Aluminium Phosphide Poisoning*:* a Case Report

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A R T I C L E I N F O

Article Type:
Case Report

Article History:
Received: 9 April 2014
Revised: 14 April 2014
Accepted: 9 May 2014

Keywords:
Aluminum Phosphide
Poisoning
Hearing Loss

A B S T R A C T

Background: *Aluminum phosphide* as pesticide commonly used to protect crops from pests. Despite the limited number of cases of poisoning with this substance, it is important due to the high risk of being fatal. The major cause of the poisoning is suicide attempt. Due to the lack of specific treatment in poisoning, taking more than 500 mg is fatal.

Case Report: The patient was a 16-year-old woman who attempted suicide by consuming some 4.5gram aluminum phosphide tablets. Within half an hour after consumption she had vomiting and nausea then smoking cigar, followed closely by smoking in her mouth flames around his mouth is created which will burn (grade II). Subsequently she had argument with her husband and injured her right ear. During the admission she was alert, 2nd degree burn were observed on the upper lip and around the mouth and nose and ears areas. Physical examination was normal, when she arrived she had severe hypotension and her oxygen saturation was 69% with tachycardia. The patient was immediately intubated and received mechanical ventilation. After installing Nasogastric tube, gastric lavage was done with potassium permanganate and bicarbonate. At Arterial Blood Gas (ABG), severe metabolic acidosis (pH 6.9) and a chest X-ray, diffuse lung opacities was seen. Blood test showed that there was a leukocytosis (22,000). Treatment was given Saline, high dose inotrope drugs (norepinephrine and dopamine), bicarbonate, calcium gluconate, magnesium sulfate hydrocortisone. Burns around the mouth was dressing after admission. On the third day the patient was alert and complained of pain in the right ear and hearing loss. 9 days after admission, the patient was discharged well with complication of sensory neural hearing loss (unrelated to slap injury).

Conclusion: Despite the extreme virulence of the *Aluminum phosphide* (rice tablets), especially in high doses, conventional therapeutic measures can sometimes unexpected ways leading to improved patient. The patient's well general condition was discharged with remained hearing loss in her right ear, despite the very poor prognosis. It is recommended that phosphine gas research on the possible impact of hearing loss further.

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►*Implication for health policy/practice/research/medical education:* Aluminium Phosphide Poisoning

► *Please cite this paper as:* Vaghefi SS, Emamhadi MA. *Aluminium Phosphide Poisoning: a Case Report. International Journal of Medical Toxicology and Forensic Medicine*. 2014;4(4):149-53.

1. Introduction:

Aluminum phosphide as a Fumigant material commonly used to protect crops from pests. Fosfyn gas (PH3) is released, when the tablet is evaporated (1, 2). Who is responsible for poisoning? Aluminum phosphide various trade names including Celphos, Phostoxin, rice tablets and had Quickphos, solid tablets weigh approximately 3 grams in Iran (3, 4). This material is relatively low in toxicity, and include only 0.2% of all cases of poisoning (5, 6). Consumption in urban is more than rural area (7). Typically it used for suicide, and sometimes randomly, although it is rare to use aluminum phosphide to homicide (8). Fosfynis are colorless, flammable and toxic gas with odor of garlic or rotten fish (1, 2). The main mechanism of toxicity is mitochondrial dysfunction due to inhalation of Fosfyn fumes (1, 5). Fosfyn impaired contraction of the heart, pulmonary edema, necrosis of hepatocytes cells, disseminated intravascular coagulation, acute renal failure and metabolic acidosis alone or together with respiratory alkalosis (1, 5, 8).

2. Case Report:

The patient was a 16-year-old woman who attempted suicide by consuming some 4.5 gram of aluminum phosphide tablets. Within half an hour after consumption she had vomiting and nausea then smoking cigar, followed closely by smoking in her mouth flames around his mouth is created which will burn (grade II). Subsequently she had argument with her husband and injured her right ear. During the admission she was alert, 2nd degree burn was observed on the upper lip, around the mouth, nose and ears areas. The patient was sent immediately to the nearest health facility. The Center placement Nasogastric tube for patient and gastric bicarbonate was occurred, and inotrope medications prescribed due to a severe hypotension and then she referred to our hospital emergency ward (Figure 1). Patient had healthy mouth without odynophagia and dysphagia. Ear external examination was normal. Examination is shown in table 1. Due to low O_2 saturation, injected anesthetic drugs and intubated with 7 diameter tube and Connected to ventilator (with SIMV mode, Tidal volume: 460 cc،respiratory rate: 14/min, FiO_2: 100%, PEEP: 5). The VBG admission was seen metabolic acidosis (Table 2). In the chest x-ray, diffuse lung opacities (Fig. 2A) and blood tests are shown in table 1. Liver enzymes levels were normal.

