Chemical facial cellulitis due to inadvertent injection of formalin into oral tissue space

Aditi Bector,[1] Pawandeep Sandhu Virk,[2] Gururaj Arakeri[3]

[1]Department of Pediatric and Preventive Dentistry, Bhojia Dental College, Baddi, Nalagarh H.P.; [2]Department of Pediatric and Preventive Dentistry, Desh Bhagat Dental College, Muktsar, Punjab; [3]Department of Oral and Maxillofacial Surgery, Navodaya Dental College and Hospital, Raichur, Karnataka, India

Abstract

This paper reports the accidental injection of formalin into oral tissue space, in an 8-year old child resulting in chemical facial necrotizing cellulitis and its management. The common practice of keeping formalin in local anesthesia vials should be avoided by dental clinics, to prevent such unfortunate incidents.

Introduction

Formalin is a 37% solution of formaldehyde in water, which is produced by oxidation of methanol, whereas the polymerized solid form is called paraformaldehyde.[1] Formalin is used in dentistry as a disinfectant, antiseptic and mainly as tissue fixative for preserving biologic specimens for histopathologic examination.[2] There have been a few incidents of accidental injection of formalin in dental patients due to use of empty vials for storage of formalin which can be readily mistaken for local anesthesia solution.[3,4] The accidental administration of formalin in to facial tissue spaces may lead to chemical cellulitis over 24 h. Fatty infiltration with necrosis of the area involved and osteolytic changes have also been reported.[5,6] This paper reports adverse effects and management of inadvertent injection of 40 percent formalin in pterygomandibular space in an 8-year old child leading to chemical facial cellulitis.

Case Report

A young boy aged 8 years was reported to a private dental practitioner for treatment of multiple carious lower primary teeth. After the clinical examination, extraction of lower teeth was planned. To extract teeth, the inferior alveolar nerve block on left side was achieved using local anesthetic solution containing 1.8 mL of 2% lignocaine hydrochloride with 1:80,000 adrenaline. Immediately after the block, the child started screaming and crying. Thinking it to be a compensatory cry by the child, the practitioner ardently administered the whole solution. The patient became quiet restless and started complaining of severe burning sensation over the left midface region. The solution was cross checked by the practitioner and it was found that by mistake the attendant had loaded 40 percent formalin instead of lignocaine which was kept in a similar vial for a biopsy specimen. Without delay, an Oral and Maxillofacial Surgeon and Pedodontists who are the authors of this paper were consulted for further management.

At first local anesthetic solution was administered in the same region to relieve pain and all vitals were recorded. Extra oral swelling was evident on left side of face. Dental procedure was postponed to be done at a later stage. Isotonic saline was injected in the region of nerve block using a large bore needle (18 gauge) and the content was aspirated. The maneuver was repeated for several times to eliminate the formalin from the tissue spaces. Intravenous saline infusion was started along with oral dexamethasone (5 mg) and patient was kept under observation. After 24 h, the size of swelling increased showing features of chemical facial cellulitis. Subsequently the patient developed trismus and peri-orbital edema indicating spread of cellulitis to adjacent spaces (Figure 1).

The following medicines were prescribed: i) amoxicillin 250 mg daily; ii) metronidazole 200 mg three orally times daily for 5 days along with analgesics, vitamin B complex and chlorhexidine mouthwash. The oral dexamethasone was continued twice daily for 5 days with tapering off the dose. After 4 days, when patient was able to open the mouth, after improvement in symptoms, an ulcer was noted at the site of injection (Figure 2). It was decided to wait and watch the progress of the lesion as the condition was improving. The affected area was regularly irrigated with normal saline and povidone-iodine (1% w/v) solution. Antibiotics were continued for another five days and patient was kept on follow up every alternate day. After 15 days, the extra oral swelling started reducing progressively (Figure 3) and the site of ulcer showed signs of healing. Wound swabs showed negative results for any microbes throughout the course. At the end of four weeks, the patient was completely comfortable with no signs of paresthesia and no functional deficit. Mucosal wound healing was complete without any complication (Figures 4 and 5).

Correspondence: Aditi Bector, Department of Pediatric and Preventive Dentistry, Bhojia Dental College, Baddi, Nalagarh H.P., India.
Tel.: +91.9815010137.
E-mail: draditibector@gmail.com

Key words: Case report; formalin; injection; management.

Contributions: all authors have done substantial work. The case was managed by Dr. Aditi Bector and Dr. Pawandeep Sandhu under the guidance of Dr. Gururaj Arakeri. This work is promoted by Dr. Gururaj Arakeri, editorial board member, Journal of Clinics and Practice.

Conflict of interests: the authors declare no potential conflict of interests.

Received for publication: 30 August 2015.
Revision received: 6 December 2015.
Accepted for publication: 17 December 2015.

This work is licensed under a Creative Commons Attribution NonCommercial 3.0 License (CC BY-NC 3.0).

©Copyright A. Bector et al., 2015
Licensee PAGEPress, Italy
Clinics and Practice 2015; 5:810
doi:10.4081/cp.2015.810

Discussion

Accidental injury from dental chemicals may occur with a number of substances.[6] Formalin is a chemical commonly used for tissue preservation in dental office. It is also used for preserving extracted teeth, which are for preclinical program, by dental trainees. There have been a few reports of inadvertent injection of formalin for local anesthesia into facial tissue spaces.[5-9]

Lian and Ngeow[8] (1998), Gupta *et al.*[9] (2011), Arakeri and Brennan[5] (2012), Vaka *et al.*[4] (2014), and Dandriyal *et al.* (2014)[6] have reported similar cases of accidental administrations of formalin during dental procedures.[5,7,8] Though the extra-oral swelling in our case exceeded that described in any of these cases.

