

OCCLUSAL REDUCTION REDUCES POSTOPERATIVE PAIN AFTER ENDODONTIC INSTRUMENTATION

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ABSTRACT

Pain management after root canal treatment is a very important issue in clinical practice. The purpose of this study was to evaluate the effect of occlusal reduction on postoperative pain in teeth with irreversible pulpitis and tenderness to percussion. This was a prospective, randomized study conducted in Operative Department of dental section of Bahria Dental College and Hospital from June 2013 to May 2014. One hundred and ten posterior teeth with no or mild preoperative pain, sensitive to percussion requiring endodontic treatment were included in this study. After administration of local anesthesia, the root canals were instrumented, and an intracanal calcium hydroxide dressing was placed. The patients were randomly divided into 2 groups of 55 each. In 1 group the occlusal surface was reduced (OR group), whereas in the other group the occlusal surface was not modified (no occlusal reduction, NOR group). The patients were recalled after 24 hour, 2nd day and 3rd day to record their postoperative pain on the visual analogue scale.

Data was analyzed by using Chi-square test. There was no significant difference in postoperative pain between the 2 groups ($P > .05$) after root canal preparation and calcium hydroxide dressing. Occlusal surface reduction did not provide any further reduction in postoperative pain for teeth with irreversible pulpitis and mild tenderness to percussion compared with no occlusal reduction.

Key Words: Irreversible pulpitis, endodontic treatment, intracanal dressing, occlusal reduction, tenderness to percussion, post-operative pain.

INTRODUCTION

Pain of endodontic origin has been a major concern to the patients and clinicians, so the main goal of endodontic procedure is to control pain during and after root canal treatment and keeps the tooth healthy and allowing it to be functional.¹ In irreversible pulpitis, endodontic therapy is currently the most frequently offered method to relieve pain.² Various researches have been conducted studies to assess pain prevalence after root canal treatment. On the basis of a recently published systematic review, the prevalence of pain after root canal treatment has been reported to be between 3% and 58% of patients.³ The causes for these vast variances among the different studies could be due to many elements, some of which may be the differences in inclusion criteria,¹ the characterization of

pain after root canal treatment,³ the technique of root canal preparation,¹ the number of treatment visits, the gender and age of the patients,² the frequency of preoperative pain,⁴ sensitivity to percussion before root canal treatment,⁵ and the type of intracanal medicine used.³ Demographic factors such as age, gender, and general health state (existence of allergies) also affect the frequency of pain.⁴

Several methods have been used for handling pain and discomfort after root canal procedure.⁷ These include preoperative analgesics and corticosteroid prescription, occlusal reduction and administration of long-acting anesthesia.⁵ Several researches have assessed the effects of occlusal reduction on pain and discomfort after endodontic treatment.^{1,2,5,6} Rosenberg et al described in his study the positive effect of occlusal reduction on postoperative pain,⁵ but Creech et al⁶ and Jostes and Holland⁷ reported no significant differences in postoperative pain and discomfort in patients who had received root canal treatment with or without occlusal reduction. Hence, the results of these studies vary, and this creates a dilemma for dentists about whether they should reduce occlusal contacts to prevent pain after root canal treatment.⁸

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The discomfort experienced did not differ in total amount, maximum intensity, or duration between those patients for whom the occlusion was relieved and for those in whom the occlusion was left intact.⁹

Therefore, the goal of the current study was to evaluate the effect of occlusal reduction on postoperative pain after endodontic instrumentation in patients with irreversible pulpitis and tenderness to percussion.

METHODOLOGY

One hundred and ten patients with the history of irreversible pulpitis and tenderness to percussion were selected from the Operative Department of Bahria Dental College from June 2013 to May 2014 to participate in this prospective, randomized study. Informed consent of all subjects was obtained after explaining the nature of the procedure, possible discomforts and risks. The inclusion criteria of this study was healthy patients with posterior maxillary or mandibular tooth, history of mild pain, tenderness to percussion, normal periapical radiographic appearance, presence of an opposing tooth (or teeth) with normal occlusal contact with the opposing tooth (or teeth), and willing to continue their treatment. Exclusion criteria were patients younger than 18 years old, presence of any systemic disorders that prevented administration of lidocaine as the anesthetic agent, teeth with an infected root canal system, swelling and severe pain on percussion, without occlusal contacts. The clinical diagnosis of symptomatic irreversible pulpitis was confirmed by a response to an electric pulp test, the tenderness to percussion was established by tapping the teeth with the end of mirror handle.

