An extreme oral chemical burns caused by an accidental contact with sodium hydroxide in a young adult: A case report

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Abstract

Oral chemical burn occurs when chemical substances such as acid or alkaline come in contact with the mouth, causing burns and ulcers on the oral mucosa. Sodium hydroxide (NaOH) is a strong alkaline chemical substance that is capable of penetrating very deeply, resulting in extensive tissue damage. The aim of this case report is to describe the extreme oral chemical burns caused by accidental contact with NaOH in a young adult. A 30-year-old male patient was admitted to the hospital as he had an accidental contact 7 h ago, with NaOH, while cleaning the bathroom. The patient was referred to the Oral Medicine Department due to the complaint in the oral cavity. The diagnosis was made based on history, clinical, and X-ray examination. He was treated with a compounded mouthwash containing diphenhydramine and sucralfate, applying the lips with a gauze soaked in 0.9% NaCl, and then continued with hyaluronic acid mouthwash. Intraoral examination showed there were very painful multiple ulcerations, yellowishwhite areas, and erythema throughout the oral mucosa. He complained of pain upon swallowing, difficulty in speaking, mouth opening, eating, and drinking. All oral lesions healed approximately within 2 months and there was ankyloglossia but did not present microstomia. The extreme oral chemical burns caused by NaOH in a young adult is an uncommon condition. Proper management of chemical burns will accelerate the healing process, improve quality of life, and is life-saving. Safety precautions when using chemical substances are needed to avoid chemical burns.

Keywords: Ankyloglossia, hyaluronic acid, oral chemical burn, sodium hydroxide

Introduction

Trauma to the oral mucosa can be caused by chemical, thermal, physical, electrical, or by radiation which can produce oral burns.¹⁻³ Oral soft tissue injuries can be unintentional (accidental or iatrogenic) and intentional (self-inflicted).²⁻⁴ Chemical injuries of the oral soft tissues may be caused by exposure to various types of chemical substances such as acids, alkaline (bases), organic, and non-organic materials, which can produce chemical burns from mild to severe.¹⁻⁴ The severity of chemical injury to the oral mucosa also depends on pH, the composition and concentration of the substance, the quantity of the agents, duration of contact with the tissue, the ability to penetrate the tissue, and its mechanism of action.²⁻⁷

Chemical burns of oral mucosa are an uncommon condition, but chemicals can easily get in contact with the oral soft tissue causing serious injury.⁸ In this article, we have reported and described an unusual condition of an extreme chemical burn in the oral cavity caused by accidental contact with an alkaline chemical (sodium hydroxide [NaOH]) in a young adult who later developed ankyloglossia.

Case Report

A 30-year-old male patient was admitted to the emergency unit, because of accidental contact with drain cleaners (NaOH) while he was cleaning the bathroom 7 h ago. After the patient accidentally contacted the lye powder, there was foam coming out of his mouth and he felt pain. First, he went to the nearest hospital and then was referred to General Hospital and he got intensive care, gastric irrigation and vital signs were maintained. Initial vital signs were in normal values. No extraoral burns or respiratory dysfunction was identified. Oropharyngeal examination at the ear, nose, and throat (ENT) department, found hyperemic tonsils, edema of
the uvula, and hyperemic pharynx. Immediately after which, the ENT Department rehydrated him with Ringer lactate as well as put him on antibiotic, corticosteroid, and nutrition management via nasogastric tube. To evaluate and observe the injury, Antero Posterior (AP) of the thorax and Soft Tissue Neck AP/Lateral (STL AP/Lat) examination were done. AP thorax photo as well as STL AP/Lat photos showed no abnormality [Figure 1a and b].

2 days later, the patient was referred to the Oral Medicine Department for the intraoral lesions management and it was diagnosed as oral chemical burns caused by chemical agent. Extraoral examination showed there were erosive lesions which looked erythematous and crusted, they were hemorrhagic with tendency to bleed at the lower and upper lip [Figure 2a]. Intraoral examination revealed painful multiple ulcerations, yellowishwhite and erythematous areas [Figure 2b-j]. The patient felt pain in swallowing, difficulty in speaking, mouth opening, eating, and drinking. At this visit, the oral ulcerations were treated with a compounded mouthwash containing diphenhydramine and sucralfate (3 times daily for 5 days), and the lips were moistened with gauze soaked in 0.9% NaCl. The patient was hospitalized for 3 days and the treatment was continued as an outpatient.

The patient routinely came to control every week and at each visit, the lesions seemed to be improving. During the 2nd–7th visit, the patient was treated with hyaluronic acid mouthwash (3 times daily) and multivitamin. 1 week later (the 3rd visit) the healing began to appear on the upper and lower lip [Figure 3a] and upper labial mucosa [Figure 3b], the pain had reduced, and that the patient was able to eat porridge. Healing was seen on the right buccal mucosa [Figure 3c] and the hard palate [Figure 3d] (the 4th visit), on the left buccal mucosa [Figure 3e] (the 5th visit), then at the 6th visit, lesions at the lower labial mucosa [Figure 3f] were healed, but there was a traumatic ulcer at the left lateral of the tongue which was caused by the sharp edge of the carious left mandibular molar tooth [Figure 3g] and further this tooth was extracted. At the 7th visit (day 56) right lateral of the tongue [Figure 3h] and the floor of the mouth [Figure 3i] had already healed, there was a non-painful single ulcer on the left lateral of the tongue and the lingual frenulum of the tongue was shortened which made difficulty in moving the tongue. All oral lesions were healed in approximately 2 months, and the only remaining abnormality was scar contracture (ankyloglossia) at the tongue. The healing process slowly started from the small damage area followed by the larger areas.

