



Case Report

Facial hematoma of endodontic origin: A case report

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ABSTRACT

Endodontic treatment is a common procedure in dentistry that consists of elimination of organic tissues, infected debris, and pathogenic bacteria from the canal system by means of mechanical instrumentation associated with abundant disinfecting agents (Haapasalo et al., 2005) [1]. Despite progress with its implementation, dentists may at any time be faced with complications during or after a root canal procedure. While some of these problems can be anticipated, many can never really be predicted. A complication such as a hematoma that is usually seen as a complication of trauma or oral surgery, is rarely seen after a simple endodontic treatment. It put the dentist in a confused and uncomfortable situation. Dentists should be aware of the possible occurrence of this incident and should know what can cause it and how to manage it.

We report the case of a 63-year-old patient, referred by her general dentist to our center for the sudden onset of a facial hematoma after endodontic treatment.

1. Introduction

Root canal treatment is a common procedure in general dental practice. The use of irrigating solutions is an important part of effective chemomechanical root canal preparation. It enhances bacterial elimination and prevents packing of the infected hard and soft tissue apically in the root canal and into the periapical area [1]. Sodium hypochlorite (NaOCl) is the most commonly used irrigating solution in endodontics and it is used in concentrations varying from 0.5% to 5.25%; it is a potent antimicrobial agent, and dissolve vital as well as necrotic tissue. NaOCl is best known for its strong antibacterial activity; it kills bacteria very rapidly even at low concentrations [1,2]. However, if used injudiciously, NaOCl can have toxic effects and can be destructive to cellular tissues, ranging from mucosal damage, ulceration, injury of the patient's or operator's eye, to air emphysema and soft tissue and facial hematoma [3].

This article describes a case of an unexpected hematoma during a routine endodontic treatment of an upper left first molar, probably due to an inadvertent injection of NaOCl into the periapical tissues [4].

2. Patient and observation

A female patient aged 63, with non-contributory systemic conditions and no family history, was referred by her general dentist to the Dental Center of Consultation and Treatment of Rabat (Ibn Sina Hospital) for a

hematoma that appeared during a root canal therapy of tooth 26.

The root canal therapy was done the day before the consultation. The patient didn't report any pain nor burning sensation nor paresthesia, apart from the hematoma that suddenly appeared during the endodontic treatment of the left upper first molar.

The patient revealed that her dentist noticed an abnormal and prolonged bleeding from the canal of the upper left first molar during the root canal preparation and before obturating the tooth canal, but she still had completed the root canal filling, followed by provisional crown restoration (Fig. 3). Both the patient and her dentist observed the onset of the swelling before the end of treatment and after some minutes, ecchymosis began to appear.

Exobuccal examination revealed a left facial swelling. An ecchymosis was evident at the left periorbital region, cheek, and submandibular region (Fig. 1). The palpation was firm and nontender.

Intraoral examination revealed a trismus and extensive ecchymosis around the left side of the labial and buccal mucosa (Fig. 2).

The management of this case consisted at first in reassuring the patient. Then, a tomodontometry was prescribed to confirm the diagnosis and to show the extension of the swelling. It showed a spontaneous hyperdensity in the deep facial spaces confirming the diagnosis of hematoma in the left facial tissues (Fig. 4).

Blood tests including Count Blood cells, Bleeding time, Prothrombin time and partial thromboplastin time, were also recommended to rule out any bleeding disorders, which were normal. Antibiotics including

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Fig. 1. Extraoral view 1 day after the accident showing left facial oedema and Ecchymosis visible on the periorbital region, the cheek, and the submandibular region.



Fig. 2. Intraoral view showing mild trismus and ecchymosis of labial and buccal mucosa.

amoxicillin + clavulanic acid (1g + 125 mg, 2 times per day) were also prescribed to prevent infection of the hematoma.

The data from medical examination, clinical and radiological exams led us to the diagnosis of a hematoma caused by the periapical extrusion of NaOCl. The patient was informed that the accident was related to the irrigation solution, was reassured, and was instructed to return daily for monitoring for the subsequent two days and one week after the accident. After what, an increase in the ecchymosis was noticed on the cheek in the left side, but regression of the swelling, trismus and ecchymosis of

the periorbital region began to be observed (Fig. 5). The follow-up after three weeks showed the complete resolution of the hematoma (Fig. 6).

