ORIGINAL ARTICLE

Effect of Occlusal Reduction on Alleviating Pain in Symptomatic Apical Periodontitis

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OBJECTIVE: To evaluate pain relief in response to occlusal reduction in teeth with symptomatic apical periodontitis.
METHODOLOGY: A randomized controlled trial was done at department of Operative Dentistry and Endodontics, PIMS Hospital, Islamabad, Pakistan 27th May 2019 to 30th May 2020 on 166 patients suffering from irreversible pulpitis with symptomatic apical periodontitis were included in the study. After consent, Visual Analogue Scale (VAS) was used to document preoperative pain levels. Pulpectomy was done and patients were randomly divided into Group A (without occlusal reduction) and Group B (with 1-1.5mm occlusal reduction).
Mean pain scores of Group A and Group B were compared at 24hrs, 72 hours and seventh day using T-test.
RESULTS: There was a significant difference in mean pain score (p=0.0001) post-pulpectomy between the teeth with and without occlusal reduction.
CONCLUSION: The teeth that underwent occlusal reduction after pulpectomy showed lower mean pain levels compared to the non-reduction group.

KEYWORDS: Occlusal reduction, apical periodontitis, irreversible pulpitis, pulpectomy, root canal therapy.
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INTRODUCTION

Endodontic pain is a common cause of discomfort among patients. It serves as a major hurdle in delivering timely treatment and also causes a decline in patient's confidence in operator's skills. Prevalence of pain after root canal treatment (RCT) is between 3% and 58% of patients (Arsalan H. et al, 2017).[1] Oguntebi et al claims it to be between 1.4 to 16% .[2]

Factors responsible for intraoperative pain include improper pulpectomy, over instrumentation, extrusion of dentinal debris beyond root apex, improper canal disinfection, missed canals and others.[3] Other causes include inflammation of the periapical tissues, and endodontic microbial turnover. Pain threshold, anxiety, age and systemic disease may cause difference in pain response.[4]

Multiple strategies for combating this problem include analgesics, corticosteroids, intracanal medicaments, occlusal reduction and anesthesia.[5] Occlusal reduction of the affected tooth is hypothesized to reduce the pain by relieving pressures of mastication, giving the tooth ample amount of time to heal while root canal is being completed.

Occlusal reduction was declared to be effective in relieving post instrumentation pain (Rosenberg et. al, 2014).[6] Other studies are in agreement like the ones published by Sheikh H et al.[7] showed that mean post instrumentation pain score was comparatively low in occlusal reduction group than non-reduction group at 6 days (2.44 SD ± 0.86 vs. 3.24 SD ± 0.89; p=0.0005).[7] Another study done by Zaman H. et. al (2016) resulted in mean post- instrumentation pain score significantly less in reduction group (2.60 SD ± 0.70) than in no reduction group (4.40 SD ± 0.97)[4] and Zaman H et al.[4]. On the other hand, literature review revealed studies

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published by Parirokh M. et al.[5] and Raza I. et al.[8] that consider occlusal reduction to be non-significant for pain relief.

The pain assessment method is critical. In the current study VAS scale was used to quantify the patient's pain severity. Not only was it documented on the proforma but also cross checked verbally to eliminate any bias.

Results of studies done in this field vary and decision making regarding occlusal reduction becomes difficult. Dentists' opinions are still divided on this issue. Previous studies have mostly measured pain relief after canal instrumentation. In contrast, this study aimed at determining whether occlusal reduction done after the very first step, ie. pulpectomy, rather than waiting for the post instrumentation phase had an additive effect on pain alleviation.

METHODOLOGY

The approval for the current research was attained by the ethical committee of Pakistan Institute of Medical Sciences Islamabad, Pakistan (Approval No. F. 1- 1/2015/ERB/SZABMU/385. Date: 27-05-2019). Sample size calculation done with WHO calculator indicated a sample size of eighty-three needed for each group.

The criteria for inclusion and exclusion of the patients' (Table 1) were met before selection for the research. This study was conducted on patients who reported to the Outpatient Department (OPD) of Operative Dentistry and Endodontics in Pakistan Institute of Medical Sciences (PIMS), Islamabad (May 2019 - May 2020).

