

Original Investigation

Effect of Occlusal Reduction on Postoperative Pain during Root Canal Treatment in Teeth with Symptomatic Apical Periodontitis

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ABSTRACT

INTRODUCTION: Pain management after root canal treatment is a very important issue in clinical practice. Occlusal reduction has been widely used after root canal treatment to reduce post treatment pain and flare up. The purpose of this study was to evaluate the effect of occlusal reduction on postoperative pain in teeth with symptomatic apical periodontitis. **MATERIALS AND METHODS:** Seventy mandibular molar teeth with symptomatic apical periodontitis requiring root canal treatment were included in this study. Each patient who met the inclusion criteria had a serial number allocated, ranging from 1 to 70. The patients were divided into two groups i.e, occlusal reduction group and without occlusal reduction group according to the odd and even numbers on the list. After administration of local anesthesia, the root canals were instrumented, and an intracanal calcium hydroxide dressing was placed. Following confirmation with articulating paper, occlusal reduction group received a 2 mm reduction in occlusal contacts. Preoperative pain before start of the procedure and postoperative pain 6 days after instrumentation were recorded on visual analogue scale. Data was evaluated by chi-square test and Man Whitney U test with p-value <0.05 considered as statistically significant. **RESULTS:** There was no significant difference in postoperative pain between two groups (p>0.05) after root canal preparation. **CONCLUSIONS:** Occlusal surface reduction did not provide any further reduction in postoperative pain for teeth with symptomatic apical periodontitis compared with no occlusal reduction.

Keywords: Occlusal reduction, postoperative pain, preoperative pain, root canal treatment, symptomatic apical periodontitis



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INTRODUCTION

Postoperative pain is referred to as pain of any intensity that develops following the start of root canal therapy (RCT). According to reports, postoperative discomfort can occur anywhere between 3% and 58% of the time [1]. There are many factors that can contribute to postoperative endodontic discomfort, such as the patient's age and gender, preoperative pain, presence of periapical radiolucency, the number of visits, the method used to prepare the root canals, and whether they are tender to percussion before the procedure [2]. For the purpose of managing discomfort during root canal therapy, several approaches are used. They include lowering the occlusal surface of the tooth and using anesthetics,

corticosteroids, and analgesics prior to surgery. A simple method to lessen the discomfort of endodontic treatment is to lower the tooth's occlusal surface [3]. Occlusal adjustment decreases mechanical stimulation of sensitized nociceptors. Reduced strain on the periodontal ligament's nociceptors is thought to lessen pressure on the wounded and inflamed peri-radicular tissues, which relieves pressure and lowers the incidence of postoperative discomfort [4]. The benefits of occlusal reduction on pain and discomfort during root canal therapy have been examined in several studies [5]. The dentist must decide whether to do occlusion reduction to lessen postoperative pain or not. This study was conducted to determine the impact

of occlusal reduction on postoperative pain in teeth with symptomatic apical periodontitis. Hence, the assumptions were made and tested for hypothesis to accurately report postoperative pain levels across all treated mandibular teeth with and without occlusal reduction procedure in symptomatic apical periodontitis.

MATERIALS AND METHODS

Study design and setting

This hospital-based prospective study was done in the department of Conservative Dentistry and Endodontics at KIST Medical College and Teaching Hospital, Imadol from November 2022 to April 2023.

