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Original Research

A study on different irrigation systems for removal of intra canal medicaments

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ABSTRACT:
Background: To evaluate different irrigation systems for removal of intra canal medicaments. **Materials & methods:** A total of 20 freshly extracted mandibular premolars were enrolled. The teeth were longitudinally split into two halves and debris were removed. The two halves were then reassembled and filled with $Ca(OH)_2$ and were divided into four groups. The amount of residual $Ca(OH)_2$ was calculated. The results were analysed using SPSS software. **Results:** The mean amount of $Ca(OH)_2$ remaining was highest with respect to Group I followed by Group II and Group III. **Conclusion:** Canal Brush and ultrasonic techniques were significantly better than the rotary instrument and irrigant groups.
Keywords: Canal Brush, Irrigation system, Calcium hydroxide.

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INTRODUCTION

Calcium hydroxide has been widely accepted as the most frequently used intra-canal medicament owning to its antimicrobial properties, inhibition of osteoclast activities and favorable tissue repair response. [1,2]All inter appointment dressing placed inside the root canal have to be removed before obturating the canals. [3] In vitro studies have shown that remnant calcium hydroxide hinder the penetration of sealers into dentinal tubules, hinder the bonding of resin sealer adhesion to the dentin, interact with zinc oxide eugenol sealers, increase the apical leakage of root canal treated teeth. [4,5]Hence, calcium hydroxide should be removed completely from the root canal system.

Several techniques have been proposed to remove the $Ca(OH)_2$ dressing from the root canal system, including the use of endodontic hand files, sonic activation, passive ultrasonic irrigation, the CanalBrush System, and nickel-titanium (NiTi) rotary instruments. [6-8] The most commonly described method for removing $Ca(OH)_2$ is instrumentation along with sodium hypochlorite (NaOCl) and ethylenediaminetetraacetic acid (EDTA) irrigant solutions combined with use of a "master apical file" at working length (WL). [9] However, there is still no consensus as to which is the best method for removal. Removal of the dressing using hand files, with or without an irrigating solution, may be inefficient and tedious, whereas the use of NiTi rotary instruments may enhance the removal procedure when compared to the techniques using hand files. [10] During root canal debridement and in order to reduce the amount of debris within the canal, a flexible microbrush (CanalBrush, Colte'ne Whaledent GmbH+ Co., KG, Langenau, Germany) made from polypropylene has been suggested. Debris removal from simulated canal irregularities in the apical part of the curved canals is more effective with CanalBrush, sonic, and ultrasonic irrigation techniques than syringe irrigation.[11] Hence, this study was conducted to evaluate different irrigation systems for removal of intracanal medicaments.

MATERIALS & METHODS

A total of 20 freshly extracted mandibular premolars were enrolled. The teeth were longitudinally split into two halves and debris were removed. The two halves were then reassembled and filled with $Ca(OH)_2$ and were divided into four groups. In Group I, the teeth were irrigated with 5 mL of 2.5% sodium hypochlorite (NaOCl) and 5 mL of 17% of ethylene diamine tetraacetic acid. In Group II, the teeth were irrigated with 5 mL of 2.5% NaOCl and a rotary ProTaper F3 instrument was used. In Group III, the teeth were irrigated with 5 mL of 2.5% NaOCl and using an ultrasonic unit. In Group IV, the teeth were irrigated with 5 mL of 2.5% NaOCl and a Canal Brush was used to remove $Ca(OH)_2$. The amount of residual $Ca(OH)_2$ was calculated. The results were analysed using SPSS software.

RESULTS

A total of 20 samples were included. They were divided into four groups. The mean amount of $Ca(OH)_2$ remaining was highest with respect to Group I followed by Group II and Group III. The lowest was seen with Group IV. Groups III and IV, while not different from each other, removed significantly more $Ca(OH)_2$ than the other two techniques.