Table 1: Inclusion and exclusion criteria for patient selection

INCLUSION CRITERIA	EXCLUSION CRITERIA
1. Healthy patients between 20-50yrs of age 2. Posterior mandibular and maxillary teeth (molars and premolars) diagnosed with irreversible pulpitis with apical periodontitis 3. Pre-op tenderness to percussion 4. Pre-op VAS score more than 4 5. Presence of antagonistic tooth	1. Patients on pre-op analgesics or antibiotics 2. History of bruxism or TMJ problems 3. Mobile teeth 4. Teeth needing re-endodontic treatment 5. Periodontal pocket depth more 5mm

Thorough history, pulp sensibility tests and radiographic examinations were done. Verbal and written consents were taken from the patient. This was followed by documenting the pre- operative pain intensity of the patients using VAS. Value of 0 stipulated no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain.

On the first visit, patients were divided into two groups of 83 each, Group A underwent no occlusal reduction while Group B with occlusal reduction. Distribution of patients was done via lottery method to eliminate bias. Teeth were anesthetized using local anesthesia (Lignocaine 2% solution of 1:100000 epinephrine) followed by rubber dam isolation. A round carbide bur (Mani ISO BR-31) was used to gain access to the pulp chamber. After confirming the working length by radiographic method using #8 and #10 files (K and H MANI), pulpectomy ensued. 2.5% sodium hypochlorite was used to irrigate the canals. Teeth were sealed with temporary filling material (CAVIT, 3M ESPE) without introduction of any intracanal medicament to prevent interference with pain intensity levels. A proforma was handed over to the patients with the VAS scale drawn on it. Patients were instructed to fill the pain intensity at 24 hrs, 72 hours and seventh day. The proforma also had questions inquiring about the need for analgesic intake, the frequency of analgesic intake and the type of analgesic that provided effective pain relief. Patients were also instructed to take six hourly analgesic (tablet Ibuprofen 400mg) in case of moderate to severe pain.

Pain intensity was recorded on the third and seventh post-op day using the VAS. Obturation with Guttapercha points using lateral condensation technique was done to finish off the RCT.

Data analysis was done using SPSS 24 software. T -test was used to compare pain between the two groups. Mean and standard deviation were used for quantitative measurement of pain and age and categorical variables were expressed as counts and percentages.

RESULTS

Out of 166 patients included in the study, 77 (46.39%) were males and 89 (53.61%) were females. The mean age of patients in Group A was 27.58 ± 5.75 years and Group B was 28.83±5.78 years as depicted by Table 2.

Table 2: Age distribution for both groups

AGE	GROUP A (n=83)		GROUP B (n=83)		TOTAL (n=166)	
	No. of patients	% age	No. of patients	%age	No. of patients	%age
20-35yrs	66	79.52	64	77.11	130	78.31
36-50yrs	17	20.48	19	22.89	36	21.69
Mean +- SD	27.58 +- 5.75yrs		28.83+-5.78		28.23+-5.76yrs	

The study showed a significant difference (p-value of 0.0001) in mean pain score after pulpectomy with and without occlusal reduction of the sample teeth at 24 hours, 72 hours and seventh day (1.95 ± 1.04 versus 4.83 ± 1.09 respectively), (1.73±0.89 versus 4.64 ± 0.92 respectively) and (1.48 ± 0.76 versus 4.07 ± 0.88 respectively) as shown in Table 3.

The pain levels deducted from the gathered data showed that patients with occlusal reduction had significantly lower mean pain levels as compared to the no reduction group. Thus the null hypothesis was rejected.

Table 3: comparison of mean pain score after pulpectomy with and without occlusal reduction respectively of teeth with symptomatic apical periodontitis

PAIN SCORE	GROUP A (n=83)	GROUP B (n=83)	p-value
At 24hrs	4.83+-1.09	1.95+-1.04	0.0001
At 72hrs (3rd day)	4.64+-0.92	1.73+-0.89	0.0001
At 162hrs (7th day)	4.07+-0.88	1.48+-0.76	0.0001

