Sodium Hypochlorite Injection into Periapical Tissues

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Sodium hypochlorite is a useful adjunct to endodontic therapy but it must be confined to the root canal. A case of periapical injection of hypochlorite with untoward sequellae is presented.

The use of sodium hypochlorite as a chemical adjunct to mechanical debridement of the root canal system is a common practice in endodontics today. Sodium hypochlorite has been used for many years and its tissue dissolution, antibacterial, and lubricating properties have been well described and investigated (1).

Untoward incidents with irrigating solutions such as sulfuric acid, hydrogen peroxide, and sodium hypochlorite (2– 5) have been reported previously.

The following case report demonstrates the extensive amount of tissue changes that can occur when sodium hypochlorite is injected into periapical tissues.

CASE REPORT

A 58-yr-old male presented to the endodontic clinic at the University of Oklahoma. The patient's medical history was noncontributory. His chief complaint was pain in the area of the left maxillary second premolar (#13). The pain was described as persistent. Tenderness was present to percussion of the tooth and palpation of the apical area. No swelling was evident. The patient had received emergency treatment 5 days before, at which time a #20 file was separated in the palatal canal of tooth 13. The pain had diminished since the emergency treatment, but was still present.

Radiographic examination revealed a separated instrument approximately 3 mm short of the apex (Fig. 1). After anesthesia (infiltration, facial and palatal, with Xylocaine 1:50,000 epinephrine) and isolation, canal preparation was started with periodic irrigation using 5.25% sodium hypochlorite. The patient suddenly experienced severe pain and rapid swelling over the area of tooth 13. Preparation procedure was stopped and a second carpule of Xylocaine with epinephrine 1:50,000 was infiltrated into the facial apical area of the tooth. An ice pack was administered within 1 min. Pain began to abate in approximately 5 min. The swelling distended the check and suborbital area but scemed to have stabilized. Since the treatment was near completion it was decided to continue with the procedure. The root canal instrumentation was completed and the canals were obturated with gutta-percha and root canal sealer (Kerr's). A polycarboxylate temporary filling was placed. Due to the patient's complaint of pain at the beginning of the procedure and in light of the separated instrument, an apical trephination and rubber drain insertion were accomplished. The patient was instructed to use ice packs (with 15min alternating periods) for the next 4 to 6 h. A prescription of Demerol (50-mg tablets for 10 days) was given. It was recommended that the patient take two tablets every 4 to 6 h as needed for relief of pain. The swelling was significant, involving the check and suborbital area, but seemed to be located such that no danger of airway compromise was likely. The patient was advised he would be evaluated daily and he was reassured that the swelling would abate within the next 10 days.

The patient was further advised that due to the separated instrument in the palatal canal, a periapical surgical procedure would be necessary to effect an apical seal. This procedure would be deferred until the present signs and symptoms disappeared.

The patient was seen the following day and presented with substantial swelling and discoloration which involved an area from the lower left eyelid through the cheek and into the submandibular and submental spaces. The mandibular involvement had not been present the preceding day and the discoloration under the chin and across the midline was dramatic. The swelling did not extend into the chest, but slight discoloration was evident in the suprasternal notch area (Fig. 2). Drainage was noted at the rubber drain site and the patient reported that his pain was poorly controlled with the Demerol. The patient had not experienced any breathing difficulties. Ceclor (Cefaclor) was prescribed, 500 mg for 18 days, one tablet every 6 h for possible secondary bacteriolog-



Fig 1. Patient presented with a separated instrument in the palatal canal.



Fig 2. Visible swelling and discoloration evident the day following the sodium hypochlorite injection.

ical involvement, and Tylox for 10 days, one capsule every 6 h as needed for pain, was also given to the patient.

Two days postoperative the patient still exhibited severe swelling and discoloration which involved the same areas as noted on the first postoperative day. The patient reported better pain relief with Tylox. Drainage was still evident intraorally at the site of the trephination. Swelling was decreased around the left eye an it was no longer swollen closed (Fig. 3).

Three days following the sodium hypochlorite injection, the patient presented with swelling noticeably reduced, but still present. Discoloration was still apparent. The patient seldom required narcotic analgesics. However, he reported that he was able to tolerate only a liquid diet. The drain was examined and left in place.

