

## CASE REPORT

# Nonsteroidal Management of Accidental Extrusion of Sodium Hypochlorite beyond Apex

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## ABSTRACT

Sodium hypochlorite is often used as an intracanal irrigant in root canal treatment for removal of organic debris. It is also used for its ability to dissolve pulpal tissues, removal of organic debris from smear layer. Despite its safe properties, serious complications can result from inadvertent use.

The present case report discusses the inadvertent effects and management of accidental extrusion of concentrated NaOCl and nonsteroidal management. Extrusion of NaOCl beyond the root canal can occur when there is iatrogenic widening of the apical foramen, lateral perforation, or wedging of the irrigating needle. Injudicious use of the irrigant should be avoided to prevent the NaOCl accidents.

This report demonstrates destructive effect of concentrated NaOCl solution on soft tissues and subsequent management of the case.

**Keywords:** Hypochlorite accident, NaOCl, Irrigant, Extrusion.

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## INTRODUCTION

Sodium hypochlorite is often used as an intracanal irrigant in root canal treatment for removal of organic debris. It is also used for its ability to dissolve pulpal tissues, removal of organic debris from smear layer. It also acts as a lubricant.

It is very effective against a wide range of intracanal microbiota. A 1% concentration of NaOCl has marked dissolution and antimicrobial properties, but use of 5.25% hypochlorite is recommended given its enhanced efficacy against intracanal microbes.<sup>1</sup>

Ideally irrigant's should remain within the root canal system, however, inadvertently it can get extended into the vital surrounding structures.

The disadvantage associated with the use of NaOCl in its high toxicity against vital tissues, which can cause acute inflammation leading to soft tissue necrosis, after causing cell death except in heavy keratinized epithelium.<sup>2</sup>

In the dental literature, mishaps during root canal irrigation are well-known, they can range from damage to the patients and operators clothing, eyes allergic reaction on getting extruded apically.<sup>3</sup>

Following is a report which presents a case in which NaOCl was inadvertently extruded beyond the apical foramen, which led to severe soft tissue necrosis and its management without using steroid based medications.

## CASE REPORT

A 33-year-old male patient reported to the Department of Conservative and Endodontics, with pain in the right lower back tooth region for few days. After pulp sensibility testing a diagnosis of acute irreversible pulpitis was made and routine endodontic therapy was initiated.

Treatment was initiated under local anesthesia with tooth number 45 (Fig. 1) and a 5.25% concentration of NaOCl was used for irrigation. As the procedure proceeded, patient complained of burning sensation and sharp pain in the vicinity of operative area, as the patient was under local anesthesia the symptoms pointed toward some mishap. Immediately, the procedure was halted and the root canal was irrigated with copious amount of normal saline; following which pain did subside a little but did not cease completely. Patient was discharged after being prescribed analgesics along with instructions to use cold compression packs and to visit the operating doctor regularly.

Patient reported after 4 days with swelling in lower right lip, intraoral examination revealed a 1 cm sinus in relation with 45 with a marked tissue necrosis (Fig. 2).

On clinical examination, soft tissue necrosis along with adhesions were seen and sinus tracing (Fig. 3) was done. Adhesions were broken using a curette under local anesthesia and the necrotic soft tissue was irrigated

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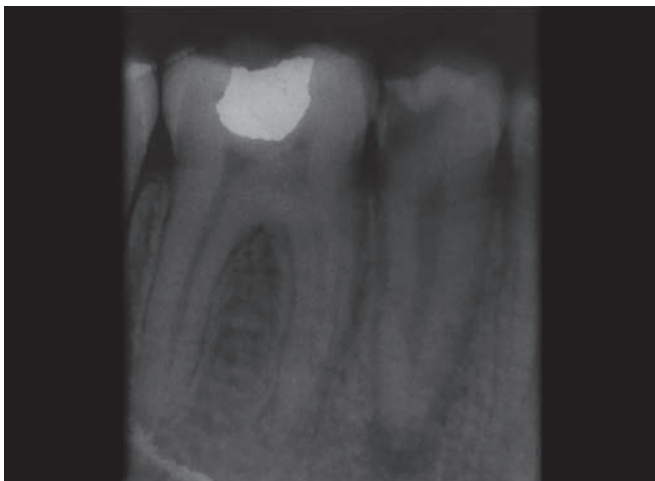


Fig. 1: Preoperative photograph



Fig. 2: Necrotic lesion seen



Fig. 3: Sinus tracing

with saline and betadine. Patient was prescribed combinations of amoxicillin CV 625 mg, acitaminophen along with narcotic based analgesics, vitamins, antacids and a metronidazole based mouthwash. The patient was on regular check-up and follow-up for the next 3 weeks. After 19 days, the mucosal tissue healed completely without any signs of necrosis, after which the root canal therapy with 45 was completed using 30 gauge side vented needle along with 2% chlorhexidine and normal saline (Fig. 4).

