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Antibacterial Effectiveness of NaOCL and Chlorexidine in Infected Root Canal

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Abstract: ***Aim: Root canal irrigants play an important role in the optimization of the root canal preparation, which is essentially a chemo-mechanical procedure. To evaluate the antimicrobial activities of the most widely used endodontic irrigants: sodium hypochlorite 2.5% and chlorhexidinegluconat 2%. Materials and methods: In this research were included 20 patients of both genders. Patients were divided in two groups: group I (n=10) patients where as a root canal irrigant was used NaOCl 2.5%, group II (n=10) patients as a root canal irrigant was used CHX2%. A sample was taken with sterile paper point before and after the instrumentation, and again after three days after irrigants was used in infected root canal. The sample was set in sterile test tubes and was send to the microbiological laboratory. For statistical analysis was used the Anova test. Results: Our results have shown that NaOCL reduce aerobe bacteria after three days SD 637.5 ± 368.8, CHX SD 318.6 ±431.4 Anaerobe bacteria was significantly reduced after three days that irrigants was used notably CHX SD 668.1 ± 415, SD NaOCl 222 ± 25.4 Conclusion: 2.5% NaOCl has a better antibacterial action than 2% CHX .***

Keywords: antibacterial effect, chlorhexidine, irrigants, sodium hypochlorite.

1. Introduction

Bacteria have long been recognized as the primary etiologic factors in the development of pulp and periapicallesions [2]. The endodontic treatment depends from the reduction and elimination of bacteria which are present in the root canal [2]. After the instrumentalization of the root canal , the curved rooot canals can still have some pulpar tissue, microorganisms and dentine dentrites and these is the reason that along with the biomechanical instrumentation should also be used various irrigants to destroy these microorganisms [3]. The irrigants have mechanical and biological action on the root canal. The mechanical action includes the detrite removement, canal lubrification, removing the organic and inorganic components and tooth whitening. The biological action is strongly related to its antimicrobial effect . During the endodotic treatment of root canal are used many different types of irrigants [2],[3].Complete debridement and adequate elimination of microbial irritants, including microorganisms and their toxins, is a fundamental prerequisite for successful endodontic therapy [16], [18], [24]. Root canal irrigants play an important role in the optimization of the root canal preparation, which is essentially a chemo-mechanical procedure [24]. Potent antimicrobial activity, dissolving of remaining pulp tissues with no systemic hazards, reducing instrument friction during mechanical preparation and availability are among the main requirements for an ideal root canal irrigant [19].Sodium hypochlorite (NaOCl) is the most common irrigant used in root canal treatment [5]-[6], [8]-[9].Sodium hypochlorite NaOCl has widely been accepted as a root canal irrigant since its first reported use by Walker in 1936 [1], [4], [13], [25], [29]. It mainly acts as a potent antimicrobial agent and an effective organic solvent for vital, necrotic and fixed tissue. It is an effective antimicrobial agent, good lubricant and an excellent organic solvent [21].However, it is highly irritating to the periapical tissues, especially at high concentrations.vNaOCl is an efficient organic solvent that causes dentin degeneration because of the dissolution of collagen by the breakdown of the bonds between carbon atoms and disorganization of the proteic primary structure [19].Chlorhexidine (CHX) has been suggested as either an alternative or an adjunct root canal irrigant because of its antimicrobial qualities and substantivity [7], [10]-[12].Chlorhexidinegluconate (CHX) is routinely used in dentistry as a mouth rinse in the prevention and treatment of periodontal disease and caries [14]-[15], [17].Chlorhexidinegluconate (CHX) is a potent antimicrobial agent, holds substantivity and has a low grade toxicity. CHX is bacteriostatic at low concentrations (0.2%), bactericidal at high concentrations (2%), and adsorbs to dental tissue resulting in its prolonged gradual release at therapeutic levels. However, chlorhexidine is unable to dissolve pulp tissue and debris may remain on canal walls, obstructing the dentinal tubules [20], [22]-[23].CHX of 2% can cause desquamation of the mucoses of oral cavity, tooth coloration and toxic effect in epithelial cells. For this reason during the endodontic treatment should be used antibiotics that have antiseptic characteristics and reduced side effects [26],[28].

2. Aim

To compare the antibacterial effects between both irrigants.

3. Objective

Is to establish an acceptance score for a best case series in determining the antibacterial effects of two root canal irrigants: 2.5% sodium hypochlorite compared to 2% chlorhexidinegluconate.

