CASE REPORT

AN ATYPICAL CAUSE OF ALKALI CHEMICAL BURN: A CASE REPORT

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SUMMARY. It has already been reported that wet ash turns into a strong alkali agent, which can cause full-thickness skin burns. A case is presented which has the particularity of sustained, self-inflicted contact with wet ash. The coal used was the self-igniting type normally used for burning scented weed or for smoking the hubbly bubbly or shisha pipe.

Keywords: chemical burn, alkali, wet ash

Introduction

Chemical burns requiring surgery are relatively rare, about 10-20% of them leading to burn unit admissions. Most serious chemical burns encountered occur as a result of industrial accidents in the workplace or with household chemical products. The severity of chemical burns is widely dictated by the substance responsible, the percentage of burns, the concentration, time since exposure, and the subsequent management of regional skin properties. Acids and alkalis can be defined as caustics, which cause significant tissue damage on contact with the skin.1 Most acids produce a coagulative necrosis by denaturing proteins, forming a coagulum (i.e. eschar) that limits the penetration of the acid. By contrast, alkali typically produces a more severe injury known as liquefactive necrosis. This involves the denaturing of proteins as well as saponification of adipose tissue, which does not limit tissue penetration. Alkalis cause deeper burns as they continue to penetrate the skin following initial contact. The mainstay of initial management of all chemical burns remains the same. Early establishment of severity, removal of contaminated clothing, and copious irrigation are all paramount, regardless of the type of agent encountered.

Accidental contact with alkali agents in the domestic environment is a common cause of chemically induced burns. On the contrary, self-inflicted contact with seemingly harmless chemical agents remains a rare occurrence.2 Here we present a rare case of a self-inflicted chemical alkali burn due to the use of an ancient home remedy technique employed for pain relief.

Case report

A 48-yr-old female patient presented to our hospital’s emergency department with burns in the left wrist. The lady had an ongoing problem of chronic wrist pain on the affected side. The night of the injury she had been using an ancient home remedy allegedly passed down from one generation to the next. This consisted of a concoction of coal ash, water, salt, and olive oil, which had to be turned into a paste and applied locally with the help of a bandage over the painful area. Our patient went to sleep having applied the remedy, only to awaken two hours later with a sensation of burning pain in the wrist. She took off the dressing and washed off the concoction with cold water under the tap. She later on self-presented to the emergency department 14 hours after the injury with ongoing pain, having realized that her skin was burned.

In view of the unusual mechanism of the injury, the patient was immediately referred to the burns team on site. On physical examination she was found to have full-thickness circumferential burns in the left wrist (Fig. 1, A-D), her hand was swollen but there was no neurovascular involvement. The pH value measured using litmus paper at the level of the burn was 14. The initial management con-
sisted of continuous washout with water, pain relief, and elevation of the arm to relieve swelling.

The patient was later taken to the operating theatre, where she underwent complete surgical debridement of the lesion under general anaesthesia (Fig. 2, E-H). Excision of necrotic tissue was performed using a diathermy knife and good haemostasis was achieved with spray application of human surgical sealant Quixil®. The defect was reconstructed using a 1-mm thick sheet of dermal regeneration collagen elastin matrix MatriDerm® and covered with a split-thickness skin graft (Fig. 3, A-D). The graft was obtained from the left anterior mid-thigh using a Stryker pneumatic-operated dermatome and, following manual fenestration, it was secured with the aid of Histoacryl skin glue. The first graft check at seven days was satisfactory and the patient was discharged home with out-patient follow-up. Although missing two initial follow-up appointments, the patient was subsequently reviewed eight months post-operatively, when it was found that the MatriDerm® reconstruction had matured well, with a supple and robust skin cover (Fig. 4, K-N). Both the patient and the surgeons were satisfied with the functional and cosmetic outcome.
Discussion

Coal ash is a strong alkaline chemical that is typically rich in calcium, potassium, magnesium, phosphorus, manganese, chlorine, and sulphur in varying degrees of strength and concentration. Mixed with water, the calcium and potassium carbonates present in coal are ionized and form a potent alkali solution. Direct contact with this agent causes alkali chemical burns of varying severity depending on the type of coal, the length of exposure, and initial management.

This case illustrates a long and sustained direct contact with the noxious agent resulting in full-thickness skin loss. The delay in presentation was also considerable and contributed to the severity of the injury. The home remedy in question originated from Yemen and, as reported by our patient, is popular and widely used for relief of pain ranging from chronic backache to various joint pains. A comparable pattern of injury resulting from a similar remedy was previously reported by Kiliç and Kiliç. In addition, our patient maintained that on a previous occasion she had used this therapeutic cocktail without sustaining any injury. The new variant in this particular incident was the use of self-igniting coal, while the use of water, olive oil, and table salt was the same. We were unable to obtain an exact account of the quantities used. A sample of the self-igniting charcoal in question was obtained from our patient and sent to our local poisons unit for analysis.

An elemental analysis was performed, and apart from mixed levels of sodium, potassium, calcium, and magnesium, no other harmful chemicals were detected. The presumption at this stage is that the ionized form of the minerals was the origin of the strong alkali that was formed.

This report illustrates the serious dangers associated with certain types of folklore medicine. In this case the result was a serious injury that required hospital stay and a costly major surgical operation. In addition, the patient suffered scarring and temporary disability.

In this case the patient presented to an emergency department with a burns unit on site and therefore received appropriate and effective management in a timely fashion. We fear that if this patient had further delayed presenting or if the injury had gone unrecognized, the outcome might have been even more serious, with a potential risk of systemic toxicity from the chemicals present in the self-igniting coal.

Conclusion

It is dangerous to expose oneself to apparently harmless chemicals and to use them in home remedies, as such behaviour can result in serious injuries and disability. Early recognition and prompt appropriate management are essential for minimizing the damage from such injuries. Nevertheless, the best approach is prevention through education of the general public.

RÉSUMÉ. Il a déjà été signalé que les cendres humides se transforment en un agent alcalin fort, ce qui peut causer des brûlures cutanées à toute épaisseur. Les Auteurs présentent un cas qui se distingue pour le contact auto-infligé de longue durée avec les cendres humides. Le charbon utilisé était le type à combustion spontanée normalement utilisé pour brûler les herbes parfumées ou pour fumer la pipe hubbly ou shisha.

Mots-clés: brûlure chimique, alcali, cendriers humides.

BIBLIOGRAPHY


Acknowledgement. The authors would like to acknowledge and thank the medical photographers at Selly Oak Hospital, Birmingham, for helping to provide the photographs used in this case report.

Consent. A patient’s consent form was obtained both for the photographs and publication of the case. A copy of the consent form is available upon request.

This paper was accepted for publication on 2 November 2010.