Lian and Ngeow[8] reported a case of formalin mishandling in lower third molar surgical procedure. Formalin was used to irrigate the surgical site instead of normal saline. The patient was managed by intravenous ranitidine 50 mg, 4mg intravenous dexamethasone (6 hourly for 1 day), 50,000 units of intravenous penicillin G (6 hourly), IV metronidazole 500 mg (8 hourly). Gupta *et al.*[9] treated their patient only with medication without any surgical intervention. The patient was continuously monitored in emergency ward over a period of 72 h. At the

local site of formalin injection 10 mg/mL of triamcinolone acetonide was administered daily one time for 5 days. Antibiotics (amoxicillin with clavulanic acid and metronidazole, 8 hourly) were given for 5 days and tapering intravenous dexamethasone (8 mg) dose was administered for 3 days. In the report of Arakeri and Brennan,[5] the patient was treated by a tube drain passed in to the tissue spaces where formalin deposited through a stab incision. To dilute the formalin in tissue spaces, normal saline was injected through tube drain and the content was aspirated immediately. This was repeated several times and a corrugated rubber drain was left *in situ* after loose wound closure. Vaka RB *et al.*[4] treated a similar condition by aspirating injected formalin through the buccal vestibular incision and placing a corrugated drain *in situ*. They supported the patient with systemic antibiotic and analgesic therapy, to ease the trauma. Dandriyal R *et al.*[6] performed surgical debridement and excision of necrotized muscle attachment under general anesthesia.



Figure 1. Presentation of chemical facial cellulitis.



Figure 2. Intra oral ulcerated lesion at the site of formalin injection.



Figure 3. Reduced swelling on 14th post-treatment day.



Figure 4. Complete healing of ulcer on 4th post-treatment week.



Figure 5. Complete reduction of extra oral swelling on 4th post-treatment week.

After the careful scrutiny of existing literature on management of accidental formalin injection into peri-oral tissue spaces, we found that aspiration of injected content followed by systemic antibiotic therapy with early intravenous corticosteroid administration is crucial in preventing any further complication.

In present case, we followed a considerably similar treatment protocol. Immediately after the incidence, normal saline was injected into the tissue spaces to dilute formalin to prevent tissue necrosis.[6] Simultaneously the diluted formalin content was aspirated back through the same needle, which is considered to decreases the neurotoxic effects of formalin. Our patient showed no paresthesia on subsequent follow-ups.

Accidental injection of formalin is considered to be associated with malpractice at three stages. Foremost, usage of disposable syringes instead of cartridges for administration of local anesthesia is the major cause of such unfortunate incidents. Secondly, attendants who are not educated/trained should not be hired as they are not well acquainted with different chemicals.

Lastly, reuse of local anesthetic bottles to store dental chemicals and biopsy specimens. A recent survey[10] demonstrated a significant (58.5%) reuse of local anesthetic bottles by practitioners of India. Reusing local anesthetic bottles for storage of dental chemicals, should be avoided to deter such incidents.

To conclude, extreme care and precaution should be taken while handling clear chemical solutions such as formalin, alcohol, acrylic monomer, hydrogen peroxide, local anesthesia, and sodium hypochlorite, which are frequently used in dental office. It is highly recommended to store these solutions in properly labeled containers.

References

1. Zararsiz I, Meydan S, Sarsilmaz M, et al. Protective effects of omega-3 essential fatty acids against formaldehyde induced cerebellar damage in rats. Toxicol Ind Health 2011;27:489-95.
2. Hilbert G, Gruson D, Bedry R, Cardinaud JP. Circulatory shock in the course of fatal poisoning by ingestion of formalin. Intensive Care Med 1997;23:708.
3. Saujanya KP, Ali FM, Japati S, Srivalli L. Dental negligence: case reports of accidental formalin injection and chemical burn caused by sodium hypochlorite. J Dental Oro-facial Res 2014;10:2.
4. Vaka RB, Chidambaram R, Nidudur SR, Reddy GC. Accidental injection of formalin: case report of severe negligence in dental

office. J Clin Diagn Res 2014;8:ZL01-2.
5. Arakeri G1, Brennan PA. Inadvertent injection of formalin mistaken for local anesthetic agent: report of a case. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:581-2.
6. Dandriyal R, Giri KY, Alam S, Singh AP. Accidental intraoral formalin injection: a rare case report. Clin Pract 2014;4:686.
7. Arakeri G, Brennan PA. Accidental injection of formalin into oral soft tissue: are medications the only treatment? J Oral Maxillofac Surg 2012;70:755-6.
8. Lian CB, Ngeow WC. Formalin mishandling during wisdom tooth surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;86:630.
9. Gupta DS, Srivastava S, Tandon PN, et al. Formalin-induced iatrogenic cellulitis: a rare case of dental negligence. J Oral Maxillofac Surg 2011;69:e525-7.
10. Rooban T, Rao UK, Joshua E, Ranganathan K. Survey of responsible handling of local anesthetic in Indian dental operatory. J Forensic Dent Sci 2013;5:138-45.

Non commercial use only