IMAGE CHALLENGE

Splashed by a clear liquid

CLINICAL INTRODUCTION

A 35-year-old male presented with painful skin rash for 2 hours after a clear liquid splashed onto his legs when a car drove past him and squelched a roadside container on a street populated by small-sized factories. Burning sensation and pain developed in 10 min. He called on the emergency room after irrigation. His trousers were intact, wet but not slippery, and had a pungent sour odour.

QUESTION

What is the best answer for the clear liquid?

A. It is a strong alkaline fluid
B. It is concentrated sulfuric acid
C. It is concentrated hydrofluoric acid
D. It is 50% of hydrogen peroxide

For the answer see page 475

Figure 1 Erythematous, centrally greyish changes can be seen over both thighs and knees. The patient felt a sharp pain, deep into the bone, leading him to tightly grasp his thighs to try to relieve it.

Figure 2 Necrotic changes with depression of the skin over the left knee.

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ANSWER: C

The affected skin had a blue-greyish depression with surrounding erythema and blisters (figures 1 and 2), a picture of liquefactive necrosis. This was suggestive of an alkaline injury; however, the pH of liquid on the trouser, measured by litmus paper, was 1, suggesting an acid.

The free H^+ ion in strong sulfuric acid solution would result in not only coagulum formation on skin but also break down fabrics, causing burnt holes in clothing,[1] but the patient's trousers were intact. Concentrated hydrogen peroxide, a strong oxidant, could cause severe burns of mucosa but should not damage intact skin.[2] Hydrofluoric acid can cause similar skin changes to those seen, but because it is a weak acid, will not affect clothing. Fluoride ion was detected by ion exchange chromatography from a 5 cm×5 cm wet fabric cut from left knee area.

Hydrofluoric acid is widely used for etching, polishing or cleaning glass, ceramics and walls and rust removing. Its dissociated H^+ ion causes skin damage and leaves fluoride ion that penetrates deep into the tissues, binding to and sequestering Ca^{2+} and Mg^{2+} ions, producing extensive tissue destruction. Irrigation with copious amount of water and treatment with calcium or magnesium compounds intravenously or locally are the conventional therapy for hydrofluoric acid burns.[3] In this case, the affected skin was then covered with calcium gluconate-soaked gauze, which drastically reduced the pain. Systemic toxicity like hyperkalaemia, hypocalcaemia or hypomagnesaemia was not observed, but the wound required skin graft because of extensive tissue necrosis.

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