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# Sequence of Irrigation in Endodontics

Dr.Pooja Parakh[1], Dr.Sarvesha Bhondwe[2,] Dr.Vishal Mahajan[3],
Dr.Rohit Dhoot[4], Dr.Sonam Muthiyan[5]
*Corresponding Author: Dr.Pooja Parakh*

***Abstract****: The success of endodontic treatment depends on the eradication of microbes (if present) from the root-canal system and prevention of reinfection. The root canal is shaped with hand and rotary instruments under constant irrigation to remove the inflamed and necrotic tissue, microbes/biofilms, and other debris from the root-canal space.. There is no single irrigating solution that alone sufficiently covers all of the functions required from an irrigant. Optimal irrigation is based on the combined use of two or several irrigating solutions, in a specific sequence, to predictably obtain the goals of safe and effective irrigation so we are proposing a sequence for the different irrigating agents in order to achieve the best chemical preparation possible.Although some of the main irrigating solutions cannot be mixed without loss of activity or development of potentially toxic by-products, several combination products are on the market, many with some evidence of improved activity and function.*

***Keywords*** *- Endodontics, Irrigation ,Root canal Irrigants*

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## I. Introduction

Irrigation has an important role during endodontic treatment.[1]The aim of root canal treatment is to remove virulence factors from this system.[2] Canal irrigation during the process of cleaning and shaping can lead to the elimination of microorganism, which are not removable through physical methods.[2]There is no single irrigating solution that alone sufficiently provides all ideal properties and the functions required from an irrigant.So for optimal irrigation we have to combine two or several irrigating solutions, in a specific sequence, to predictably obtain the goals of safe and effective irrigation.[3]

Irrigating solution differ in their way of action so sequence of irrigation is important.Sodium hypochlorite is proposed as primryirrigant by virtueof its organic tissue dissolution capacity and broad antimicrobial properties.Chelating solutions like EDTA are recommended as auxillary solutions to remove smear layer.so sealers and root canal filers can penetrate to dentinal tubules. After smear layer removal final irrigation with Chlorhexidine which is antiseptic solution is helpful.[2]

Desired functions of irrigating solutions

During and after instrumentation, the irrigants facilitate removal of microorganisms, tissue remnants, and dentin chips from the root canal through a flushing mechanism .Irrigants can also help prevent packing of the hard and soft tissue.Some irrigating solutions dissolve either organic or inorganic tissue in the root canal.They serve as a lubricant.In addition, several irrigating solutions have antimicrobial activity and actively kill bacteria and yeasts when introduced in direct contact with the microorganisms. They should be nontoxic and biocompatible in nature.They should penetrate to the canal periphery.Inan attempt to achieve above results, irrigation in different situations is done[4]

We are proposing a sequence for the different irrigating agents in order to achieve the best chemical preparation possible.[1]

***Vital teeth***

Treatment is started by:

- Access cavity preparation
- Followed by biomechanical preparation
- Irrigation done with 2ml of sodium hypochlorite(5.25percent) at 60°C and/or urea peroxide.
- A second application and its activation is done by using a K file (08-10). This step has to be preceded by an abundant irrigation with distilled water in order to eliminate the first mixture present in the access cavity.
- Once the preparation of the canal has begun, Smear Clear (Sybron Endo, Orange, CA) (17 percent EDTA cetrimide, and surfactants) must be used

- It is advised to alternate the use of EDTA from the beginning of the preparation in order to eliminate the mineral layer before its thickening and condensing it inside the canal systems which will close the entrances of lateral and accessory canals and dentinal tubules.
- Chlorehexidine can be used for a total elimination of the bacteria inside the canal. Distilled water is used between each irrigating solution in order to prevent an acid/ base reaction, between sodium hypochlorite and EDTA, for a more efficient action of the chemicals on the tissues.
- A maximum neutralization of all the chemical agents must be done by the end of the preparation and before the fitting of the guttapercha cones so that the master cone does not push any of the chemicals outside the canal that might cause an inflammation

***Nonvital teeth***

- Irrigation will be initiated with either sodium hypochlorite (5.25%, 60%C) for its bacterial effect or with chlorohexidine (0.2%) (10 minutes)15 for the elimination of various bacterial types present in the root canals and dentinal tubuli.
- We will use distilled water to neutralize the effect of these irrigants.
- Then we can repeat the same irrigation sequence described previously for vital teeth.

The EDTA( in liquid form), by eliminating the smear layer and opening the dentinal tubuli will permit an easy flow of NaOCl or chlorhexidine for a better disinfection of the endodontic system.
In both clinical situations (vital and nonvital teeth) it is necessary to end our sequence by using distilled water or normal saline in order to eliminate the chemical agents or to neutralize their effects.

***Resorptions***

- When we suspect an internal resorption, the irrigation sequence is the same that was described for vital teeth.
- But this sequence will be followed by the use of citric acid 50 percent (10 minutes) in order to eliminate the granulation tissue and to obtain smooth dentinal walls.

The citric acid is eliminated by NaOCl and distilled water.
The same sequence is adopted for external apical resorptions but with an activation of the patency.

***Weeping canal***

- Irrigation done with normal saline
- Then canal is irrigated with chlorhexidine
- Calcium hydroxide placed as intracanal medicament

**Abscess**

- Irrigation done by using 2.5% sodi.hypochlorite with open 30- gauge needle at 2mm from working length(Jesus Alejandro Quinones Pedraza et al 2017)
- Then canal is irrigated with normal saline

**Hyperinflammed teeth**

- Irrigation with normal saline
- Then irrigated with sodi.hypochlorite combined with EDTA
- Then follow same irrigation sequence sodi.hypochlorite followed by EDTA

***Pulp polyp***

- Irrigation done with 5ml of 5% sodi.hypochlorite solution (KanakamedalaAnilkumar et al.2016)
- Then irrigation done with normal saline

***Open apex***

- After coronal access ,root canal filled with 3% sodi.hypochlorite
- Then irrigation performed with 10 ml of saline
- Then root canal was flushed with 5 ml of 17% EDTAAnd finished with 10 ml of 3% sodium hypochlorite gel and 10 ml of saline
- Care should be taken to prevent apical extrusion of irrigation solution (Miriam GrazieleMagro et al 2017)

***Primary teeth***

- Canal is irrigated with copious amount of sodi.hypochlorite
- Then rinsed with aqueous EDTA or citric acid
- Final rinse with chlorhexidine
- After introduction of MTAD irrigant new irrigating regimen is initial rinse with 1.3%NaOCl for 20 min followed by final rinse with MTAD for 5min

**INTERACTION BETWEEN IRRIGATING SOLUTIONS**

1) Sodi.hypochlorite + EDTA

EDTA reduces the amount of chlorine resulting in loss of NaOCl activity
Not mixed[5]

2) CHX + sodi.hypochlorite

Not soluble in each other.Brownish-orange precipitate is formed.This precipitate prevents clinical use of the mixture.Alsoparachloroaniline present in precipitate have mutagenic potential
Not mixed[6]

3) CHX + EDTA

Immediately produce white precipitate and ability of EDTA to reduce smear layer is reduced
Not used[6]

**COMBINATION PRODUCTS**

1)Detergents + EDTA and Sodium hypochlorite
It increase the speed of tissue dissolution by hypochlorite
Superior killing of planktonic and biofilm bacteria by combination product[7]

2)MTAD + Tetraclean
Smear layer removal with added antimicrobial activity
Should be used at the end of chemomechanical preparation after sodium hypochlorite[8]

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