

## Original Research

### Evaluation of effectiveness of manual and ultrasonic technique for removal of Calcium Hydroxide medicament from root canals

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#### ABSTRACT:

**Background:** In endodontics, the use of intracanal dressing is important between treatment sessions for periapical periodontitis. Calcium hydroxide has been used in various clinical situations and placed inside the root canal for medication for different time periods ranging from 7 days to 6-24 months for apexification. Hence; the present study was undertaken for evaluating the effectiveness of manual and ultrasonic technique for removal of Calcium Hydroxide medicament from root canals. **Materials and methods:** A total of 20 extracted mandibular first premolars were included in the present study. Filling of the canals was done, after preparation, with calcium hydroxide (CaOH<sub>2</sub>). Radiographs were taken for assessing the quality. Placement of the teeth was done in the incubator for one month at thirty seven degree centigrade. After removal, all the specimens were divided into two study groups with 10 specimens in each group as follows: Group A: Removal of CaOH<sub>2</sub> paste was done manually using flexo file and NaOCl irrigant, and Group B: Removal of CaOH<sub>2</sub> paste was done using ultrasonic instrumentation and NaOCl irrigant. After, removal of calcium hydroxide, evaluation of empty canals was done by taking radiographs of roots. The optical thickness of radio opaque area was recorded in view of a size of 256 conceivable shades of grey, with dark symbolizing zero and white symbolizing 255. **Results:** Within both the study groups, while doing intragroup comparison, it was observed that mean gray levels in both the study groups showed a significant increase after removal of Ca(OH)<sub>2</sub>. In between both the study groups, while doing intergroup comparison, no significant difference was observed while comparing the mean gray levels after Ca(OH)<sub>2</sub> removal. **Conclusion:** Both the techniques for removal of calcium hydroxide from the root canals are equally effective.

**Keywords:** Root canal, Medicaments, Calcium Hydroxide

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#### INTRODUCTION

In endodontics, the use of intracanal dressing is important between treatment sessions for periapical periodontitis. Calcium hydroxide (Ca(OH)<sub>2</sub>) has been used to inactivate bacterial LPS (1), to induce the formation of mineralized tissue (2) and to change the pH in the tubules through the diffusion of hydroxyl ions (3), thereby contributing to the success of endodontic therapy.<sup>1-3</sup>

Calcium hydroxide has been used in various clinical situations and placed inside the root canal for medication for different time periods ranging from 7 days to 6-24 months for apexification. Calcium hydroxide as a root canal medicament has proven to be able to reduce the number of pathogenic species associated with pulp necrosis. Remaining calcium hydroxide inside the root

canal must be removed before the root canal was filled with a permanent filler.<sup>4-6</sup>

In order to maximize the properties of Ca(OH)<sub>2</sub>, the pulp space should be filled with the medication. However, the removal of Ca(OH)<sub>2</sub> may be difficult, which raises questions regarding the appropriate method to use for the effective removal of the paste and the consequences of keeping the medication in the root canal filling. Different irrigating solutions and hand files have been widely used for this purpose.<sup>4</sup> Hence; the present study was undertaken for evaluating the effectiveness of manual and ultrasonic technique for removal of Calcium Hydroxide medicament from root canals.

**MATERIALS AND METHODS**

The present study was conducted with the aim of assessing effectiveness of manual and ultrasonic technique for removal of Calcium Hydroxide medicament from root canals. A total of 20 extracted mandibular first premolars were included in the present study. Malformed teeth, teeth with multiple root canals, teeth with incompletely formed apex and carious teeth were excluded from the present study. Immersion of the selected teeth was done in sodium hypochlorite solution for two days for removing organic debris. Preparing of the root canals was done using NiTi rotary files. Irrigation of the canals was done with normal saline. Removal of the smear layer was done using sodium hypochlorite (NaOCl) and EDTA as final irrigants. Drying of the canals was done using paper points. Filling of the canals was done, after preparation, with calcium hydroxide (CaOH<sub>2</sub>). Radiographs were taken for assessing the quality. Placement of the teeth was done in the incubator for one month at thirty seven degree centigrade. After removal, all the specimens were divided into two study groups with 10 specimens in each group as follows:

Group A: Removal of CaOH<sub>2</sub> paste was done manually using flexo file and NaOCl irrigant, and

Group B: Removal of CaOH<sub>2</sub> paste was done using ultrasonic instrumentation and NaOCl irrigant.

