

ASDJ

AINSHAMS DENTAL
JOURNAL

Print ISSN 1110-7642

Online ISSN 2735-5039

AIN SHAMS DENTAL JOURNAL

Official Publication of Ain Shams Dental School

September 2021 • Vol. XXIV

Post operative pain assessment after manual dynamic agitation at three different time intervals (An In vivo study)

Mariam Mohamed Sayed¹, Sarah Hossam Fahmy², Maram farouk Obeid³

Abstract

Aim: To compare the post-operative pain level after three different time intervals following single-visit endodontic treatment in cases with symptomatic irreversible pulpitis teeth using manual dynamic agitation as a final irrigation protocol.

Methodology: 22 Teeth were anaesthetized using a nerve block technique, Access was performed with Z and round bur. Length was determined using apex locator. Canals were prepared with crown down technique using Fanta rotary files with an endo motor. Canals were thoroughly irrigated with a syringe with end needle gauge 27, delivering 5 ml of 2.5% NaOCl at each instrument change and finally irrigated with manual dynamic agitation, the irrigant was manually activated for 60 seconds with a master cone for each canal. The canals were dried with sterile paper points equal to the size of the master cone. Root canals were obturated using lateral compaction technique, by gutta percha master cone equal to the size of the master apical file and a spreader was used to make space for auxiliary cones, using resin root canal sealer then placing temporary filling and then a spreader was used to allow space for auxiliary cones, using resin-based root canal sealer i then placing temporary filling.

Results: There was a significant difference in levels of pain after six hours and forty-eight hours with p value (0.001) and no significant difference between six hours and twenty-four hours or between twenty-four hours and forty-eight hours.

Conclusion: There was a difference in pain level between six hours & forty eight hours but no difference in pain level between six hours and twenty-four hours and twenty-four hours and forty-eight hours when using manual dynamic agitation as a final irrigation step in 1-visit endodontic treatment of multiple canaled molar with symptomatic irreversible pulpitis.

Key words: post operative pain, manual dynamic agitations, master cone, irreversible pulpitis.

1AinShams University

2Ass. Prof. of Endodontics, Faculty of Dentistry, Ain Shams University

3 Lecturer of Endodontics, Faculty of Dentistry, Ain Shams University

Introduction

Pain is an unpleasant sensation that is attended by actual or potential tissue damage and is the body's response to noxious stimulus. Postoperative pain is usually due to an acute inflammatory response in the periradicular tissue, provoked by extrusion of debris and irrigating solutions beyond the apical constriction, which causes severe tissue irritation and necrosis. Irrigating solutions are supposed to act as lubricants and as cleaning agents during biomechanical endodontic treatment. They must be in contact with walls of the canal to ensure effective action, especially in the apical third¹.

Even with good instrumentation, total removal of debris of canals is reported to be difficult. Most of root canal walls remain untouched, which is confirmed with micro computed tomography scanning². These untouched areas are thought to be a source of reinfection or persistent periradicular inflammation³ because they may harbor debris of pulpal tissues, bacteria, and their byproducts. This emphasizes the need for another means of disinfecting all of the root canal. Mechanical active irrigation reduces post-operative pain⁴. It was shown to improve canal and isthmus cleanliness and to reduce postoperative pain. The bacterial number was more with active methods of irrigation. It may be concluded that they are effective in decreasing pain levels after treatment and improving canals cleanliness during Endo treatment⁴. The simplest way to activate the irrigating solution inside the root canal is by using manual dynamic agitation technique. It is considered simple and cost-effective, but some drawbacks hinder its clinical use. It was reported that the irrigant was delivered 1 mm deeper than the tip of the needle, thus showing difficulty in accessing the apical part of the canal⁵.

Up to our knowledge, no study compared 6 hours, 24 hours ,48hours time intervals together clinically. Thus, this study was to make a comparison between levels of pain after manual dynamic activation of irrigation. Our null hypothesis was that there is no difference in the level of post operative pain after different time intervals after manual dynamic agitation.

Materials and Methods:

• *Patients' selection*

The protocol of the trial was approved by the Ethics committee, Faculty of Dentistry, Ain Shams University, Cairo, Egypt. The inclusion criteria were based on female patients, medically-free of any systemic disease, patients with an age range of 25-45 years, symptomatic irreversible pulpitis in lower molars with mature roots, teeth without calcified root canals, root caries-free teeth (Restorable teeth), teeth without internal or external root resorption, While the exclusion criteria were based on pregnant females, male patients, patients having bruxism or clenching, previously endodontically treated teeth, periodontally affected teeth, presence of abnormal mobility, presence of resorption, periapical abscess, periodontal space widening or root fracture, and teeth without internal or external root resorption.