Ten hours after admission the patient was awake and alert and pressure was normal in patients with inotrope drugs. Vital signs were stable and she was not respiratory distress. The patient extube was performed 19 hours later than admission, but she was complained from nausea and feeling thirsty. O_2 sat: 95%, the ABG was shown in table 2 and FBS: 88 mg/dl, axillary temperature was 37°C degrees. On the second day of admission WBC: 3000 mm^3, RBC: 3.09, Hb: 8.9 g/d, Hct: 26 decline to prior days, and increased FBS up to 142 mg/dl.

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Liver enzymes levels were normal. Due to normal ABG and stable vital signs, cut the chronotrope drugs and counseling internal medicine was asked to investigate potential esophagus burn. Pharynx and esophagus was normal on endoscopy and no burn. Inotrope medications were stopped in third day, after its discontinuation, the patient's vital signs had remained stable (BP: 109/65 ،PR: 85, O_2 sat: 95). Productive cough with white sputum occurred fourth day of hospitalization. The patient CXR air bronchogram was showed in Figure 2B. Oral and parenteral antibiotics were started. In addition, the patient also complained of pain in the right ear and hearing loss. Ear, nose and throat consultant that conducted the hearing loss can be attributed to the patient's ear canal WAX. Glycerin drops administered to the patient and the patient's ear after three days were washed. Patients were discharged from hospital with good tests and examination and continuing oral antibiotic therapy on the ninth day of hospitalization. Although sensory neural right ear hearing loss (the patient's own claims and confirmed by audiometry) will still remain Subsequent follow-up.

Table 1: Physical examination and blood tests on admission

Blood Pressure	80/60 mmHg (Despite inotrope drug)
pulse rate	150/min
Respiratory rate	12/min
O_2 sat	69%
white blood cell count	11100 cubic millimeter
Red Blood Cell count	4.22 mill/cubic millimeter
hemoglobin	12.2 gram per *deciliter*
Hematocrit	34.3%
Fasting Blood Sugar	109

Fig. 1. Second degree burns around the mouth and nose and lips.

3. Discussion:

There are few case reports Studies of aluminum phosphide poisoning and most of these studies have been associated with clinical findings, yet, limited research has been done on these patients. Aluminum phosphide is highly toxic to rodents wiring and effects on plants, in many countries due to its low cost and effective fumigant easily accessible and used for suicide (9). These statistics clearly indicate that toxicities are increasing in some countries, particularly in India (1). Aluminum phosphide effects on most organs. In human early symptoms include nausea, vomiting, epigastric pain, retrosternal pain, dyspnea, agitation and smell of garlic breathing. In previous studies, the mortality rate within 12 hours of taking the pill were 55% and within 24 hours of eating were 91% (10). Uncommon findings are atrial infarction, pleural effusion, ascites, rhabdomyolysis, pancreatitis and renal failure. In study of singh and chugh, most people are poisoned at a young age (10, 11). Our patient was 16

