Permanent mimic musculature and nerve damage caused by sodium hypochlorite: a case report

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Sodium hypochlorite is often used as an irrigation solution during routine endodontic treatment. Before recementation of a post-retained crown on the upper left lateral incisor, the root canal was irrigated with sodium hypochlorite. There was no root filling in the root canal, and the apex was open after an earlier apicoectomy. Sudden pain with swelling of the left face side occurred during root canal rinsing. Three years later, a paraesthesia still remained in the affected region and a paralysis of some mimic muscles in this region was observed. There were no signs of improvement. *(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;106:e80-e83)*

Sodium hypochlorite (NaOCl) in different concentrations is the irrigation solution most widely used by endodontists. 1-4 It dissolves proteins. Used in combination with citric acid, chlorine gas will be released. 5 Sodium hypochlorite is effective against endodontic microorganisms organized in a biofilm. 6 However, owing to the release of chlorine gas, it is extremely toxic to vital tissues, 7-9 causing hemolysis, ulceration, inhibition of neutrophil migration, damage to endothelial and fibroblast cells, facial nerve weakness, and necrosis after extrusion during root canal treatment. 10,11 We present a case in which NaOCl was accidentally injected beyond the root apex into the mimic muscular system and caused permanent anesthesia and damage of mimic muscle motor innervations, which did not show any signs of improvement 3 years later.

CASE REPORTS

A 54-year-old woman with penicillin allergy and hypothyroidism visited a dental polyclinic in 2004 for consultation about the possibility of implants in the upper and the lower left jaw. From the clinical examination, the upper left lateral incisor lost its post-retained crown. The radiographic picture showed that the region apical of the post was empty and the apical foramen was open, and the apical area showed a distinct apical translucency (Fig. 1). Prior to recementation of the crown the dentist rinsed the root canal with 3% NaOCl and 0.2% chlorhexidine digluconate (CHX). During rinsing with NaOCl a sudden pain and a left-side suborbital swelling occurred. The dentist administered local anesthesia and completed the irrigation with the CHX solution. The patient was given a cold compress, antibiotics, and analgesics. Pain and swelling worsened significantly over the next hours and the patient visited her general dental dentist for further medical care. On examination there was a firm left facial swelling which extended from below the border of the mandible up to the left eye (Fig. 2). Infraorbitally and in the region of the upper left lip up to the left lip corner, there was altered sensation. This is the area of the left infraorbital nerve. In addition the buccal branch of the facial nerve was affected. This resulted in a distinct loss of upper lip and cheek function (the corner of the mouth could not be pulled up by the mimic musculature). Mouth opening was limited to 20 mm. Intraorally there was no necrosis in the apical region of the tooth. Pain and swelling remained for 1 week, and the patient felt ill for this period. On review by the general dentist 1...
month later, the swelling had almost resolved, mouth opening was improved, and the patient was free of pain. On her own request the patient went to a neurologist because of persisting hypoprefhrenibity and motor restriction. The neurologist found a paresthesia of the left facial nerve branch 3 and 4 with a nonsymmetric soft palate arch, an asymmetric mouth, and a hypotrophic left facial mimic musculature. The sensible arch of the trigeminal nerve was also altered infraorbitally on the left face side. The infraorbital nerve paresthesia was unchanged, and there was no improvement of the buccal branch facial nerve weakness.

The patient filed legal claims against the dental polyclinic. Three years later our clinic got involved in the complaint processing and we were requested, by the court, to examine the patient and provide a written testimony to the court. The main problem in the case was that the patient attended the dental polyclinic for consultation only and there was no informed consent about a root canal treatment with possible negative side effects.

During our examination in 2007—3 years after the NaOCl accident—we found new prosthetic implant rehabilitation replacing the upper front teeth, and the lateral left incisor was extracted and replaced by a pontic attached to implants at both middle front teeth. Mouth opening was unhindered up to 40 mm. We found in the upper left infraorbital region a reduced sensitivity in the area marked in Fig. 3. We asked the patient to smile and found that the left corner of her mouth was not pulled up by the mimic musculature (Fig. 3). The patient reported that these problems showed only slight improvement shortly after the accident up to one year. During the last two years no further improvement was observed. The problems with the mimic musculature in the region of the upper left lip side and the left lip corner led to some problems during drinking, and the patient noticed some involuntarily uncontrolled flow of saliva. These negative long-term effects of the NaOCl accident showed no signs of improvement, although the patient tried to train the mimic musculature every day.

DISCUSSION
Sodium hypochlorite is an effective endodontic irrigation solution used in different concentrations, rang-
The management of the complications related to NaOCl incidents have been described previously in detail.\textsuperscript{11,24} As an alternative irrigant for rinsing root canals during endodontic treatment a 0.1%-2% CHX solution could be used. The antimicrobial effect of CHX is well known, and adverse side effects of CHX during endodontic treatment have not been reported.\textsuperscript{25}

**CONCLUSIONS**

The present case showed that NaOCl—inadvertently injected beyond the apex—is able to produce permanent facial and trigeminal nerve weakness.

Because of this fact and the number of reported cases, it is very important to include the adverse reactions of NaOCl into the normal written information provided to the patient before endodontic treatment. Without such written consent, NaOCl should not be used as an irrigation solution during endodontic therapy.

In endodontic cases with a widely open apical foramen in combination with an apical translucency, CHX may be a better alternative than NaOCl for irrigation. If NaOCl is used despite this recommendation, it should be done carefully with meticulous length control.

**REFERENCES**

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