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What you need to know about sodium hypochlorite (NaOCl) ACCIDENT:

NaOCl has been used as an intracanal irrigant for root canal sterilization and débridement for more than 75 years. NaOCl is an alkaline solution with a pH of approximately 11 to 12; it is well-recognized to be effective against a broad range of pathogens: gram-positive and gram-negative bacteria, fungi, spores and viruses (including the human immunodeficiency virus).¹ The clinical efficacy of NaOCl is owed to its nonspecific ability to oxidize, hydrolyze and osmotically draw fluids out of tissues. Introduction of this agent beyond the tooth apex can cause violent tissue reactions and unbearable pain.

Improper use of sodium hypochlorite (NaOCl) during endodontic treatment may result in undesirable outcomes ranging from discoloration of the patient's clothing and a bad taste in his or her mouth to more severe symptoms and complications. The tissue-dissolving capability and the toxic effects of NaOCl on vital tissues have been known for some time.

When NaOCl is inadvertently forced into the periapical soft tissues, the sequence of injury seems to be as follows²:

- excruciating severe pain for two to five minutes;
- Immediate swelling (ballooning) of the area, with spread of the tissue reaction to the surrounding areas through the loose connective tissue;
- Profuse hemorrhage, either interstitially or manifesting intraorally through the tooth.

As the tissue destruction progresses, extreme constant discomfort replaces the initial severe pain. The tissue response is out of proportion to the volume of the irritant. Once the initial bleeding ceases, interstitial oozing still continues because of lysis of cellular structures and surrounding vasculature. This results in significant ecchymosis.

Treatment should center on the principles of minimizing swelling, controlling pain and preventing secondary infection. Reassuring the patient is of prime importance. Use of cold packs externally is recommended for the first one to two days to minimize edema. Once drainage is established, the cold packs should be replaced by warm compresses in an attempt to promote liquefaction of the hematoma and dissolution of the soft-tissue swelling. Pain control often requires narcotic analgesics. Appropriate antibiotic therapy is highly recommended for two reasons: the possibility of infection's being forced from the root canals into the periapical tissues with the NaOCl irrigation, and the subcutaneous presence of significant amounts of necrotic tissue and dead space, which can promote secondary infection.

Depending on the degree of the injury and its response to conservative therapy, some cases might require surgical intervention. The aims for any surgical procedure should be to provide decompression and facilitate drainage, and to create an environment conducive to healing. This can be accomplished by meticulous débridement of grossly necrotic tissue, and by lavage and irrigation of the affected sites. It should be kept in mind that the hematoma and/or infection may not follow the usual anatomical planes. Because of its potential to actively destroy tissues, NaOCl often causes sufficient tissue lysis to

create its own planes. This results in widespread and haphazard progression of the tissue reaction, as occurred in our patient.

Most cases resolve after several days of edema, paresthesia, ecchymosis and, in a few cases, secondary infection. Some patients, however, may be left with long-term paresthesia, scarring or esthetic defects.

CONCLUSIONS:



Proper treatment, the experience can be traumatic and frightening for the patient. General practitioners should therefore take extra precautions to avoid such situations. The best treatment is always prevention. To prevent the adverse effects of NaOCl, consider the following steps:

- *Thoroughly examine the tooth to be treated.*

A complete clinical and radiographic assessment of the tooth may reveal that the root canal system is complex enough to warrant referral to an endodontist for proper management

- *Always use isolation. A rubber dam is the most effective*

Barrier to protect the intraoral tissue from the damaging effects of NaOCl.

- *Use an apex locator to confirm the working length.*

After radiography, this is the most accurate and reliable method of determining the actual working length.

- *When in doubt, obtain a radiograph.*

If you are encountering difficulty in locating the canals during canal preparation, stop and obtain another film. Be confident about the area you are working in.

- *Use proper needle type and size.*

A smaller-bore, side-venting irrigating needle of a size appropriate for the prepared canal is recommended

- *Use a plastic stopper on irrigating needles.*

A stopper can guarantee the position of the needle tip inside the canal system, where tactile sensation is limited.

- *Use an appropriate method to deliver the irrigation solution.*

Use low, constant pressure, withdrawing the needle slightly from the binding point.

REFERENCES:



1. Pashley EL, Birdsong NL, Bowman K, Pashley DH. Cytotoxic effects Of NaOCl on vital tissue. *J Endod* 1985; 11(12):525–8.
2. Hulsmann M, Hahn W. Complications during root canal irrigation —Literature review and case reports. *Int Endod J* 2000; 33(3):186–93.
3. Gatot A, Arbelle J, Leiberman A, Yanai-Inbar I. Effects of sodiumhypochlorite on soft tissues after its inadvertent injection beyond the root apex. *J Endod* 1991; 17(11):573–4.
4. Becking AG. Complications in the use of sodium hypochlorite duringendodontic treatment. Report of three cases. *Oral Surg Oral Med Oral Pathol* 1991; 71(3):346–8.
5. Chow TW. Mechanical effectiveness of root canal irrigation. *J Endod* 1983; 9(11):475–9.
6. Baumgartner JC, Cuenin PR. Efficacy of several concentrations of sodium hypochlorite for root canal irrigation. *J Endod* 1992; 18(12):605–12.