A visual analogue pain scale (VAS) was used to evaluate pain levels. The VAS was explained to the patients, and they were instructed how to use it. Patients were asked to complete the VAS before local anesthesia was administered to rate their preoperative pain. The teeth were then anesthetized by using 2 cartridges of a local anesthetic solution containing 2% lidocaine with 1:80,000 epinephrine. All root canal treatment was performed by a single operator. Biomechanical preparation of the canals was performed after establishment of the working lengths by using an electronic root canal measuring device and confirming the measurements with a periapical radiograph. A 1.3% solution of sodium hypochlorite was used as an irrigant between each instrument during root canal preparation. The root canals were instrumented initially to file size no. 15, followed by the use of sizes 1 and 2 Gates-Glidden burs to prepare the coronal portion of the canal. After the biomechanical preparation, the root canals were dressed with calcium hydroxide paste and the access cavity was filled with a temporary restorative materi-

al. The patients were randomly divided into 2 groups of 55 each, the occlusal reduction (OR) group and the no occlusal reduction (NOR) group. To randomize the patients, each patient was assigned a number. The numbers in each group were written on paper, and each number was kept in a separate sealed envelope. Each patient was asked to choose one of the envelopes, and on the basis of the number chosen, the patient was assigned to 1 of the groups.

After confirming the presence of occlusal contact with articulating paper, patients in the OR group had all occlusal contacts on the functional and nonfunctional cusps as well as on the marginal ridges reduced by 1 mm by using a diamond bur in a high-speed handpiece with copious water spray. Occlusal reduction was not done in NOR group. Patients of both groups were recalled to complete a VAS to rate their pain at 24 hours, 2 days, 3 days, after the treatment. The following criteria were outlined for the patients to rate their pain: 0, no pain; 1-3, mild pain; 4-6, moderate pain; 7-9, severe pain. No analgesic was prescribed to patients.

Data was analyzed by using SPSS 17. Frequencies and percentages for both groups were computed for gender, age, tooth number and levels of postoperative pain. Chi-square test was used to assess the difference of postoperative pain for teeth after endodontic instrumentation between both groups. The level of significance was set at 0.05.

RESULTS

A total of 110 patients included in this study, with 28 male and 27 female in OR group, and 25 males and 30 females in NOR group. The response rate was 100%. The average age of the patients in the OR group was 32.55 years, and it was 30.75 years in the NOR group. (Table 1) There was no significant difference between the number of molar and premolar teeth in the OR group (31 molars and 24 premolars) and the NOR group (28 molars and 27 premolars).

After 24 hour in OR group, 58.18% of the patients had no postoperative pain, the remainder had mild pain

TABLE 1: VARIABLES IN OCCLUSAL REDUCTION (OR) AND NO OCCLUSAL REDUCTION (NOR) GROUPS

Variables		OR group N (n=55)	NOR group N (n=55)
Gender	Male	28	25
	Female	27	30
Age (Mean in years)		32.55	30.75
Molars		31	28
Premolars		24	27

TABLE 2. POSTOPERATIVE PAIN AFTER 24 HOUR, 2 DAYS, 3 DAYS IN OR AND NOR GROUPS

	No Pain	Mild Pain	Moderate Pain	Severe Pain	Total	P-value
Postoperative pain after 24 hour in OR group	32	15	5	3	55	0.338
Postoperative pain after 24 hour in NOR group	27	15	9	4	55	
Postoperative pain after 2 days in OR group	43	8	3	1	55	0.943
Postoperative pain after 2 days in NOR group	39	12	3	1	55	
Postoperative pain after 3 days in OR group	46	7	2	0	55	0.784
Postoperative pain after 3 days in NOR group	44	8	2	1	55	

27%, moderate pain 9.09% and severe pain 5.45%. In NOR group after 24 hour, 49.09% had no postoperative pain, 27.27% had mild pain, 16.36% had moderate pain, and 7.27% had severe pain. (Table 2) The postoperative pain levels felt by the patients in both groups (OR & NOR) were assessed by using Chi-square test. There was no significant pain reduction in OR group when cross-tabulated with NOR group after 24 hour (P-value=0.338), 2 days (P-value=0.943), and 3 days (P-value=0.784).

