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Original Research

Comparison of 2% chlorhexidine and 5.25% sodium hypochlorite irrigating solutions on postoperative pain: A randomized clinical study

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ABSTRACT:

Aim: To compare the levels of postoperative pain after cleaning and shaping of root canals using two different root canal irrigants for debridement. **Materials and methods:** Sixty patients with irreversible pulpitis, pulp necrosis and non-vital teeth exhibiting acute apical periodontitis requiring root canal treatment were included. At random, canals were cleaned and shaped with the following protocols. 2% chlorhexidine solution in group I and 5.25% sodium hypochlorite solution in group II were used as an irrigants. Access cavities were closed with a sterile cotton pellet and cavit. The patients recorded degree of pain at various time intervals after cleaning and shaping on a visual analogue scale for 1 week. **Results:** The overall mean age was 28.97±4.5 years. There were 32 (53.3%) males and 28 (46.6%) females. The mean value of pain score determined post operatively was 1.70±1.8 in Group-I and 1.90 ± 2.4 in Group-II (p=0.5). At 72 hours, only 5(16.7%) patients reported pain, while 25(83.3%) patients had no pain. In Group-II, 10(33.3%) patients had pain at 72 hours while 20(66.7%) patients had no pain (p=0.13) /. In terms of age and gender, there was no significant difference between the two irrigants. **Conclusions:** there was no significant difference in pain level between the two groups.

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INTRODUCTION

The success of endodontic treatment is directly associated with infection control. For this and other reasons, irrigating solutions play an important role, making up for the shortcomings of instrumentation and complementing endodontic disinfection procedures. Sodium hypochlorite (NaOCl) solution is the standard irrigant for cleansing and disinfection of the root canal. It has antimicrobial and histolytic characteristics, among other properties.However, NaOCl may be cytotoxic to the periradicular tissues, particularly at high concentrations. As such, postoperative pain is a concern when highly concentrated NaOCl solutions are used in single-visit treatment of nonvital teeth because of the risk of extravasation of the irrigant into these tissues. Some investigators have suggested 2% chlorhexidine gel (CLX) as a good choice of irrigant for necrotic teeth because of its antimicrobial action, high substantivity and low toxicity. In addition, CLX may be less caustic than NaOCl properties.However, NaOCl may be cytotoxic to the periradicular tissues, particularly at high concentrations.[1-5] As such, postoperative pain is a concern when highly concentrated NaOCl solutions are used in single-visit treatment of nonvital teeth because of the risk of extravasation of the irrigant into these tissues. Some investigators have suggested 2% chlorhexidine gel (CLX) as a good choice of irrigant for necrotic teeth because of its antimicrobial action, high substantivity and low toxicity. In addition, CLX may be less caustic than NaOCl. The study described here involved in vivo assessment of the incidence of postoperative pain after single-visit endodontic treatment of patients with radiographically visible chronic apical periodontitis and necrotic pulp, with either 5.25% NaOCl or 2% CLX plus normal saline (0.9% NaCl) as the irrigant.[6-10.]

MATERIALS AND METHODS

This study was carried out to compare the levels of postoperative pain after cleaning and shaping of root canals using two different root canal irrigants for debridement. After approval from the institutional ethics committee, patients of either gender aged 18-40

years with irreversible pulpitis involving a posterior tooth (maxillary and mandibular premolar and molar teeth) were included. Patients with periapical periodontitis, periapical radiolucency and discharging sinus were excluded. With level of significance 5% and power of study 80%, the sample size was calculated using the formula: SS= Z2 × (P 1) × (1- P 2) ÷ C2 Where Z= confidence interval= 95%; P 1 = population 1= 25%; P 2= population 2=65%; and C= confidence interval=0.05. After informed consent was taken from all the patients, a thorough history was taken and clinical examination was performed. A preoperative periapical radiograph was taken. The patients were randomly divided into two equal groups. The randomisation was carried out using the computer, with Group-I signifying 2% CHX (Canal Pro CHX, Coltene Endo), and Group-II denoting 5.25% NaOCl (Canal Pro NaOCl, Coltene Endo) irrigating solutions. Local anaesthesia was administered to anesthetise the test tooth. Under rubber dam isolation, the tooth was accessed following all the principles of an ideal access cavity preparation. Rubber dam isolation was achieved after preparation of the access cavity in tilted, rotated, heavily restored and mal aligned teeth. After canal location and negotiation (using International Organization for Standardization [ISO] 8 and 10 K files), pulpectomy was performed using barbed broaches. Working length was established using radiographic technique. Canal preparation was done utilising crowndown technique with the help of ProTaper (Dentsply) universal files with simultaneous use of irrigants from each group, according to the manufacturer's instructions. Further, 2ml of the irrigant was used to irrigate the canal after each filing using 30 gauge Max-i-probe syringes with side vented needles (Maillefer, Dentsply). Precautions were taken during irrigation to prevent extrusion. Care was taken not to let the needle bind with canal walls. Irrigant was extruded using finger pressure (instead of thumb pressure).