## DISCUSSION

Sodium hypochlorite is commonly used as a root canal irrigant. It has a great physiochemical property of dissolving necrotic tissue and organic debris in root canal therapy. It acts as a solvent for organic fat, dehydration of fatty acids which are transformed into fatty acid salt and glycerol which leads to saponification; also it causes dehydration of protein through the amino acid neutralization and chloramination reactions.<sup>4</sup>

Sodium hypochlorite solution of 0.5% is less toxic than the 5% solution but the antimicrobial effectiveness is not intensified proportionately to its concentration. A 0.5% conc. is nontoxic but is readily absorbed in circulation; its caustic properties are due to its high pH, i.e. about 12 and the chlorine radicals in the solution. The 5% conc. is more than potent; than necessary to kill bacteria commonly present in the root canal and dissolves both vital and necrotic tissue quickly and efficiently. The adequate concentration for endodontic irrigation is advised to be 0.5 to 1.0% with the pH close to neutral along with copious irrigation with large volumes<sup>5</sup> even though the concentration which is safe and suitable is debateable.

Sodium hypochlorite accident was first reported in 1974. It is a rare complication of root canal therapy. It is an extremely cytotoxic and proteolytic material.<sup>6</sup>

How do we recognize a hypochlorite accident?

Severe pain immediately encountered (for 2-6 mins); Edematous ballooning of soft tissue as well as to large sites of the face, such as cheeks, periorbital region, or lips. Ecchymosis on skin or mucosa as a result of profuse interstitial bleeding. Profuse bleeding from the affected root canal. Reversible or persistent anesthesia as well as the possibility of secondary or spreading of former infection may occur.<sup>7</sup>

The pH and concentration of sodium hypochlorite decides its deleterious effects. The alkalinity of sodium hypochlorite enhances deep penetration of tissue causing extensive liquefaction tissue necrosis.<sup>8</sup>

The amount of tissue dissolved by sodium hypochlorite is determined by the duration in contact with the tissue, the temperature and concentration of solution, the spread of solution and host response. The ideal resort should always be the prevention of such an accident.<sup>9</sup> Although small amount of extrusion may be occurring



**Fig. 4:** Complete healing achieved

during endodontic instrumentation regardless of type of instrument and instrumentation technique used.<sup>10</sup>

Sodium hypochlorite also inhibits migration of neutrophils along with endothelial and fibroblast cell damage<sup>11</sup> also sodium hypochlorite affects the permeability of vessels by damaging the vessels and causing release of chemical mediators, and thus hemorrhage and swelling from interstitial extravasation is a common complication<sup>12</sup> tissue swelling can be minimized by using cold compression.<sup>10</sup>

Prophylaxis antibiotics is also recommended to minimize the risk of any secondary infection. Analgesics should also be given to manage mild to moderate pain.<sup>13</sup>

It is recommended that the operator asks some pre-operative questions should be asked to patients in order to avoid any accident;

- a. Are you sensitive to any household bleach? Any other allergic history which runs in family?
- b. Do you face problems or allergic reaction while swimming or bathing in chlorinated water?

A rubber stopper on the needle should be placed so as the working length is not exceeded during irrigation, also irrigation should be done passively and most importantly a side-vented needle should only be used in endodontics.<sup>2</sup>

Adequate access preparation with proper working length control, placing irrigating needle passively in the canal and 2 to 3 mm short of the working length, slow administration of irrigant and a constant in and out movement of needle and checking backflow of irrigant adds to the preventive and safe measures.<sup>14</sup> These measures will somehow reduce the accidental incidents.

There is no specific treatment protocol that can undo the accidental damage of hypochlorite, but the treatment's mainstay is to check for airway patency, relieving pain, controlling the swelling and preventing any secondary

infection. A reassurance and calming the patient is the primary step for a successful management as well the patient is alarmed of upcoming symptoms.<sup>4</sup>

Pain control in the dental office can be done by using long acting local anesthesia further it can be controlled using narcotic analgesics but nonsteroidal anti-inflammatory drugs (NSAIDs) and aspirin should be avoided initially due to high chances of interstitial soft tissue hemorrhage. Cold packs initially for 24 hours every 15 minutes helps to reduce pain and inflammation for first 24 hours;<sup>10</sup> followed by warm compression to shorten the clearing time of massive ecchymosis by increasing the circulation of the involved area. Prophylactic antibiotic coverage for 7 to 14 days is an essential as the extensive necrotic tissue in the dead space provides a medium good enough for secondary infection<sup>4</sup> steroid therapy with methyl prednisolone for 2 to 3 days has also been used in such cases to control inflammatory reaction. But contrary to this, we decided to treat the patient without using steroid based medications as even short-term administration of steroids can lead to aggravation of hypertension, fluid retention, stress ulcers, GI bleeding, silent perforation, psychiatric disturbances, delayed and abnormal wound healing, hypokalemia, osteoporosis, increased susceptibility to infection, and decreased glucose tolerance.<sup>15</sup> The patient is given both verbal and written homecare instructions; it is indeed the duty of operator to monitor the patient for pain control, secondary infection and reassurance.<sup>7</sup>

## CONCLUSION

Sodium hypochlorite accident can be a rare complication in any dental set up during an endodontic therapy. The management lies in avoiding such an accident from happening in first place and providing supportive care. Healing takes place without any complication. Treating

doctors should be aware of potential complications associated with sodium hypochlorite so that they can provide better initial management of symptoms.

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