

Original Research

Comparative evaluation of two different root canal irrigating solutions during root canal therapy

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ABSTRACT:

Background: Bacteria and their products play the main role in the initiation and exacerbation of pulp and periapical diseases. Previous authors established that mechanical instrumentation alone is inefficient and supporting actions of disinfectants such as NaOCl are still necessary. Hence; the present study was conducted for evaluating and comparing two different root canal irrigating solutions during root canal therapy. **Materials & methods:** A total of 40 freshly extracted mandibular first premolar were obtained and were broadly divided into two study groups with 20 specimens in each group; Group A- Root canals irrigated using 2.5% NaOCl for 1 min only, and Group B- Root canals irrigated with 2% CHX gluconate for 1 min followed by 3 ml of 2.5% NaOCl solution. Each tooth was accessed coronally and all the teeth were decoronated at the cemento-enamel junction. Teeth were instrumented and at every change of instrument, the canals were irrigated with 2 ml of 2.5% NaOCl solutions during procedure. Canals were dried with paper points after which the roots were split longitudinally and examined. The cleaning ability of irrigating solutions was evaluated using the smear layer score system. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. **Results:** Mean smear layer score among specimens of group A and group B was 4.5 and 4.2 respectively. Non-significant results were obtained while comparing the mean smear layer score. **Conclusion:** Both the irrigating solutions are equally effective in removing smear layer.

Key words: Irrigation solution, Root canal

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INTRODUCTION

Bacteria and their products play the main role in the initiation and exacerbation of pulp and periapical diseases. In 1894, Miller introduced the role of bacteria in the pathogenesis of pulp diseases for the first time. Therefore, the main purpose of a root canal treatment is to eliminate the bacteria and their products from the pulp space. It has been figured out that the most probable cause of the failure in root canal treatments is the presence of oral bacterial flora in the apical portion of the root canal. In a research done by Sundqvist on necrotic human teeth, it was concluded that apical periodontitis only occurs in teeth containing bacteria in their root canals. *Enterococcus faecalis* (*E. faecalis*) is a part of the

normal flora of the oral cavity that can be detected in small numbers in the treated root canals, but in large numbers in teeth with endodontic treatment failure.¹⁻³ Success of root canal treatment depends on good biomechanical preparation. Despite all efforts, it is evident that bacteria can still survive in certain inaccessible areas. Previous authors established that mechanical instrumentation alone is inefficient and supporting actions of disinfectants such as NaOCl are still necessary. Another authors showed that the efficacy of apical irrigation is directly related to the depth of insertion of the needle, which at times presents a challenge to the clinician.⁴⁻⁶ Hence; the present study was conducted for evaluating and

comparing two different root canal irrigating solutions during root canal therapy.

MATERIALS & METHODS

The present study was conducted for evaluating and comparing two different root canal irrigating solutions during root canal therapy. A total of 40 freshly extracted mandibular first premolar were obtained and were broadly divided into two study groups with 20 specimens in each group; Group A- Root canals irrigated using 2.5% NaOCl for 1 min only, and Group B- Root canals irrigated with 2% CHX gluconate for 1 min followed by 3 ml of 2.5% NaOCl solution. Each tooth was accessed coronally and all the teeth were decoronated at the cemento enamel junction. Teeth were instrumented and at every change of instrument, the canals were irrigated with 2 ml of 2.5% NaOCl solutions during procedure. Canals were dried with paper points after which the roots were split longitudinally and examined. The cleaning ability of irrigating solutions was evaluated using the smear layer score system. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

A total of 40 freshly extracted mandibular first premolar were obtained and were broadly divided into two study groups with 20 specimens in each group; Group A- Root canals irrigated using 2.5% NaOCl for 1 min only, and Group B- Root canals irrigated with 2% CHX gluconate for 1 min followed by 3 ml of 2.5% NaOCl solution. Mean smear layer score among specimens of group A and group B was 4.5 and 4.2 respectively. Non-significant results were obtained while comparing the mean smear layer score.

