



EFFECT ON POST ENDODONTIC PAIN AFTER SINGLE SITTING ROOT CANAL TREATMENT IN VITAL TOOTH FOLLOWING FINAL IRRIGATION WITH COLD SALINE

Dental Science

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ABSTRACT

Aim: To evaluate effect on post endodontic pain after single sitting RCT in vital tooth following final irrigation with cold saline at 2-4 °C.

Methodology: A total of 60 patients referred for intentional root canal treatment were selected for this study. The teeth were randomly divided into two groups.

Group I- Control (n=30 normal saline)

Group II- Cold Saline (n=30 at 2-4 °C)

After routine chemo-mechanical preparation was completed teeth were finally irrigated over a period of 3 minutes using 10ml normal saline in Group I and cold saline at 2-4 °C in Group II.

Pain levels were assessed by visual analog scale (VAS) after 6, 24, 48 hours. The data were then analyzed.

Result: Group II final irrigant showed a significant reduction in postoperative pain levels in comparison to Group I (control group).

Conclusion: Cryotherapy reduces postoperative pain following single-visit root canal treatment in teeth with vital pulps.

KEYWORDS

INTRODUCTION

Pain is the major reason for patients' visits to dental clinics in order to gain immediate relief. Some dental treatments may result in postoperative pain causing patient discomfort¹. Postoperative pain is an unwanted yet unfortunately common sensation after endodontic treatment. The incidence of postoperative pain was reported to range from 3% to 58%.² Irrigation has a key role in successful endodontic treatment.³ Managing post-endodontic pain is of prime importance because the incidence of patients returning to endodontist with discomfort is on the rise¹.

Antimicrobial debridement is a key step in root canal therapy. Bacteria play a primary role in the development of pulp necrosis, periapical pathosis, and post-treatment disease⁴. Mechanical instrumentation alone is not enough to render canals free from microorganisms and postoperative complications⁵.

Post-endodontic pain is common, even when the endodontist has followed acceptable standards of treatment⁶. According to previously published data, pulp therapy and root canal treatment (RCT) induce more frequent and more severe post-operative pain than do other dental operative procedures. It has also been found that frequencies of post endodontic pain range from 1.53 to 53%⁷.

Cryotherapy is a relatively new form of treatment in which the body is briefly exposed to very cold temperatures in order to promote healing and other therapeutic results. The basic technique of cryotherapy stresses rapid cooling, slow thawing, and repetition of the freezing process to minimize tissue destruction⁸.

It will reduce the local blood flow by vasoconstriction and therefore, the local inflammatory reaction, and also will slow the conduction of nerve signals, potentially reducing pain transmission⁹.

The common factors influencing the occurrence of pain after RCT include insufficient instrumentation, irrigant extrusion, intracanal interappointment dressing extrusion, hyper-occlusion, missed canals, presence of periapical pathosis, apical debris extrusion, and apical patency during root canal preparation¹⁰. Post endodontic pain most often occurs during the first 24 to 48 hours after obturation, and generally recedes in a few hours,¹¹ although it occasionally persists for several days⁶.

In dentistry, cryotherapy has been used after intraoral surgical procedures, such as periodontal surgery, extractions, and implant placement, and was found to be effective in reducing swelling and pain¹². One way to apply cryotherapy to the inflamed periradicular tissues is by intracanal irrigation with a cold substance after flaring the root canal

system¹³. In a recent in vitro study by Vera et al,¹⁴ it was found that intracanal delivery of cold saline solution (2.5°C) with negative pressure irrigation reduced the external root surface temperature more than 10°C and maintained it long enough to possibly produce a potential local anti-inflammatory effect in the periradicular tissues. So, the aim of my study was to evaluate effect on post endodontic pain after single sitting RCT in vital tooth following final irrigation with cold saline at 2-4 °C.

