

Evaluation the Effect of Occlusal Reduction on Postoperative Pain in Teeth with Irreversible Pulpitis and Mild Tenderness to Percussion.

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Abstract

Introduction: Pain control management after root canal treatment is a very important in clinical practice. The purpose of this study was to evaluate the effect of occlusal reduction on postoperative pain following root canal instrumentation in teeth with irreversible pulpitis and mild tenderness to percussion.

Methods: Forty premolar vital teeth with sensitivity to percussion requiring endodontic treatment were included in this study. After administration of local anesthesia, the root canals were instrumented using WaveOne single file technique. The patients were randomly divided into 2 groups of 20 each. In group I (OR group) the occlusal surface was reduced, whereas in the other group II (NOR group), the occlusal surface was not modified (no occlusal reduction) and all teeth were instrumented with WaveOne single file technique. Each patient was asked to record their postoperative pain on a verbal rating scale with 4 categories at 12 hours, 24 hours and 48 hours. Data were analyzed by Mann-Whitney tests.

Results: Forty patients returned the verbal rating scale forms. There was no significant difference in postoperative pain between the 2 groups ($P > .05$) after root canal preparation.

Conclusions: *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*

Introduction:

One of the most important aspects during endodontic treatment is to control pain during and after root canal treatment [1]. On the basis of a published systematic review, the prevalence of pain after root canal treatment has been reported to be between 3% and 58% of patients [2]. The reasons for these vast differences among the various studies could be due to many factors, some of which may be the differences in inclusion criteria (table 1), the definition of pain after root canal treatment, the method of root canal preparation, the number of treatment visits, the gender and age of the patients, the presence of preoperative pain, tenderness to percussion before root canal treatment, and the type of intracanal medication used. So many investigations of postoperative pain have not been completely in accordance with each other regarding the influencing factors except for the presence of preoperative pain and tenderness to percussion [3]. Several strategies have been described for managing pain and discomfort after root canal treatment such as preoperative analgesics, corticosteroid prescription and occlusal reduction [1,4].

Generally, it is accepted that there is no single factor affecting pain after root canal treatment [5]. Several factors may influence pain perception after root canal treatment including the state of the pulp or condition of the root canal system, the presence of a periapical radiolucency, spontaneous preoperative pain, and pain arising from the periapical tissues [6]. Several investigations have evaluated the effects of occlusal reduction on pain and discomfort after root canal treatment [4,6,7]. Despite the positive conclusions of Rosenberg et al [4] on the effect of occlusal reduction on postoperative pain, Creech et al [6], Jostes and Holland [7] and Masoud et al [8] 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 other studies vary, and this creates a dilemma for dentists regarding whether they should reduce occlusal contacts to prevent pain after root canal treatment or not. Therefore, the purpose of the present study was to evaluate the effect of occlusal reduction on pain level after root canal treatment in patients with irreversible pulpitis, mild tenderness to percussion and without moderate-to-severe spontaneous pain.

Materials and Methods

This study was approved by the Ethics Committee of Al-Mustansiriya University of college of dentistry in Iraq, The patients included in the present study met the inclusion and exclusion criteria described in Table 1. The clinical diagnosis of symptomatic irreversible pulpitis was confirmed by presence of bleeding during access cavity preparation bleeding in the pulp chamber after access cavity preparation has been considered as a sign of the pulp having an intact blood supply (9). The tenderness to percussion was established by tapping the teeth with the end of mirror handle. Forty patients were eligible to participate in this prospective, randomized single-blind clinical study. Informed consent of all subjects was obtained after the nature of the procedure and the possible discomforts and risks had been fully explained. A verbal rating pain scale (VRS) used to evaluate pain levels.

