

Environ of Chemomechanical Caries Removal Agents

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Abstract:

Background: The purpose of the study is to check whether chemomechanical caries removal agents carisolv and papacarie be used as root canal irrigants along with chlorhexidine in comparison with saline.

Materials and Methods: In the present *vivo* study, total of 100 samples were chosen and each tooth was treated in five appointments by the test irrigants with saline as control group. Aerobic and anaerobic culture test evaluation was done on different appointments.

Results: Results showed gradual reduction in number of aerobic bacteria in all groups indicating number and percentage of recovery was the highest in carisolv followed by chlorhexidine and papacarie. However, number of teeth with anaerobic was least in papacarie followed by chlorhexidine and carisolv.

Conclusion: The observational results were analyzed statistically through which the following conditions were arrived at: Out of all the test irrigants papacarie show maximum antimicrobial effect against anaerobic bacteria; Carisolv showed highest antimicrobial effect bacteria; 0.2% chlorhexidine was less effective than carisolv but more effective than papacarie against aerobic bacteria; 0.2% chlorhexidine and carisolv were equally effective against anaerobic bacteria.

Key Words: Carisolv, carie-care, CMCR, papacarie

Introduction

It is generally believed that mechanical enlargement of canals must be accompanied by copious irrigation to facilitate maximum removal of microorganisms so that the prepared canal becomes as bacteria-free as possible.¹ Ideally an irrigant should provide a mechanical cleansing action, be antimicrobial and disintegrate residuum of organic tissues without marring

the periradicular tissues if extruded into the periodontium. In addition, the root canal irrigants should be biocompatible with oral tissues.

Ever since the use of sodium peroxide by Krik since 1892 as a root canal cleaning agent, different researchers introduced different irrigants for root canal disinfection ranging from sodium hypochlorite,^{2,3} citric acid,⁴ gly-oxide,⁵ ethyl diamine tetra acetic acid (EDTA),⁶ etc.

The changing concept of microbiology of periapical pathosis from aerobic to obligatory and facultative anaerobic organisms require consideration on the antimicrobial properties of the irrigants to eliminate or reduce the pathogens to a clinically acceptable level.

The objective of present study is to find out the effectiveness of three chemomechanical caries removal agents namely chlorhexidine, carisolv, and papacarie with 0.9% normal saline as control by culture test evaluation.

Materials and Methods

A total number of 100 anterior teeth were selected from 90 patients among the age group of 15-30 years requiring endodontic treatment. The criterion for selection of patient was based on history, clinical and radiological examination. Teeth selected were with <3 mm diameter (measured by scale, divider) periapical bone rarefaction.

The teeth samples were divided into two groups; control and experimental comprising of 25 and 75 teeth. The experimental group was further divided into three subgroups comprising 25 teeth each on the basis of irrigant used in the study.

Method of taking bacterial sample from tooth

After oral prophylaxis of the involved tooth segment, a rubber dam was applied which was cleaned with chlorhexidine gluconate. An access opening was made into the pulp chamber with sterile round bur at high speed, which was modified with round or tapered fissure bur at slow speed as per need. Canal length was determined by a radiograph after placing a no. 15 file into the canal which was then adjusted to within 1 mm of the radiographic apex. The file was manipulated for 30-60 s to contact all canal walls to suspend as many bacteria as possible. A sterile paper point was inserted into the canal and kept for about 5 min so as to soak the contents of the root canal after removal of the file. For anaerobic organism's paper point picked up canal with a sterile cotton forceps and

inserted deep into the fluid thioglycolate medium and the cap was tightened as soon as possible. For aerobic organism, paper point with soaked root canal contents was inserted into a sterile container containing peptone water. Both the samples were labeled to indicate patient's name, date and the tooth cultured.

The walls of the canals were prepared biomechanically and the debris was flushed out at regular intervals with 5 ml of the test irrigant in each instalment with 25 gauge luerlock monojet syringe (Nlinjing Industrial Co. Ltd). The canal was then washed with 5 ml of double distilled water. The access opening was sealed with a double seal of zinc-oxide eugenol and zinc-phosphate cement after proper drying without intra-canal medicament. The patient was recalled after 72 h.

In the sub-segment appointment, same procedure was followed to obtain total 10 bacterial samples.

Identification of bacteria

For anaerobic bacteria, the inoculated paper point in thioglycolate media (BD BBL™Mycoflask Media) was incubated at 37°C for 24 h and then inoculated on kanamycin blood agar, 100 ug/m,100 ug, disc of metronidazole was placed which was incubated in anaerobic Mc into and fidelzar (Hamilton Microlab) for 48 h. After 48 h, isolated sub-cultured colonies were identified according to the methods described in Orskov,⁷ Washington,⁸ Dewhirst.⁹

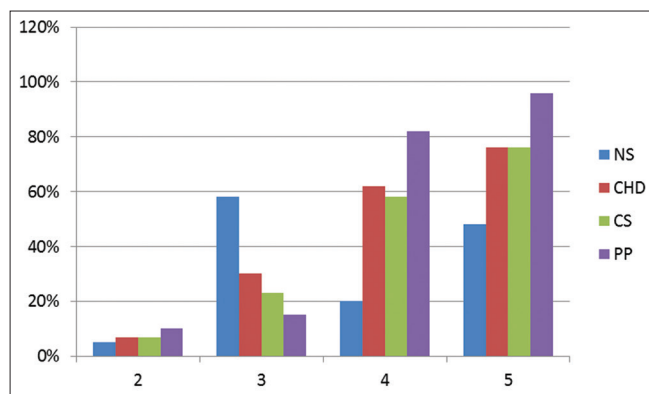
For aerobic bacteria, inoculated paper point in peptone water was inoculated on solid agar for 48 h. Colonies were then identified with help of Gram-staining, motility and biochemical reaction.