After, removal of calcium hydroxide, evaluation of empty canals was done by taking radiographs of roots. The optical thickness of radio opaque area was recorded in view of a size of 256 conceivable shades of grey, with dark symbolizing zero and white symbolizing 255. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Mann-Whitney U test was used for evaluating the level of significance.

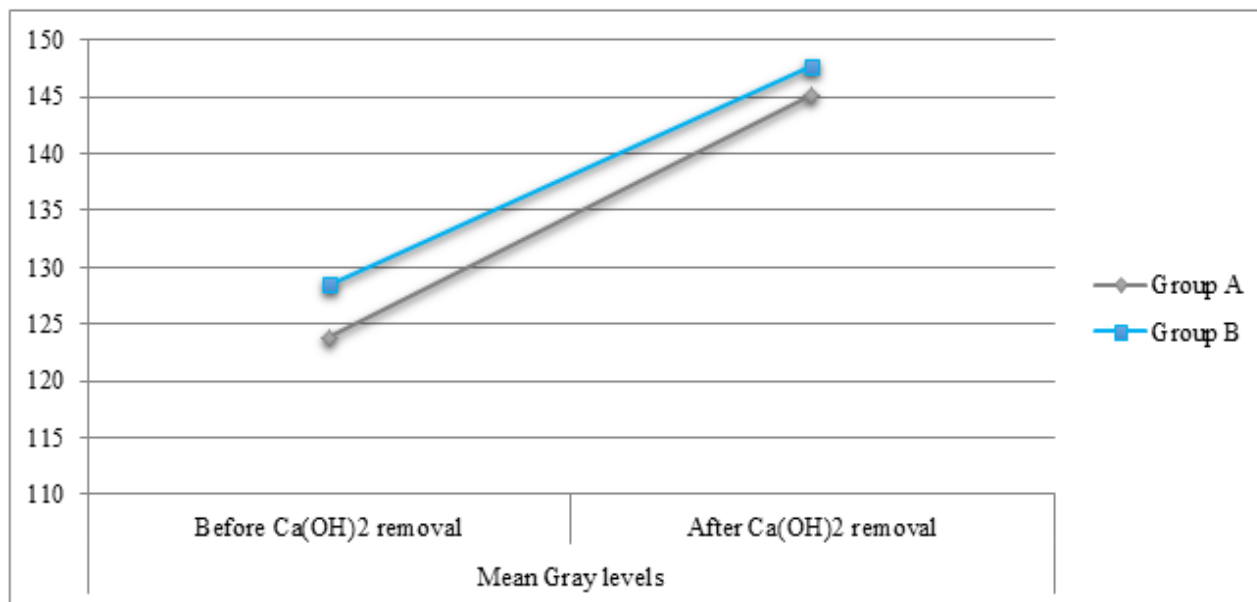
**RESULTS**

In the present study, a total of 20 tooth specimens were analyzed and were broadly divided into two study groups as follows: Group A: Removal of CaOH<sub>2</sub> paste was done manually using flexo file and NaOCl irrigant, and Group B: Removal of CaOH<sub>2</sub> paste was done using ultrasonic instrumentation and NaOCl irrigant. Within both the study groups, while doing intragroup comparison, it was observed that mean gray levels in both the study groups showed a significant increase after removal of Ca(OH)<sub>2</sub>. This shows that both the techniques are significantly effective in removing Ca(OH)<sub>2</sub>. In between both the study groups, while doing intergroup comparison, no significant difference was observed while comparing the mean gray levels after Ca(OH)<sub>2</sub> removal. This implies that both the techniques are equally effective in removing Ca(OH)<sub>2</sub> from the root canals.

**Table 1:** Comparison of mean gray levels at canals

Group	Mean Gray levels		p- value
	Before Ca(OH) <sub>2</sub> removal	After Ca(OH) <sub>2</sub> removal	
Group A	123.85	145.12	0.00 (Significant)
Group B	128.46	147.71	0.01 (Significant)
p- value	0.11	0.25	-

**Graph 1:** Comparison of mean gray levels at canals



## DISCUSSION

Existence of microorganisms, their products, or necrotic pulp tissue can cause pathologic changes, several lesions, and bone resorption in the periradicular tissues. Therefore, one of the most important goals of dentistry treatment is elimination of microorganisms. In a root canal therapy attempts should be made to eliminate microorganisms existing in root canal by different chemical and pharmaceutical methods. Calcium hydroxide (Ca(OH)<sub>2</sub>) was first introduced into endodontics by Herman in 1920.<sup>6-9</sup> Hence; the present study was undertaken for evaluating the effectiveness of manual and ultrasonic technique for removal of Calcium Hydroxide medicament from root canals.