The VRS was explained to the patients, and they were instructed how to use it. After administering a local anesthesia using 2% lidocaine 1:100,000 epinephrine, elimination of all carious tissue to prevent introducing of bacteria and their products from carious lesion to root canal system after that applying rubber dam (Figure 2.5) then access was made. The volume of anesthetic and type of injection being at the discretion of the dentist [16]. Working length considered to be at apical constriction 1mm from radiographic apex. The canals of all teeth were prepared using WaveOne single file technique. All teeth were instrumented to the same size of MAF (25) to minimize group disparity [16,17]

All root canal treatment was performed by a single operator. Biomechanical preparation of the canals was performed after getting direct access to canal orifice and establishment of the working lengths by using an electronic root canal measuring device (Root ZX; Morita Corporation, Kyoto, Japan) and confirming the measurements with a periapical radiograph. The working length of each root canal was set at 1 mm less than the radiographic apex. Any teeth where the working length had been overestimated or where instruments had inadvertently been placed beyond the working length were excluded from the study. A 2% 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, then WaveOne primary 25/0.08 (Dentsply, Maillefer, Switzerland) used to complete root canal preparation. After the biomechanical preparation, Endoseptone (PD, Switzerland) used as intra-canal medicament and the access cavity sealed by resin reinforced glass ionomer (SDI, Australia). The patients were randomly divided into 2 groups of 20 each, Group I was the occlusal reduction group and Group II was the no occlusal reduction group, with the latter serving as a control group, To randomize the patients, each candidate asked to withdraw a paper from a jar; this paper has a number which indicate the group type. After confirming the presence of occlusal contact with articulating paper, patients in the group I 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. To ensure that the patients in the control Group II were unaware whether their teeth had been reduced, a high-speed handpiece with copious water spray was activated inside the patient's mouth without contacting the occlusal surface to simulate the procedure used in the group I. patients were asked to record their postoperative pain on a verbal rating scale with 4 categories as follow: (no pain, mild, moderate and severe pain) at 12 hours, 24 hours and 48 hours.

1. No pain: the treated tooth felt normal. Patients don't have any pain.
2. Mild pain: recognizable, but not discomforting, pain, which required no analgesics.
3. Moderate pain: discomforting, but bearable, pain (analgesics, if used, were effective in relieving the pain).
4. Severe pain: difficult to bear (analgesics had little or no effect in relieving the pain)

**Table 1: Inclusion and Exclusion Criteria for Participants Patient
in this Study**

Exclusion Criteria	Inclusion Criteria
1. Having a tooth not suitable for restoration. 2. Teeth with radiographical changes. 3. Teeth with moderate to severe curved canals. 4. Patients who treated with antibiotics during past 24 hour. 5. Present of any systemic disease that interfere with administration of lidocaine. 6. Teeth with sclerotic obliterated canals. 7. The canals of the teeth were too wide, initial file larger than #15 file. 8. Teeth had been fractured between the appointments. 9. Missing opposite teeth, teeth with unsupported or weak cusp. 10. Pregnant and breast feeding female 12. Teeth with an infected root canal system 13. Teeth associated with swelling. 14. Presence of spontaneous pain that need emergency treatment. 15. Presence of periodontal disease or mobility grade 1.	1. The aims and requirements of the study were freely accepted. 2. Treatment was limited to patients that have no sign or symptom for any systemic disease. 3. All premolar teeth, either maxillary or mandibular and without any radiographical changes. 4. Teeth with straight to mild curvature and single canal. 5. No antibiotics before clinical procedures were used. 6. Treatment of only one tooth, completion of access opening and instrumentation in one session. 7. Prolonged pain to cold and Mild tenderness to percussion. 8. #10 K-file confirmed loose at length and #15 K-file was the initial file and snugly fit at working length. 9. Presence of an opposing tooth (or teeth) with normal occlusal contact with the opposing tooth (or teeth) Willing to continue their treatment plan until placing a full-coverage restoration 10. Treatment was limited to patients ranged in age from 19 to 50 years.

Result

40 patients participated in the study (20 male and 20 female), all patients reported no to mild pain before starting the treatment. Both groups showed no significant differences regarding the patients’ age and gender ($P > .05$). The pain levels felt by the patients in both groups significantly decreased after root canal treatment ($P < .05$; Figure 1), and there was no significant difference between the two groups.