• *Procedural steps*

Personal information includes the participant's name, phone number, address medical and dental history. Chief complaint and history of pain were recorded in the patient's own words. Extra oral examination was performed to rule out swelling or facial cellulitis. Intraoral clinical examination was performed visually for the presence of large or old restorations, extensive caries, or traumatic injuries, as well as percussion and palpation to rule out apical periodontitis. Clinical diagnosis of acute pulpitis was detected by a prolonged exaggerated response > 10 seconds. The Radiographic

examination was done using intra-oral periapical films with a bisecting angle technique.

- **Treatment procedures**

22 Patients were selected from the postgraduate outpatient clinic in the Endo department, Faculty of Dentistry, Ain Shams University, Cairo, Egypt. A nerve block of local anesthesia was used to anaesthetize the tooth (Art pharma anthesia, ArtPharma Pharmaceuticals, 6 October City, Egypt). Access was done using z and round burr (Dentsply Tulsa Dental Specialties; Tulsa, Oklahoma, USA). Isolation was carried out with a rubber dam. Length was determined using apex locator (E connect apex locator, Eighteeth, Jiangsu Province, China) and confirmed by periapical radiograph. Cleaning and shaping of root canals was done by the crown down tech using Fanta rotary files using an endo motor with speed and torque following the manufacturer's instructions (Fanta Dental Materials Co., Ltd, East Tianlin RD, 200230 Shanghai), by beginning with orifice opener then 20 then 25 rotary file then file 30 till 35 in root with multiple canals and till 50 if single canal in root. Irrigation and Final irrigation protocol: 5 ml of 2.5% Sodium hypochlorite was delivered into the canal using a syringe with end-perforated beveled needle gauge 27. The irrigant was manually activated for 60 seconds with a master cone for each canal. The canals were dried with sterile paper points corresponding to the same size of the master cone. Root canals were obturated by using lateral compaction by gutta percha master cone equal to the size of the master apical file (50 for single canal in root, 35 for more than one canal in root) and a spreader was used with size that shorter 2 ml from working length, to make space for auxiliary cones (smaller than spreader (size 25)), using resin root canal sealer then placing temporary filling. The

patient was asked to come back to complete the treatment procedures.

- **Pain assessment**

Pain was assessed by giving the patient the numerical pain scale to assess pain at 6, 24, 48 hours after the visit. If swelling was recorded, the patient was instructed to contact the operator to assess the severity and determine if antibiotics or drainage were indicated. NRS (Numerical Rate Scale) 0: no pain, from 1 to 3: mild (recognizable, not discomforting), from 4 to 6: moderate (discomforting, but bearable), from 7 to 10: severe (considerable discomfort, difficult to bear).

Results:

Mean and SD were calculated for groups and statistically analyzed by using 1 way analysis of variance and post hoc tukey test with Minitab 10. Statistical significance was set at 5. Data are presented in table (1), figure (1).

Table (1): The mean and SD values of pain values at different time intervals of manual dynamic irrigation

Manual dynamic agitation	
6 hours	6.250 ± 2.19 ^a
24 hours	4.0 ± 3.55 ^{a,b}
48 hours	0.875 ± 1.25 ^b
P value	0.001

Means which do not share the same letter a are significantly different.

After activation of irrigation by manual dynamic agitation, post operative pain at 6 hours was (6.250 ± 2.19), at 24 hours was (4.0 ± 3.55), at 48 hours was (0.875 ± 1.25). There was no statistically significant difference in level of pain between six hours & twenty-four hours, and between twenty four hours & forty-eight hours. On the other hand, there was a statistically significant difference in pain between six hours and forty-eight hours with p value = 0.001.

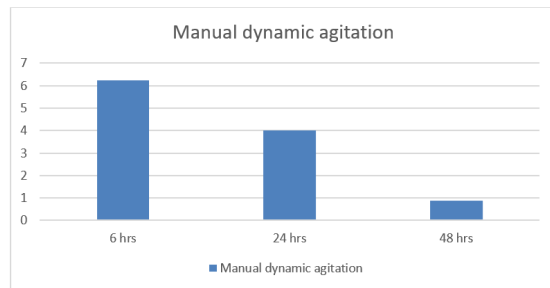


Figure (1): Bar chart representing the difference in pain level between time intervals after manual dynamic irrigation.

