ORAL MUCOSA DAMAGE BECAUSE OF HYPOCHLORITE ACCIDENT – A CASE REPORT AND LITERATURE REVIEW

Elitsa Deliverska
Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University - Sofia, Bulgaria

ABSTRACT

Background Hypochlorite solution is widely used in dental practice during root canal treatment. Although it is generally regarded as being very safe, potentially severe complications can occur when it comes into contact with soft tissue especially due to its cytotoxic features.

Objective The aim of our paper is to present a case of damage of oral mucosa because of leakage of 3% hypochlorite through rubber dam during endodontic treatment.

Material and methods We present a 31 years old female with necrosis of buccal mucosa during the endodontic treatment of 46.

Results Three days after the procedure the patient was referred to our department for consultation and treatment. Antiseptic lavage was performed and oral antibiotic was administrated. After 5 days intraoral examination showed signs of almost full recovery.

Conclusion The need for proper tooth isolation during restorative procedures is obvious. Anything that obscures the operative field negatively impacts operator efficiency and effectiveness. Visibility, patient/operator safety, infection control and the physical properties of dental materials are all compromised when proper isolation is lacking.

Key words: sodium hypochlorite, mucosa damage, rubber dam

INTRODUCTION

Sodium hypochlorite (NaOCl) is the most commonly used solution in root canal treatments, as it is a low-cost method that displays a very effective antimicrobial activity against microbiota of infected root canals [1]. Furthermore, the ability to oxidize and hydrolize cell proteins and its tissue solvent capacity, increases its value as an irrigant solution [2]. Root canal treatment aims at the complete removal of the connective tissue and the destruction of residual microorganisms found in infected root canals. In addition, it seeks an effective seal in order to prevent recolonization of the root canal system with bacteria. However, this solution can cause complications especially due to its cytotoxic features.[3, 4] The clinical efficacy of NaOCl relates to its nonspecific ability to oxidize, hydrolize, and osmotically draw fluids out of tissues. Thus, this chemical agent reaches and cleans new areas within infected root canals, dissolving necrotic-purulent tissues. However, the cytotoxic effects are directly proportional to the concentration of the NaOCl [3, 4]. When this solution is injected into the adjacent tissues, the patient usually experiences intense pain, and an urgent treatment should be implemented in order to prevent a long-term sequelae. [5, 6, 7]

The purpose of this paper is to discuss the use of sodium hypochlorite in dental treatment, reviews the current literature regarding hypochlorite complications, and considers the appropriate management for a dental practitioner when faced with a potentially adverse incident with this agent.

Complications causing severe tissue reactions associated with the accidental extrusion of NaOCl into periapical tissues have been described in the literature. Some authors have mentioned clinical situations where sodium hypochlorite was inadvertently injected into the maxillary sinus [6, 7], or was unintentionally injected into the oral mucosa [5] causing adverse tissue reactions and life-threatening allergic responses [8, 9].

With today’s heightened awareness of infection control, patient safety, and technique sensitive dental materials, meticulous operative field isolation is mandatory. Barrier isolation (rubber dam) is the most reliable method. If isolation is so important, why do so many clinicians resist using the rubber dam? Perhaps they never really learned to use it effectively. Today the rubber dam is the “Standard of Care” for isolation during restorative procedures and should be employed whenever possible.

Rubber Dam Benefits

· Dry, clean operating field
· Improved access and visibility
· Improved properties of dental materials
· Patient protection
· Improved infection control
· Increased operating efficiency

Sodium hypochlorite is a commonly used irrigant in endodontic practice. It has many potential complications ranging from permanent bleaching of clothes to severe soft tissue damage. NaOCl is highly irritant when extruded into vital tissues. [10 - 14] The well-perfused tissues of the oral cavity yet have considerable healing ability. The most common complication are described in Table 1.
We describe a case of buccal mucosa necrosis because of leakage of rubber dam during the root canal treatment procedure of 46 and irrigation with 3% sodium hypochlorite. During the rubber dam technique for operative field isolation of the tooth there occured a leakage of sodium hypochlorite and caused necrosis of the mucosa.

**Fig. 1.** Necrosis of buccal mucosa because of sodium hypochlorite exposure

Three days after the procedure the patient was referred to our department for consultation and treatment. (fig.1) Thirty one years’ old female patient complained of severe pain started some hours after the procedure. Clinical examination showed extraorally swelling and intraoral exam revealed necrosis of mucosa 1/2 cm in vestibular fold of 46, 47 and inflammatory reaction of surrounding tissue. Treatment consisted of a combination of amoxicillin and clavulanic acid 875/125 mg (Augmentine® 875/125 mg) 1 tablet every 12 hours for 5 days; prednisolone- cortico (60-40-20) taper dose over a 3 day-period using a decreasing dosage; paracetamol (0,500g) 1 tablet every 8 hours; vit C 1,0g twice daily.