Four days postincident, the patient presented with minimal discomfort. He reported having taken a Tylox approximately 18 hr before and since that time had required no analgesics. He also indicated that he had been able to eat some solid food. Swelling was further reduced, yet discoloration persisted, principally in the area of the neck and the corner of the mouth. The drain was removed at this time and the area was cleansed with hydrogen peroxide.

The next postoperative examination (7 days after incident) revealed slight discoloration still present, with tissue contours near normal (Fig. 4).

The final postoperative check was completed 9 days following the incident. Tissue contours and color had returned to normal (Fig. 5). An appointment was made at this time for the periapical surgery.



Fig 3. Two days postincident. Patient more comfortable but swelling and discoloration still present.



Fig 4. Seven days postincident. Tissue contours near normal.

The periapical surgery was performed 14 days after the sodium hypochlorite injection. This was a routine uneventful treatment. The sutures were removed 4 days later and healing progressed satisfactorily (Fig. 6).

DISCUSSION

The inadvertent injection of 5.25% sodium hypochlorite into the soft tissue can elicit a violent and frightening response. The sequence seems to be (a) excruciating pain of 2- to 5-min duration, (b) immediate swelling (ballooning) of the tissue in the area with spread to surrounding loose connective tissue



Fig 5. Nine days postincident. Tissue contours and color returned to normal.



Fig 6. Postsurgery radiograph, 6-month recall. Tooth is functional and asymptomatic.

areas, and (c) a profuse bleeding episode, either interstitially or intraorally through the root canal system. The severe initial pain is replaced with a constant discomfort, probably related to the tissue destruction and distention. The bleeding is readily controlled, but oozing interstitially can result in significant ecchymosis, as was evident in this patient report.

Treatment should center on alleviation of the swelling, with cold initially and warm saline soaks the following day. Pain control with appropriate analgesics is necessary. Initial control of pain with added local anesthetic must be considered. Infection control should be instituted, as the potential for secondary or spreading of present infection is very real. Reassurance



Fig 7. Photograph taken by patient's daughter the evening following the injection episode.

of the patient is very important and five items of concern are addressed in a previous article (4). The tissue response seems out of proportion to the volume of the irritant. Certainly not more than 0.5 ml of sodium hypochlorite can be forced into the periapical tissues, yet the response is very dramatic. The mechanism of response may be similar to that proposed in angioneurotic edema with a release of histamine or a histamine-like substance, a vasodilation with subsequent transudation of plasm, plus hemorrhage (6).

The extreme amount of ecchymosis under the chin in this report was probably related to the accumulation of loose tissue present in this patient (Fig. 5). The ecchymosis may have been increased or added to by the incision and trephination which was deemed necessary for pain control. This response was of great concern to the patient's daughter who is a registered nurse. She felt that respiratory embarrassment might be a possibility. Since the etiology was related to a maxillary tooth, we were more concerned with mediastinal spread then respiratory compromise. Stabilization of the spread and discoloration after the first day with no compromise of breathing allayed our concerns. Photographs taken by the patient the evening following the incident illustrate the reason for the concern (Fig. 7).

The benefits of sodium hypochlorite in endodontic treatment are such that its continued use is justified, but every effort should be taken to avoid the introduction of this irrigant into the periapical tissues. Wedging the irrigating needle into the canal must be avoided and a side delivery orifice needle is recommended.

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References

1. Ingle JI, Taintor JF (eds). Endodontics. 3rd ed. Philadelphia: Lea & Febiger, 1985:180-1.

2. Harris WE. Unusual endodontic complication: report of case. J Am Dent Assoc 1971;83:358-63.

 Kaufman AY. Facial emphysema caused by hydrogen peroxide irrigation: report of case. J Endodon 1981;7:470–2.

4. Becker GL, Cohen S, Borer R. The sequelae of accidentally injecting sodium hypochlorite beyond the root apex. Oral Surg 1974;38:633-8.

 Herrmann JW, Heicht RC. Complications in therapeutic use of sodium hypochlorite. J Endodon 1979;5:160.

6. Shafer WG, Hine MK, Levy BM. A textbook of oral pathology. 3rd ed. Philadelphia: WB Saunders, 1974:532.