This case report has been reported in line with the SCARE Criteria [5].

3. Discussion

Irrigation is an important step during the cleaning, disinfection, and lubrication of the root canal system. Irrigation by itself can expel the remains of tissue, the smear layer or some foreign material from the tooth [2,6].

NaOCl has been used as an intracanal irrigant for root canal disinfection and debridement for more than 75 years [4]. NaOCl has been defined by the American Association of Endodontists as a clear, pale, yellowish and extremely alkaline liquid that has dissolvent action on necrotic tissue and organic residues and acts as a potent antimicrobial agent [2,7].

It is well known to be effective against a wide variety of pathogens such as gram-positive and gram-negative bacteria, fungi, spores and viruses (including the human immunodeficiency virus). The clinical efficacy of NaOCl is due to its nonspecific ability to oxidize, hydrolyze and osmotically draw fluids out of tissues [4,8]. The efficacy of NaOCl is also affected by its concentration, volume, contact time and temperature in the root canal. One alternative approach to improve the efficacy of NaOCl irrigants could be to elevate the temperature of the solutions [9].

However, its numerous advantages are not without risks. The literature contains several case reports on complications during root canal irrigation including mucosal and skin ulceration, air emphysema, allergic reactions to the solution and less frequently hematoma [3].

A hematoma is an abnormal collection of blood outside the blood vessels, in a body space. The size and spread of a hematoma depend on its vascular origin (capillary, venous or arterial) and the tissue from which it is bleeding (muscle, fat or interstitial). Facial Hematoma is a well-known and recognized complication in oral and maxillofacial surgery or in facial trauma. However, it is much less known and unexpected after routine canal therapy.

When NaOCl is accidentally forced the apical foramen, it can cause violent tissue reactions and unbearable pain. It causes injury at first by oxidation of proteins.

Becker et al. [10] and Sabala and Powell [10] were among the first to report accidents of forceful injection of NaOCl into the periapex tissues beyond the periapex. Pashley et al. [8] reported that even at dilutions as low as 1:1,000, NaOCl caused complete hemolysis of red blood cells in vitro, and provoked severe inflammation and cellular destruction in all tissues except heavily keratinized epithelium.

The sequence of injury seems to be as follows: severe pain for two to 5 mins, immediate swelling 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 [11]. As the tissue destruction progresses, extreme constant discomfort replaces the initial severe pain. The tissue reaction is disproportionate to the volume of the irritant [4,11]. Because of lysis of cellular structures and damage to the blood vessels with extravasation of blood into the adjacent subcutaneous soft tissues. This results in significant ecchymosis [4,12].

Even though the initial hemorrhage ceases, the area of the ecchymosis continues to spread due to continuing interstitial leakage. In the current case, the increased ecchymosis observed at the first week can be attributed to this phenomenon [13].

These manifestations are not surprising, as NaOCl is extremely cytotoxic and it is a solvent for organic materials [12].

Hematoma and ecchymosis of the facial skin could occur immediately or after a few hours, accompanied by tissue necrosis and, at times, paresthesia and anesthesia [12]. The patient might also experience soreness and trismus [14]. The swelling and discoloration of the involved region usually subsides in 10–15 days [14].

In the reported case, the patient didn't experience pain, maybe because anesthesia was realized, but only root canal bleeding and a rapidly increasing swelling and ecchymosis.

An article of Zhu and al. in 2013 analyzed and summarized cases reports of hematomas caused by an accidental extrusion of NaOCl beyond the root apex during root canal treatment and found that there was a similarity in the locations of ecchymosis. They found that ecchymosis is universally present along the angle of the mouth, and around the periorbital region (upper and/or lower eyelids) most of the time, and that it was far away from the apex of the upper teeth [14] and its absence in the soft tissues immediately superficial to the apical region of the tooth involved in NaOCl extrusion [14]. In more severe cases, ecchymosis may extend into the contralateral side, neck and chest [14].

