A RARE INCIDENT OF INTRAORAL FORMALIN INJECTION

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ABSTRACT

Formalin is a hazardous chemical that needs careful handling and special storage. It is generally used in dentistry because of its disinfectant and fixative properties. Negligence on part of the dental professionals by accidentally injecting formalin rather than the original anesthetic can lead to internal tissue damage and also may induce a life threatening situation. The general practice of storing formalin in the original anesthetic bottles and being supported by untrained assistants is the most common reason for this mishap to happen. The operating dentist should be careful and apprehensive of the medicines and chemicals available in the operatory and re-check the solution being injected in the case as to not land up in complications because of the negligence. Successful management can be done by cautious debridement and empirical medicine therapy.

KEY WORDS

Formaldehyde; Formalin; Local Anesthesia

INTRODUCTION

Formaldehyde, a simple aldehyde with molecular formula CH_2O at room temperature, is a colorless gas having inflammable properties with irritating pungent odor. It is a highly water-soluble reactive chemical that has a short biologic half-life. The aqueous 35–40% solution of formaldehyde mixed with water is known as formalin. Formalin contains a stabilizer usually 10–15% methanol and 48–50% water. Both formaldehyde and formalin have the same chemical formula.[1] Formalin is commonly used as a disinfectant and as a tissue fixative for preserving biological specimens for histopathological examinations.[2] Local anesthetic injection is delivered with standard protocols to perform various dental procedures.[3] This case report describes a case of accidental injection of formalin instead of local anesthetic into the buccal mucosa in a 65-year-old man during long buccal nerve block for intralesional steroid injections.

CASE REPORT

A case of accidental formalin injection instead of local anesthesia prior to performing an intralesional steroid injection in patient with oral submucous fibrosis. A 65-year-old male clinically diagnosed with oral submucous fibrosis reported to the department of Oral Medicine and Radiology, College of Dental Surgery, B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal, for intralesional injection with steroids. The informed consent regarding the procedure was obtained from the patient. Intralesional injection was to be performed in the bilateral buccal mucosa under local anesthesia. Long buccal nerve block was given. Within a couple of minutes the patient started complaining of sharp burning pain sensation and severe discomfort on the injection site. The procedure was aborted and was reported to the faculty members. Patient was monitored. Blood pressure was 120/80mmHg, pulse was 75 beats/minute, respiratory rate was 16 breath/minute and temperature was afebrile to touch. Patient was reassured. The vial of the local anesthetic agent was checked for the expiry date. Initially it was assumed that it was a case of hypersensitivity reaction to local anesthesia. Antihistaminic drug was given for one week and patient was recalled after 1 week. After sometime while loading the local anesthesia from same vial for another procedure it was found that the seal of local anesthetic bottle was broken (Fig: 1). After opening the rubber cup, it was found that the vial thought to contain a local anesthetic agent was actually pungent smelling clear liquid which was formalin. After knowing that it was an accidental injection of formalin, the patient was immediately traced and contacted.

Figure 1: local anesthesia bottle with its original label. Sealed (right) broken seal (left side)

On the next day the patient presented with bilateral swelling of the face near the angle of mandible. Swelling was diffuse with size of 4 cm*4 cm with normal overlying skin which was tender on palpation with no any discharge. As the mouth opening of the patient was 20 mm due to preexisting oral submucous fibrosis, intraoral examination could not be done properly.

Figure 2: Clinical picture of patient

Figure 3: Intraoral picture of right buccal mucosa showing ulcer after accidental formalin injection.

Figure 3: Intraoral picture of left buccal mucosa showing ulcer after accidental formalin injection.

Systemic corticosteroid and antibiotic therapy was given along with analgesics. Patient was given instructions to report the next day for periodic monitoring. On next follow-up, swelling of the face was decreased and on careful intraoral examination there was a single well defined ulcer of size 5mm*3mm with slough and necrosis of surrounding tissues was found at the injection site without pain, pus or blood discharge (Fig:2, 3). Curettage was done thoroughly and irrigation was done with chlorhexidine mouthwash (0.2%). Patient was recalled daily for 1 week for irrigation and evaluation of the ulcer. At the end of one week swelling subsided and the size of the ulcer was decreased. Ulcer was completely healed in two weeks. Subsequent monitoring of the patient was conducted via phone for one month, during which there were no reported complaints.