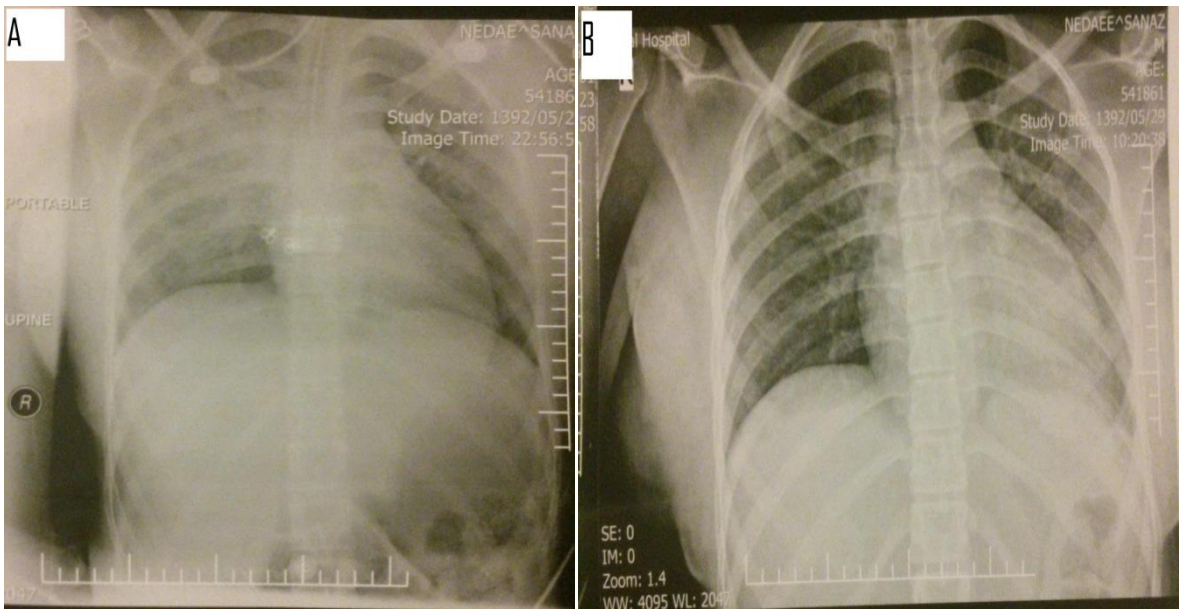

Fig. 2. It shows diffuse lung opacities in patients after intubation (A) Air bronchogram view on chest x-ray (B).

years old woman and she was young. After taking the pill, serious toxic effects were begins during the first hour of the consumption (12). In our patient, symptoms began within half an hour after taking pills. The toxic effects and prognosis depends on dose and time of producing tablet, vomiting immediately after the onset of toxicity, GCS down, hypotension, acidosis, the ECG abnormality, leukocytosis, hyperglycemia, blood urea Nitrogen and SAPS II on admission in the hospital (12). Our patient also had a lethal dose of pills rice (1.5 tablets) pill had not expired and with water that had been after laying a solid tablet at the mouth. During the early hours the patient was developed hypotension and metabolic acidosis. GI symptoms and cardiovascular collapse are the most common sign and symptoms of poisoning, which may lead to congestive heart failure and respiratory arrest (13). The heart and vascular collapse resulting in damage cardiac myocytes is the direct effect of aluminum phosphide (13, 14). Survey of Mehrpour and his colleagues showed (15) BS>140 mg/dl predictive factor for mortality. Our patient had no history of diabetes and blood sugar admission 131 mg/dl and his hospitalization 145 mg/dl, which despite its, our patient survived. There is no study effect of Fosfyn gas on hearing loss yet. Ear trauma can cause conductive hearing loss (16). In this patient, due to right ear hearing loss and seen wax in the ear, it washed but mild sensory neural hearing loss in the right ear

Table 2: Air blood gases

Air blood gas on admission	2 hours later	19 hours later
PH: 7.23	PH: 7.32	PH: 7.4
PCO_2: 29	PCO_2: 19. 6	PCO_2: 28
HCO_3: 12	HCO_3: 10	HCO_3: 17.3
BE: -14.1	---------	BE: -6.5

was evident in the audiometry (unrelated to slap injury). After some months of follow up, the patient still remained deafness.

4. Conclusions:

We introduce the 16-years-old woman who attempted suicide by consuming 1.5 aluminum phosphide tablets. Within half an hour after, vomiting and nausea then smoking cigar, followed closely by smoking in her mouth flames around his mouth is created which will burn. Subsequently, the patient developed severe metabolic acidosis and hypotension, meanwhile, uncertain trauma on right ear. The patient was hyperglycemic duration hospitalization (average blood glucose 145 mg/dl). After the standard treatment unexpectedly she was heals but the patient's right ear remains hearing loss. Further research on blood glucose and its prognostic effect of hearing loss is suggested to examine the influence of gas Phosgene.

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