Table 1: Percentage of $Ca(OH)_2$ remaining in the root canals

Group	Number	Mean	P- value
NaOCl EDTA	5	51.56	<0.001*
Pro Taper	5	35.39	
Ultrasonic	5	23.12	
CanalBrush	5	21.25	

*: significant

DISCUSSION

All intra-canal inter appointment dressing should be removed from the root canal walls prior to obturation. It has been reported that residual medicaments interact with the penetration of sealers into dentinal tubules, compromising the microleakage of the obturation. [12] However, calcium hydroxide pastes are not easily removed from the root canal walls. This aim requires new devices with high effectiveness and easy handling for clinical application. Some factors that can influence removing the medicaments from root canal include final apical instrumentation size, [13]the size of the needle used for irrigant delivery, [14] the length of time devoted to irrigation, and the system that is used for canal irrigation. [15] Hence, this study was conducted to evaluate different irrigation systems for removal of intra canal medicaments.

In the present study, a total of 20 samples were included. They were divided into four groups. The mean amount of $Ca(OH)_2$ remaining was highest with respect to Group I followed by Group II and Group III. A study by Bhuyan AC et al, studied that canal Brush and ultrasonic techniques showed significantly less residual Ca(OH)2 than irrigants and rotary techniques. There was no significant difference between the rotary and irrigant techniques. None of the techniques used were completely able to remove Ca(OH)2 from the root canals. But the Canal Brush and ultrasonic techniques were significantly better than the rotary instrument and irrigant groups.[16]

In the present study, the lowest was seen with Group IV. Groups III and IV, while not different from each other, removed significantly more $Ca(OH)_2$ than the other two techniques. Another study by Singh AK et al, an intra group comparative analysis revealed that the highest $Ca(OH)_2$ elimination was seen at middle third (0.82 ± 0.09, 0.30 ± 0.11) in NaviTip FX irrigation system and Vibringe sonic irrigation system, respectively. Higher $Ca(OH)_2$ was eliminated at the apical third (0.26 ± 0.02) by the EndoVac irrigation system. At coronal third, maximum $Ca(OH)_2$ removal was seen in EndoVac irrigation system (0.49 ± 0.03). A statistically significant difference was noted amid Vibringe sonic irrigation and EndoVac irrigation systems. The intergroup evaluation of $Ca(OH)_2$ elimination at coronal, middle, and apical third showed a statistically significant difference between NaviTip FX irrigation and Vibringe sonic irrigation as well as between NaviTip FX irrigation and EndoVac irrigation at a p value of 0.001. The difference between EndoVac irrigation and Vibringe sonic irrigation was not statistically significant. Amid the limitations of this research, this research concludes that none among the irrigation methods employed could totally eliminate the $Ca(OH)_2$ off the root canals. Nevertheless, EndoVac apical negative pressure irrigation has slightly superior potential in eliminating $Ca(OH)_2$ from the root canals in comparison with Vibringe sonic irrigation as well as the NaviTip FX irrigation system.[17] Khademi AA et al, access cavities were prepared in 50 single-rooted anterior teeth. Cleaning and shaping were done using the Flex master rotary system up to size no. 30, 6%. The canals were filled with injectable calcium hydroxide (calcipex). After 7 days, the calcium hydroxide were retrieved using RinsEndo system in Group 1 (n = 20), with PUI system in Group 2 (n = 20). In positive control group (n = 5), no irrigation was performed. In negative control group (n = 5), root canals were not filled with any medicament. There was no significant difference in the removal of calcium hydroxide between RinsEndo and PUI at cervical (P = 0.67), middle (P = 0.51) and apical (P = 0.75) part of the root canals. None of the irrigation techniques was able to completely remove calcium hydroxide from the root canal system.[18]Kozak et al. [19] compared cleaning efficiency of five different cleaning techniques to remove artificially placed $Ca(OH)_2$/chlorhexidine paste from simulated apical grooves and depressions within wide root canals (prepared to a size 80, 0.02 taper). They reported that all tested cleaning methods were similar, though the Sonicare/Canal Brush had a slightly higher cleaning efficiency compared with the other cleaning procedures. This result can be explained by the over

prepared to a large diameter of the canals in this study. Whereas the CanalBrush was more effective in terms of debris removal in the narrower parts of the root canal where it was in better contact with the root canal surface. [20] Also, Tasdemir et al. compared the Canal Brush with ultrasonic and irrigant only techniques for Ca(OH)2 removal and found that the CanalBrush and ultrasonic were better than irrigant only techniques for removal of Ca(OH)2 from the root canal.[7]

CONCLUSION

Canal Brush and ultrasonic techniques were significantly better than the rotary instrument and irrigant groups.

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