



ASSESSING THE IMPACT OF OCCLUSAL RELIEF IN ENDODONTIC THERAPY ON POSTOPERATIVE PAIN PATTERNS IN PATIENTS AFFLICTED WITH IRREVERSIBLE PULPITIS AND APICAL PERIODONTITIS.

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Abstract

Background and Aim: Nonsteroidal anti-inflammatory medications are widely used to treat postoperative pain. Corticosteroids, long-acting anesthesia, and occlusal relief are among of the therapy techniques utilised to relieve inter or postoperative pain. The goal of this research was to see the impact of occlusal relief affected the considerable pattern towards postoperative pain at different time intervals in patients having apical periodontitis and irreversible pulpitis.

Material and Methods: This research used a prospective study among individuals were underwent RCT in teeth concerning necrotic pulp, vital pulp, or vital pulp that undergone treatment and treated for major symptomatic irreversible pulpitis by one endodontic clinician over a one-year period, or individuals undergone root canal retreatment. Sixty posterior teeth along with irreversible pulpitis and minor tenderness towards percussion were substantially included in this randomised trial. The root canal procedure was started, and biomechanical preparation was completed. After applying calcium hydroxide as an intracanal medicament, a



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closed dressing was applied. The selected patients have been randomly allocated to one of two groups: the experimental group having occlusal contacts were alleviated ($n = 50$) and the other control group included occlusal contacts were left intact ($n = 50$). The “Heft Parker Visual Analogue Scale” was used to record and analyse postoperative pain at various intervals.

Results: Overall, a total of 100 patients were treated, with 50 in each group. Each group had 50 patients evaluated. There were 64 (64%) women and 36 (36%) men among the 100 patients. The discomfort felt by the patients dramatically decreased over time and was constant in both groups at the 6-hour follow-up. At 6 h, there is no statistically significant change in pain status among the control and experimental groups ($P > 0.05$).

Conclusion: In conclusion, the study stated there was no statistically significant difference in postoperative discomfort incidence between groups. In the occlusion eased group, the significant pattern of postoperative pain did indicate a steady reduction. There were flare-ups in the occlusion intact group. This shows that occlusal reduction could be useful in preventing flare-ups during endodontic treatment.

Key Words: Endodontic treatment, Root canal treatment, Occlusal relief, Postoperative pain

Introduction

“Endodontic therapy”, often known as root canal treatment (RCT) in the medical context, and the treatment is used to treat tooth discomfort and infection. Pain is a highly individual and subjective experience.¹ In general, suitable diagnosis and corresponding treatment procedures result in a cure.² The postoperative discomfort after the occurrence of RCT ranged from 1.9% to 48%.^{3,4} The severity of post-treatment pain decreased over time, as did the prevalence of postoperative discomfort. It is thought to be related to immense periapical inflammatory response. And it can last from a limited time to multiple days after endodontic therapy.

Nonsteroidal anti-inflammatory medications are widely used to treat postoperative pain.⁶ Corticosteroids, long acting anaesthesia, and occlusal relief are among of the therapy techniques used for inter or postoperative pain reduction.⁶⁻⁸ There is some debate about removing occlusal contacts to prevent postoperative pain. According to Gatewood et al, Natkin and Rosenberg et al, removing occlusal contacts may be effective in lowering postoperative discomfort in some instances.⁷⁻⁹ Creech et al., Jostes, and Parirokh, on the other hand, found no positive link between postoperative pain and occlusal alleviation.¹⁰⁻¹²

Pain is a personal experience that is impacted by both physical (genetic) and psychological elements. In the clinical setting, pain has been measured using either numeric or verbal self-rating measures. Many factors influence pain, including personality, behaviour, physical and psychological issues. Most clinical research employs numerical, verbal, and visual analogue scales. In this investigation, a categorical scale of no pain, minor, acute, moderate, and intolerable pain was utilised. Despite its simplicity and ease, the categorical scale is regarded as a valid and reproducible measuring instrument for clinical pain investigations.^{13,14}

The Heft Parker Scale is a mixed metric scale (0-170 mm) with several verbal cues meant to improve communication and correlation amongst pain assessment scales.^{15,16} It is a four-point

scale that includes no discomfort, mild pain, considerable pain, and severe pain. This scale is regarded as a dependable and repeatable measuring instrument for clinical pain investigations.

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Material and Methods

The research proposes a prospective study of persons significantly experienced RCT in teeth concerning necrotic pulp, vital pulp, or vital pulp that undergone treatment and treated for major symptomatic irreversible pulpitis by one endodontic clinician over a one-year period, or individuals undergone root canal retreatment.

The sample size of the study was estimated using an error range of $\alpha = 0.05$ (95% confidence limit) at 85% power and the study included a sample size of 50 under each group, plus a 10% dropout rate. Patients who had been treated in the outpatient department were recruited.