**Fig. 2.** Healing process five days after treatment

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<tr>
<th>Complication</th>
<th>Author</th>
<th>Study</th>
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<tbody>
<tr>
<td>Damage to eye</td>
<td>Ingram TA 3rd. [18]</td>
<td>Response of the human eye to accidental exposure to sodium hypochlorite.</td>
</tr>
<tr>
<td></td>
<td>Linn JL, Messer HH. [23]</td>
<td>Hypochlorite injury to the lip following injection via a labial perforation. Case report</td>
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<td></td>
<td>Baumgartner JC, Ibay AC. [26]</td>
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Table 1.
Five days after treatment clinical examination revealed almost full recovery and epitelization of the lesion. (fig. 2)

Based on the presented case reports, special attention must be drawn to the potential risks associated with the use of NaOCl as an irrigant for root canal therapy. Thus, it is important to carry out an effective technique (isolation of operative field with rubber dam)) in order to avoid complications. In the event of accidental extrusion of NaOCl, treatment guidelines should be applied according to the magnitude of each individual case.

**DISCUSSION**

Although a safe root canal irrigating solution, the use of NaOCl may also lead to life-threatening complications [27-33]. So, to ensure best safe, long lasting clinical practice, it is essential to recognize and manage these complications.

Acute inflammation followed by necrosis results when NaOCl comes into contact with vital tissues. It causes severe inflammation and cellular destruction in all tissues. Sodium hypochlorite when comes in contact with tissue proteins, forms nitrogen, formaldehyde and acetaldehyde in short time and peptide links are broken resulting in dissolution of proteins. During the process, the amino groups is replaced by chlorine thereby forming gluconate is recommended as an alternative irrigating solution.

Sodium hypochlorite reacts with the proteins and fats of oral mucosa which might lead to secondary infections. Sodium hypochlorite reacts with the proteins and fats of oral mucosa which might lead to secondary infections. As the solution used

<table>
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<tr>
<th>Author</th>
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<tr>
<td>Veeresh et al.</td>
<td>2011</td>
<td>A patient with continuous , severe pain, oedema on left side of face, managed by antibiotics, analgesics, cold compress and on 10th day all symptoms suppressed.</td>
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<tr>
<td>Lovery PD.</td>
<td>2014</td>
<td>Patient with NaOCl extrusion followed endodontic treatment in maxillary first molar with excruciating pain, with blood stained fluid from left nostril; all managed by first ENT consultant for nasoscopy and then later root canal treatment completed.</td>
</tr>
<tr>
<td>Jonathan et al.</td>
<td>2015</td>
<td>A patient with NaOCl extrusion followed perforation during root canal treatment in maxillary first premolar with swelling, bruising; pain was managed by i.v antibiotics, analgesics, steroids and then surgical intervention and finally full recovery was observed.</td>
</tr>
<tr>
<td>Bernardo et al.</td>
<td>2014</td>
<td>A patient with NaOCl apical extrusion followed root canal treatment returned in 24 hours with extreme pain, burning sensation in maxillary region with oedema and was managed by amoxicillin 500mg orally for 7 days then dexamethasone 4mg I.M. for 3days. Symptoms subsided after 8 months.</td>
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If accident occurs treatment protocol should be followed [36].

Immediate irrigation of canal or damaged soft tissue with normal saline to dilute the sodium hypochlorite.
- Let the bleeding response continue to flush the irritant out.
- Advice ice pack compression for 24 hours (15 minutes interval) to minimize the swelling.
- Recommend warm, moist compress after 24 hours (15 minutes interval).

- Prescribe non steroid anti-inflammatory drugs and pain killers for 7 days. Analgesics and antibiotics must be prescribed to reduce secondary infection. Refer to emergency on inhalation or injection.
- Prophylactic antibiotic coverage for 10 days to prevent secondary infection. Amoxicillin 1.0 g (2x1) with/ without Metronidazole 500mg(3x1). In penicillin allergic patients prescribed Clindamycin (2x0,600).
- Steroid therapy for 2-3 days to control inflammatory reaction.
- Reassure the patient and provide with both verbal and written homecare instructions.
- Monitor the patient periodically.

CONCLUSION
Sodium hypochlorite is an effective antibacterial agent but, when in contact with vital tissues it becomes a potential irritant causing tissue destruction. So, to prevent this, injudicious use should be avoided by the use of a sealed rubber dam isolation during treatment, use of a Leur lock needle for irrigation, maintain a minimum of 2 mm reduction from the working length, avoid wedging of needle into the canal and most importantly avoid excessive pressure during irrigation.

REFERENCES:
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**Corresponding author:**
Associate prof. Elitsa Deliverska, PhD
Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University Sofia
1, St. Georgi Sofiiski Str., 1431 Sofia, Bulgaria.
E-mail: elitsadeliverska@yahoo.com