Discussion

This case report is about a young adult patient with an intraoral chemical burn which was caused by accidental short contact with alkaline agent NaOH while he was cleaning the bathroom. NaOH also known as lye and caustic soda are strong alkaline (bases) with a pH >11.5 that present as household cleaning fluids. In general, ingestion of chemicals is not uncommon due to strong chemical smells and tastes, but chemical ingestion may be usually accidental in children, the elderly, or patients with dementia, patients in benzodiazepines for psychological disorders, and in suicide attempts. In this case, an intraoral chemical burn caused by accidental contact with NaOH happened in a young adult man without any psychological problems or suicide attempt as the underlying background.

The diagnosis of oral ulceration due to chemical trauma usually depends on clinical history and features. In this patient, the diagnosis of chemical burns could be made faster because the patient was conscious and could tell the history of contact with NaOH in the oral cavity. Initial screening (thorax AP and STL AP/Lat radiographs) was performed to assess the depth and extent of the chemical burn.

Prompt treatment is essential to minimize tissue damage. Several managements for acute stage of chemical burns involve prevention of further damage by as much removal of the harmful agent as possible, complete and thorough assessment, controlling the acute inflammatory reaction, providing treatment for the healing process as well as prevention and management of complications. In oral medicine department, the initial

Figure 1: (a) Antero-posterior (AP) thorax radiography; (b) Soft tissue neck AP/Lateral radiography
management of oral cavity chemical burns was by applying the lips with a gauze soaked in 0.9% NaCl, and using a compounded mouth rinse of diphenhydramine and sucralfate in order to management of pain, protect the mucosa, reducing inflammation, and hastening mucosal healing. During the second visit until the last visit, the patient was treated with hyaluronic acid mouthwash in order to accelerate the tissue healing process. Hyaluronic acid has anti-inflammatory properties that influence

Figure 2: (a-j) Clinical features at the first visit

Figure 3: (a-i) Differences in the duration of healing process. (a) Upper and lower lip healed in 14 days; (b) Upper labial mucosa healed in 14 days; (c) Right buccal mucosa healed in 21 days; (d) The hard palate healed in 21 days; (e) Left buccal mucosa healed in 28 days; (f) Lower labial mucosa healed in 42 days; (g) Left lateral of the tongue showed ulceration and caries of mandibular 1st molar (arrow) made traumatic injury at the left lateral of the tongue (in 42 days); (h) Right lateral of the tongue healed in 56 days; (i) Floor of the mouth healed in 56 days and lingual frenulum become shorten (arrow) and made difficulty to move the tongue.
the healing process, preventing the conversion of wounds and formation of hypertrophic scars or keloids, and when hyaluronic acid is applied to wounds, there is increased water retention, which supports a suitable environment for collagen and elastin formation, and permits the cells to proliferate and differentiate, accelerating the healing process. However, another study showed that rapid administration of dexamethasone can significantly reduce the frequency and severity of strictures as well as the severity of burns.

At the 6th visit (day 42), the lateral part of the tongue had already healed, but the patient noticed that the tongue was difficult to be moved. Intraoral examination found a shortened lingual frenulum and the tongue stuck to the floor of the mouth. Long-term complications resulting from intraoral burns caused by caustic soda are microstomia and ankyloglossia; due to scar contraction in the oral cavity. In view of the extent of burn injury in the oral cavity, this patient was considered to be at high risk of developing microstomia and ankyloglossia but in this patient, the injury resulted in scar contracture leading to ankyloglossia without microstomia. Stricture formation, such as stenosis of the oral musculature and extraarticular ankylosis, microstomia, and contracture of the tongue and trismus, may lead to the obliteration of the lingual and buccal sulci and failure of normal tongue movement, resulting in difficulty in maintaining oral hygiene, speech, and mastication. The treatment of severe injury resulted in scar contracture leading to ankyloglossia without microstomia. Proper management of burns will promote healing, improve quality of life and save the patient. Some precautions can be taken to prevent chemical burns, such as providing information to put chemical substances out of reach of children or elderly patients who are at higher risk as well as to follow safety precautions when using chemical agents.

Conclusion

Extreme burns due to an alkaline chemical NaOH only in the mouth in a young adult is an uncommon condition. Due to extensive damage in the oral cavity, the healing process occurred slowly and resulted in ankyloglossia without microstomia. Proper management of burns will promote healing, improve quality of life and save the patient. Some precautions can be taken to prevent chemical burns, such as providing information to put chemical substances out of reach of children or elderly patients who are at higher risk as well as to follow safety precautions when using chemical agents.

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Conflicts of Interest

The authors declare no conflicts of interest.

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