Statistical analysis

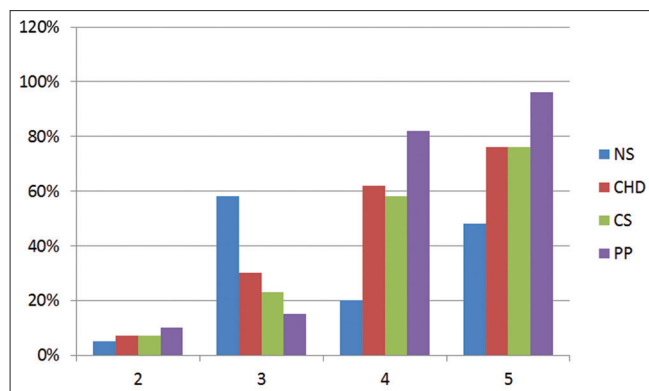
1. Percentage of each group was calculated with the help of total root canals in each group and the number of infected root canal on different appointments
2. The fifth appointment of each experimental group was compared with controlled group was achieved by using "Z" test.

Observation and Result

Graph 1 shows the evaluation of aerobic culture test in different appointments for different irrigants. All teeth were infected with aerobic bacteria in all the groups. Though there was gradual reduction in number of aerobic bacteria in all the groups, carisolv shows the least number of cases, i.e. (3) (showed pressure of aerobes on fifth appointment) followed by 0.2% chlorhexidine (5) and papacarie (6), it is indicated that number and percentage of recovery was highest in carisolv22 (88) followed by 0.27 chlorhexidine 20 (80%) and 0.5% papacarie 19 (76%).



Graph 1: Cases recovered from aerobic bacteria on different irrigants (in percentage)



Graph 2: Cases recovered from aerobic bacteria on different irrigants (in percentage)

In the control group only 11 (44%) teeth with negative culture were found on fifth appointment.

Graph 2 shows the evaluation of anaerobic culture test in different appointments for different irrigants. All teeth were infected with anaerobic bacteria in all groups. There was subsequent reduction in a number of infected cases in all the groups. However, number of teeth with anaerobic bacteria was at least (1) in papacarie subgroup followed by 0.2% chlorhexidine and carisolv (6 each). In the control group 13 teeth were with aerobes to get 12 (48%) teeth with negative culture on the fifth appointment. It is an evident number and percentage recovery is maximum in papacarie 24 (96%) followed by 0.2% chlorhexidine and 0.2% carisolv 19(76%).

Z value is maximum in 0.2% carisolv subgroup for teeth recover from aerobic bacteria which indicate highly significant p value followed by 0.2% chlorhexidine and papacarie.

Z value is maximum in papacarie subgroup for teeth recovered from anaerobic bacteria which indicates highly significant p value followed by 0.2% chlorhexidine and 0.5% carisolv.

Discussion

González-Moles and González¹⁰ who established bacteria has one of the most causative agents of pupal and periapical lesions.

Before 1970s predominant microorganisms isolated were alpha and beta hemolytic streptococci, *Staphylococcus aureus*, *Enterococcus* spp., lactobacilli, etc. After 1970s, it was realized that anaerobic bacteria were responsible for causation of pulpal and periapical infections. It was well established by Sundqvist¹¹ and Wittgow. Jr.¹²

The presence of anaerobic bacteria is much more prevalent in root canals than it was previously considered.^{13,14} Common anaerobes were *Bacterioides melaninogenicus*, *Peptostreptococcus*, *Fusobacterium*, etc.

The aim of the study was to evaluate and compare the antimicrobial effectiveness of three irrigating solutions 0.2% chlorhexidine, carisolv, and papacarie with 0.9% normal saline as control.

Brenda¹⁵ and Bhardwaj¹⁶ et al. found chlorhexidine to be a potent antibacterial irrigating solution. It was found active against a wide range of Gram-positive and Gram-negative organisms, yeast, fungi, facultative anaerobes and aerobes.¹⁷

Carisolv, a new chemomechanical caries was chosen for its well-documented broad spectrum of activity.¹⁸⁻²⁰ Anaerobic bacteria is a common entity in pulp and periapical infections. As papacarie is active against anaerobes,^{21,22} it was selected in this study. Kim et al.²³ found antimicrobial activity of papain and lysosome activated by EDTA and cysteine against *Escherichia coli*.

From the results of this study, it is evident that normal saline has poor antimicrobial activity which can be correlated with the study of Nikolov et al.²⁴ Sha et al.²⁵ Shahni et al.²⁶ However, our result is contradictory to the study of Goel et al.²⁷ who found 5% sodium hypochlorite, 15% EDTA and normal saline to be equally effective in reduction of bacterial colonies from the root canal.

0.2% chlorhexidine was effective in removing aerobic bacteria in 80% of the cases and anaerobic bacteria in 76% of cases which is consistent with the result of Daleny et al., Sha et al., Vahdaty et al.,²⁸ and Kandaswamy et al.²⁹

Carisolv was effective in removing aerobic bacteria in 88% of cases and anaerobic bacteria in 76% of cases. Papacarie was effective in eliminating aerobic bacteria in only 76% of cases whereas it eliminated 96% of anaerobic bacteria on fifth appointment. It is evident that papacarie is more effective against anaerobes than aerobes which is also a finding of Juntavee et al.²²

Conclusion

The article reviewed the potential new irrigants that could substitute the traditional endodontic irrigants. Presently these newer chemo mechanical caries removal agents could be used as an adjunct to saline & Naocl, as ideal root canal irrigants.

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