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**"УВЕЛИЧЕНИЕ УСПЕШНОСТИ ЭНДОДОНТИИ: ПРЕИМУЩЕСТВА
ПРОТОКОЛОВ ПОСТОЯННОГО ХЕЛАТИРОВАНИЯ"**

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**"ENHANCING ENDODONTIC SUCCESS: THE BENEFITS OF CONTINUOUS
CHELATION PROTOCOLS"**

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Резюме. Успех эндодонтического лечения во многом зависит от правильной инструментальной обработки, эффективной дезинфекции и точной трехмерной obturation корневой системы канала для устранения микробных биопленок и органических остатков. Гипохлорит натрия (NaOCl) широко считается золотым стандартом для ирригации благодаря своей мощной антимикробной активности и способности растворять ткани. Однако его взаимодействие с дентином и неспособность удалить неорганический шлам, образующийся в процессе инструментальной обработки, требуют включения хелатирующих агентов.

Ключевые слова: смешанная пленка, непрерывная хелатация, этидроновая кислота, гипохлорит натрия, дентинные каналы.

Resume. The success of endodontic treatments depends largely on proper instrumentation, effective disinfection, and precise three-dimensional obturation of the root canal system to eliminate microbial biofilms and organic debris. Sodium hypochlorite (NaOCl) is widely regarded as the gold standard for irrigation due to its potent antimicrobial activity and tissue-dissolving properties. However, its interaction with dentin and its inability to remove the inorganic smear layer created during instrumentation necessitate the incorporation of chelating agents.

Keywords: smear layer, continuous chelation, etidronic acid, sodium hypochlorite, dentinal tubules.

Relevance. New irrigation protocol based on continuous chelation was established. Continuous chelation can be defined as the concept of using a single mix of a weak chelator, such as Etidronic acid, with NaOCL throughout the entire root canal preparation procedure without causing a reduction in the antimicrobial and proteolytic activity of NaOCL. Etidronic acid, also known as "1-Hydroxyethylidene-1, 1-Bisphosphonate" or HEDP, is chemically compatible with NaOCl, allowing for a sustained synergistic effect during irrigation.

By preserving NaOCl's antimicrobial efficacy while simultaneously chelating calcium ions, continuous chelation protocols offer advantages such as enhanced smear layer removal, reduced mineralization of biofilm matrices, and prevention of dentin erosion associated with stronger chelators like EDTA. Furthermore, the continuous chelation approach ensures effective contact of the irrigant with complex anatomical structures, including lateral canals and isthmuses, thereby improving disinfection outcomes.

Aim: this study aims to evaluate and compare between the activities of both sequential chelation (using sodium hypochlorite) and continuous chelation (using both etidronic acid and sodium hypochlorite) on penetration into dentinal tubules.

Objectives:

1. This study aims to evaluate and compare between the activities of both sequential chelation (using sodium hypochlorite) and continuous chelation (using both etidronic acid and sodium hypochlorite) on penetration into dentinal tubules.

Material and methods. 30 extracted human caries-free wisdom teeth with complete root formation were stored in thymol solution for 1 week. After that they were kept in distilled water. Each tooth was decoronated to obtain a uniform length of 13 mm and roots were separated by a diamond bur using high speed handpiece. Root canals were negotiated with N10 K-files. The first group was control group.

The second group was NaOCl group, irrigation was performed with NaOCl alone. The second group is NaOCl+EDTA group, irrigation during instrumentation was performed with NaOCl, and the final rinse was performed with EDTA followed by NaOCl. After the final irrigation, the root canals were dried with paper points. The samples were examined under a scanning electron microscope.

Results and their discussion. After examining the prepared teeth under a scanning electron microscope, the results show that the first group (control group) shows severe homogenous smear layer covering the dentin surface with few or no dentinal tubules opened. The second group (NaOCl alone) shows moderate amount of smear layer; the majority of tubules are closed or partially opened. The third group (NaOCl+EDTA) shows no smear layer; all tubules are completely open.

Conclusion:

1. Integration of continuous chelation protocols utilizing sodium hypochlorite (NaOCl) and etidronic acid presents a promising advancement in endodontic therapy.

2. NaOCl's potent antimicrobial properties are complemented by etidronic acid's ability to effectively chelate calcium ions and disrupt mineralized debris.

3. This combined approach not only enhances the cleaning efficiency of the root canal system but also promotes a more thorough disinfection process, potentially leading to improved treatment outcomes.

4. By addressing the limitations of conventional irrigation techniques (sequential irrigation), continuous chelation protocols may significantly reduce the risk of treatment failure and post-operative complications.

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