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Acute Diquat Poisoning Manifesting as Acute Rhabdomyolysis: A Case Report

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Abstract Rhabdomyolysis caused by diquat is relatively rare. We herein report a case of acute diquat poisoning resulting in acute rhabdomyolysis. A 22-year-old female with anuria presented to the emergency department after intentional ingestion of a commercial herbicide containing diquat 100ml three days later. Acute rhabdomyolysis is the earliest manifestation. First-aid measures including gastric lavage, urine alkalinization, hemoperfusion and continuous renal replacement therapy were performed. After 15 days of hospitalization, she got a comprehensive rehabilitation and was discharged. Diquat intoxication should be suspected in patient presenting an acute rhabdomyolysis. The characteristics of diquat intoxication are complex. Diquat should undergo strict management.

Keywords: *diquat poisoning, rhabdomyolysis*

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1. Introduction

Diquat (DQ) is a nonselective contact bipyridyl herbicide and a preharvest desiccant which is commonly used worldwidely [1]. It has been classified as a moderately hazardous compound by the World Health Organization (WHO) [2]. The toxic target organs include the kidneys, liver, lungs, gastrointestinal tract, cardio-vascular system, and central nervous system [3,4,5]. Acute kidney injury is the most common, leading to renal tubule damage [6]. Acute rhabdomyolysis caused by DQ is rare. We report one case of an intentional DQ intoxication with an initial presentation of rhabdomyolysis which emphasizes the necessity of the early recognition and certainly enhanced regulatory restrictions on this very toxic compound. This study was approved by the Medical Ethics Committee of West China Fourth Hospital of Sichuan University (HXSY-EC-2022030). Written informed consent was obtained from all patients.

2. Case Presentation

A 22-year-old female with anuria presented to the emergency department three days after an intentional ingestion of approximately 100 milliliters of a commercial herbicide containing DQ dibromide 2.30%. On initial physical examination, the temperature was 36.5°C, the respiratory rate 18 breaths per minute, the heart rate 86 beats per minute, the non-invasive blood pressure 125/78 mmHg, and the oxygen saturation 100% while the patient was breathing ambient air. She appeared comfortable, with anicteric sclerae, moist mucous membranes, and mild chemical burns to the oral mucosa. The neck was supple, with a full range of motion and no lymphadenopathy. Both lungs were clear on auscultation. Cardiovascular examination revealed a regular rate and rhythm with normal heart sounds. The abdomen was soft, without hepatomegaly or splenomegaly. The arms were warm and well perfused. Tension-induced three vesicles were seen on her right thigh (Figure 1a, b). Arterial pulsations of doralis pedis cannot be touched and the feet were cold. Laboratory test results were as follows: The level of serum creatine kinase (SCK, 81KD) was 5979 U/L (normal range, 55 to 170) and myoglobin (Myb,17KD) was 3328 ng/mL (normal range, 0 to 61.5). The results of urinalysis were unremarkable. Computed tomography of the head and chest were performed, and the results were unremarkable. A diagnosis of acute rhabdomyolysis were made. Treatment with gastric lavage, urine alkalinization, Hemoperfusion (HA330, Jafron-800A, 2 h per time) was performed. Hemoperfusion was performed as follows: the first day, three times; the second day, twice; the third day once; the fourth day once, i.e.3-2-1-1 plan. Skin tension and the tension-induced vesicles of the legs were almost completely relieved (Figure 1c,d) in two weeks. Recovery of renal function begins approximately in one week, presenting as the decreased serum creatinine levels and the recovered urine volume (Figure 2a-b). The levels of SCK and Myb toward normal completely after two weeks (Figure 2c-d). After 15 days of hospitalization, she got a comprehensive rehabilitation and was discharged.