In the present study, a total of 20 tooth specimens were analyzed and were broadly divided into two study groups as follows: Group A: Removal of CaOH<sub>2</sub> paste was done manually using flexo file and NaOCl irrigant, and Group B: Removal of CaOH<sub>2</sub> paste was done using ultrasonic instrumentation and NaOCl irrigant. Within both the study groups, while doing intragroup comparison, it was observed that mean gray levels in both the study groups showed a significant increase after removal of Ca(OH)<sub>2</sub>. This shows that both the techniques are significantly effective in removing Ca(OH)<sub>2</sub>. Dadresanfar B et al compared the efficacy of two rotary systems of Race and Mtwo in the removal of Ca (OH) 2 aqueous-based from distobuccal canals of human maxillary molars. A total of 44 distobuccal root canals of human maxillary molars were randomly distributed into two groups of 20 canals each and two control groups. Specimens in each group were instrumented with similar master apical rotary (MAR) and flexible files according to the manufacture's guidelines. The Ca (OH) 2 paste was placed in canals using # 20 lentulo and radiographs were taken from the two dimensions. The roots were incubated for 1 week at 37°C and 100% humidity and Ca (OH) 2 was removed from canals by MAR, afterward. Then, the roots were longitudinally split in halves by diamond disk and chisel without entering the root canals. Photos were taken from the canals' walls by a stereomicroscope with × 10 magnification. Next, according to a defined scoring system, photos were scored by four endodontists, so that scores 1 and 2 (nonvisible remnants or scattered remnants of Ca(OH)<sub>2</sub>) were considered as acceptable and scores 3 and 4 (distinct mass or densely-packed mass of Ca(OH)<sub>2</sub>) were regarded as nonacceptable. The obtained findings indicated that in coronal, middle, and apical portions of the root canal, 45, 60, and 65% of Mtwo specimens and 40, 50, and 55% of specimens prepared by the Race system acquired an acceptable score (1 and 2), respectively. Moreover, the results showed no significant difference between the two groups (P > 0.05). Both Mtwo and Race rotary systems with acceptable removal efficiency (score 1 and 2) were similarly able to remove Ca(OH)<sub>2</sub>.<sup>10</sup>

In the present study, in between both the study groups, while doing intergroup comparison, no significant difference was observed while comparing the mean gray levels after Ca(OH)<sub>2</sub> removal. This implies that both the techniques are equally effective in removing Ca(OH)<sub>2</sub> from the root canals. Kourti E et al compared the efficiency of different irrigations systems to remove calcium hydroxide from root canal walls, especially from the apical third by using scanning electron microscopy (SEM). Eighty-four single-rooted teeth were divided into 4 groups of 20 teeth each, according to different irrigation protocols using a 30-gauge slot-tipped needle, ultrasonic irrigation system, erbium-doped yttrium aluminum garnet laser (Er: YAG) laser, and EndoVac system. The rest 4 teeth were used as control groups (2 positive and 2 negative control groups). After coronal access, all teeth were instrumented by Protaper Next rotary files (Dentsply-Maillefer, Ballaigues, Switzerland) up to size X3, followed an irrigation protocol and filled with pure calcium hydroxide powder mixed with saline. Teeth were stored in an incubator for 7 days, and then, calcium hydroxide was removed using 3 techniques: Manually (Group 1), by ultrasonic irrigation (Group 2), by laser Er: YAG and x-pulse tip (Group 3), and by EndoVac system (Group 4). The teeth of control groups were instrumented as the experimental groups; no removal technique was applied in positive group, whereas in negative one, the root canals were left empty. Teeth were sectioned longitudinally and observed under SEM. The results showed a significant difference between laser and the other three groups in coronal and middle root third, but no statistic difference in apical third. Laser improved the removal of calcium hydroxide in comparison with conventional techniques.<sup>11</sup>

## CONCLUSION

From the above results, the authors concluded that both the techniques for removal of calcium hydroxide from the root canals are equally effective. However; further studies are recommended.

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