
Accidental benzalkonium chloride (zephiran) injection

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We report a case of an accidental injection of benzalkonium chloride (zephiran) instead of a local anesthetic agent during a tooth extraction. The sudden development of chin and neck swelling led to dyspnea and the patient lost consciousness. She was sent to an emergency clinic by her dentist immediately. After medical treatment for 20 days, the necrotic tissue was debrided and a gingival sulcoplasty was performed. Healing was uneventful. (**Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;112:e103-e105**)

Benzalkonium chloride (zephiran) is an ammonium compound used in the medical field for antiseptics of skin and mucous membranes and as a disinfectant in surgery, gynecology, urology, ophthalmology, otorhinolaryngology, and general practice.¹ It also may be used as a disinfectant for hospital utensils and other environmental surfaces and for disinfection and storage of ampules, thermometers, metal instruments, and catheters.² In the present day it is not used for sterilization of surgical instruments.³

Inadvertent use of drugs is an unacceptable mistake in the medical field but unfortunately it has been reported in the literature to a considerable degree. Misuse of solutions and drugs may lead to local and systemic complications. Signs of systemic toxicity of zephiran include restlessness, apprehension, weakness, confusion, dyspnea, cyanosis, collapse, convulsions, and coma.⁴ This article presents a case in which zephiran was inadvertently injected instead of anesthetic solution, resulting in dyspnea and loss of consciousness in a short period and severe oral mucosa necrosis in the following days. This case report is unique because it is the first to report on an accidental benzalkonium chloride injection in dentistry and should remind the dentist to check pharmaceutical agents carefully before administering them to patients.

CASE REPORT

A 33-year-old woman attended a private dentist complaining of pain in the right mandibular first incisor. The dentist decided to extract the tooth. On administering local anesthesia into the mandibular vestibular mucosa, sudden pain developed and the lower lip, chin, and neck swelled immediately. The patient developed dyspnea and lost consciousness. The dentist realized the mistake and sent the patient to an emergency clinic immediately with a note stating that she had been given an accidental injection of benzalkonium chloride into the oral mucosa instead of local anesthetic. We do not know how much solution was injected, because the dentist did not state this in the note.

In the emergency room, the neck was swollen and dyspnea was still present. Her body temperature was normal and there was no change in blood pressure. We administered 100 mg prednisolone intravenously (IV) and 2 mL pheniramine maleate (IV) for their effects of reducing edema and admitted the patient to the dermatology department.

In the dermatology department, the drug administration protocol for 14 days was as follows:

- Pheniramine maleate, IV, twice a day: for drug-induced toxic reactions and preventing from possible angioedema
- Methylprednisolone sodium succinate, intramuscularly, daily: for edema-reducing effect
- Lansoprazole 30-mg capsule, daily: to prevent the stomach from producing gastric acid

The swelling continued to increase for 4 days and resolved gradually over the next 10 days. However, on the fifth day, necrotic lesions appeared in the mouth. The dermatologist decided to start chlorhexidine mouth gargles twice a day for the lesions. On day 15, the patient appeared normal medically but the necrotic lesions in the mouth had not improved. According to antibiogram test results and after consultation with the infection department, broad-spectrum antibiotic therapy was started.

The patient was referred to our clinic 20 days after the accidental benzalkonium chloride injection. The clinical evaluation revealed a necrotic area of alveolar bone and surrounding erythematous mucosa, starting from the vestibule of tooth

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Fig. 1. Intraoral view 20 days after the accidental injection. The mucosa and bone necrosis are obvious.

41 (The Federation Dentaire Internationale Numbering System [FDI]) and extending to the molar region on the left side (Fig. 1). The patient also had paresthesia of the vestibular mucosa of teeth 32 and 33, and the left lower lip. Given the presence of necrotic tissue and the large affected area, we recommended surgical treatment. Under local anesthesia, a large incision was made between tooth 41 and the left molar region (Fig. 2). The necrotic tissue was debrided and a gingival sulcoplasty was performed (Fig. 3). Healing was uneventful. The paresthesia disappeared completely within 3 months.

DISCUSSION

The accurate use of medicines is a paramount consideration. The dental literature includes several case reports about the accidental injection of different solutions; most involve sodium hypochlorite (NaOCl) injection instead of a local anesthetic agent.^{5,6} To our knowledge, this case report is the first report of accidental benzalkonium chloride injection and the related complications.

Benzalkonium chloride is an effective antiseptic and disinfectant commonly used as a skin antiseptic and floor or hard-surface cleaner. It is also one of the most commonly used preservatives in pharmaceutical products (eg, eye drops, nasal drops) in varying concentrations and is known to have toxic effects.⁷ Systemic toxic effects are related to the dose absorbed via the mucosa.⁸ In humans, a fatal dose is 100 to 400 mg/kg orally or 5 to 15 mg/kg parenterally.⁸ Given its widespread usage and easy accessibility, poisoning and death have been reported.^{1,8} In dentistry, benzalkonium chloride is used as a cavity disinfectant, although not commonly. Although it has been used to sterilize or disinfect medical and dental instruments in the past, current opinion holds that it is not suitable for this purpose.³ We believe that the dentist who caused the complication used benzalkonium chloride as a cavity



Fig. 2. Intraoperative view after the mucosal incision. The tissue damage caused by the benzalkonium chloride injection extends from the anterior mandible to molar area.



Fig. 3. Primary closure after debriding the necrotic tissue.

disinfectant and kept the solution in a dental syringe. This mistake caused the complication.

Possible reasons for using incorrect drugs include keeping solutions in identical containers, not checking carefully before injecting, and working with inexperienced staff. The necessary procedures to follow in the event of the accidental injection of cytotoxic agents are well documented in the literature. First, it is crucial to examine the patient closely and provide all necessary care. Second, the use of potent anti-inflammatory drugs is recommended immediately after the injection.⁶ If there is any clinical evidence of wound infection or if necrosis is expected, the literature supports the administration of antibiotics.⁹⁻¹¹ In our case, the doctors treating the patient in the dermatology department thought there was no need to start antibiotics initially because there was no sign of wound infection and because the patient was under observation in the hospital. However, on day 15, infected necrotic areas became distinctive so antibiotic therapy was started.

Finally, it should be decided whether surgical treatment of the damaged tissue is necessary. Surgical intervention depends on the nature and severity of the incident. As in our case, surgery is required for deep necrosis, including the alveolar bone, whereas conservative treatment is usually sufficient for superficial necrosis with a good blood supply.

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