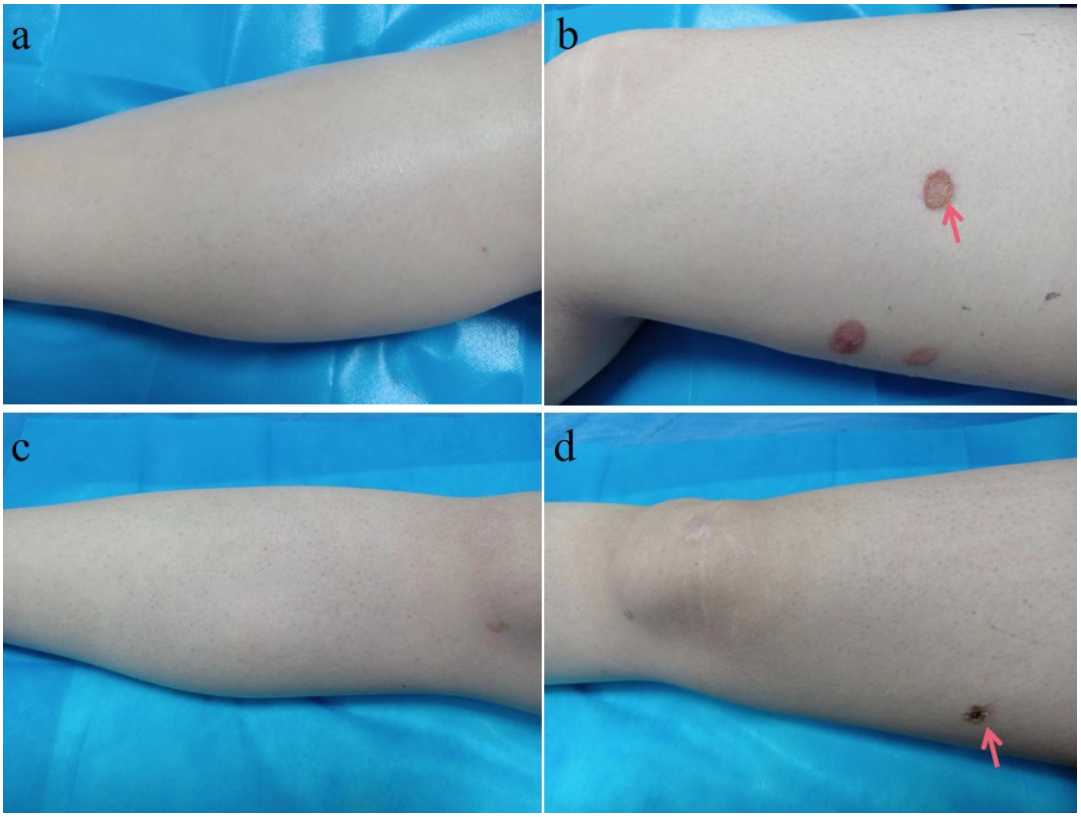

Figure 1. Presentations of skin tension in one week (a and b, red arrow indicates tension-induced vesicles) and two weeks (c and d) after DQ intoxication

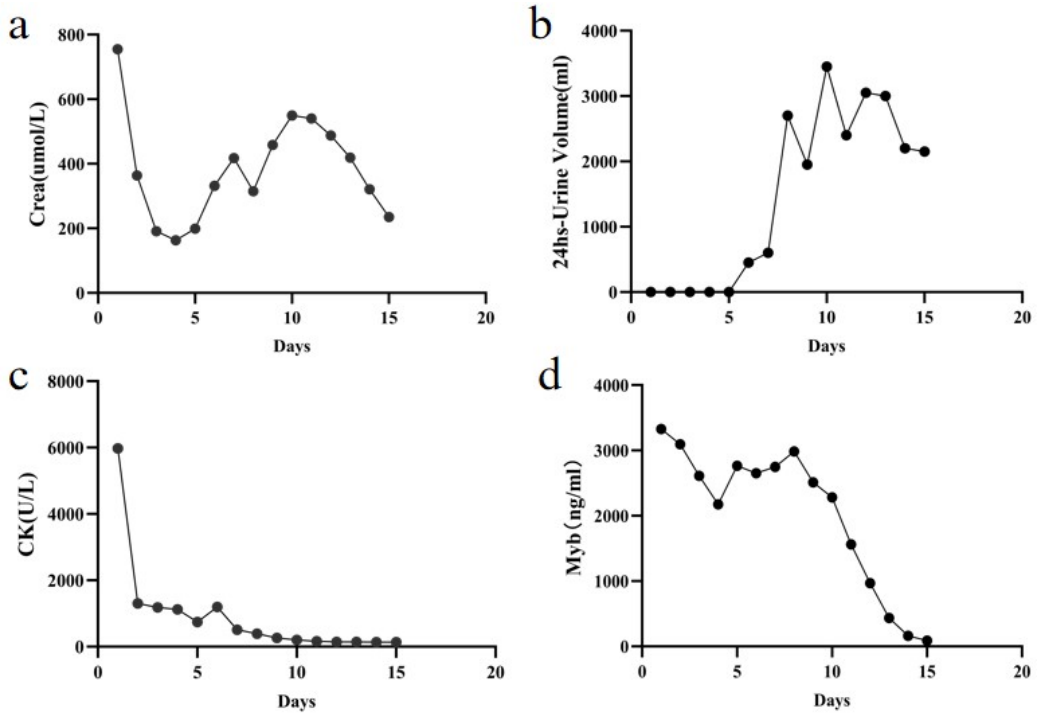

Figure 2. Dynamic changes of serum creatinine (a),24h urine volume(b),creatine kinase isoenzyme (c) and myoglobin (d) after DQ intoxication

3. Discussion

DQ is a moderately hazardous compound [2]. The lethal dose of DQ at a concentration of 20% ranges from 6 to 12 g (30–60mL) [3,7]. Acute intoxication can derive from accidental ingestion, inhalation, injection and dermal contact. DQ intoxication can lead to severe toxic effects on the kidney, lungs, liver, central nervous system, heart, and so on [3,4,5]. The exact pathophysiological mechanisms involve a rapid oxidative stress and superoxide radical production [8,9].

Rhabdomyolysis involvement of DQ intoxication is relatively rare. We herein report a case of acute DQ intoxication that manifested as rhabdomyolysis.

Tension-induced vesicles on her right thigh burst one week after intoxication. Two weeks after admission, skin tension and the tension-induced vesicles were almost completely relieved. Skin tension of the thighs were seriously worsen within the three days after DQ intoxication. We only saw the vesicles were dispersedly distributed on her right thigh. An obvious question is whether it takes place on other parts of the body.

Recently, new discoveries have suggested serum creatine phosphokinase (SCK) can be used to assess the severity of poisoning [10,11]. We found that, there are two peaks of the SCK and Myb, one is at 3-5 days, the other is at 5-7 days. SCK and SCK-MB toward normal approximately a week after admission, they are can be used as indexes which redict the patient's prognosis [12]. It is very important to early, quickly, and accurately determine the DQ concentration. The HPLC-DAD method with clinical characteristics of high sensitivity, simple operation, and wide linear ranges which can be used for analysis and quantitative detection of DQ intoxication [13]. There is limited understanding of the mechanisms of DQ toxicity and no clear rationale for an effective strategy of treatment, and care is still based on supportive modalities.

We observed that patients (Oct 1st 2016-Jun 1st 2022, about 100 patients with DQ intoxication in Sichuan China) with DQ intoxication treated with hemoperfusion (HA330,3-2-1-1 plan) may improve the success rate. To confirm this finding, a larger multicenter randomized trial is needed to be further investigated.

Disclosure Statement

No potential conflicts of interest were reported by the authors.

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