4. Materials and Method

In our study we included 20 patients of both genders age 21-59 years old. In the first group (n=10) the patients were treated withNaOCl 2.5% for the desinfection of the root canal. In the second group (n=10) the patients were treated

CHX 2% for the desinfection of the root canal. The treated patients are diagnosed with chronic parodontitis apicalis and pulpar necroses.

5. Statistical Analysis

The spectrophotometric results were analyzed using one-way ANOVA. The mean difference is significant at the 0.05 level, and $P< 0.05$ was considered to be statistically different.

6. Results

In the first group, the desinfection of the root canal were treated with NaOCl 2.5%.After determination of the diagnoses we performed radiographic examination on the teeth. Then we performed the opening of the root cavity. Immediately after treatment and instrumentalization of the root canal we took a sample to test for aerobic and anaerobic bacteria by using a sterile Pointit paper. After receiving the first sample, we estimated the length of tooth root canal 1mm shorter, than the actual length of the tooth root canal. Then we instrumentalized the root canal with the K-File instrument. The irrigation is done with 2.5% NaOCl. In order to neutralize the tooth root canal by NaOCl dissolution, the root canal is neutralized by dilution with NaCl 0.9% and the root canal was dried with sterile pointin paper. After drying the tooth root canal a second sampleis taken from the canal in the same conditions as the first sample. After instrumentation of root canalwe put there NaCl 2.5 %. The interpretation of results is done with the help of apparatus Vitek 2.

Table 1: NaOCL and CHX reduce aerobe bacteria after three days

SD	Aerobe
NaOCL	637.5±368.8
CHX	318.6±431.4

In the second group the root canal is desinfected with CHX2%.In the second group we also used the same techniques and procedures and the instrumetion of the tooth root canal, the only difference is that the irrigation is made with CHX 2% and inorganic components are also removed with EDTA 17 %. The final irrigation is made with dilution of CHX 2%. In this group a first smear was taken before the canal instrumentalization and the second swab was taken after the canal instrumentalization and third swab was taken three days after this process.

Table 2: NaOCL and CHX reduce anaerobe bacteria after three days

SD	Anaerobe
NaOCL	222±25.4
CHX	668.1±415

In the first group we included (n= 10) patients treated with 2.5% NaOCl. In the second group (n=10) the patients were treated with 2% CHX. In the first and second group the samples are taken three times, one before treatment, one after treatment and three days after treatment. Before the treatment all the sample taken from the root canals of both groups were positive for aerobic and anaerobic bacteria. Immediately after treatment 30% of samples taken in the first group were pozitive. After three days of treatment in samples of the two groups were found aerobic and anaerobic bacteria. Before the treatment 60% of samples taken in the first group were positive and 20% of the samples in the second group were positive. Immediately after treatment 10% of samples taken in the first group were all positive, while in the second group they did not have anaerobic bacteria.

7. Discussion

Carlos E., et al, Estrela C et al. in their study have reported a similar action between 2.5% NaOCl and 2% CHX [4], [8]. It has been advocated use NaOCl in concentrations ranging from 0.5% to 5.25%, but there has been no agreement on the optimal concentration. Baumgartner and Canga et al., confirmed that 2.5% NaOCl is extremely effective in removing vital pulp tissue from dentinal walls [2], [5]-[6]. Siqueiraetal., reported that using NaOCI in 2.5% concentrations may significantly reduce the endodontic infection, but might not consistently dissolve all pulpal remnants in a reasonable time [20],[21],[23]. Some authors emphasized that the antibacterial effectiveness of 2.5% concentrations of NaOCI might be improved by usage larger volumes of solution and continuous exchange of agent. Siqueiraetal. Reported that instrumentation and irrigation by using 2.5% NaOCl provided a decrease of 99.9% in the count of viable bacteria in the root canal. Viannaetal, compared that 2% CHX and 2.5% NaOClinvitroand demonstrated that 2% CHX was more efficient to inhibition of growth of E.faecalis, Staphylococcus aureus and Candida albicans [26].Jeansonne and White compared the antibacterial effect of different irrigation solutions against anaerobic bacteria and noticed that 2% CHX was more effective than 5.25% NaOCI, but the differences were not statistically significant [12],[28]. White etal., claimed that, after instrumentation, CHX continues to be released while 48-72 h. The stability of antibacterial efficacy of endodontic irrigants, especially in prolonged periods of treatment, is very important [28]. It was concluded that NaOCl should remain in the root canal for a considerable time, so that it can act on the residual bacteria placed in the irregularities in the root canal.

8. Conclussions

From the results of our study we can conclude: 2.5% dhe NaOCl and 2% CHX have a remarkable antibacterial action in the infected root canal. 2.5% NaOClhas a better antibacterial action than 2% CHX .

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