

Arsenic Poisoning Due to the Intake of Orpiment

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Introduction

Emergency departments of hospitals frequently admit patients that are intoxicated by drugs or that attempted to suicide. Intoxication due to substance use may differ according to geographical regions and culture. Intoxication due to orpiment, used for hair removal, has been common in the Eastern Asian countries, particularly in Iran and India. The substance has also been used for suicidal purposes because it is inexpensive and easily available and has high toxicity. Herein we report a case who presented with oral consumption of orpiment, including arsenic, for suicidal purpose.

The Case

A 34-year old woman was taken to the emergency department after consuming two packs of the depilatory agent stirred with water. She had used it for hair removal four hours ago. When she was brought to the hospital, her general condition was moderately bad, and she was inclined to sleep. She was suffering from severe nausea, vomiting, stomach ache, diarrhea and shortness of breath. The examination showed that the Glasgow coma scale was 14 (E3M5V6), blood pressure was 80/50 mmHg, and heart rate was 36/min. The examinations of systems provided normal results. The ECG showed sinus bradycardia, segment depression in D2, D3, aVf derivations, and biphasic Y waves in V2V3V4 derivations. The laboratory tests did not provide any pathological values except the following: leucocyte $31.77 \times 10^3/\text{ul}$, serum glucose 257 mg/dl, and potassium (K) 1.9 mmol/l. Abdomen and lung radiographies did not provide any pathological findings. The patient was administered 20 mEq/hour potassium replacement and 100 cc/hour 0.9% NaCl infusion. After being observed in the emergency department for three hours, the patient, suffering from respiratory arrest, was intubated urgently and transferred to the Intensive Care Unit of the Department of Anesthesia and Reanimation. Throughout the process of treatment, the patient was dialyzed five times and transferred to the Department of Psychiatry on the fifth day she was brought to the hospital.

Discussion

The depilatories that involve arsenic are produced by small manufacturers under nonstandard conditions. In the East Asia countries such as India and Iran, there have been common incidences of accidental consumption of chemical depilatories as well as their use for suicidal and murder purposes. The depilatories mostly consist of 55% calcium bicarbonate ($\text{Ca}(\text{HCO}_3)_2$), 25% arsenic sulfide, and 10% clay [1]. When the substance interacts with water, arsine and arsenic acid are produced, which are responsible for the toxicity effect. The complications result from severe corrosive damage in the digestive system, intravascular hemolysis and the systemic effects. Skin absorption may also cause systemic toxicity.

Depilatories have usually been consumed orally for suicidal purposes [2]. The symptoms start in a period of time ranging from 10 minutes to a couple of hours after the consumption. In the present case study, the patient was brought to our clinic after oral consumption of the depilatory agent. The most common symptoms, i.e. stomach ache, nausea, vomiting, shortness of breath and diarrhea, were present in the case.

The majority of patients suffer from gastroenteritis together with medium-level hypotension resistant to antiemetic and fluid therapy. In the cardiovascular system there may emerge clinical situations ranging from sinus tachycardia to orthostatic hypotension and even to shock. The literature also presents cases that imitate myocardial infarct or systemic inflammatory response syndrome [3,4]. Cardiogenic or non-cardiogenic pulmonary edema may also emerge. In four days to five weeks following the oral intake, the ECG may show uncharacteristic T-wave abnormalities, prolonged QT interval, conduction disorders, ventricular tachycardia and mortal arrhythmia such as torsades de pointes [5]. Acute intoxication may affect the central nervous system and cause delirium, crisis and coma as well as a small cerebral bleeding and encephalopathy due to necrosis [6]. Furthermore, acute renal failure may develop due to hemolysis, hemoglobinuria, and hypoperfusion resulting from the direct toxic effect of the substance on renal tubular cells and hypotension [7]. In the literature there are also reports of acute pulmonary damage; ARDS and hepatitis cases [6]. Disorders of consciousness, cardiac arrhythmia, renal failure and hypotension are the conditions that determine the prognosis of patients [8]. Mortality occurs due to sudden emergence of a systole that develops following bradycardia [7,9].

The diagnosis is based on the measurement of the level of arsenic in urine. In our country, the level of arsenic is measured in the laboratories of the Poison Research Directorate at the Refik Saydam Health Center. In the case that the urine level is not at toxic concentrations, samples of hair and nail may be examined. Until 30 hours following the oral intake, the amount of arsenic is detectable in proximal parts of hair. However, treatment should start before waiting for test results. Furthermore, arsenic may be seen in the digestive track in abdominal radiography because it is radiopaque. In our case, the abdominal radiography did not provide any pathological finding.

In treatment, it is important to repair the liquid and electrolyte disorder. However, special care is required due to the risk of cerebral and pulmonary edema. The levels of magnesium, K and Ca should be examined carefully since they may cause prolongation of the QT interval. In the case of acute intoxication, gastrointestinal decontamination should be considered. Its interaction with activated charcoal and cholestyramine is weak [10]. However, many researchers suggest that activated charcoal is administered after respiratory safety is assured. If the radiopaque substance is seen in abdominal radiographies, it is suggested to carry out colonic irrigation until the opaque image disappears in repeated radiographies [10]. Dimercaprol (BAL), used as

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Received November 07, 2013; Accepted November 22, 2013; Published November 26, 2013

Citation: Ozakin E, Can R, Kaya F, Acar N, Cevik AA (2013) Arsenic Poisoning Due to the Intake of Orpiment. J Clin Toxicol 3: 176. doi:10.4172/2161-0495.1000176

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a chelating agent, may be administered in consideration of the patients' clinical condition and the level of arsenic in samples. Chelation therapy should be administered urgently in the cases with symptoms of severe toxicity and with suspected acute arsenic intoxication. In the United States, BAL has still been the first option in chelation therapy [11]. If there is no deterioration in hemodialysis renal functions, circulation may remove a very small amount of arsenic. That is why, although the use of dialysis is controversial, dialysis treatment may help reduce the level of arsenic [12]. However, this treatment is not suggested for patients with normal renal functions [13,14].

The mortality is associated with the amount of the substance taken, period of exposure and time of arrival to the hospital. While the mortality rate was 20% in 1990s [15], with the reduction of the amount of arsenic in depilatories, it decreased to 6% [2]. Deaths mostly result from oral intake of powder forms of the substance.

Conclusion

Heavy metals poisoning is a rarely encountered case in emergency departments. Diagnosis is difficult particularly in patients suffering from impaired consciousness and patients without a case history. Although depilatories are commonly used in our country, arsenic intoxication due to the intake of depilatories is not a common case. However, because the substance is inexpensive and easily available, emergency medicine physicians should suspect that the intake of this substance in the case of suicide attempts and in the case of children, if the relevant symptoms and findings are available.

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