INSECTICIDE/ORGANOPHOSPHORUS COMPOUND POISONING IN CHILDREN

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Poisoning has become a relatively important child health problem, even as many other health problems have been ameliorated. Each year around the world, approximately two million children under the age of five are poisoned. Children are adventurous and inquisitive, hence the high incidence of poisoning being recorded during their developmental period. The majority of poisoning cases are involuntary and inadvertent.

We present three cases of organophosphorus compound poisoning (OP) seen in our hospital over a 12-month period.

Case 1

A five-year-old Saudi female was brought to the emergency room by her parents within two hours of exposure to an insecticide used to spray farm products. The child was with the farmer while the spraying was going on, and must have absorbed the substance via the lungs and skin. The presenting complaints were breathing difficulties, abdominal pain, vomiting, salivation and sudden loss of consciousness. On examination, the patient was deeply comatosed, hypothermic with generalized cyanosis, pupils were constricted to pinpoint, and she had frothy secretions at the mouth. The lungs were full of coarse crepitations bilaterally, and the abdomen was soft. The central nervous system examination revealed a comatosed child with flaccid limbs. She was afebrile, tachycardic (HR 180 min.), with gasping respiration and with a blood pressure of 100/60.

Organophosphorus compound poisoning was diagnosed from the history, the smell of the patient's skin, hair and clothes. Treatment with atropine sulphate was started, along with other resuscitating measures. The patient was given a bath in an attempt to rid the body of the offending compound. Intravenous boluses of 4 ampoules (a total of 2.4 mg of atropine sulfate) were given at intervals of 15-20 minutes. It was over four hours before any tangible change could be noticed in her overall condition. After eight hours, the patient showed a marked improvement, with normal respiratory and heart rate, temperature and and blood pressure. Her lungs were clearing, and muscle tone was good, although her pupils were yet to return to their normal size. After 11 hours she was completely conscious, the lungs had completely cleared, and the pupils had returned to their normal size. During the period of recovery, the patient became irritable and started to twitch, and was given valium. A total of 32 ampoules (19.2 mg) of atropine were also given.

Cases 2 and 3

Two Saudi sisters, aged six and eight years, were brought to the emergency room of the hospital about five hours after their hair had been sprayed with an insecticide in an attempt to rid them of lice. According to the parents the children had been vomiting, had abdominal pain and breathlessness, and had experienced loss of consciousness. On examination, the six-year-old girl was deeply comatosed with generalized cyanosis, constricted pupils and was frothing at the mouth. The lungs were full of coarse crepitations bilaterally. The abdomen was soft. The central nervous system revealed a comatosed child with increased motor tone. The child was afebrile, bradychardic (HR 45/min.), with gasping respiration and blood pressure was 60/40. The eight-year-old sibling presented with the same complaints, but in less severe form. This may have been due to the varying quantity of insecticide used. The older sister was afebrile and tachycardic (HR 150/min.), with gasping respiration, and with a blood pressure of 95/60. She looked comatose, with labored breathing, constricted pupils and mild frothy secretions at the mouth. The lungs were full of crepitations bilaterally. The abdomen was soft and examination of the central nervous system was unremarkable.

Organophosphorus compound poisoning was diagnosed in both cases, and treatment with atropine sulfate was started along with other resuscitating measures. Both patients were given a thorough bath in an attempt to remove the offending compounds. The six-year-old patient was given intravenous boluses of 5 ampoules (total 3 mg atropine sulfate) at intervals of 15-20 minutes. After about two hours, her condition clearly improved. She was completely stable with normal respiratory and heart rates, temperature and blood pressure after about four hours. She continued to show good improvement and after about 12

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hours was ready for discharge. In total, 30 ampoules (18 mg) of atropine were given.

The eight-year-old sister was given 6 ampoules (3.6 mg) of atropine sulfate at intervals of 15-20 minutes. Her condition started to improve after an hour. She was completely stable after three hours and was ready for discharge after 12 hours.

Discussion

Children may be inadvertently exposed to organophosphorus compounds which are available in different forms, and used as agricultural and household insecticides, and in the treatment of animal ectoparasites and human lice infestation. They are available as dichlorvos, parathion, diazenon and chlorothion. These substances are absorbed via the lungs, skin, and the alimentary tract. Food, including stored grains contaminated by a spray of these insecticides, has been known to cause severe poisoning. Organophosphorus compounds cause an inhibition of cholinesterase enzymes all over the body. The resulting accumulation of acetylcholine is responsible for the symptoms observed, most especially muscarinic, nicotinic and central nervous system (CNS) effects. Muscarinic effects include nausea, vomiting, abdominal cramps and fecal incontinence. Cholinergic stimulation of the respiratory tract produces cough, increased bronchial secretion and terminally pulmonary edema. Miosis is also present, as well as bradycardia. Conduction block or hypotension are the cholinergic effects on the cardiovascular system. In more serious cases of poisoning, nicotinic signs include restlessness, confusion, convulsions, tremor and coma.[2,3] Coma with pinpoint pupils should bring to mind organophosphorus poisoning as one of the possibilities. The history, and smell of the patient's skin, hair or clothes can be of help in coming to a diagnosis. The diagnosis can be proven by drawing a sample of blood and testing its cholinesterase levels. A level below 50% indicates intoxication.

Initial effort should be made to decontaminate the patient by thorough washing of the skin and hair with soap and water. Removal of the ingested substance by gastric lavage or emesis as soon as possible after ingestion is considered effective.[1] Intravenous atropine is of great diagnostic value, and is a specific antidote in the diagnosis of organophosphorus poisoning. It should be promptly used when the latter is suspected. The dose is 0.02-0.05 mg/kg administered every 15-20 minutes until complete atropinization is achieved. Once the pupils dilate to a normal size, atropine is stopped. It is important to remember that atropine has no effect on severe muscular paralysis. Respiratory support is therefore vital in OP patients. Pulmonary edema is countered by intravenous Lasix 20-40 mg, and by using a mechanical ventiltor to give oxygen under pressure. The use of cholinesterase reactivator such as pralidoxime (2-PAM), should be considered because of its capability to counteract the effects of OP on skeletal muscles where atropine is less effective. Pralidoxime is not easily available. The dose is 1-2 g IV over 5-10 minutes. Treatment with pralidoxime should be repeated after 30 minutes if respiration does not improve. Prognosis is good if prompt action is taken as soon as the diagnosis is made. Any delay in starting treatment may be costly.

Community education in the rural areas where small or large-scale farming is practiced is very important. Prevention is better than cure. Doctors working in primary care centers must be aware of the dangers posed by organophosphorus compounds used by farmers. Questions should always be asked about exposure to insecticides whenever a patient is brought to their clinic comatose and with constricted pupils, particularly in agricultural areas, where their use may be prevalent. Pediatricians should work for primary prevention of poisoning, not only from their offices but also in the community, by supporting efforts at educating parents about properly storing and disposing toxic substances.

References

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