Post-stratification independent 't' test

DISCUSSION

Root canal therapy aims to provide pain relief to patients suffering from endodontic pain. Patients find it difficult to associate pain relief with RCT because of the gradual nature in days rather than immediately. The difference in pain prevalence from 3% to 58% is probably because of multiple patient and clinician related factors affecting the treatment.[1] Numerous strategies have been in practice since decades for managing pain and discomfort after root canal treatment. These include preoperative analgesic and corticosteroid administration[9,10] reduction of occlusal surfaces[11,12] and anesthesia.[13,14,15]

Multiple factors act in unison to influence pain perception including pre-op state of pulp, detection of a periapical radiolucent lesion, patient's pain threshold, preoperative anxiety etc.[16] Stimulation of nociceptors are the reason for causing pain on percussion or chewing. By performing reduction of occlusal surfaces, mechanical sensitization of nociceptors is decreased which results in pain relief.[18]

Reduction of natural tooth structure for the sake of research is not accepted by many patients. Hence timely explanation to the patients about this methodology and necessitating the need for full coverage crowns after endodontic treatment is very important. Without a full coverage restoration, the brittleness of the tooth might lead to recurrent dislodgement of the coronal restoration and ultimately tooth fracture.

Numerous investigations have been published that aimed at evaluating the effects of occlusal reduction on pain and discomfort after root canal treatment. Rosenberg et al. reported positive conclusions of occlusal reduction on the effect of occlusal reduction on postoperative pain.[13] An article published by Sheikh H. et al showed that mean post instrumentation pain score was comparatively low in occlusal reduction group than non-reduction group at 6 days (2.44 SD ± 0.86 vs. 3.24 SD ± 0.89; p=0.0005).[7] Another study done by Zaman H. et. al (2016) resulted in mean post-instrumentation pain score significantly less in reduction group (2.60 SD ± 0.70) than in no reduction group (4.40 SD ± 0.97).[4] Creech et al.[19] and Jostes et al.[20] reported that there were no discernable differences in postoperative pain and discomfort in patients who had received root canal treatment with or without occlusal reduction.

The currently proposed study showed occlusal reduction to be a significant factor in relieving endodontic pain after pulpectomy in teeth. The results depict statistically significant difference between the two test groups on all the three stages 24 hours, 72 hours and seventh day (1.95 ± 1.04 versus 4.83 ± 1.09 respectively), (1.73 ± 0.89 versus 4.64 ± 0.92 respectively) and (1.48 ± 0.76 versus 4.07 ± 0.88 respectively). The most significant pain relief between the two groups was determined to be on the third day. This study stands out due to the initial stage at which occlusal reduction is done rather than waiting for the post instrumentation stage that studies in the past have evaluated. Hence it should be followed up by similar studies in the future to back up the claim.

Limitations of the current study were acceptability of the patient for reducing tooth structure during the procedure. Secondly, innovations in rotary endodontics, single visit root canal treatment and various computer based equipment for analysis of occlusal loads are becoming popular nowadays. Therefore, there is a need for further studies that can evaluate the effect of occlusal reduction in such cases.

CONCLUSION

Occlusal reduction after pulpectomy decreases pain in teeth with symptomatic apical periodontitis. So, we recommend that occlusal reduction should be used as an additive method for pain relief in patients undergoing endodontic treatment.

ETHICAL APPROVAL

Study was approved by the Ethical Review Board (ERB) committee of Shaheed Zulfiqar Ali Bhutto Medical University, Pakistan Institute of Medical Sciences (PIMS), Islamabad. (Approval No. F. 1-1/2015/ERB/SZABMU/385. Date: 28-02-2019)

PATIENTS' CONSENT

Informed consent, both written and verbal, were obtained from the patient prior to initiating the procedure.

CONFLICT OF INTEREST

The authors declared no conflict of interest

AUTHOR'S CONTRIBUTION

All the authors performed closely with the corresponding

author in various fields during the duration of the study.