Severe Pain		Moderate Pain		Mild pain		No Pain		Table 1.
NOR	OR	NOR	OR	NOR	OR	NOR	OR	
0	0	7	4	13	12	20	24	12h
0	0	3	3	9	6	28	31	24h
0	0	1	1	6	5	33	34	48h

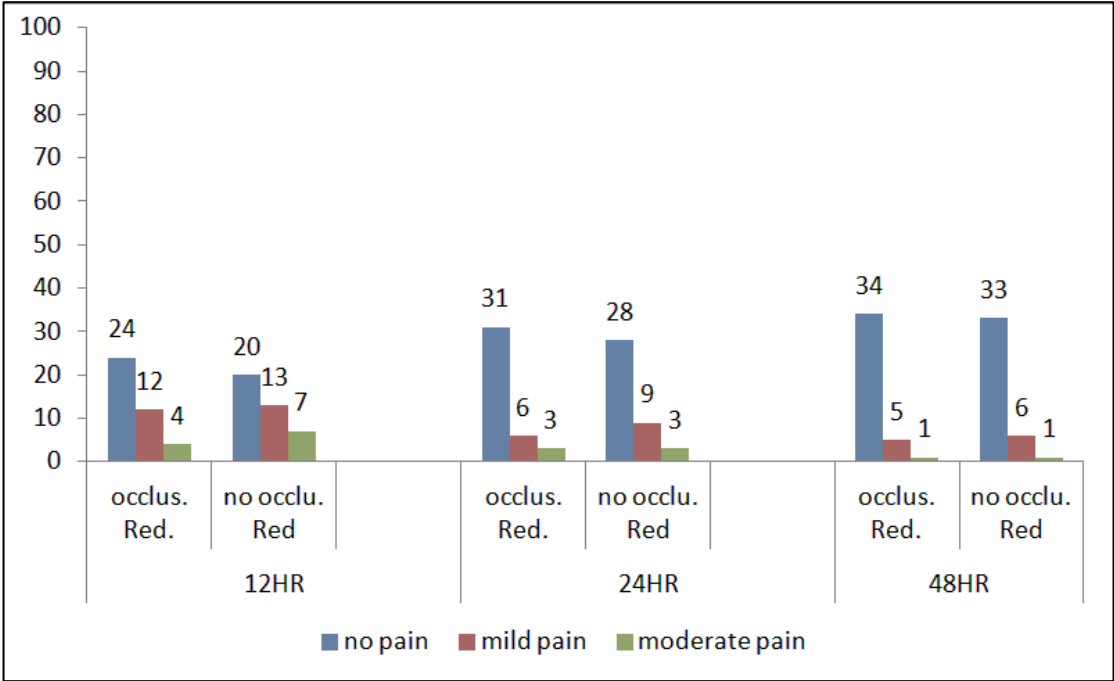


Figure 1: Bar Chart Showing the Pain Level during the Time Interval.

Discussion

The results of the present study showed that occlusal reduction has no significant effect on postoperative pain after root canal treatment of teeth with irreversible pulpitis and mild tenderness to percussion. Previous investigations on occlusal reduction have evaluated either the patient’s comfort [7] or the amount of postoperative pain after root canal instrumentation [4,6,8] ,as was done in the present study. Previous studies [4,6,8] have reported conflicting results regarding the efficacy of occlusal reduction on postoperative pain and discomfort after root canal treatment. The results of the present study were in accordance with both of them [6,8] while in contrast with the other, Rosenberg et al [4] reported that pulpitis, the absence of periapical radiolucency, the presence of preoperative pain, and tenderness to percussion all

had significant influences on postoperative pain after root canal treatment. For that reason, in the present study all of these significant factors except pretreatment pain were included in the inclusion criteria. However, the results of the present 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 intact ($P > 0.05$), despite having the same pretreatment factors mentioned by Rosenberg et al.

