LETTER TO THE EDITOR

Role of Antimicrobial Irrigants in Root Canal Treatment

Sir,

The aim of root canal treatment is elimination of necrotic tissue bacteria from the root canal system and avoidance of reinfection. Removal of micro-organisms from contaminated root canals is a complex job. The probabilities of a favorable result with root canal healing are high, if infection is eliminated successfully before obturation of the root canal structure. Current guidelines recommend single-application for all endodontic apparatus. This makes compulsory the requirement for efficient antimicrobial solution, when root canal treatment is to be carried out in more than a single visit.

Currently, no comprehensive guidelines on the use of endodontic irrigants are available in print, from the British, the European and the American Endodontic Society. Therefore, there is no conformity on which irrigant is the best and whether they should be used alone or in combination but it is decided that the irrigant must have bactericidal function. Few dental clinicians use saline, local anaesthetics and distilled water as an irrigant in root canal system. These have no antimicrobial action but they are safe, simple to apply and easily available.

Sodium hypochlorite is well-known as the gold standard irrigant. It is an organic solvent (pH > 11), has a wide antimicrobial spectrum (concentration 0.5% to 5.25%) against bacteria, bacteriophages, spores, yeasts and viruses. However, it is not able to remove smear layer, thus demineralizing agents such as Ethylenediaminetetraacetic Acid (EDTA) and citric acid have been suggested for absolute removal of smear layer during root canal treatment. At higher concentrations, it is capable to disinfect *E. faecalis* and *C. albicans* contaminated canals. Hypochlorite is caustic in nature, so various adverse reactions occur with it like irritation, tissue damage risks if it is expressed under pressure into the periodontal ligament space and also reduce flexural strength of dentin.

Chlorhexidine (1% and 2% concentrations) is a bis-biguanide which carries a positive charge which is quickly attracted to the negatively charged bacterial cell wall and increase permeability of bacterial contents. Chlorhexidine is bacteriostatic when it is used at low concentrations. At higher concentrations, it shows bactericidal effect but it cannot be used as the main irrigant in endodontic cases as it does not have the capability to dissolve organic tissue.

Iodine potassium iodide (2% preparations) used in endodontics are shown to be less irritating and poisonous, but more rapidly reducing the bacterial load. It is important that it is not used in patients reported to have allergy to iodine or seafood and it has the potential to stain dentine. Hydrogen peroxide is used in endodontic between 3% to 5% concentrations. It is active against bacteria, bacterial spores, viruses and yeasts by the production of free radicals which degrades numerous cell components such as proteins and DNA.

Newer root canal irrigants like Tetraclean, MTAD (Mixture of Tetracycline, Acid and Detergent) are highly efficient against both, anaerobic and facultative bacteria.

Photo-activated disinfection is the innovative irrigation method, in which placement of a dye (Toluidine blue or Methylene blue) into the root canals which is activated by lasers radiation emitted from a low power (100 mW) laser device, causing interference with microbial cell walls and following bacterial death. Ozone is found in nature consisting of three oxygen atoms, powerful oxidant and antibacterial agent but it does not have the ability to differentiate between a variety of targets in the surroundings and bacteria, possibly influence the result of antibacterial management. Nagayoshi et al. advocated that ozonated water had almost the same antibacterial action as 2.5% NaOCl in endodontic therapy, particularly when used with the ultrasonics. Electronically Activated Water (EAW) is also recognized as Oxidative Potential Water. It is electrolyzed saline solution and it is able to disturb biofilms by reducing the adhering capability of bacteria to canal walls by generating a negative isotonic pressure. Marais and Williams demonstrated that ECA is less effectual antibacterial agent than 3.5% NaOCl.

Neodymium:Yttrium-Aluminum Garnet (Nd:YAG) lasers have been recently introduced for disinfection in endodontic therapy. It was established that when there was direct contact to the laser, all root canal systems were not entirely eliminated of bacteria and they were not superior than irrigation with NaOCl. In vitro study showed that the application of a photosensitizing solution and laser was not competent to accomplish complete diminution in bacterial load, but 3% NaOCl was noticed to attain it. It should be considered that it may not be easier to enter small and curved canal places with lasers. Another limitation of these systems, is that they are costly to purchase.

NaOCl is still the best available irrigant due to its ability to dissolve organic matter together with its broad antibacterial range. Currently, newer root canal irrigants could be used as an adjunct to NaOCl. Innovative improvement in the composition of the irrigating agent and mechanical system used for successful delivery of the solution in complicated areas of the root canal system will provide safe and effectual irrigation.
REFERENCES


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**Letter to the editor**


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