DISCUSSION

Patients accidentally exposed to formalin into the intravascular compartment have developed acute hemolysis. In vitro studies revealed that formalin has direct oxidative action on red blood cells. Though, cases of intentional consumption have presented with fully different set of clinical features like orofacial, pharyngeal and gastrointestinal symptoms like corrosive gastritis with hematemesis, dysphagia and inhalational pneumonitis with cough, dyspnea, cyanosis and cardiac arrhythmias. Humans exposed to excess of formaldehyde, show several symptoms including respiratory irritation; watery, itchy eyes; itchy, watery, or stuffy nose; dry or sore throat; and headache.[3] In Dentistry there are numerous clear solutions like sodium hypochlorite, normal saline, original anesthesia, hydrogen peroxide and formalin used for different purposes. They all needs special storage and handling.[4]

Reasons for Accidental Injection

1. Storage of dental chemicals in local anesthetic bottles or unlabeled containers.
2. Repeated use of empty local anesthetic bottles for conserving and transferring biopsy tissue samples.
3. Dentists supported by unskilled assistants.
4. Use of disposable syringes rather than cartridges for administration of local anesthetic.

Guidelines to help, manage and treat complications proposed by Khandelwal et al. 2022

1. Terminate the ongoing dental treatment procedure
2. Monitor vital signs
3. Don't horrify, report the tragic incident to the patient and gain written consent form.
4. Initiate I.V. prophylactic antibiotic regimen (1.2 gm Amoxicillin plus Clavulanic acid and 500 mg Metronidazole) and I.V. Ranitidine 50 mg.
5. Administer local anesthetic solution precisely to relieve pain, if needed.
6. Place tube drain through vestibular incision into tissue space at the affected region of the nerve block.
7. Wash with isotonic saline, aspirate the fitted contents and therefore, reduce the neurotoxic effects of formalin.
8. Repeat the maneuver several times to exclude as much of the fitted solution as possible from the tissue spaces.
9. Place corrugated rubber drain into tissue space in- situ for nonstop drainage of the chemical solution.
10. Administer early I.V. (8 mg Dexamethasone) as well as original submucosal (2 mL of dexamethasone- 4 mg/ mL) corticosteroids.
11. Monitor patients at the emergency room/ recovery room for minimal four- six hours and discharge only if vitals are within normal limits.
12. Systemic antibiotics, analgesics and other medications should be prescribed.
13. Diurnal follow up check-up is obligatory. Hospitalization should be advocated in case of adding swelling, tissue destruction/ necrosis or airway obstruction.
14. Periodic monitoring of the injected site is needed; the affected point should be completely irrigated with povidone iodine (1 weight/ volume) and normal saline solution and corticosteroids should be administered daily at point of injection locally for five days.
15. Scrupulous debridement and surgical excision of necrotic tissue/ muscle under general anesthesia or local anesthesia should be performed, if needed.

Precautions to prevent any accidental Injection of chemicals intraorally

1. Proper labelling and separate storage and shelving should be done for each of similar chemicals.
2. The local anesthetic solution should be kept and stored independently from similar sharp colorless solutions. There should be one predefined area where only local anesthetic bottles are kept.
3. All chemicals that aren't used for injection must be physically removed from clinical areas.
4. Practice of reusing empty local anesthetic bottles for storage of dental chemicals should be discouraged to discourage similar incidents.

5. Local anesthetic bottles, if at all to be reused, should not be used with labels. It should be removed instantly and must retain a new well-stressed label of chemical stored.
6. All the staff working in dental clinics should have a thorough introduction and knowledge of dental drugs and chemicals used in the clinics and their severe side effects.
7. Clinicians should check and confirm the contents of the syringe before injecting if it's loaded by the assistant or the dentist himself should load the syringe.

In future to circumvent similar circumstances, the specific protocols need to be cultivated by the dental practitioners, which have been improved from the regretful episode.[5]

i) Original anesthetic bottles, if at all to be reused for conserving specimens, must retain a label.
ii) Unskilled assistants shouldn't be entertained to work in a dental operatory.
iii) It's extremely safe to keep the dental chemicals away from the clinical area, if they aren't indicated for injection purpose.

CONCLUSION

In our case though accidental administration of formalin occurred, the patient survived without any systemic complications. This could be because, the amount of formalin injected was very low. In developing countries, single use cartridges is not used generally due to financial reason. We generally use the original anesthetic solution vial to store other solutions. When the refilled solution is clear, it creates confusion. In case we are reusing the vial, it should be well tagged about the content. Solution not used for injection should be kept away from clinical area and employing untrained staff as an assistant should not be done because a small mistake from their side can create a great trouble to both clinician and patient.[6]

So to prevent similar incidence in future, dental assistants should be trained in handling dental drugs and chemicals. Dental students should be educated on drug safety and toxicity of chemicals used in dental operations. Continuing dental education programs should be conducted for awareness among dentists regarding similar mishaps and ways of avoiding the same incident.[7]

PATIENT CONSENT

The written consent was obtained from the patient.

CONFLICT OF INTEREST

None

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