These findings suggest that preoperative pain may have more effect than mild tenderness to percussion on the efficacy of occlusal reduction. In addition, other studies [4,6] have reported a significant influence of preoperative pain. Another important factor that may influence postoperative pain is the amount of extruded apical debris after root canal treatment [8]. Previous investigations on the effect of occlusal reduction used the step-back technique for root canal preparation [4,6]. In the present study, rotary instruments were used with the crown-down technique. This technique has been shown to result in significantly less apically extruded debris [10], and hence it was chosen for this study. So the cause of postoperative pain that occur in the present study which ranged between mild to moderate pain level might contribute to the debris extrusion and the file design that enhance the amount of apical extrusion of debris. In clinical practice worm of debris includes bacteria, dentin chips, irrigants, and inflamed or dead pulp tissue, which form during instrumentation, when pushed into the periapical tissues may elicit postoperative pain [11]

The amount of extruded debris may influence the response of the periradicular tissues [12]. The greater the weight of debris, the greater would be the severity of the reaction. It is likely that not only the quantity of debris but also the type and virulence of bacteria bound to the debris and the resistance of host tissue are important [13]. In a study by Gambarini et al., [11]; a reciprocating single-file technique was found to produce a more significant inflammatory response and pain when compared to a rotary nickel-titanium crown down instrumentation technique. Since

reciprocation movement is formed by a wider cutting angle and a smaller releasing angle, while rotating in the releasing angle, the flutes will not remove debris but push them apically. Reciproc and WaveOne motion is very similar (even if not precisely disclosed by manufacturers), and this fact could also explain incidence of postoperative pain that was found in the present study in both group. Moreover, both WaveOne and Reciproc techniques use a quite rigid, big single-file of increased taper (usually 08 taper, size 25), which directly reach the apex. In many cases, in order to reach the apical working length, reciprocating instruments are used with force directed apically, which makes an effective piston to propel debris from a patent apical foramen. Since instruments are used without any preliminary coronal enlargement. This result in a greater engagement of flutes and, consequently, more torque or pressures is needed. Moreover cutting ability of a reciprocating file is smaller when compared to a continuous rotation, and also debris removal is smaller, thus increasing the frictional stress and torque demand, due to entrapment of debris within the flutes this is in agreement with [11,14,15]

In conclusion, occlusal reduction in teeth with irreversible pulpitis and mild tenderness to percussion had no significant influence on postoperative pain after root canal preparation.

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تقيم تأثير خفض الاطباق على الالم مابعد معالجة الاسنان المصابة بالتهاب العصب الغير قابل للرجوع وخفة الضرب بالرقعة

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المستخلص

الالم والسيطرة عليه بعد عملية حشوة الجذر يعد من الأشياء المهمة في العمل السريري. هذه الدراسة تقيم تأثير تقليل الاطباق على الالم بعد عمل حشوة الجذر للاسنان المصابة بالتهاب العصب غير الرجعي.

لقد تم اختيار اربعون مريضاً ممن لديهم التهاب في عصب السن الضاحك قابل للتحسس بالضرب ويحتاج الى حشوة جذر. بعد إعطاء البنج الموضعي للمريض تم تحضير قنوات الجذور باستخدام المبرد المنفرد المسمى Wave One وبعد الانتهاء من العلاج تم تقسيم المرضى الى مجموعتين كل مجموعة تحتوي على عشرين مريضاً، في المجموعة الاولى تم تخفيض سطح الاطباق اما المجموعة الثانية فلم يتم تخفيض الاطباق ومن ثم نسأل كل مريض عن مراقبة حدوث الالم بعد ١٢ ساعة، ٢٤ ساعة، و ٤٨ ساعة. بعد تحليل البيانات وجد انه ليس هناك اختلاف معنوي ما بين المجموعتين ولوحظ ان تخفيض الاطباق لايؤثر بشكل كبير من ناحية الالم على الاسنان المصابة بالتهاب العصب.

الكلمات الرئيسية: معالجة حشوات الجذور. التهاب العصب غيرالرجعي. الالم مابعد المعالجة وخفة الضرب بالرقعة.