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EVALUATING THE EFFECT OF OCCCLUSAL RELIEF IN ENDODONTIC TREATMENT ON POSTOPERATIVE PAIN PATTERN IN PATIENTS DIAGNOSED 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 anaesthesia, and occlusal relief are among of the therapy techniques utilized to relieve inter or postoperative pain. The goal of this study was to see how occlusal relief affected the pattern of postoperative pain at various time intervals in patients with irreversible pulpitis and apical periodontitis.

Material and Methods: This is a prospective study of persons who underwent RCT in teeth with vital pulp, necrotic pulp, or vital pulp that had been treated for symptomatic irreversible pulpitis by one endodontic clinician over a one-year period, or who received root canal retreatment. Sixty posterior teeth with irreversible pulpitis and minor tenderness to percussion were 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 closed dressing was applied. The patients were randomly assigned to one of two groups: the experimental group where occlusal contacts were alleviated (n = 50) and the control group where 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: 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 between the experimental and control groups ($P > 0.05$).

Conclusion: There was no statistically significant difference in postoperative discomfort incidence between groups. In the occlusion eased group, the 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, Occlusal relief, Postoperative pain, Root canal treatment

Introduction

Endodontic therapy, often known as root canal treatment (RCT), is used to treat tooth discomfort and infection. Pain is a highly individual and subjective experience.[1] In general, appropriate diagnosis and corresponding treatment procedures result in a cure.[2] Postoperative discomfort after RCT ranged from 1.9% to 48%.[3,4] The severity of post-treatment pain decreased over time, as did the prevalence of post-operative discomfort.It is thought to be related to periapical inflammatory response. It can last from a few hours to many 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, mild, moderate, acute, and intolerable pain was utilised. Despite its simplicity, 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

This is a prospective study of persons who underwent RCT in teeth with vital pulp, necrotic pulp, or vital pulp that had been treated for symptomatic irreversible pulpitis by one endodontic clinician over a one-year period, or who received root canal retreatment.

The sample size was estimated using an error of = 0.05 (95% confidence limit) at 85% power and a sample size of 50 in 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 had a history of local anesthetic agent allergies. Tooth mobility greater than Grade 1 and pocket depth 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 clinical diagnosis of 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 were 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 2 mL of lignocaine 2% with 1:80000 adrenaline (Lignox A 2% Warren, Indoco). Following the application of the rubber dam, the access cavity was prepared and the working length was 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 were prepared to a minimum of 0.4 taper 25, and a calcium hydroxide dressing was used before the root canals were sealed with temporary restorative 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 who was not involved in the study. The envelopes were provided to the operator after they had been cleaned and shaped. The operator opened the sealed envelopes, and the patients were divided into two groups: 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 using 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 was explained to the patients, and they were invited to return after 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."[16-19]All patients were instructed to report to emergency in case of severe pain.

Statistical analysis

The collected data was assembled and input into a spreadsheet programme (Microsoft Excel 2007) before being exported to the data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). The confidence level and level of significance for all tests were set at 95% and 5%, respectively.

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 experimental and control groups reveals 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 saw 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 for independent samples 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≤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≤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 was done using an engine driven nickel-titanium system rather than stainless steel files because engine driven nickel-titanium systems extruded less debris and irrigant, which could lessen postoperative pain.[21] In addition, the crown down strategy was adopted in this investigation, which has been found to be superior to the step back technique in debris extrusion.[22] Sathorn et al[23] 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 prevalence and pattern of postoperative pain following root canal therapy.

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

Overall, comparing the means of the experimental and control groups reveals no statistically significant difference ($P > 0.05$) at different time intervals. At 6 hours, 10% of patients in the experimental group 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 both groups, with a steady reduction in discomfort reported over subsequent time

intervals. These findings are consistent with those of Dummer et al[24], who discovered that 87% of individuals with acute pulpitis experienced significant discomfort. According to Levin et al[25], 53% of patients having root canal therapy had PEP; just 21% reported a low level of pain. Other research, on the other hand, found reduced 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 reduction in pain was observed in the control group at day 2, day 3, day 4, and day 5. Abdel Hameed et al[26] discovered similar results, finding a higher rate of postoperative discomfort in preoperatively symptomatic teeth than in 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 al[28] 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 pain following endodontic therapy based on pulp state may help doctors warn patients about expected pain and prescribe analgesics for use immediately after treatment. To avoid exacerbation, pain management should be an intrinsic element of dental treatment, especially in the early phases.

Conclusion

There was no statistically significant difference in the incidence of postoperative pain in between the groups. The pattern of postoperative pain did show a gradual reduction in the occlusion relieved group. Flare-ups were reported in the occlusion intact group. This suggests that occlusal reduction could play an important role in prevention of flare-ups during endodontic treatment. Dentists should be aware of this pain and make efforts to prevent or treat it. Patients should be informed about the possibility of pain after endodontic treatment and instructed in the use of analgesics.

