotic contents from the root canal system, thereby contributing to more effective infection control.<sup>1-5</sup> However, it is believed that this procedure may cause severe damage to periapical tissues, which would result in postoperative pain.<sup>6,7,8</sup>

Postoperative pain is a frequently recurring topic in endodontic literature.<sup>9-12</sup> A possible explanation for the occurrence of post-instrumentation pain may be related to mechanical, chemical, and microbial factors.

Glennon et al<sup>13</sup> analyzed postoperative pain in 272 patients treated by general practitioners, endodontists, and Master's degree students in Endodontics. Postoperative pain was found in 176 patients (64.7%) within the first 48 hours, and severe pain was reported by less than 10% of patients.

In addition to causing patient discomfort, pain delays endodontic treatment due to creating the need for additional visits.<sup>14</sup> Nevertheless, precisely identifying the causal factors of pain is not a simple task.

A hypothesis has been proposed, suggesting that instrumentation aiming to clean the cemental canal would increase the chances of postoperative pain, which explains why this procedure is avoided by some professionals.

Thus, the aim of the present study was to conduct a clinical analysis of the incidence of postoperative pain after instrumentation of the cemental canal during endodontic treatment of necrotic teeth.

## Material and Methods

The records of 90 patients subjected to endodontic treatment performed by dental students at the Endodontics Clinic of Bahiana School of Dentistry and Public Health were examined.

Patients aged between 20 to 50 years. At the time of treatment, they were not under antibiotic therapy and did not present systemic diseases such as uncontrolled hypertension or diabetes. Patients were analyzed for incidence of postoperative pain by means of a pain scale. Those who reported pain prior to treatment were excluded from the study.

All teeth had complete root formation, a single canal and pulp necrosis. Whenever present, radio-

graphically visible periapical lesions had a diameter of 5 mm or less. Periodontal disease was absent.

The pulp chamber was accessed with a #3 round carbide (KG Sorensen, Cotia, Brazil) and Endo-Z (Maillefer, Ballaigues, Switzerland) burs. The working length (WL) of all canals was radiographically established at 1.5 mm from the root apex.

Canals were prepared by means of the crown-down technique using #1, #2, and #3 Gates-Glidden burs and K-files (FKG Dentaire, La-Chaux-de-Fonds, Switzerland) with watch-winding motion, starting with the initial size file followed by three progressively large instruments. Irrigation was performed with 2 mL of 2.5% sodium hypochlorite (Q-Boa – Indústrias Anhembi S/A, Osasco, Brazil) by means of an irrigation needle positioned 5 mm from the apex, prior to instrumentation and at each instrument change.

According to the treatment protocol adopted at the Endodontics Clinic of Bahiana School of Dentistry and Public Health, a K-file #10 was used in all canals. The instrument was inserted 1.5 mm beyond the working length, i.e., up to the apical foramen. A watch-winding filing motion was applied with the patency instrument at each instrumental change.<sup>3</sup> At the end of canal preparation, a file fitted to its diameter cleaned the cemental canal by applying a watch-winding filing motion.<sup>3,4</sup>

After instrumentation, the canals were irrigated with 4 mL of sterile saline solution and dried with absorbent paper points. The smear layer was removed by irrigation with 1 mL of 17% EDTA (INODON - Porto Alegre, Rio Grande do Sul, Brazil) which was agitated with a Lentulo spiral and remained in the canal for 3 minutes. Next, the canals were irrigated with 3 mL of 2.5% sodium hypochlorite (Q-Boa – Indústrias Anhembi S/A, Osasco, Brazil) which remained in the canal for 5 minutes after agitation with a Lentulo spiral. Subsequently, the canals were once again irrigated with saline solution, dried with absorbent paper points and filled with a calcium hydroxide/saline solution paste. Finally, the teeth were sealed with a temporary filling material (IRM).

Pain intensity was evaluated by means of a visual analog scale,<sup>13</sup> given to each patient at the root canal preparation visit. This scale consists of a 10-cm horizontal line with the ends labeled “no pain” and “worst pain”.

The patients recorded the time and date in which the pain occurred and when present, they marked its intensity on the scale. The distance, in centimeters, from the lower end of the scale until the mark made by the patient was used as a numerical parameter to quantify the level of pain.