The study's inclusion criteria were healthy patients who complained of significant pain in response to cold stimuli, who had a carious posterior tooth (molar or premolar) with mild tenderness on percussion and no radiological periapical alterations. Preoperative pain must be less than 30 mm on the "Heft Parker Visual Analogue Scale" (VAS).

Participants under the age of 18 and above the age of 65 were excluded, as were those taking medication. Patients who have a history of local anaesthetic agent allergies. Tooth mobility significantly greater than Grade 1 and the pocket depth value is greater than 5-mm. Pregnancy and lactation, a history of serious medical disorders, patients experiencing moderate-to-severe pain, the presence of infection and edoema, periapical radiolucency, a tooth with no opposing teeth, and a previously root canal-treated tooth are all factors to consider.

The essential clinical diagnosis towards irreversible pulpitis was based on a prolonged excessive response to cold stimuli lasting more than 10 seconds and mild discomfort to percussion. The response of the teeth to the electric pulp tester verifies the diagnosis. A radiographic examination was performed to rule out a periapical lesion. Before starting treatment, each patient completed the Heft Parker VAS. All qualifying patients have been previously informed about the study's design and treatment procedure, and their informed consent was acquired.

This prospective randomised, single blind, parallel controlled study included 100 healthy adult patients. The teeth were anaesthetized with the concentration of "2 mL of lignocaine 2% with 1:80000 adrenaline" (Lignox A 2% Warren, Indoco). Concerning the important usage of the rubber dam, the access cavity for the teeth was prepared and the associated working length has been determined, which was validated using periapical radiographs and an apex locator. The root canals were constructed utilising the crown down approach, with the working length kept "1 mm short of the radiographic apex". Shaping and cleaning were accomplished with the K3 rotary file system. During instrumentation, 3% sodium hypochlorite was utilised as an irrigant with 17% EDTA. The root canals for the treatment has been prepared to a minimum of 0.4 taper 25, and a

calcium hydroxide dressing was used before the root canals were properly sealed with effective temporary curative material.

All of the patients were given a number for the purpose of randomization. Using computer generated randomization software (www.randomiser.org), these numbers were randomised into experimental and control groups. The approach of equal randomization was used, with a 1:1 allocation ratio for both groups. Envelopes with numbers inscribed on top were produced for all patients. The group to which they were assigned by computer-generated software was written down on paper and sealed by a dental nurse. The envelopes were provided to the operator after they had been cleaned and shaped. The operator opened the sealed envelopes, and the patients were mainly divided into two groups concerning the available data: those with occlusal reduction (experimental group) and those without (control group). The occlusal contacts (functional cusps) for the experimental group were marked with articulating paper and removed with the a high-speed air rotor handpiece with a diamond bur by reducing around 1 mm. To overcome the bias, the control group experienced identical motion, but the occlusal contacts were not deleted.

The Heft Parker Visual Analogue Scale has been clearly explained towards the patients, and they were invited to return after specific time periods such as “6 hours, 12 hours, 18 hours, 24 hours, 2 days, 3 days, 4 days, 5 days, 6 days, and 7 days”. The Visual Analogue Scale was classified into four groups: No pain equaled 0 mm; 1 mm-54 mm equaled "faint, weak, or mild pain;" 55 mm-114 mm equaled "moderate" pain; and 114 mm-170 mm equaled "strong, intense, and maximum possible pain.”¹⁶⁻¹⁹All patients were instructed to report to emergency in case of severe pain.

Statistical analysis

The gathered information was precisely compiled and entered into Microsoft Excel 2007 (spreadsheet software) before being exported to SPSS version 15's data editor page (SPSS Inc., Chicago, Illinois, USA). For every test, a 95% confidence level and a 5% significance threshold were clearly defined.

Results

A total of 100 patients were treated, with 50 in each group. Each group had 50 patients evaluated. There were 64 (64%) women and 36 (36%) men among the 100 patients. 46 (46%) of those treated were maxillary, while 56 (56%) were mandibular. The mean age in the control group was 32.54 9.32 and 33.10 14.18 in the experimental group. Overall, comparing the means of the control and experimental groups reveals that there is no statistically significant difference ($P > 0.05$) at different time periods [Table 1]. The discomfort felt by the patients dramatically decreased over time and was constant in both groups at the 6-hour follow-up. According to the Pearson Chi-square test results, the difference in pain state between the experimental and control groups at 6 h is not statistically significant ($P > 0.05$). [Table 2]. To explore the thorough comparison of pain patterns, the repeated measures ANOVA test was used. The control group substantially identified a statistically significant ($P 0.05$) reduction in pain between 6 h and 18 h, 24 h, day 6, and day 7, whereas the experimental group experienced a statistically significant ($P 0.05$) reduction in pain between 6 h and all subsequent time periods. The “Mann-Whitney U test”

used for independent samples and the results revealed a statistically insignificant difference ($P > 0.05$) in the distribution of pain values between males and females in both groups. In both groups, the difference in pain distribution between molar and premolar teeth was statistically negligible ($P > 0.05$). The relationship between the tooth (premolar/molar) and pain state was similarly statistically insignificant at all time intervals. ($P > 0.05$).