MATERIALS AND METHOD

A total of 60 patients diagnosed with symptomatic irreversible pulpitis were selected for this study. The teeth were randomly divided into two groups with final irrigant as normal saline.

- Group I- Control (n=30 normal saline)
- Group II- Cold Saline (n=30 at 2-4 °C)

Inclusion criteria

- Single rooted vital tooth
- Patients aged 18 to 45 years
- Teeth referred for intentional root canal therapy

Prior to treatment the patients were instructed how to complete a visual analogue scale (VAS) to determine their pain scores. VAS included a 10 cm straight horizontal line numbered at each centimeter with following criteria;

- 0, no pain;
- 1-3, mild pain;
- 4-6, moderate pain;
- 7-8, severe pain
- 9-10, worst pain

After recording preoperative pain levels, local anaesthesia was administered. A rubber dam was placed and the endodontic access cavity was prepared with sterile bur (figure .1).

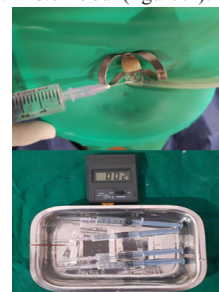


Figure.1

Glide path was established with a #10 K file. The working length (WL) was determined using Root ZX mini apex locator (Morita Corp., Kyoto, Japan) and confirmed radiographically. The root canals were instrumented with a ProTaper system under copious irrigation with 3% sodium hypochlorite (NaOCl). The root canals were flushed with 2 mL of 17% EDTA solution.

In the control group, final irrigation was performed using 10 mL of 0.9% physiological saline solution at the room temperature.

In group II, following completion of biomechanical preparation, the root canals was irrigated with normal saline at 2.5°C (APPROX); the solution was stored in refrigerator until use (figure.1).

In both groups, the root canals were dried with paper points and obturated with lateral compaction technique using gutta-percha cones. Coronal access cavities were restored with direct composite restorations.

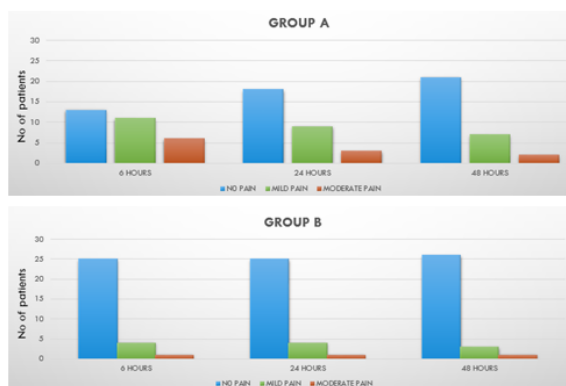
Patients were instructed to complete VAS to determine their postoperative pain scores at 6, 24 and 48 hours. Patients were told to use analgesic if they experienced severe pain. Patients were contacted by telephone and asked whether they experienced any pain, and their VAS scores were recorded.

RESULT

Patients in the group II reported significantly lower VAS scores compared with patients in the control group at 6 to 24 h follow-ups. In the group II, 85.5% of patients had no postoperative pain, 13.01% of patients reported mild pain, and 1.49% of patients reported moderate pain.

In the control group, 59.23% of patients had no postoperative pain, 30.71% of patients reported mild pain, and 10.06% of patients reported moderate pain at 24 hours.

At the 48 h follow-up pain scores revealed a significant reduction. In control group few patients with moderate pain took medication for pain



Graph.1 showing vas scale rating at different time intervals of 6, 24 and 48 hours

Table.1 showing VAS scale rating at different time intervals of 6, 24 and 48 hours

STUDY PERIOD	GROUP A			GROUP B		
	No pain	Mild pain	Moderate pain	No pain	Mild pain	Moderate pain
After 6 hours	44.37% 13	36.5% 11	19.13% 6	85.1% 25	13.8% 4	1.1% 1
After 24 hours	59.23% 18	30.71% 9	10.06% 3	85.5% 25	13.01% 4	1.49% 1
After 48 hours	68.23% 21	24.71% 7	7.06% 2	85.88% 26	12.94% 3	1.18% 1

DISCUSSION

Avoiding pain during and after dental treatment is of great importance for patients, because fear of pain is one of the major reasons for dental

apprehension. Postoperative pain is one of the primary problems in endodontic treatment (post-endodontic pain), even when proper treatment steps were followed¹. Although the success of endodontic treatment is highly related to the elimination or reduction of post endodontic pain, many clinical studies have reported varying degrees of pain, ranging from 1.53⁷ to 53%¹⁵.