This is also the case of the patient reported who presented with ecchymosis both intra-orally and extra-orally around the left periorbital region and the cheek.

The majority of NaOCl extrusions into the periapical area are attributed to incorrect determination of the working length, iatrogenic widening of the apical foramen, lateral perforations, needle stuck within the root canal, or vertical root fractures as well [3,15,16]. Destruction of periapical alveolar bone due to chronic infection as well as the use of high-pressure during injection also facilitates NaOCl extrusion into soft tissues [3,13,16].

The extraoral swelling and discoloration on the face may have a great psychological effect on the patient. The patient is usually very much concerned about the complication and might doubt the ability and

experience of the dentist. In such incident, the dentist should immediately inform the patient of the cause and nature of the incident [14].

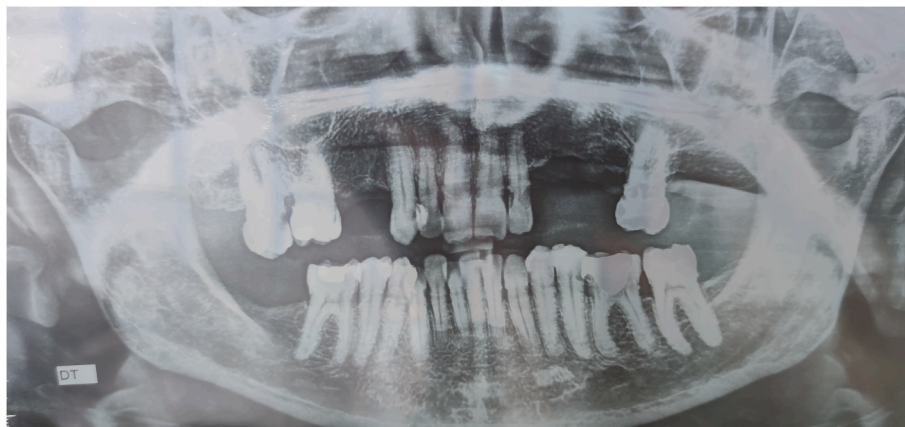
No standard therapy for management of the complication has been described. Treatment should center on the principles of minimizing swelling, controlling pain and preventing secondary infection [4].

The patient should be advised to take an analgesic if there is pain, avoid any heat application which might increase the size of the hematoma due to vasodilatation. Application of ice immediately after developing hematoma helps in minimizing the size by vasoconstriction and also has palliative effect [14]. Antibiotics are recommended only in cases where there is a high risk of infection spread; they are not necessary in minor cases [3]. However, in life-threatening situations or when a serious infection of adjacent tissues is expected, admission to a hospital should be considered in order to prescribe intravenous medication and to allow close monitoring and improve clinical outcomes of the patient [17].

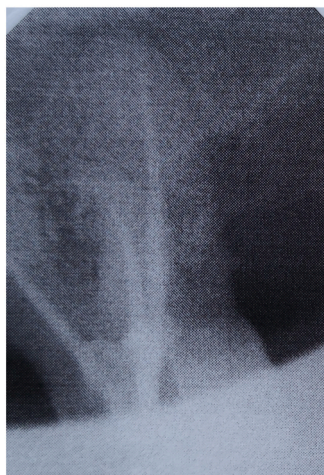
When the acute symptoms have resolved or decreased, root canal therapy may be completed. The use of a mild nonirritating irrigation solution (sterile saline, chlorhexidine gluconate) is recommended in such cases [3].

NaOCl is extremely cytotoxic. However, its established efficacy as a proteolytic solvent and track record justify its continued use as an intracanal medicament for endodontic therapy [4].