Fifteen days after instrumentation, the intracanal dressing was removed and the canals were sealed by lateral condensation with EndoFill sealer (Dentsply, Petrópolis, Rio de Janeiro, Brazil). The scales were collected for data processing, and analyzed by means of chi-square test with significance level set at 5%.

## Results

Results are shown in Table 1. Out of 90 treated canals, 86 patients (95.5%) reported no pain, whereas 4 (4.5%) reported mild pain within the first 24 hours after canal preparation. Among these patients, three used pain killers and all of them reported that the pain was gone after 24 hours. The fourth patient did not take medication, but also reported resolution of pain after 24 hours. None of the patients reported severe pain. The difference between the pain levels reported was statistically significant ( $P < 0.05$ ).

## Discussion

The literature shows that in several situations, root canal instrumentation carried out below the limits of the apex promotes accumulation of dentin debris at the working length, forming an apical dentin plug that may completely or partially obliterate the canal.<sup>3,11,15</sup>

As observed in any surgical procedure, root canal preparation provokes inflammatory response characterized by an exudative phase within the first hours. In addition to cytokine release, which may promote pain, it not only causes edema confined to periapical tissues,

but also cells and tissues to be compressed, thereby contributing to the development of postoperative pain.

Unlike one may expect, cemental canal instrumentation, in addition to reducing the microbiota,<sup>16</sup> unblocks the apical portion of the canal, allowing edema drainage. Therefore, this procedure favors tissue decompression promoting relief and not exacerbation of pain.

Comparison of the results obtained from the present study with those from a previous study in which the cemental canal was not instrumented,<sup>13</sup> appears to validate our assumption: these authors observed that 64.7% of patients reported pain (severe pain in less than 10%) within 48 hours after endodontic treatment. In the present study, 86 (95.5%) patients reported absence of pain while only 4 patients (4.5%) reported pain of mild intensity.

It is important to keep in mind that absence of postoperative pain does not mean absence of inflammatory reaction, since inflammation is inherent to any surgical procedure. Similarly, the degree of inflammation does not always correlate with the degree of tissue damage. However, the aim of the present study was not to evaluate the characteristics of inflammatory reaction in response to potential damage caused to apical/periapical tissues. This would only be possible by performing a histological analysis, which is not always feasible in clinical studies.

Therefore, due to the impossibility of performing histological analyses in some clinical situations, clinical parameters have been adopted in order to establish the correlation between pain commonly reported after root canal instrumentation and tissue trauma and damage induced by this procedure. According to the results from the present study, cemental canal instrumentation does not appear to be associated with tissue damage per se as a cause of postoperative pain.

Still, it is important to mention that evaluation of pain is highly subjective. Several social, technical and psychological factors can interfere and modulate an individual response to pain.<sup>17</sup> For this reason, patients who reported the occurrence of pain were asked for more details, such as how and where the pain was felt. We detected the possibility that the discomfort reported by these patients may have been caused by pressure of the rubber dam clamp against the gum.

**Table 1.** Postoperative pain after cemental canal instrumentation.

n	Absent	Mild	Severe	p value
90	86	4	0	0.00
(100%)	(95.5%)	(4.5%)	(0%)	

Should that be the case, pain resulting from clamp pressure might have been mistakenly attributed to pain resulting from root canal preparation.

Regarding the technical aspects of the procedure, it is important to highlight that treatment was conducted by dental school students with limited clinical experience in Endodontics, which may have contributed for a higher occurrence of postoperative pain.

In a previous study, Glennon et al<sup>13</sup> reported the presence of pain in 64.7% of patients when treatment was performed by endodontists or Master's degree students, which emphasizes the relevance of data from the present study.

Postoperative discomfort should not be assessed from the perspective of a single aspect of treatment.

Rather, when postoperative pain is analyzed, several aspects should be observed. However, based on the results obtained from the present study and considering the occurrence of postoperative pain after endodontic therapy, cemental canal instrumentation appears to be a safe alternative to achieve more effective infection control.

## Conclusion

The results from the present study suggest that the incidence of postoperative pain after endodontic treatment of necrotic root canals in which cemental canal instrumentation is performed is extremely low, and when present, the pain is of mild intensity. Additional studies are warranted to further investigate this topic.

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