References

1. Yu VS, Messer HH, Yee R, Shen L. Incidence and impact of painful exacerbations in a cohort with post-treatment persistent endodontic lesions. J. Endod. 2012; Jan 38 (1): 41-46.
2. Oshima K, Ishii T, Ogura Y, Aoyama Y, et al. Clinical investigation of patients who develop neuropathic tooth pain after endodontic procedures. J. Endod. 2009 July; 35 (7): 958-961.
3. Siqueira JF Jr., Rocas IN, Favieri A, Machado AG, et al. Incidence of postoperative pain after intracanal procedures based on an antimicrobial strategy. J. Endod. 2002 Jun; 28 (6): 457-460.
4. Harrison JW, Baumgartner JC, Svec TA. Incidence of pain associated with clinical factors during and after root canal therapy. Part 2. Postobturation pain. J. Endod. 1983 Oct; 9 (10): 434-438.

5. Pak JG, White SN. Pain prevalence and severity before, during, and after root canal treatment: A systematic review. J. Endod. 2011 Apr; 37 (4): 429-438.
6. Attar S, Bowles WR, Baisden MK, Hodges JS, McClanahan SB. Evaluation of pretreatment analgesia and endodontic treatment for postoperative endodontic pain. J Endod 2008;34:652-5.
7. Jalalzadeh SM, MamaviA, Shahriari S, Santos FA, Pochapski MT. Effect of pretreatment prednisolone on postendodontic pain: A double-blind parallel-randomized clinical trial. J Endod 2010;36:978-81.
8. Dunsky JL, Moore PA. Long-acting local anesthetics: A comparison of bupivacaine and etidocaine in endodontics. J Endod 1984;10:457-60.
9. Gatewood RS, Himel VT, Dorn SO. Treatment of the endodontic emergency: A decade later. J Endod 1990;16:284-91.
10. Natkin E. Treatment of endodontic emergencies. Dent Clin North Am 1974;18:243-55.
11. Rosenberg PA, Babick PJ, Schertzer L, Leung A. The effect of occlusal reduction on pain after endodontic instrumentation. J Endod 1998;24:492-6.
12. Creech JL 3rd, Walton RE, Kaltenbach R. Effect of occlusal relief on endodontic pain. J Am Dent Assoc 1984;109:64-7.
13. C. Mor, I. Rotstein, and S. Friedman, “Incidence of interappointment emergency associated with endodontic therapy,” Journal of Endodontics, vol. 18, no. 10, pp. 509–511, 1992.
14. J. W. Harrison, J. Craig Baumgartner, and T. A. Svec, “Incidence of pain associated with clinical factors during and after root canal therapy. Part 1. Interappointment pain,” Journal of Endodontics, vol. 9, no. 9, pp. 384–387, 1983.
15. Heft MW, Parker SR. An experimental basis for revising the graphic rating scale for pain. Pain 1984;19:153-61.
16. Averbuch M, Katzper M. Assessment of visual analogue versus categorical scale for measurement of osteoarthritis. Pain J Clin Pharmacol 2004;44:368-72.
17. Antrim DD, Bakland LK, Parker MW. Treatment of endodontic urgent care cases. Dent Clin North Am 1986;30:549-72.
18. Dorn SO, Moodnik RM, Feldman MJ, Borden BG. Treatment of the endodontic emergency: A report based on a questionnaire. Part I. J Endodon 1977;3:94-100.
19. Natkin E. Treatment of endodontic emergencies. Dent Clin North Am 1974;18:243-55.
20. Kuştarci A, Akpinar KE, Er K. Apical extrusion of intracanal debris and irrigant following use of various instrumentation techniques. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:257-62.
21. Morgan LF, Montgomery S. An evaluation of the crown-down pressureless technique. J Endod 1984;10:491-8.
22. Sathorn C, Parashos P, Messer H. The prevalence of postoperative pain and flare-up in single- and multiple-visit endodontic treatment: A systematic review. Int Endod J 2008;41:91-9.

23. Dummer PM, Hicks R, Huws D. Clinical signs and symptoms in pulp disease. Int. Endod J. 1980 Jan; 13 (1): 27-35.
24. L. Levin, A. Amit, and M. Ashkenazi, "Post-operative pain and use of analgesic agents following various dental procedures," American Journal of Dentistry, vol. 19, no. 4, pp. 245–247, 2006.
25. El Mubarak AH, Abu-bakr NH, Ibrahim YE. Postoperative pain in multiple-visit and single-visit root canal treatment. J. Endod. 2010 Jan; 36 (1): 36-39.
26. Goreva LA, Petrikas A. Postobturation pain associated with endodontic treatment. Stomatologiia (Mosk). 2004; 83 (2): 14-16.
27. Salehrabi R, Rotstein I. Endodontic treatment outcomes in a large patient population in the USA: An epidemiological study. J Endod 2004;30:846-50.
28. Shelley PQ, Johnson BR, BeGole EA. Use of an electronic patient record system to evaluate restorative treatment following root canal therapy. J Dent Educ 2007;71:1333-9.