

Accidental injection of sodium hypochlorite beyond the root apex

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بعد محلول هيبوكلوريت الصوديم من افضل محاليل الغسل المبيده للجراثيم، المستعمله في المعالجه اللبنيه. ويجب ان يقتصر استعماله على قناة الجذر فقط. وقد اوردت التقارير تجاوز الحقن للمنطقه حول الذرويه. ونورد في هذا التقرير عرضا لحاله مشايه. ويحدث نتيجة لذلك ألما شديدا مترافقا مع ورم دموي. ويمكن بالعنايه الدقيقه والمعالجه المهدئه المناسبه التخلص من مثل هذه الاختلاطات.

Sodium hypochlorite is one of the most commonly used antimicrobial irrigating solution in endodontic therapy. It should ideally be confined to the root canal system but incidences of injection into the periradicular area have been reported. Such an incidence is reported in this case. Extreme pain, edema and hematoma usually occur after this accidental injection. Careful management and proper palliative treatment will restore these complications.

Introduction

Careful mechanical cleansing and irrigation are usually sufficient to eliminate root canal infection. The antibacterial properties, tissue dissolution and canal lubrication of sodium hypochlorite (NaOCl) make it the most commonly used irrigating solution in endodontics.¹⁻⁴ Clinically, various concentrations of NaOCl (0.5, 1, 2.6 and 5.25 %) have been used in root canal therapy. Spangberg *et al.*⁵ reported that high concentration of NaOCl is very toxic. They recommended diluting the solution to 1% to keep its antibacterial property at the lowest toxic level.

Incidents of irrigating solutions injected beyond the apical foramen and consequent hypersensitivity reaction have been reported.⁶⁻⁹ Such an incident may cause severe clinical complications. This present report describes an accidental injection of sodium hypochlorite through a root canal into the periradicular tissue and the immediate extensive facial sequelae.

Case Report

A 17-year old female presented to the clinic at the College of Dentistry, King Saud University, to seek an esthetic restoration of the maxillary right central incisor. Clinical examination revealed crown fracture involving the pulp with slight discoloration. All sensitivity tests were negative. There was no sinus tract and no pain to percussion and palpation tests. Radiographic examination revealed small rarefaction around the apex of the root (Fig. 1). The patient stated that she had trauma 3 years previously. A diagnosis of necrotic pulp

with chronic apical periodontitis was established. It was decided to perform root canal therapy to be followed by post and porcelain crown.

After local anesthesia and rubber dam isolation, access opening was done and working length was determined. The root canal was instrumented to file size 60K and irrigated during instrumentation with 1% NaOCl. After the final instrumentation, a 25-gauge needle attached to a 10 c.c. disposable syringe was inadvertently wedged in the canal and approximately 1.5 cc of NaOCl was expressed into the root canal and periradicular tissues accidentally. The canal was dried with paper points, 2% Iki on cotton pellet was placed as intracanal medicament, the access cavity was closed with Cavit and the patient was dismissed. The patient came back within 15 minutes complaining of severe pain and facial swelling localized to the upper lip. The swelling extended to the infraorbital area. The mucous membrane of the upper lip showed ecchymosis. Patient was seated and reassured. The Cavit was removed and a profuse hemorrhage was discharged from the root canal. Irrigation was done with saline and the canal was left open for drainage of exudate. The patient was prophylactically covered with erythromycin 500mg every 8 hours for six days. In addition, she was instructed to use ice pack and to take Panadol 500mg as analgesic. She was given an appointment for the next morning. The patient was phoned several hours after the incident, and she stated that the swelling did not increase and that the pain had abated except for discomfort from the distended lip swelling.

Twenty-four hours later, the patient was seen at the clinic with swollen upper lip and swollen shut

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eyes. There was slight ecchymosis under the orbits and diffuse ecchymosis over the right and left cheeks (Fig. 2). She reported that the pain had diminished. The root canal was opened and irrigated with saline and dressed with Cavit. There was no hemorrhage.



Fig. 1. Diagnostic radiograph of the right central incisor showing small rarefaction around the apex of the root.



Fig. 2. Facial swelling of the upper lip extending to the infraorbital area.

Forty-eight hours after the incident, the intra-oral swelling became localized at the upper anterior area. Under local anesthesia a small incision was made for further drainage, and the patient advised to continue using the antibiotic.

Four days later, the patient presented with normal tissue contour. The swelling had disappeared and the involved tooth was asymptomatic (Fig. 3). Under rubber dam isolation, the root canal was irrigated with saline, dried with paper points and filled with calcium hydroxide and the access cavity was sealed with Cavit. After two weeks, the root canal was instrumented and filled with gutta-percha using lateral cold condensation technique and AH26 silver free sealer cement.



Fig. 3. Clinical picture of the patient after four days showing normal tissue contour.

Discussion

The toxic effects of NaOCl irritation and its potential on soft tissue have been described in various case reports. The degree of destruction when NaOCl comes in direct contact with healthy soft tissue is determined by the duration of the contact and the concentration of the sodium hypochlorite.¹⁰ At a concentration of 0.5%, NaOCl

is nontoxic to vital tissues and immediately washed away by circulating blood.⁵⁻¹¹ Intradermal injections of 5.25%, 0.525%, 0.052% and 0.005% of NaOCl produced skin ulcerations in rats as well as immediate severe conjunctival palpebral edema and hyperemia of rabbit's eyes.¹² Therefore, an accidental passage of NaOCl solution regardless of its concentration through the foramina is considered a serious clinical mistake. This usually occurs as a result of insufficient access opening, incorrect determination of endodontic working length, iatrogenic widening of the apical foramen, wedging of the irrigating needle and a lateral root perforation.¹³ In addition, Harrison *et al.*¹³ reported that the clinical toxicity of NaOCl was no greater than the clinical toxicity of normal saline solution when used as an endodontic irrigant.

The cause of this emergency case could be directly attributed to the irrigation technique. The needle was accidentally wedged into the canal and the irrigant expressed with force. The sequence seems to be severe pain of short duration, immediate swelling of the tissue in the working area with spread to the surrounding areas and profuse bleeding through the root canal system. Sabala and Powell¹⁴ and Gatot *et al.*¹⁵ reported similar cases with identical symptoms and signs.

In order to prevent a similar accident, one should make certain that the needle is not wedged into the root canal and that the irrigant is expressed freely and slowly. The operator must ensure that excess irrigant leaves the root canal coronally via the access cavity. Brown *et al.*¹⁶ reported that the use of a reservoir of irrigation in the coronal access cavity results in significantly less apical extrusion of irrigation solution than with deep delivery.

If an incident such as that described in this case occurs, the dentist should remain calm. Analgesics should be given in order to relieve the post incident pain. A course of antibiotics should be prescribed, as there is potential for secondary or spread of infection. Local anesthesia in the presence of diffuse swelling should be avoided to prevent spreading of existing infection. Extraoral cold compresses should be used for the first 6 hours in order to minimize swelling. Subsequent to this initial period, heat packs and warm mouth rinses should be used for one week to improve the circulation to the area. The dentist should assist the patient in remaining calm and explain what

has happened, what is anticipated, and reassure the patient that a normal appearance will be regained within a short time.

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