A stopper was used to mark the irrigating needle such that it was kept 1-2mm away from the root apex. During irrigation the needle was constantly moved up and down in the canal. The rate of irrigant extrusion was never greater than 4ml per min. At the end of the procedure, paper points were used to dry the canals and a temporary restoration placed to seal the access cavity. No intracanal medication was used to confuse the effects of the irrigation solutions. A special type of proforma was given to each patient at the completion of first appointment with instructions for recording their evaluation of the level of pain visual analogue scale (VAS) score (0-10) at 72 hours. The pain response of each patient was divided into two categories: VAS score 0-3 was considered no pain; VAS score 4-10 was considered as pain. SPSS 20 was used to analyse the data. For qualitative and quantitative variables, descriptive statistics were used. For age and pain score at 72 hours, Mean ± standard deviation was calculated. Percentages and frequencies were calculated for gender and pain. To compare the frequency of pain between the groups, Chi-square test was used. $P<0.05$ was statistically significant.

RESULTS

There were 60 patients divided into groups of 30(50%) each. The overall mean age was 28.97±4.5 years. There were 32 (53.3%) males and 28 (46.6%) females. The mean value of pain score determined post operatively was 1.70±1.8in Group-I and 1.90 ± 2.4 in Group-II (p=0.5). At 72 hours, only 5(16.7%) patients reported pain, while 25(83.3%) patients had no pain. In Group-II, 10(33.3%) patients had pain at 72 hours while 20(66.7%) patients had no pain (p=0.13). In terms of age and gender, there was no significant difference between the two irrigants.

Table-1: Pain at 72 hrs according to age.

Age	Irrigant	No pain	Pain	P value
<25 years	2% CHX	83.3%	16.7%	**0.64**
	5.25%NAOCL	90.9%	9.1%	
26-30years	2% CHX	52.8%	45.2%	**0.27**
	5.25%NAOCL			
31-35years	2% CHX	60%	40%	**0.09**
	5.25%NAOCL	100%	0%	
36 to 40 years	2% CHX	0%	100%	0.09
	5.25%NAOCL	83.3%	16.7%	

DISCUSSION

Post-operative pain weakens the patient's trust in clinician the and may even provoke the patient to question the clinician's skills. Post-operative pain in endodontic treatment continues to be an issue faced by the dentists. Extrusion of the disinfectant solutions into the periapical area during irrigation is a major cause of inter-appointment pain. NaOCl possesses antibacterial properties and can cause dissolution of organic tissue. However, it has caustic effect in case it is inadvertently extruded into the periapical region. CHX 2% is another solution used in endodontic treatment. It has acceptable antimicrobial activity but it is not capable of dissolving necrotic tissue remnants.[11] The current study has investigated 2% CHX and 5.25% NaOCl as irrigating solutions and compared them in terms of their effect on inter-appointment pain in root canal treatment at 72 hours. Patients of age 18-

40 years were included in the study. Young patients with teeth with open apices were not included in the study. Patients above age 40 were excluded from the study in order to exclude old patients with sclerosed canals and patients who might be taking drugs that may interfere with the assessment of post-operative pain. Teeth with necrotic pulps were excluded since in necrotic teeth debris extrusion can occur which could be a source of post-operative pain. Furthermore, crown- down technique was used to prepare the canals as it causes less debris extrusion. Strict irrigation protocol was followed and side vented needles were used with the aim of preventing irrigant extrusion into the periapical area. VAS score was used to assess the patient's pain at 72 hours postoperatively since this scale can be a good assessment tool to quantify patients pain when correctly employed. The data from the study revealed that only 5 patients in Group-I experienced pain as compared to 10 in Group II. However the difference was not significant (p=0.136). Another study followed up 126 patients at 24 hours, 48 hours, 72 hours and 7 days. The results showed that only 3% patients from each group experienced moderate pain at 24 hours post-operatively. For all the time periods evaluated, no significant difference was found between the two irrigants ($p>0.05$).[12]

CONCLUSION

It is recommended for the clinicians to use side vented needles for irrigation. Care should be taken not to let the needle bind with the canal walls. The irrigant must be extruded slowly using finger pressure instead of thumb pressure. The irrigating needle should be kept 1-2mm away from the root apex with the needle constantly moving up and down in the canal allowing for irrigant backflow. The rate of irrigant extrusion should not be greater than 4ml per min.

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