Table 1: Comparison of smear layer score

Smear layer score	Group A	Group B
Mean	4.5	4.2
SD	1.3	1.1
p- value	0.36	

DISCUSSION

Elimination of microorganisms from infected root canals is a complicated task. The chances of a favourable outcome with root canal treatment are significantly higher if infection is eradicated effectively before the root canal system is obturated. However, if microorganisms persist at the time of obturation, or if they penetrate into the canal after obturation, there is a high risk of treatment failure. Numerous measures have been described to reduce the number of microorganisms in the root canal system, including the use of various instrumentation techniques, irrigation regimens, and intracanal medicaments. The use of chemical agents during instrumentation to completely clean all aspects of the

root canal system is central to successful endodontic treatment. Irrigation is complementary to instrumentation in facilitating the removal of pulp tissue and/or microorganisms. Irrigation dynamics plays an important role; the effectiveness of irrigation depends on the working mechanism(s) of the irrigant and the ability to bring the irrigant in contact with the microorganisms and tissue debris in the root canal.⁶⁻⁹ Hence; the present study was conducted for evaluating and comparing two different root canal irrigating solutions during root canal therapy.

A total of 40 freshly extracted mandibular first premolar were obtained and were broadly divided into two study groups with 20 specimens in each group; Group A- Root canals irrigated using 2.5% NaOCl for 1 min only, and Group B- Root canals irrigated with 2% CHX gluconate for 1 min followed by 3 ml of 2.5% NaOCl solution. Mean smear layer score among specimens of group A and group B was 4.5 and 4.2 respectively. Salgar A et al compared the efficacy of different irrigating solutions on root canal system and analyzing smear layer using scanning electron microscope (SEM). Materials and Methods: Fifty mandibular premolars were decoronated and split longitudinally. Each root half was divided into five groups (n = 10): Group I - 3 ml of physiological saline, Group II - 3 ml of 2.5% sodium hypochlorite (NaOCl), Group III - 1 ml of 10% citric acid, Group IV - 2% chlorhexidine (CHX) gluconate (Vishal Dentocare, India), Group V - Largal Ultra (ethylenediaminetetraacetic acid [EDTA] 15% + cetrinide 0.75%), Septodont (Saint-Maur-des-fosses, France), and Group VI - Smear Clear (Sybron Endo, Orange, CA, USA) (17% EDTA, cetrinide, and a special surfactant). Irrigation regimens were performed for 1 min. The presence or absence of smear layer at the coronal, middle, and apical portion of each canal were examined under a SEM. Results: A significant difference (P < 0.001) in smear layer removal between smear clear and Largal Ultra at the apical and middle third of the canal was observed. The presence of debris is more obvious in the apical third rather than in the middle and coronal part of the root canals. Conclusion: Largal Ultra, Smear Clear, and the citric acid removed the smear layer more efficient way as compared to CHX, NaOCl, and saline solutions.¹⁰

In the present study, Non-significant results were obtained while comparing the mean smear layer score. Gomes-Filho JE et al compared the reaction of rat subcutaneous connective tissue to 0.9% sterile saline, 2.5% sodium hypochlorite (NaOCl), 5.25% NaOCl and 2% chlorhexidine gluconate solution or gel. Six circles were demarcated on the dorsal skin of 24 male Wistar rats, leaving 2 cm between each circle. Using a syringe, 0.1 mL of each root canal irrigant was injected subcutaneously into 5 circles. In the 6th circle, the needle of an empty syringe was introduced

into the skin, but no irrigant was injected (control group). Evaluations were undertaken at 2 h, 48 h, 14 days and 30 days post-procedure. Tissue samples were excised, embedded in paraffin blocks and 3- μ m-thick sections were obtained and stained with hematoxylin and eosin. The areas of inflammatory reaction were evaluated and analyzed statistically by ANOVA and Tukey's test. The control group showed few or no inflammatory reaction areas in the subcutaneous tissue. 0.9% saline solution, 2.0% chlorhexidine solution and 2.5% NaOCl showed a good biocompatibility, as very mild inflammatory reaction was detected at 14 days and tissue repair occurred at 30 days. 5.25% NaOCl was the most toxic irrigant, as the number of inflammatory cells remained elevated at 14 and 30 days. The group treated with 2.0% chlorhexidine gluconate gel presented a moderate inflammatory response at 14 days, which decreased at 30 days, being considered similar to that of the control group, 0.9% saline solution, 2.0% chlorhexidine solution and 2.5% NaOCl at this experimental period.¹¹

CONCLUSION

Both the irrigating solutions are equally effective in removing smear layer.

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