Participants, sample size and sampling technique

Patients between the ages of 16 and 70 years who were in good physical health, had mandibular molar teeth with symptomatic apical periodontitis, as well as those who had normal occlusal contact with the opposing tooth and were willing to continue treatment until the placement of a full-coverage restoration, all met the inclusion criteria. Mobility greater than grade I, teeth in which instruments had been used outside the apical foramen during root canal preparation, patients who had used preoperative antibiotics or analgesics within the previous 24 hours, and teeth that had previously undergone root canal therapy were among the exclusion criteria. Sample size calculation for comparison between group in quantitative data was derived from the equation: $2 SD^2 (Z_{\alpha/2} + Z_{\beta})^2 / d^2$, SD = Standard deviation of previous study on VAS pain score⁶ = 0.86, Level of significance = 5%, $Z_{0.05/2} = Z_{0.025} = 1.96$ (from Z table at 5% error), $Z_{\beta} = Z_{20}$ (at power of study = 80%) = 0.842 (from Z table), $d =$ effect size = difference between mean value of VAS pain score⁶ = 0.6. Therefore, sample size = $2 SD^2 (Z_{\alpha/2} + Z_{\beta})^2 / d^2 = 2 \times (0.86)^2 (1.96 + 0.842)^2 / (0.6)^2 = 32.25$. Hence, minimum sample enrolled in each group was 35.

Data collection procedure and study variables:

Only patients who provided informed consent were enlisted in this study. Each patient who met the inclusion criteria had a serial number allocated to them, ranging from 1 to 70. The patients were divided into two groups: Occlusal reduction group and without occlusal reduction group according to the odd and even numbers on the list. Using a visual analogue scale, preoperative pain was assessed in both groups. All patients had their access opened with an endo access bur (Howard Martin No. 2/ Dentsply) following

the injection of local anesthetic comprising lignocaine (2%) and epinephrine (1:80,000). After measuring the working length using a periapical radiograph, the canal was prepared. The working canal length was chosen to be 1 mm shorter than the radiography apex. As an irrigant during root canal preparation, 3% sodium hypochlorite was employed. Up to 15 number (K-file, Mani) initial root canal preparations were performed. A size F1 or F2 protaper universal manual file (DENTSPLY, Oklahoma, USA) was then used to complete canal preparation. All of the prepared canals were filled with calcium hydroxide paste. Temporary restoration (CAVIT/3M ESPE) was used to temporarily seal the access cavity. Following confirmation with articulating paper, occlusal reduction group received a 2 mm reduction in occlusal contacts with a flame-shaped diamond bur (Mani ISO, FO-30-F). Patients were asked back to provide their pain rating on a visual analogue scale following a 6-day canal preparation period. The prepared canals were obturated during the same appointment. Antibiotics or analgesics were not given from any other route following the occlusal reduction or without occlusal reduction in the postoperative phase of 6 days. Patients were investigated on the first visit and performed RCT, thereafter follow-up was done on 6th day and obturation was done on the same day by principal investigator to reduce all errors.

Statistical analysis and data management:

The acquired data were entered into SPSS software version 22 IBM for statistical analysis. Age, preoperative score, and postoperative score were non-normally distributed by Shapiro-Wilk test. In descriptive statistics, the median Inter-quartile range (IQR) was used. For categorical data, the chi-square test was employed for inferential statistics; for numerical data, the Mann Whitney U test was applied. A p-value <0.05 was considered statistically significant.

Ethical consideration:

The study's proposal (Ref. No. 2079/80/28) was approved by the institution's ethical review board.

RESULTS

Table 1 shows the age wise, preoperative pain score and postoperative pain score. The median age was observed to be 40 years in the study population (n=70) whose median preoperative pain score was observed to be 6 (moderate pain category) and 6th day postoperative pain score was found to be 1 (no pain

Table 1| Median age, preoperative pain score and postoperative pain score in the study population (n=70)

Variable	Age (years)	Preoperative score	Postoperative score
Median (IQR)	40.00 (26-47)	6.00 (5-8)	1.00 (0-2)

Table 2| Gender-wise distribution of study population (n=70)

Variables	Frequency	Percent
Female	34	48.6
Male	36	51.4
Total	70	100.0

Table 3| Distribution of pain categories in postoperative patient with and without occlusal reduction (n=70)