REFERENCES

1. Arslan H, Seckin F, Kurklu D, Karatas E, Yanikoglu N, Capar ID. The effect of various occlusal reduction levels on postoperative pain in teeth with symptomatic apical periodontitis using computerized analysis: a prospective, randomized, double-blind study. Clini oral investig. 2017;21:857-63
https://doi.org/10.1007/s00784-016-1835-y

2. Oguntebi BR, DeSchepper EJ, Taylor TS, White CL, Pink FE. Postoperative pain incidence related to the type of emergency treatment of symptomatic pulpitis. Oral Surg, Oral Med, Oral Pathol. 1992;73:479-83
https://doi.org/10.1016/0030-4220(92)90330-S

3. Manfredi M, Figini L, Gagliani M, Lodi G. Single versus multiple visits for endodontic treatment of permanent teeth. Cochrane Database of Systematic Reviews. 2016(12).
https://doi.org/10.1002/14651858.CD005296.pub3

4. Zaman H, AHMED SS. Effect of occlusal reduction on post instrumentation pain in patients with acute irreversible pulpitis. Pak Oral Dent J. 2016;36:119-21

5. Parirokh M, Rekabi AR, Ashouri R, Nakhaee N, Abbott PV, Gorjestani H. Effect of occlusal reduction on postoperative pain in teeth with irreversible pulpitis and mild tenderness to percussion. J Endod. 2013;39:1-5.
https://doi.org/10.1016/j.joen.2012.08.008

6. Rosenberg P. Endodontic pain. Endodontic Topics 2014. 30: 75-98.
https://doi.org/10.1111/etp.12059

7. Sheikh H, Ahmed M, Jouhar R, Choudhry Z. Comparison of post instrumentation pain in teeth during root canal treatment with or without occlusal reduction.Pak Oral Dent J. 2015;35:699-701.

8. Raza I, Ahmed A, Khalid N, Batool F. Effect of occlusal reduction on frequency of post operative pain relief, following an endodontic instrumentation. Pak Oral Dent J. 2016;36;50-53.

9. Pochapski MT, Santos FA, de Andrade ED, Sydney GB. Effect of pretreatment dexamethasone on postendodontic pain. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;108:790-5.
https://doi.org/10.1016/j.tripleo.2009.05.014

10. Keiser K, Byrne BE. Endodontic pharmacology. In: Hargreaves KM, Cohen S, eds. Pathways of the Pulp, 10th ed. St Louis, MO: Mosby Elsevier; 2011:671-90.

11. Rosenberg PA. Clinical strategies for managing endodontic pain. Endod Topics 2002;3:78-92.
https://doi.org/10.1034/j.1601-1546.2002.30108.x

12. Rosenberg PA, Babick PJ, Schertzer L, Leung A. The effect of occlusal reduction on pain after endodontic instrumentation. J Endod 1998;24:492-6.
https://doi.org/10.1016/S0099-2399(98)80054-X

13. Keiser K, Byrne BE. Endodontic pharmacology. In: Hargreaves KM,Cohen S, eds. Pathways of the Pulp, 10th ed. St Louis, MO: Mosby Elsevier; 2011:671-90.

14. Moore PA, Dunsky JL. Bupivacaine anesthesia: a clinical trial for endodontic therapy. Oral Surg Oral Med Oral Pathol 1983;55:176-9.
https://doi.org/10.1016/0030-4220(83)90175-5

15. Dunsky JL, Moore PA. Long-acting local anesthetics: a comparison of bupivacaine and etidocaine in endodontics. J Endod 1984;10:457-60.
https://doi.org/10.1016/S0099-2399(84)80270-8

16. Shahnaz N, Masoodi A, Amin K, Baba IA. Management of post endodontic pain following single visit endodontics: A review. Int J Dent Health Sci 2015;2:396-405.

17. Hamedy R, Shakiba B, Fayazi S, Pak JG, White SN. Patient-Centered Endodontic Outcomes.A Narrative Review. Iran Endod J. 2013 Fall;8:197-204.

18. Wolcott J, Rossman LE, Hasselgren G. Management of endodontic emergencies. In: Hargreaves KM, Cohen S, eds. Pathways of the Pulp, 10th ed. St Louis, MO: Mosby Elsevier; 2011:30-42.
https://doi.org/10.1016/B978-0-323-06489-7.00002-3

19. Creech JL 3rd, Walton RE, Kaltenbach R. Effect of occlusal relief on endodontic pain. J Am Dent Assoc 1984;109:64-7.
https://doi.org/10.14219/jada.archive.1984.0294

20. 116. Jostes JL, Holland GR. The effect of occlusal reduction after canal preparation on patient comfort. J Endod 1984;10:34-7.
https://doi.org/10.1016/S0099-2399(84)80251-4