

## Homicidal Attempt by Injection of an Organophosphate Insecticide in a Seven Month-Old Baby

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### Abstract

The present case reports the first ever case of homicidal poisoning due to injection of an organophosphate insecticide with successful resuscitation and reporting.

**Case:** A 7-month-old baby presented to the emergency department with a history of insect bite since 5 hours by his relatives with a main complaint of irritability, disturbed conscious level, irregular respiration and wheezy chest. The injection site has appeared as oval area of redness and swelling at right elbow region that were noticed by the pediatric emergency department physician, with a medical history of resistance to medications for suspected insect bite (antihistaminic and corticosteroids in pediatric dosage) from referral hospital. By toxicological consultation, we revealed disturbed conscious level (GCS 10), pinpoint pupils and increase all body secretions, salivation, bronchorrhea and incontinence in urine and stools. The clinical toxicology consultant suspected a case of acute anticholine esterase toxicity and recommended a plasma pseudocholinesterase level that appeared to be very low, consistent with acute intoxication with organophosphate insecticide. The management of organophosphate poisoning was started, as airway management, administration of oxygen and fluids, as well as atropine in increasing doses and pralidoxime. Our case report emphasizes the necessity of a detailed history taken and careful smart medical examination for the possibility of homicide in such cases. Although injection sites may be the expected results of insect bite, medical treatment, dermal lesions also may be associated with injections of toxic substances.

**Keywords:** Homicidal injection; Plasma pseudocholinesterase; Insecticides; Intoxication; Organophosphorus compound; Child

### Introduction

Organophosphate (OP) poisoning is common in developing countries, especially in Egypt. Organophosphate insecticides are widely used in rural areas. Intentional exposure of organophosphates is associated with a high mortality rate [1].

OP poisoning by parenteral route has been described by very few authors [2-4]. If the history of parenteral administration of the compound is not available, diagnosis becomes difficult.

Organophosphate Intoxication (OI) induces irreversible inhibition of acetylcholinesterase. Organophosphates phosphorylate the serine hydroxyl group of acetylcholine, leading to accumulation of acetylcholine at the cholinergic synapses [5]. This accumulation leads to weakness and fasciculation of the muscle. In the central nervous system, neural transmission is disrupted. If this blockade is not reversed within 24 h, large amounts of acetylcholinesterase are permanently destroyed [6].

Acetylcholinesterase is found in red blood cells as well as in nicotinic and muscarinic receptors. To determine the severity and/or the elimination time of OI, one should measure cholinesterase in blood, either by measuring plasma pseudocholinesterase (PCE) or by measuring the cholinesterase in erythrocytes (which is thought to reflect the cholinesterase in neurons and neuromuscular junctions). The first method is widely available and therefore commonly used [6,7].

Herein, we report a case of a 7 month male baby who, upon being injected "homicidal attempt" with an organophosphate insecticides solution, developed severe OI associated with Central Nervous System (CNS) depression.

### Case Report

A 7-month-old previously healthy boy was brought to the emergency department with redness and swelling in the right antecubital fossa. He had been in good health until he was found, 5 hours prior to admission, crying in his bed with a suspected history of

insect bite in his right elbow region. The mother was not able to provide more information.

At admission, the pediatrician received a medical report from the referral health care personnel that the child had a history of unknown insect bite with a resistance to anti-allergic medications (antihistaminic and corticosteroids). The pediatrician consulted the clinical toxicologist for further opinion.

The physical examination of the baby by the clinical toxicologist showed, pinpoint pupils (less than 1 mm in diameter), sialorrhea, disturbed conscious level (his Glasgow Coma Scale (GCS) score was 10). Upon presentation, his vital signs included a rectal temperature of 36.1°C; heart rate, 132 beats/min; respiratory rate, 46 breaths/min; blood pressure, 85/45 mmHg; and haemoglobin saturation, 94%. Lung auscultation revealed bilateral basal non-consonating crepitations and ronchi. He had no abdominal tenderness, distension or hepatosplenomegaly. The skin was warm and clammy with Capillary Refill (CR) of less than two seconds. By local examination to the suspected area, there was found a widespread redness and swelling at the injection site of the right antecubital region of the studied case with a very tiny injection mark in the center of the inflammatory region (Figure 2). After oxygen tent and atropine administration (0.02 mg/kg every 5 min), the patient's condition stabilized. Earlier atropine (0.02 mg/kg) was given to prevent further decline.

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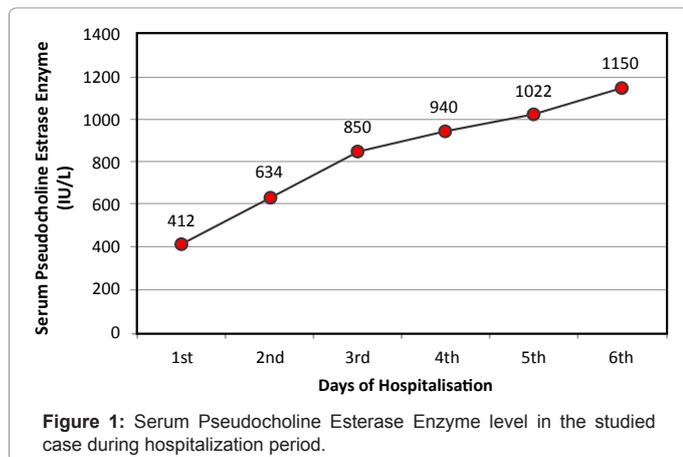
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The cause of the symptoms was unclear, but intoxication with an Organophosphorus Compound (OC) was considered [8]. The patient's symptoms and signs, the recovery after atropine administration indicated probable organophosphate intoxication.