To avoid hypochlorite accidents, particularly hematoma like in our case, some recommendations must be followed such as [18] the use of special needles (caliber 27) to irrigate the conducts; set the needle at

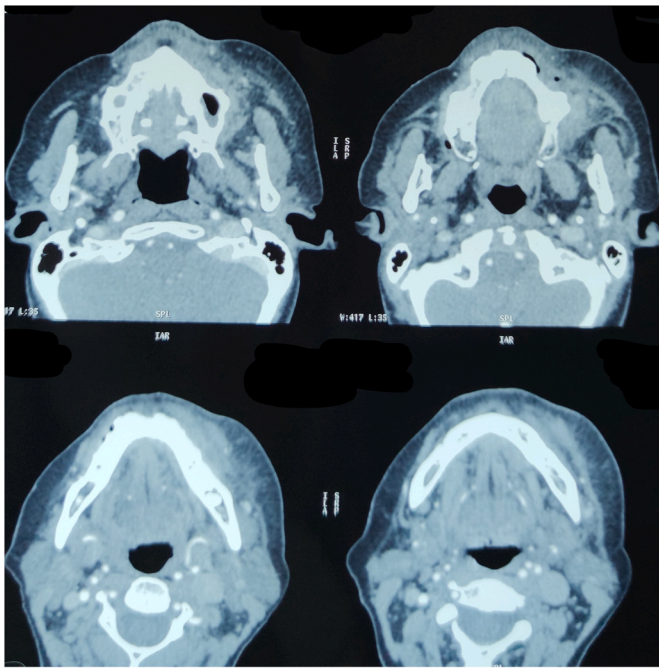


A

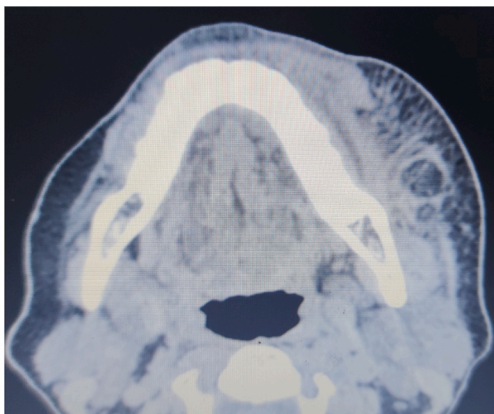


B

Fig. 3. a- Panoramic radiograph before treatment of tooth 26. b- Periapical radiograph done by the general dentist immediately after the canal root obturation and the hematoma incident.



A



B

Fig. 4. a and b: Axial views of computed tomography showing the extension of the hematoma to the left facial spaces.

least 2 mm short from the working length and avoiding the use of excessive pressure during irrigation to prevent the passage of hypochlorite to apical tissues; the use of a lower concentration of NaOCl and the use of chlorhexidine gluconate 2%, saline solution or ethylenediaminetetra acetic acid (EDTA) as alternative irrigants after the accident [2,3,18], or using “Intracanal controlled heating irrigation” to avoid iatrogenic damage [9,19].

Teeth with wide apices, resorption, and apical perforations must be given special attention. Clinicians should avoid over instrumentation beyond the tooth apex [4,12].

4. Conclusion

Although sodium hypochlorite accidents created by extrusion of the solution through root apices are relatively unusual and rarely life-threatening, they create important morbidity when they occur. This unusual case of a hematoma developing after routine endodontic treatment reminds us that this accident should be known, understood,



Fig. 5. Follow-up one week after the accident. Note the increase of the ecchymosis in the cheek, but the decreasing of the swelling, and the regression of the periorbital hematoma.

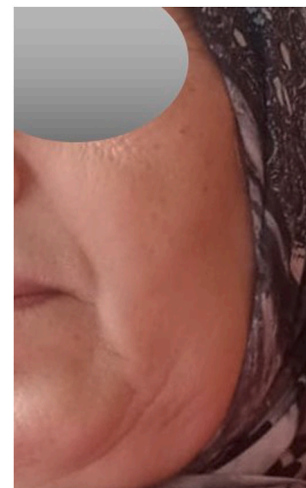


Fig. 6. Follow-up 3 weeks after the accident: Resolution of the hematoma.

and managed by the general dentist and the endodontists and that NaOCl solution should be handled with extreme care.

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Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request

Author contribution

All authors contribute to data collection, data analysis and interpretation, and writing the paper

Registration of Research Studies

Not applicable

Guarantor

Dr Benjelloun Laila

Declaration of competing interest

NONE

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.104484>.

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