VIA MEDICA

CASE REPORT

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Double trouble combat grenade allergic contact dermatitis

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ABSTRACT

Allergic contact dermatitis (ACD) is a frequent inflammatory and the most common type of occupational skin disease. Chloroacetophenone (CN) has been one of the most typical riot control agents known since the end of the First World War. It is used by the armed and police forces and as pocket tear gas for personal protection. However, it is considered to be safe and, therefore, should not cause fatal health effects. Although CN is stated to provoke ACD, there are only a few cases found in the literature similar to the one shown below.

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CASE DESCRIPTION

A 21-year-old male soldier, without a personal or family history of skin diseases or allergies, was presented to the Department of Dermatology with maculopapular rash soon after exposure to tear gas — chloroacetophenone (CN) — while throwing a practice gas grenade at a military exercise. The patient had had contact with the described substance before, but this was the first time such symptoms appeared. On physical examination, skin lesions were observed mostly on the forearms, lateral surfaces of the trunk and whole neck, with no rash on the face which was covered by a face mask (Fig. 1). The skin lesions were accompanied by pruritus. The patient reported no general symptoms. The treatment with intravenous 100 mg hydrocortisone, intramuscular 100 mg phenazoline, followed by oral antihistamines and topical steroids, resulted in significant clinical improvement. The patient was referred for a follow-up at the dermatology outpatient clinic.

DISCUSSION

Chloroacetophenone probably reacts with transient receptor potential (TRP) channels, especially TRPA1, localized on the skin and mucous membranes. As a result, the gas provokes such symptoms as pain, itching, inflammation and cold [1]. Its toxicity is possibly associated with SN2 alkylation having negative effects on cellular functions [1]. The eyes and airways are irritated most frequently [2, 3]. Conjunctivitis, ophthalmalgia, intolerance to light, lacrimation and eyelid erythema, as well as cough, rhinitis, chest discomfort, pharyngitis, dyspnoea and sternutation may appear [2]. After tear gas inhalation, saliva with molecules of the toxic substance could be absorbed and cause gastrointestinal issues — sickness, emesis or diarrhoea [2]. However, the effects of CN on human health depend on the concentration of the substance and length of exposure [2]. The above symptoms did not appear in the present patient wearing a mask.

Chloroacetophenone may provoke ACD but there are only a few cases found in the literature [4–7]. Skin symptoms appear as disseminated erythematous papulovesicular lesions, pruritus, burning sensation, itchy blistering eruptions, erythema and swelling, even as a second-degree chemical burn in one case [5–8].

The dermatitis emerges first at the site of CN contact, but after a few days, the lesions may disseminate [8]. A single contact with this substance can cause primary sensitization and provoke allergic skin reactions [6]. Patch tests with CN in ACD diagnosis should be applied and they usually result in an intense eczematous reaction [7]. Furthermore, this reaction could be associated with the irritative potential of CN [4]. In the cases described canisters of tear gas and police officers' occupational exposure were the sources of CN [5, 9].

Different tear gases apart from CN, such as o-chlorobenzylidene malononitrile (CS), were proven to initiate ACD in

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Figure 1. Maculopapular rash on the lateral surfaces of the trunk and whole neck (**A–C**); maculopapular rash on the upper limbs (**D–F**)

patients. CS action and results are similar to CN although its toxicity is lower [10].

Although the patient had had contact with CN before, that was the first time of the appearance of such symptoms. It should be emphasized that face masks can definitely reduce the risk of skin symptoms in this sensitive area. Proper diagnosis and treatment are important in the case of the exposed individuals, who may experience significant skin or systemic reactions in contact with such substances. Despite the fact that CN is used by military forces all around the world, there have been only a few similar ACD cases described in the literature so far. Therefore, research on CN's potential side effects is desired.

Article information and declarations

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Author contributions

AK — writing original draft, review & editing, conceptualization; JN — review & editing, conceptualization, visualization, patient's attending physician; JK — writing original draft, ZP — writing original draft, AB — supervision, review & editing, IF — supervision.

Conflict of interest

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Ethics statement

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