The baby was transferred to The Pediatric Intensive Care Unit (PICU). All laboratory values were normal, except for a decreased Pseudocholesterase Enzyme (PCE). The baby's PCE was 412 IU/L (laboratory reference range: 1900-3800 IU/L). These clinical and laboratory findings confirmed our diagnosis of organophosphate intoxication. We registered this case in medico legal registry and notification was sent to the police [9].

Admission laboratory values were haemoglobin 13.5 g/dL (12.5-14.5), haematocrit 37% (35-50), white blood cell count 3.5 K/uL (4.5-11), platelet count 390 K/uL (150-400), glucose 150 mg/dL (76-110), urea 26 mg/dL (17-50), creatinine 0.72 mg/dL (<1.2), calcium 10.1 mg/dL (8.5-10.7), serum glutamic-oxaloacetic transaminase (sGOT) 31 U/L (<40), serum glutamic pyruvic transaminase (sGPT) 31 U/L (<40), gamma-glutamyl transferase (GGT) 21 U/L (<50) and lactate dehydrogenase (LDH) 411 U/L (<490).

The baby was kept on oxygen tent for the next 24 h. He was treated with plenty fluid infusions, atropine (0.02 mg/kg every 15 min) and obidoxime (7 mg/kg every 12 h). The frequency of atropine administration was reduced and finally stopped when symptoms as hypersecretion and bronchospams disappeared. Baby improved considerably. After atropine treatment had been stopped, obidoxime was slowly decreased and stopped after 3 days. His PCE level was 1150 IU/L on the 6<sup>th</sup> day (Figure 1).



The baby was discharged from the PICU on the 4<sup>th</sup> day and from the hospital on 6<sup>th</sup> day without any sequelae. Further evaluation of the baby 2 weeks later showed normal clinical findings and the PCE values were within the normal range.

Dementon was detected in blood and urine samples. No toxic agent was found in baby formula and medicines obtained from the crime scene. Dementon was also detected; insect sprayer bottle at bathroom of the baby's home and syringe remainings in the kitchen basketball were found. Gas Chromatography Mass Spectrophotometry (GCMS) was the method used for toxicological analysis. Based on the history, clinical findings and toxicological analysis, the cause of reported case was documented as dementon intoxication due to injection of insecticide to the right arm. The member of parquet decided that the case is a homicide attempt but could not convict any patient relatives as murderer because of lack of evidence. The file is still open.

## Discussion

Egypt is a predominantly agrarian country with large rural population. Organophosphate pesticides are used commonly for suicidal purpose. Although ingestion with suicidal intent is a common mode, occupational exposure while spraying in fields is an important modality of poisoning. Finally, a homicidal attempt via organophosphate poisoning is a rare situation and only one reported case all over the world by parenteral homicidal injection [10]. The clinical presentations and outcome of organophosphate poisoning depend not only on the pesticide but also on the dose, the route of administration, the time between poisoning and start of treatment, and patient's age [4,11,12]. Signs of intoxication may be seen lately in subcutaneous and intramuscular route of poisoning [13].

Unlike adults, infants mainly present with acute CNS depression and do not demonstrate the typical muscarinic effects. Symptoms such as increased body secretion, fasciculation and acute respiratory failure are more common in children. Tachycardia, rather than bradycardia, has been noted upon presentation in 49% of children presenting with organophosphate intoxication [14].

Organophosphate intoxications mostly occur in suicidal intent or by accident. Deaths due to injection of organophosphate are unusual [15]. Only a small number of cases of homicides by mixing the insecticide with the food of victims are reported [16]. In the literature, homicides by injection of toxic agents seem to be based on health care professionals [17] and a few homicide-suicide cases [15], except the case of intramuscular paraquat injection [18]. According to our knowledge, this is the first report of homicidal poisoning by injection of insecticides poisoning with complete recovery from toxicity.

Accidental organophosphate ingestions are mostly seen in active and exploratory period of childhood, in which they tend to take everything into their mouth, when parents are careless, neglectful or also when interfamilial conflicts are present [19]. Meadow mentioned the increased risk of deliberate poisoning in children especially under the age of 2½ years [20]. These poisonings may also be seen in the form of Munchausen syndrome by proxy [21]. Our case report emphasizes the necessity of a detailed history taken, circumstance evidence investigations and careful laboratory investigations for the possibility of homicide in such cases.

Although injection sites may be the expected results of medical treatment, dermal lesions also may be associated with injections of toxic substances [22]. Poisoning with organophosphates are the most common causes of intoxications in Egypt [23]. The routes of the

intoxication were gastrointestinal system, respiratory tract system and skin, however, it should be realized that parenteral intoxication may occur even with small amounts of the poison. Since the intoxication occurred by parentral injection, therapy was given earlier as a result of earlier symptoms and signs.

In this case report, we document a parental use of an organophosphate substance for homicidal purposes. Therefore signs such as miosis, increased secretion, bronchospasm, incontinence in urine and stool appeared after a short period. Atropine and the enzyme reactivator obidoxime were given as antidotal therapy for this poisoning. Eventually the baby got better after the fourth day of therapy.

On performing a careful and thorough history taken, meticulous medical examination and accurate toxicological laboratory test, it was clear that cause of illness was organophosphate intoxication by injection and it was a homicide attempt. Our case emphasizes the importance of careful medical examination and toxicological analysis in such cases.

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