Discussion:

Despite of the introduction of rotary instrumentation, totally disinfecting of canals is reported to be difficult⁶. Many studies using micro computed tomography scanning have shown that most of the areas of canal remain untouched by the instruments⁷. These untouched areas are thought to be a source of reinfection or persistent periradicular inflammation³ because they may harbor debris of pulpal tissues, bacteria, and their byproducts. This emphasizes need for new means of disinfecting all areas of the root canal. Activation of irrigation decreases pain after treatment⁴. It improved debridement, canal cleanliness, and irrigating solution delivery up to 1mm from working length (WL).

Debris and irrigating solutions extrusion during endodontic treatment is considered to be one of the main causes of postoperative pain. Unfortunately, it is inevitable unless using negative apical pressure irrigation system. However, the measured amounts of extruded debris or irrigants shown in ex-vivo studies are not confirmed to occur clinically or to be significant in stimulating pain or damaging tissues⁸.

Thus, the purpose of the study was to make a comparison between pain levels after single visit endo treatment in irreversible acute pulpitis molar with different time intervals after manual dynamic agitation. In the present trial, the root canal treatment was

done in a single visit. There has been growing concern in recent years about the need for multiple appointments in endodontic treatment, particularly given that there is no significant differences in antimicrobial effect have been reported between multiple and single visit treatment⁴.

Additionally, there is no difference in the incidence of postoperative pain between single and multiple-visit treatments⁹.

In this study, irrigant solution was performed using 2.5% sodium hypochloride at each file change, as it remains the most used, because of its antimicrobial activity and dissolving the organic matter¹⁰, Bashetty et al.¹¹ also showed that there was no significant difference in pain levels after when using NaOCl or CHX as an irrigant with different concentrations. Final step of irrigation in this clinical trial, parameters were standardized in group. Following the lead of Karamifar et al. (2017)¹² and Silva et al. (2018)¹³, a volume of 5 ml of NaOCl with 2.5% concentration is delivered into the canal using a traditional syringe.

Needle penetration was placed 1 mm shorter than the WL in this study for effective cleaning and disinfecting the root canal and to avoid production of high apical pressure, increasing the risk for apical extrusion of debris, which in turn increases the probability of postoperative pain.

Mandibular molars were chosen because it was discovered that the pain record in mandibular teeth is 42% higher than in maxillary teeth⁸. Furthermore, because pain levels differed depending on the type of treated teeth, only molars were chosen^{4,9}.

Females were only rolled in this study as there was statistically significant difference in pain level according to gender due to difference in pain threshold¹³. A numerical pain scale was selected for measuring the intensity of pain at 6,24, 48

hours after the visit; to facilitate the patient's understanding and to aid in recording the pain intensity. It was reported that patients prefer the NRS when they seek accuracy and the VRS (verbal rating scale) for simplicity. It was also stated that the NRS is more useful than VRS and VAS (visual analogue scale) in audit and research, since it showed lower failure rates¹.

No statistically significant difference was recorded between six hours and 24 hours, but there was a significant decrease in pain level between 6 six hours and 48 hours, which was consistent with Topcuoglu et al. (2018)¹⁴. Topcuoglu HS et al. measured pain intensity between 6 to 12 hours, 24 hours after endodontic treatment after a single visit treatment, and he found that pain decreased with time after 3 groups (sonic agitation, PUI, and manual dynamic activation of irrigation). Gündoğar et al. (2020)¹⁵ concluded that activating the irrigant solution had no effect on post-operative pain. This could be related to the amount of apical debris extruded.

The reason for the higher incidence and severity of post operative pain after treatment of teeth with vital pulp is that the injury of periapical vital tissue during endodontic treatment in teeth with vital pulp promotes more intensive secretion of inflammatory mediators, such as prostaglandins, leukotrienes, serotonin, histamine, and bradykinin (all of which are also pain mediators). Inflammation subsides gradually by time after treatment.

Currently, because it is not recommended to prescribe analgesics as a regular medication after a single visit, in the case of pain incidence, endo treatment with Cataflam was prescribed, and the patient was excluded from the study. However, all clinical steps were carried out in such a way that post-operative pain was minimized or eliminated.

It is worth noting that we committed CNI because it has been shown to be the least effective regular antimicrobial and cleanliness purpose. No clinical trials were conducted comparing postoperative pain at different time intervals after using manual dynamic irrigation.