Groups	Pain Score Category			P-value (Chi-square test)
	No	Mild	Moderate	
Without Occlusal Reduction (n=35)	17 (48.58%)	11 (31.42%)	7 (20%)	0.005
With Occlusal Reduction (n=35)	21 (60%)	14 (40%)	0 (0%)	

category). Table 2 shows gender wise distribution of study population (n=70) where male (n=36, 51.4%) was predominant gender. Table 3 shows pain categories in the study population in postoperative without occlusal reduction (n=35) and with occlusal reduction (n=35). The maximum distribution of no pain was seen in 21 (60%), and 14 (40%) were observed to be with mild pain with occlusal reduction group. However, no cases of moderate pain were observed with occlusal reduction group. Table 4 shows comparison of postoperative pain score without occlusal reduction

Table 4| Median postoperative pain scores with and without occlusal reduction (OR) (n=70)

Variables	Without OR	With OR	P-value*
Median postoperative pain score (IQR)	2 (0-3)	1 (0-2)	0.125

*Mann-Whitney U test

and with occlusal reduction. The median postoperative pain score was found to be less with occlusal reduction than without occlusal reduction

DISCUSSION

One of the most important aspects of endodontic practice is to control pain during and after root canal treatment [7]. Several studies have assessed the effects of occlusal reduction on post instrumentation pain during endodontic treatment [6]. The result of the present study showed that, occlusal reduction had no significant effect on postoperative pain score after root canal treatment of teeth with symptomatic apical periodontitis. Our study was in agreement with Khan et al. [3], Kumar et al. [2], Ghimire et al. [5], Sheesh et al. [7], Fathy et al. [1], Yousaf et al. [4], Parirokh et al. [8], Asghar et al. [9], and Arslan et al. [10] who revealed that there was no significant difference in the outcome of pain after instrumentation during endodontic therapy with or without reducing the occlusal surface. However, maximum distribution of 'no pain' was seen with occlusal reduction group than that of without occlusal reduction group. Also, 'mild pain' distribution was higher in occlusal reduction group than that of without occlusal reduction group. Whereas 'moderate pain' was seen in only without occlusal reduction group. On the other hand, studies by Sheikh et al. [6], Zaman and Ahmed [11], Rosenberg

et al. [12] showed that reduction of occlusal surface helped in the prevention of pain after instrumentation. The present study included patients from 16 to 70 years of age to control the effect of age. The pain perception may differ on the tolerability between male and female, hence both the genders were included in the study to minimize the bias. To control the microbiological impact on postoperative pain calcium hydroxide was used as an intra-canal medicament in both groups. The posterior teeth of the mandible typically experience more post-endodontic pain than those of the maxilla because of the mandible's thick trabeculae pattern, which reduces blood flow and concentrates infection, delaying recovery.

Additionally, it was demonstrated that postoperative pain was significantly associated with teeth that had preoperative symptoms [1]. Step-back technique was used in previous studies for root canal preparation [3]. Crown down technique with manual protaper was used in present study. Crown down technique has been shown to result in less post instrumentation pain due to less extrusion of apical debris [3]. The patient's response to the therapy and the likelihood of

postoperative pain may be significantly influenced by anxiety and prior dental experiences. Pain is a subjective experience that also depends on the patient's mental and emotional health [4]. If the ultimate treatment plan calls for a full coverage crown to be placed once endodontic therapy is finished, a 2 mm occlusal reduction is acceptable; otherwise, molars ability to function in chewing would be lost. Hence, the full treatment plan needs to be addressed with the

clinicians and patients in advance and they need to be made aware of any potential drawbacks of the treatment [4]. However, our finding can't be generalised as the study was confined to only our medical school. A person's perception is a subjective experience that can be influenced by physical and psychological factors. In this investigation, pain was judged subjectively using VAS, which could be a limiting factor in interpreting the data.

CONCLUSIONS

According to the findings of the current investigation, occlusal reduction had no discernible impact on

postoperative pain in teeth with symptomatic apical periodontitis following root canal therapy.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability: Data will be available upon request to corresponding authors after valid reason.

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