There was no significant difference between gender and the level of postoperative pain in both groups ($P > .05$). There was also no significant difference between postoperative pain level and the patients' age (p-value=0.177) and tooth involvement (p-value=0.508) in both groups. The postoperative pain level was decreased in both groups after root canal treatment.

DISCUSSION

Pain after endodontic therapy is of serious concern both to the dentist and patient.¹⁰ The results of the our study have shown that there was no significant effect on pain after root canal treatment in patients having occlusal reduction compared with patients in whom their occlusal contacts were left untreated. Two previous studies^{5,6} have reported conflicting results regarding the efficacy of occlusal reduction on postoperative pain and discomfort after root canal treatment. The results of our study were in harmony with one of them⁶ while in disparity with the other.⁵

Rosenberg et al reported in his study, occlusal reduction should prevent postoperative pain in those patients whose teeth initially exhibit pulp vitality, percussion sensitivity, preoperative pain, and/or the absence of periradicular radiolucency.⁵ For that reason, in this study all of these significant factors except pretreatment pain were included in the inclusion criteria. Saatchi M & Mansouri P¹¹ in 2005 demonstrated similar results to our

study that occlusal reduction in vital teeth and without preoperative pain or sensitivity to percussion cannot decrease postoperative pain effectively. Our results also agree with the consensus that pulp extirpation alone is probably the most significant factor in reduction of postoperative pain; regardless of other variables.¹² The vast majority of our patients in both groups reported no pain or only minimal pain within 24 to 72 hours of treatment after pulp extirpation. Postoperative pain was reduced in both groups from 1st to 3rd days might be due to use of crown down technique and placement of intracanal medicament.

In the present study, the effect of occlusal reduction on pain after root canal treatment was evaluated in patients with no or mild spontaneous preoperative pain but with mild tenderness to percussion. No significant differences were found between the 2 groups ($P < .05$).

In the present study, only posterior teeth (both molars and premolars) having occlusal contacts with opposing teeth were included to be able to compare the results with others studies. It is considered acceptable to reduce the occlusal surface of a tooth when one or more walls of the cavity have undermined enamel.⁵ It has been recommended to use full coverage over occlusal surfaces of posterior teeth after root canal treatment. If the patient does not proceed with full-coverage restoration of the tooth after root canal treatment and the dentist had reduced the occlusal surface to prevent possible postoperative pain, the tooth would then have no function. Therefore, clinicians and patients should be aware of the possible disadvantages associated with occlusal reduction.

In 2 surveys conducted among American board certified endodontists, the use of occlusal adjustment was evaluated. In the 1974-1975 survey, respondents performed occlusal adjustment for pulpitis cases with or without apical periodontitis 80% and 48.8% of the time, respectively.¹³ However, in the 1988 survey, the percentages were 73.2% and 40.1%, respectively.^{14,15}

Another important factor that may influence postoperative pain is the amount of extruded apical debris after root canal treatment.^{16,20} In the present study, hand and rotary instruments were used with the crown-down technique to reduce apically extruded debris. In this study, both groups had calcium hydroxide placed in the canals, but this is in contrast to previous investigations of the effect of occlusal reduction where the root canals were left empty.¹⁷ There are very few reports regarding the efficacy of calcium hydroxide in reducing postoperative pain when used as a root canal medicament.¹⁸ Some studies have reported favorable results whereas others have reported no significant difference on postoperative pain with or without dressing with the medication.¹⁹ This study highlights that when the endodontic treatment appropriately done according to the guidelines, only a small numbers of teeth would report postoperative pain.

There were some limitations of this study; first, the data was collected by using Visual analogue scale. It is well known that pain perception is a highly subjective and variable experience modulated by multiple physical and psychological factors.²⁰ Second, the sample size was small.

CONCLUSION

It was no difference in concluded that was found in postoperative pain between patients treated in OR group and those treated in NOR group regardless of preoperative diagnosis or tooth location. Occlusal reduction in teeth with irreversible pulpitis and mild tenderness to percussion had no significant influence on postoperative pain after root canal preparation.

No Conflict of Interest

Authors declare that there was no conflict of interest involved in carrying out this study.

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