Pain management during endodontic procedures and the postoperative stages is one of the most important goals of clinicians¹⁶.

This study evaluated the effect on post endodontic pain after single sitting RCT in vital tooth following final irrigation with cold saline at 2-4 °C. The results of this study revealed that irrigation of root canals with a cold saline (group ii) at 2.5°C reduced postoperative pain when compared with the pain levels of patients in a control (group I).

The present study only included teeth with vital pulps, which were treated in single-visit root canal treatment, to exclude the possible effects of presence of infected necrotic pulps and use of intracanal medicament.

Here pulp vitality was confirmed with ethyl chloride spray, electronic pulp tester and bleedings from the pulp during access cavity preparation, because bleeding has been used as a gold-standard test to ensure pulp vitality.

In general, the VAS scores experienced and reported by the patients in this study were low. None of the patients reported symptoms or complications such as severe postoperative pain, swelling and/or paresthesia.

Cryotherapy restricts tissue metabolism and blood flow to tissues thereby leading to vasoconstriction¹⁷⁻²¹. The decreased temperature of the external root surface might constrain inflammatory reactions, production of the release of pain-producing substances, and edema occurring in the periapical region.

Cryotherapy has been shown decreased peripheral nerve conduction²². As the temperature decreases, the conduction velocity of nerve fibers decreases²². Cryotherapy also triggers thermal receptors, which reduce the transmission of painful stimuli²³.

This result could be explained by the fact that the cold saline application reduced the temperature of the root, as it was emphasized in the in vitro study by Vera et al,¹⁴ to unknown duration, and this root temperature reduction possibly extended to the periapical area, the action that could have a local anti-inflammatory effect by reducing edema. McGown²⁴ showed that a 5-minute ice massage was enough to induce changes in the inflamed tissue of the quadriceps muscles. Hochberg²⁵ showed that continuous cold application resulted in a significant reduction of pain when compared with intermittent application.

Oliviera et al²⁶ showed that Cryotherapy was effective in reducing swelling and pain after third molar extraction.

In the present study, final irrigation of root canals with cold saline reduced postoperative pain levels. Accordingly recommend cryotherapy as a safe and well-tolerated strategy to minimize postoperative pain with few-to-no side effects.

CONCLUSION

Within the limitations of this study, cryotherapy reduced postoperative pain following single-visit root canal treatment in teeth with vital pulps.

Cryotherapy can be used as a simple, cost-effective, and non-toxic option for postoperative pain control in single visit root canal treatment.

REFERENCES

1. Talal Al-Nahlawi, Talaat Abo Hatab, Mahmoud Abd Alrazak, Ahmad Al-Abdullah. Effect of Intracanal Cryotherapy and Negative Irrigation Technique on Postendodontic Pain
2. 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.
3. Haapasalo M, Shen Y, Qian W, Gao Y. Irrigation in endodontics. Dental Clin North Am 2010 Apr 30;54(2):291-312.
4. Kakehashi S, Stanley HR, Fitzgerald RJ. The effects of surgical exposures of dental

