

## Sodium Hypochlorite: The Secret of Successful Endodontics

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### Abstract

The successful endodontic treatment always has strong back bone of thorough irrigation of root canal system. It is absolutely clear that a three-dimensional cleaning shall pave the way for three dimensional obturation of the root canal system. Of all the irrigants which have been used in endodontics, the role of sodium hypochlorite holds paramount importance. Various percentages of this magical solution have been advocated by researchers all across the globe, but the use of 5.25% remains popular. Different techniques of irrigation also have a detailed mention in the literature and the use depends on the individual's preference. Whatever percentage or technique is used, thoroughness is the key behind the success. This article presents case reports of few such successful cases of Endodontics, where irrigation had a major role to play.

**Keywords:** CanalPro; Dentistry; Endodontics; Hypochlorite

### Introduction

The secret of Successful endodontics lies in thorough cleaning and shaping of root canal system and finally obturating it three dimensionally [1]. It is very obvious that you can seal the root canal system in an ideal manner only if you have cleaned it well. Cleaning and shaping the root canal system has perfectly been assigned the term 'chemo-mechanical preparation' for it is the combined effort of both, the instruments as well as the chemical irrigants, which provides the desired results [2].

Of all the irrigants which have been used in the field of Endodontics since decades, sodium hypochlorite has been the most popular [3]. This is for the fact that it has multiple properties to its credit which are of paramount importance to a clinician performing endodontic therapy.

It has high antibacterial and antifungal efficiency, good chelation potential and a unique property of 'ability to dissolve dental pulp tissue [3-7].

Sodium Hypochlorite has been used in various percentages from time to time all over the world. However, the ones which are most common are 3% and 5.25% [8,9]. Also, there has been a wide variety of testimonials regarding warming of sodium Hypochlorite before using, some in favour while others not [10-12].

At the end of the day, it perhaps is left on the clinicians personal preferences and also that whatever way works for him/her is considered to be the best.

This article discusses case reports of endodontic management of three cases wherein success may be attributed to the thorough use of sodium hypochlorite.

### Case Report

A 45 year old male patient reported dental caries in right mandibular second premolar, the radiograph of which revealed pulp all involvement (Figure 1). Recalling the facts that there is high incidence of apical deltas in these teeth, the emphasis was laid on thorough irrigation with sodium hypochlorite .In this particular case Canal Pro 5.25% (Coltene,) was used throughout the bio mechanical preparation using stainless steel hand files followed by the use of Hyflex CM files (Coltene) This particular solution is available in ideal dark coloured bottle (Figure 2) and can be conveniently capped with uniquely designed safe cap (Figure 3 and 4). This ensures safe, spill free delivery of hypochlorite and other advantages such as long lasting potency of hypochlorite solution, increased availability of chloride ions for irrigation. The dark coloured bottle prevents the rate of dissociation of sodium hypochlorite caused due to exposure of air, making it an ideal choice for use in endodontic practice. A 30 gauge side vent endodontic irrigating needle was used to ensure uniform delivery without the risk of apical extrusion. The master cone fit radiograph was taken (Figure 5) and amazing fill of apical delta was observed (Figure 6) after obturation using GuttaFlow 2 sealer (Coltene).

A 32 year old male patient who had a carious mandibular first molar (Figure 7) reported with severe pain and discomfort. Following the rules of endodontic treatment, all the steps were performed with emphasis on thorough irrigation with 5.25% Sodium hypochlorite. The final obturation revealed fine apical delta filled with endodontic sealer, GuttaFlow 2 (Figure 8). Certainly, the credit of this three dimensional obturation goes to the three dimensional cleaning attained by use of copious amount of sodium hypochlorite.



**Figure 1:** IOPA radiograph showing proximal caries in right mandibular second premolar.



**Figure 2:** CanalPro sodium hypochlorite (Coltene) available in a dark coloured bottle.



**Figure 3:** The unique cap of CanalPro system to be fitted on the bottle.



**Figure 4:** CanalPro Hypochlorite bottle with cap fitted on its top.



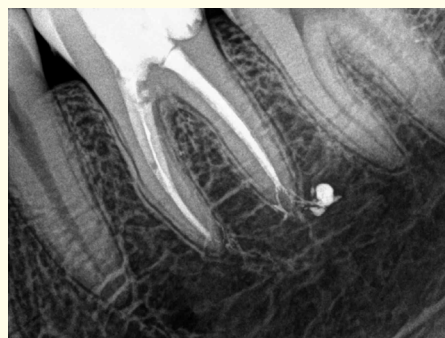
**Figure 5:** Master cone fit radiograph of right mandibular second premolar.



**Figure 6:** Post-obturation radiograph showing amazing fill of apical delta.



**Figure 7:** IOPA radiograph showing carious mandibular first molar.



**Figure 8:** Post obturation radiograph revealing fine apical delta filled with endodontic sealer.

### Discussion

Sodium hypochlorite (NaOCl) was first recognized as an antibacterial agent in 1843 and it was first recorded as an endodontic irrigant in 1920 [13]. It has been used as a successful endodontic irrigant as it is an effective antimicrobial and has tissue-dissolving capabilities. It has low viscosity which allows its easy introduction into the root canal system is easily available and relatively inexpensive [14]. Sodium hypochlorite acts as a solvent for organic and fat degrading fatty acids, transforming them into fatty acid salts and glycerol that reduces the surface tension of the remaining solution [15].

It neutralizes amino acids forming water and salt, a process called as neutralisation reaction. Hypochlorous acid present in sodium hypochlorite solution comes in contact with organic tissue and acts as a solvent and releases chlorine. This chlorine combines with the protein amino group and forms chloramines, a process referred to as chloramination reaction. This particular event interferes in cell metabolism [15]. Chlorine acts as a strong oxidant and exhibits strong antimicrobial action by inhibiting bacterial enzymes [3].

The antimicrobial effectiveness of sodium hypochlorite can be attributed to its high pH. The high pH of sodium hypochlorite interferes in the cytoplasmic membrane integrity as it causes irreversible enzymatic inhibition and biosynthetic alterations in cellular metabolism. Sodium hypochlorite, in addition has antifungal activity [15] and possesses a unique ability to disrupt and remove microbial biofilm from the infected root canals [16,17].

Considering the multi beneficial properties of Sodium Hypochlorite, it can undoubtedly be designated as the prime irrigating solution in endodontics. In the cases described above, 5.25 % sodium hypochlorite (CanalPro, Coltene) was used. As a matter of individual preference, we used warm solution, however, this is certainly not the mandatory protocol. A 30 gauge side vent needle was used for irrigation purpose [18], throughout the procedure as this would ensure that the solution would not pass beyond the apical foramen. It is noteworthy that the hypochlorite accident, which happens due to its apical extrusion, due to forceful irrigation, is one of the major complications associated with its neglected use [19].

Needles to say that Rubber Dam application is the standard protocol followed, when performing endodontic therapy. Sodium hypochlorite can cause burning injury when it comes in contact with soft tissue such as gingival, mucous membrane, lips, tongue etc. and therefore it is essential to maintain absolute isolation during its usage [20].

### Conclusion

The success of Endodontic therapy lies in thorough cleaning and disinfection of the root canal system. Amongst the various irrigants in use, Sodium has a vital role to play due to its high antimicrobial efficacy and its unique ability to dissolve dental pulp. The use of optimal amount of sodium hypochlorite facilitates the three dimensional cleaning which further ensures three dimensional obturation of the root canal system. The cautious use of this magical solution in an isolated working environment is recommended.

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