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NEW PERSPECTIVE ARTICLE:

Sodium Hypochlorite in Endodontic Therapy: Immutable Hero or Imminent Threat?

Hipoclorito de sodio en la terapia endodóntica: ¿Héroe inmutable o amenaza inminente?

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ABSTRACT: Historically, in its beginnings, sodium hypochlorite was only related to the bleaching of garments, however, over the years its use was extended to the medical area thanks to its disinfectant qualities, and its application continued in the field of dentistry, especially in endodontics, so much so that it has come to be considered today the gold standard in endodontic irrigation. This article aims to briefly highlight its importance in endodontics and the qualities that allow its continued use.

KEYWORDS: Sodium hypochlorite; Endodontics; Root canal irrigants; Disinfection; Antibacterial agent; Toxicity.

RESUMEN: Históricamente, en sus inicios, el hipoclorito de sodio sólo estaba relacionado con el blanqueamiento de prendas de vestir, sin embargo, con el paso de los años su uso se extendió al área médica gracias a sus cualidades desinfectantes, y su aplicación continuó en el campo de la odontología, especialmente en endodoncia, tanto así que ha llegado a ser considerado hoy en día como el estándar de oro en irrigación endodóntica. Este artículo pretende destacar brevemente su importancia en endodoncia y las cualidades que permiten su uso continuo.

PALABRAS CLAVE: Hipoclorito de sodio; Endodoncia; Irrigantes del conducto radicular; Desinfección; Agente antibacterial; Toxicidad.

There is no doubt that endodontic therapy, to this day, has had a great advance and development in every sense, since the invention of the first instrument specifically designed for endodontics in 1838 by Edwin Maynard (1), the use of gutta-percha as an intraradicular filling material popularized by G.A. Bowman in 1867 (2), the implementation of radiographs for the identification of root canals by Edmund Kells in 1899 (3), the invention and use of the rubber dam by Sanford C. Barnum in 1864 (4), and of course, the beginning of the use of sodium hypochlorite (NaClO) as an intracanal irrigant by Coolidge E.D. in 1919 (5), to the evolution of techniques, instruments, equipment and diagnostic strategies, which make it possible to achieve the objectives of the endodontic triad of biomechanical preparation, microbial control and complete obturation of the root canal space, which are the basis of endodontic therapy today (6).

Despite the enormous interest that endodontics has presented in these three simple but important principles, the great paradox is the resistance and difficulties throughout history to their full understanding and assumption. Well, in terms of applying these principles, if you can, but you don't want to, then it is not endodontic therapy; and if you want to, but you can't, then there is no endodontic therapy.

Without downplaying the importance of biomechanical preparation and root canal filling, I will focus on one of the characters with multiple historical records of application and use not only in dentistry but also in human medicine, namely NaClO (7).

The heroic capabilities of NaClO are due to its aqueous presentation, which is obtained from sodium hydroxide and chlorine in the presence of water. Its main properties include being a powerful oxidizing agent, being a strong base (pH>11), having antimicrobial activity and allowing the dissolution of organic and fatty compounds (8). Its chemical-physical attributes facilitate the understanding of its mechanism of action, which involves saponification, amino acid neutralization and chloramination reactions (8,9) It is precisely its mechanism of action that gives it the title of imminent hero in endodontic therapy, it is currently the gold standard in endodontic irrigants (10), and it is the one that meets most of the properties that an ideal irrigant should have (11), allowing to a great extent the success of endodontic treatment by contributing to the complete elimination of microorganisms capable of causing an intraradicular or extraradicular infection. Thus, NaClO remains an undisputed component of current irrigation therapy planning and intracanal medication in root canal treatment (12).

The main problem with the use of NaClO in endodontics lies in its non-selective cytotoxicity, as although its use and application are considered safe and effective, there is the possibility of it being extruded into the periapical tissues by various factors, giving rise to an endodontic accident with NaClO, an adverse event which, although rare, its presence significantly affects the patient's health, triggering various signs and symptoms such as intraradicular haemorrhage, ecchymosis, tissue necrosis, pain and acute inflammation (13), even life-threatening (14,15). This is considered an imminent threat in its handling; however, it is well known that the NaClO accident in endodontics can be avoided and prevented by controlling factors that would minimize the threat.

Among the factors that can be controlled and should be taken into account are the systemic and local medical situation of the patient, the internal anatomical characteristics of the tooth, the experience of the health professional and the NaClO concentrations used (16). Undoubtedly, it will also depend on the sex of the patient, the anatomical location of the tooth involved, the amount of irrigant extruded, the method of irrigation and the method of irrigant expulsion, the time elapsed from

the onset of the accident to its identification and the care response since its identification, as well as the relevance of the pulp and periapical diagnosis, among others that may be of interest, as each case becomes a clinical challenge. The likelihood of this type of accident due to NaClO extrusion should always be taken into account in root canal therapy, as it is a multifactorial event, and because it is a multifactorial event, proper knowledge and management of clinical response guidelines and an algorithm of care should be used.

In recent years, interest has been aroused and research has been carried out on other substances that can be used alone or in combination with NaClO (17), a privileged place has been given to activation techniques for irrigants (18), and at the same time, endodontic irrigation protocols have been proposed (19), even so, NaClO figures in all of them. We cannot deny that it is still, and will be for a long time, the most versatile intracanal irrigant to meet the demands of disinfection in endodontic therapy, so there are more benefits than detriments that it can cause.

With the above, NaClO can fully position itself today as an immutable hero and not as an imminent threat following its use and application in endodontic therapy.

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