- pulps in germfree and conventional laboratory rats. *Oral Surg Oral Med Oral Pathol* 1965;20:340-9.
5. Dalton BC, Orstavik D, Phillips C, et al. Bacterial reduction with nickel-titanium rotary instrumentation. *J Endod* 1998;24:763-7.
 6. Siqueira JF Jr. Microbial causes of endodontic flare-ups. *Int Endod J* 2003 Jul;36(7):453-463.
 7. Levin L, Amit A, Ashkenazi M. Post-operative pain and use of analgesic agents following various dental procedures. *Am J Dent* 2006 Aug;19(4):245-247.
 8. Salmassy DA, Pogrel MA. Liquid nitrogen cryosurgery and immediate bone grafting in the management of aggressive primary jaw lesions. *J Oral Maxillofac Surg* 1995 Jul;53(7):784-790.
 9. Kullenberg B, Ylipaa S, Soderlund K, Resch S. Postoperative cryotherapy after total knee arthroplasty: a prospective study of 86 patients. *J Arthroplasty* 2006 Dec;21(8):1175-1179.
 10. Alves Vd O. Endodontic flare-ups: a prospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010 Nov;110(5):e68-e72.
 11. 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.
 12. Laureano Filho JR, de Oliveira e Silva ED, Batista CI, Gouveia FM. The influence of cryotherapy on reduction of swelling, pain and trismus after third-molar extraction: a preliminary study. *J Am Dent Assoc* 2005 Jun;136(6):774-778.
 13. Saini D. Cryotherapy—an Inevitable part of sports medicine and it's benefits for sports injury. *Int J Adv Res* 2015;1(4): 324-327.
 14. Vera J, Ochoa-Rivera J, Vazquez-Carcao M, Romero M, Arias A, Sleiman P. Effect of Intracanal Cryotherapy on Reducing Root Surface Temperature. *J Endod* 2015 Nov;41(11):1884-1887.
 15. Imura N, Zuolo ML. Factors associated with endodontic flare-ups: a prospective study. *Int Endod J* 1995 Sep;28(5): 261-265.
 16. Rosenberg PA. Clinical strategies for managing endodontic pain. *Endod Topics* 2002; 3: 78-92.
 17. Nadler SF, Weingand K, Kruse RJ. The physiologic basis and clinical applications of cryotherapy and thermotherapy for the pain practitioner. *Pain Physician* 2004; 7: 395-400.
 18. Lee H, Natsui H, Akimoto T, Yanagi K, Ohshima N, Konol. Effects of cryotherapy after contusion using real-time intravital microscopy. *Med Sci Sports Exerc* 2005; 37:1093-8.
 19. Dolan MG, Thornton RM, Fish DR, Mendel FC. Effects of cold water immersion on edema formation after blunt injury to the hindlimbs of rats. *J Athl Train* 1997; 32: 233-7.
 20. McLean D. The use of cold and superficial heat in the treatment of soft tissue injuries. *Br J Sports Med* 1989; 23: 53-4.
 21. Muldoon J. Skin cooling, pain and chronic wound healing progression. *Br J Community Nurs* 2006; 11: 21-5.
 22. Sambroski W, Stratz T, Sobieska M. Individual comparison of effectiveness of whole body cold therapy and hot packs therapy in patients with generalized tendomyopathy (fibromyalgia). *Z Rheumatol* 1992; 51: 25-31.
 23. Nadler SF, Weingand K, Kruse RJ. The physiologic basis and clinical applications of cryotherapy and thermotherapy for the pain practitioner. *Pain Physician* 2004; 7: 395-400.
 24. McGown HL. Effects of cold application on maximal isometric contraction. *Phys Ther* 1967 Mar; 47(3): 185-192.
 25. Hochberg J. A randomized prospective study to assess the efficacy of two cold therapy treatments following carpal tunnel release. *J Hand Ther* 2001 Sep; 14(3): 208-215.
 26. Laureano Filho JR, de Oliveira e Silva ED, Batista CI, Gouveia FM. The influence of cryotherapy on reduction of swelling, pain and trismus after third-molar extraction: a preliminary study. *J Am Dent Assoc* 2005 Jun;136(6):774-778.