Table 1: Deference in pain status between with and without occlusion at 7 days

At 7 day	Groups		Total	P value
	With occlusion	Without occlusion		
Pain Yes	0	1	1	0.65
Pain No	50	49	99	
Total	50	50	100	

Statistically significance at $p \leq 0.05$

Table 2: Deference in pain status between with and without occlusion at 6 Hour

At 6 Hour	Groups		Total	P value
	With occlusion	Without occlusion		
Pain Yes	40	39	79	0.1
Pain No	10	11	21	
Total	50	50	100	

Statistically significance at $p \leq 0.05$

Discussion

The function of occlusal relief during root canal treatment has been contested. According to a study of the literature, the pulpal and periradicular diagnoses have played an important role in determining the role of occlusal relief after root canal therapy. According to Natkin E., occlusal relief may be effective in cases of acute abscess that is painful when biting.¹⁹ According to Antrim et al., occlusal reduction will be effective regardless of the diagnosis.¹⁷ The Diplomats of the American Board conducted two surveys. The first survey, conducted in 1977, suggested that occlusal adjustment was commonly performed in two conditions: vital pulp with irreversible pulpitis and no periapical involvement, and nonvital teeth with apical periodontitis and no swelling. A decade later, the trend was towards occlusion adjustment in situations of apical periodontitis and no swelling.^{17,18}

The biochemical preparation in this trial has been done through an engine driven nickel-titanium system rather than stainless steel material because the engine driven nickel-titanium systems mainly extruded less debris and irritant, that properly lessen the postoperative pain.²¹ In addition, the crown down strategy was adopted in this investigation, which was found to be more significant for the step back technique in debris extrusion.²² Sathorn et al²³ said that simply quantifying the prevalence of postoperative pain is insufficient and emphasized the significance

of measuring both pain improvement and progression. As a result, the current study examines the occurrence and pattern of postoperative pain following root canal therapy.

In the current investigation, we discovered that occlusal alleviation had no statistically significant effect on postoperative pain. The research findings are consistent with the research of Creech, Jostes, Holland, and Parirokh.¹²

Overall, comparing the means of the control and experimental groups reveals no statistically significant difference ($P > 0.05$) at different time intervals. At 6 hours, 10% of patients in the experimental group findings reported severe pain, while 3.5% of patients in the control group reported severe pain. The initial pain could be caused by a variety of causes, including debris extrusion or irrigants, which could result in periapex inflammation. The occurrence of significant pain was recorded in the two groups, with a steady reduction in discomfort reported over subsequent time intervals. These result findings are consistent with the results of Dummer et al²⁴, who discovered that 87% of individuals with acute pulpitis experienced significant discomfort. According to Levin et al²⁵, 53% of patients having root canal therapy had PEP; just 21% reported a minimal level of pain. Other research, on the other hand, found concentrated and minimized frequency even for single appointment groups.¹⁴⁻¹⁶

A statistically significant reduction in pain was observed in the experimental group at 6 h and all other time intervals (“12 h, 18 h, 24 h, day 2, day 3, day 4, day 5, day 6, and day 7”) whereas no statistically significant minimized and reduced pain was observed in the control group at day 2, day 3, day 4, and day 5. Abdel Hameed et al²⁶ discovered similar results, finding a higher rate of postoperative discomfort in preoperatively symptomatic teeth compared with asymptomatic teeth. Other studies have found an association between preoperative and postoperative discomfort.^{16,18,27}

Coronal covering of crowns is the preferred restoration in root canal treated teeth because it reduces the chance of tooth fracture, which is a common cause of tooth mortality. Salehrabi et al²⁸ conducted an epidemiological investigation on the outcome of endodontic treatment and discovered that 85% of root canal treated removed teeth did not have full coverage restorations. Shelley et al.²⁹ discovered that only 27% of patients received the recommended full coverage restoration.

Attention to differences in the occurrence and severity of teeth pain subsequent endodontic therapy based on pulp state may help doctors warn patients about expected pain and prescribe analgesics for usage immediately after the treatment. To avoid exacerbation, pain management should be an intrinsic element of dental treatment, especially in the early phases.

Conclusion

In conclusion, the study concluded that there is no statistically significant difference in the incidence of postoperative pain among the considered research participants and groups. The significant pattern of postoperative pain results revealed a gradual reduction of pain within the occlusion relieved group. The flare-ups were substantially reported in the occlusion intact group. This suggests that reduction of occlusal having an important and significant role in anticipation of flare-ups during the endodontic treatment. Dentists needs to be highly aware of the pain and

need to put maximum efforts to prevent and treat it. Patients must be informed and advised about the significant possibility of pain following the endodontic treatment and must be instructed about the use of analgesics.

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