There was no control group in this study because the aim of this study was effect of manual dynamic irrigation on time intervals of pain level not methods.

Conclusion:

Postoperative pain intensity and incidence were higher after 6 hours and 48 hours but similar between six hours and twenty-four hours and twenty four hours and forty-eight hours time intervals when using manual dynamic agitation as a final irrigation step in one-visit endodontic treatment of multiple canaled teeth with symptomatic irreversible pulpitis.

References:

1. Chatterjee R, Venugopal P, Jyothi K, Jayashankar C, Kumar S, Kumar P. Effect of sonic agitation, manual dynamic agitation on removal of *Enterococcus faecalis* biofilm. *Saudi Endodontic Journal*. 2015;5(2):125.
2. Gawdat SI, Heba Seif Allah Amin El Asfour. Comparison of the effect of xpendo finisher file, passive ultrasonic irrigation and conventional syringe irrigation on the apical extrusion of debris. *Jdent*, 2015 ;62, 5107:5114.
3. Wu MK, Wesselink PR. A primary observation on the preparation and obturation of oval canals. *International endodontic journal*. 2001;34(2):137-41.
4. Susila A, Minu J. Activated Irrigation vs. Conventional non-activated Irrigation in Endodontics - A Systematic Review. *Eur Endod J*. 2019 25;4(3):96-110.
5. Leoni GB, Versiani MA, Silva-Sousa YT, Bruniera JF, Pecora JD, Sousa-Neto MD. Ex vivo evaluation of four final irrigation protocols on the removal of hard-tissue debris from the mesial root canal system of

- mandibular first molars. *International endodontic journal*. 2017;50(4):398-406.
6. Sjogren U, Hagglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. *Journal of endodontics*. 1990; 16(10):498-504.
 7. Peters OA, Schonenberger K, Laib A. Effects of four Ni-Ti preparation techniques on root canal geometry assessed by micro computed tomography. *International endodontic journal*. 2001; 34(3):221-30.
 8. Azim AA, Aksel H, Margaret Jefferson M, Huang GT. Comparison of sodium hypochlorite extrusion by five irrigation systems using an artificial root socket model and a quantitative chemical method. *Clinical oral investigations*. 2018;22(2):1055-61.
 9. Gündoğar M, Sezgin G, Kaplan S, Özyürek H, Uslu G, Özyürek T. Postoperative pain after different irrigation activation techniques: a randomized, clinical trial. *Odontology*. 2020;109(2):385-392
 10. Law AS, Nixdorf DR, Aguirre AM, Reams GJ, Tortomasi AJ, Manne BD, et al. Predicting severe pain after root canal therapy in the National Dental PBRN. *Journal of dental research*. 2015;94(3 Suppl):37s-43s.
 11. Bashetty K, Hegde J. Comparison of 2% chlorhexidine and 5.25% sodium hypochlorite irrigating solutions on postoperative pain: a randomized clinical trial. *Indian journal of dental research : official publication of Indian Society for Dental Research*. 2010;21(4):523-7.
 12. Karamifar K, Mehrasa N, Pardis P, Saghiri MA. Cleanliness of Canal Walls following Gutta-Percha Removal with Hand Files, RaCe and RaCe plus XP-Endo Finisher Instruments: A Photographic in Vitro Analysis. *Iranian endodontic journal*. 2017;12(2):24
 13. Ali SG, Mulay S, Palekar A, Sejpal D, Joshi A, Gufran H. Prevalence of and factors affecting post-obturation pain following single visit root canal treatment in Indian population: A prospective, randomized clinical trial. *Contemporary clinical dentistry*. 2012; 3(4):459-63
 14. Silva E, Belladonna FG. Effectiveness of XP-endo Finisher and XP-endo Finisher R in removing root filling remnants: a micro-CT study. 2018;51(1):86-91
 15. Topcuoglu HS, Topcuoglu G, Arslan H. The Effect of Apical Positive and Negative Pressure Irrigation Methods on Postoperative Pain in Mandibular Molar Teeth with Symptomatic Irreversible Pulpitis: A Randomized Clinical Trial. *Journal of endodontics*. 2018.
 16. Gündoğar M, Sezgin G, Kaplan S, Özyürek H, Uslu G, Özyürek T. Postoperative pain after different irrigation activation techniques: a randomized, clinical trial. *Odontology*. 2020; 109(2):385-392.