

# Burns caused by domestic alkalis

M.A. RIDER & M.N. TARAR

S.E. Scotland Regional Burns and Plastic Surgery Unit, St. John's Hospital, Howden, Livingston, Edinburgh, UK

## INTRODUCTION

Benign-looking household chemicals can cause full-thickness burns after even minimal exposure. The serious nature of these injuries and the great importance of adequate first-aid are not widely appreciated, by the public in particular, but also perhaps by the medical profession. We here report one year's experience of domestic alkali burns requiring admission to a Regional Burns Unit, and use this to illustrate some important points of management.

**Keywords:** accidents, burns, chemical emergencies, first aid surgery, home alkalis, plastic

## PATIENTS

The commonest burn requiring admission was caused by Mr Muscle Oven Cleaner Spray (Johnstone Wax Ltd). Details of patients with full-thickness burns due to this agent are summarized in Table 1. A further three patients required admission with less deep burns to the hands and

face caused by this spray.

There were three hand burns from unknown cleaning agents (one illicitly procured), one of which required grafting.

One 34-year-old woman was admitted after she had dropped a bag of caustic soda down her leg. She washed the area, but 6 h later had developed a 6% full-thickness burn that required grafting, leaving a significant cosmetic deficit.

## DISCUSSION

Although chemical burns represent only a small proportion of the workload of a Regional Burns Unit (3.1% in a recent review<sup>1</sup> greater numbers are seen in accident and emergency (A&E) departments<sup>2</sup>. Their pathogenesis and management differ significantly from those of thermal burns.

Severity of burn is related to exposure, concentration and penetrative ability of the chemical.<sup>3</sup> Strong alkalis rapidly penetrate the skin and cause liquedation of fat, allowing further penetration and ongoing tissue damage over a

Table 1. Case reports

Age (years) and sex	History of accident	Delay in onset of pain		First aid	Delay in presentation		Burn	
		Gloves	(h)		(h)	Depth, area, site	Treatment	
31 F	Cleaning oven, unaware of contact	Yes	1	Wash after 1h	24	FT, 6% BSA, arm and thigh	SSG	
66 F	Cleaning oven, unaware of contact	Yes	Never painful	Nil	24	FT, 5 × 12 cm, wrist	SSG	
20 F	Cleaning oven, unaware of contact	Yes	Never painful	Nil	5	FT, 2%, both arms	SSG	
27 F	Cleaning oven, unaware of contact	Yes	4	Wash after 4 h	6	FT, 5 × 5 cm, foot	Conservative (SSG refused)	
56 F	Spilled from container	Yes	24	Washed immediately	48	FT, 10 × 2 cm, foot	Conservative	

FT, full thickness; BSA, body surface area; SSG, split skin graft.

Correspondence:  
Mark A. Rider, c/o  
Department of  
Plastic Surgery,  
Stoke Mandeville  
Hospital, Aylesbury,  
Bucks HP21 8AL, UK

period of many hours. An initially superficial burn will often progress to full thickness if inadequately treated.

The case reports presented here illustrate the typical features of alkali burns. There is often no initial pain, and the patient may not even be aware of any contact. Inadequate first aid and delay in seeking medical help are the norm. The Mr Muscle aerosol spray is particularly difficult to detect and this, combined with a very high pH (measured in our laboratory as 14), may explain why it burns so deeply. Depth of burn can be difficult to assess in the early stages, and is often underestimated. A thick black eschar commonly develops.

The key to managing alkali burns is early irrigation with copious amounts of water, a technique whose importance has been stressed by numerous authors<sup>3-7</sup>. It is most effective if started immediately by the patient at home. Unfortunately, this only rarely happens, for reasons discussed earlier. Irrigation remains of benefit, however, even if started later, and can be usefully continued for many hours. The duration of irrigation can be guided by applying pH indicator strips to the skin 10 min after suspending irrigation; irrigation should be continued for as long as the pH continues to fall.

The use of buffers or neutralizing agents is more controversial. If used immediately after the burn, they can actually cause additional thermal injury by the exothermic reaction of neutralization. However, they may be of benefit in the later stages<sup>8</sup>.

The vital role of A&E departments in managing alkali burns is to prevent any further delay in treatment. Chemical burns should be triaged as an 'urgent attention' group. The diagnosis can usually be made from the history and the use of pH paper, and irrigation should be rapidly initiated. Minor obviously superficial burns that have

responded to irrigation should be dressed and reviewed at no later than 48 h. All other patients should probably be discussed with the local Burns Unit. The Burns Unit can offer (1) facilities for continuing irrigation, (2) expert assessment of the depth of the burn, (3) management of airway and fluid replacement in the rare event of extensive chemical burn, and (4) definitive treatment. The ideal treatment for full-thickness burns is early excision and grafting.<sup>1,6,9</sup>

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