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Bronchiolitis Revealing Pyrethroid Poisoning in a 2-Month-Old Infant

Vanessa Iris Gaspiet-Sonny[1*], Aymard Joker Tresor Guenefio[1], Ghislain Franck Houndjahoue[1,2], Jean Chrysostome Gody[1,3]

[1]Centre Hospitalier Universitaire Pédiatrique de Bangui (CHUPB), Bangui, République Centrafricaine
[2]Médecins avec l'Afrique CUAMM International NGO, Padova, Italy
[3]Faculté des Sciences de la Santé (FACSS), Université de Bangui, Bangui, République Centrafricaine
Email: *vanessagaspiet@gmail.com

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Abstract

Despite the widespread domestic use of pyrethroid insecticides, very few cases of poisoning are reported in the literature, especially in children. The manifestations are generally benign, and the management is controversial. We report a case of severe intoxication in a 2-month-old infant, initially treated as bronchiolitis, which progressed favorably under atropine. This case illustrates on the one hand the importance of looking for the notion of a spray in the sudden onset of respiratory distress in the infant, and on the other hand monitoring any intoxication with pyrethroids in a small infant in order to consider a treatment with atropine sulfate in case of the occurrence of a muscarinic syndrome.

Keywords

Intoxication, Pyrethroids, Infant, Bangui

1. Introduction

Indoor spraying with pyrethroid insecticides is a method of mosquito control [1]. This widely used method would increasingly expose the population to a risk of poisoning [2]. Nevertheless, very few cases are reported in the literature. The U.S. monitoring system of toxic exposure and the American Association of Poison Control Centers reported 37,397 cases of exposure to pyrethroids from 2001 to 2003, one-third of which occurred in children under 6 years old [3] [4]. The manifestations are generally benign [3] [4] [5], and the management is controversial. We report a case of suspected intoxication in a 2-month-old infant with severe manifestations, initially managed as bronchiolitis.

2. Case Report

M.S., a 2-month-old, male infant with no specific medical history, was received at the emergency room on May 15, 2020 for sudden onset of respiratory distress 24 hours earlier. The parents have consulted in a pharmacy where he was treated by amoxicillin, sodium alginate/sodium bicarbonate and oral betamethasone. Upon admission, the infant was conscious, weighted 7.270 kg, his temperature was 37.2˚C. His heart rate was 190 beats/min, the respiratory rate 80 breaths/min and the oxygen saturation 63% under room air. Physical examination findings were: signs of respiratory distress (nasal flaring, intercostal space indrawing, thoracoabdominal rocking motion), drooling, watery eyes, myosis pupils, and wheezing. The chest X-ray showed no abnormalities (Figure 1). Biological investigations are summarized in Table 1. The nasopharyngeal swab for viruses had not been done. The diagnosis of severe acute bronchiolitis was evoked. He was put on oxygen, ampicillin and gentamicin. The evolution was marked by the onset of fever at 38.5˚C on the first day of hospitalization. The persistence of the respiratory distress, the muscarinic syndrome (hypersalivation, watery eyes, myosis) and the wheezing at the 5th day of hospitalization motivated an in-depth

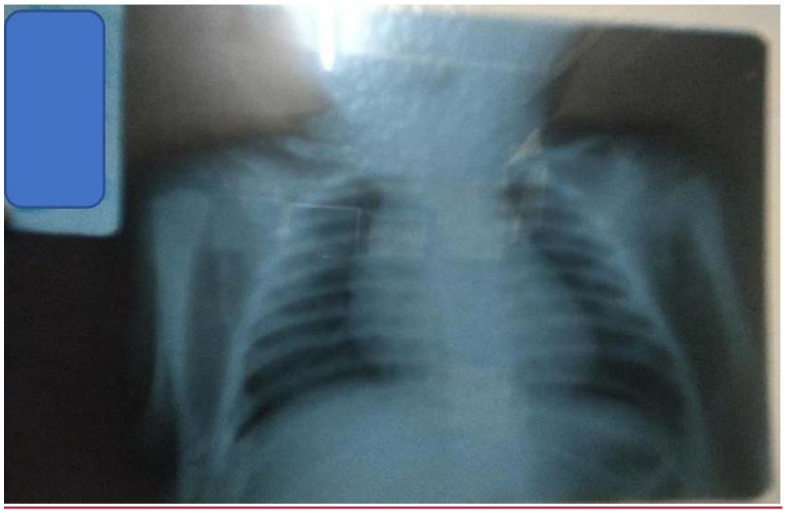

Figure 1. Chest X-ray done upon admission.

Table 1. Biological investigations upon admission.

Biological investigations	Result
Hemoglobin	11 g/dl
Leukocyte	11,900/mm^3
Platelet	238,000/mm^3
Protein C reactive	3.90 mg/l
Malaria thick smear	Negative
Natremia	138 mmol/l
Kalemia	3.2 mmol/l

interview which revealed the sudden manifestation—while sleeping—of cough followed by a respiratory distress progressively worsening within 20 minutes of spraying with "ORO Double Action" insecticide. The visual composition on the bottle showed: permethrin 0.25%, tetramethrin 0.20%, d-phenothrin 0.01% and piperonyl butoxide 0.34%. In the absence of a laboratory for the determination of anti-cholinesterase activity and other toxicological analysis, the suspicion of pyrethroid poisoning was retained on the basis of anamnestic and clinical findings. The infant was put on atropine intravenous 0.05 mg/kg/15minutes, *i.e.* 0.36 mg/15minutes, until the signs of atropinization appeared; then 0.15 mg/hour for 24 hours. The evolution was marked by the regression of the signs of respiratory distress and the weaning from oxygen 24 hour later. The infant was discharged 72 hours after the administration of atropine and was seen again 72 hours after discharge with a favorable clinical course. The 1-month follow-up visit was without any complaints.

3. Discussion

Type 1 pyrethroids are insecticide constituents widely used for domestic in Africa and worldwide [5] [6]. The most frequently reported was permethrin (83.16%), followed by tetramethrin (46.9%) [7]. This wide use is explained by the fact that it is considered as a low toxicity product for humans [8]. Cases of intoxication are rare in the literature or underestimated, especially in children, despite exposure to various sources. This is the first case reported in Africa in an infant of this age. The routes of contamination are variable: cutaneous, oral and airborne; but no significant association has been found between the route of exposure and the severity of the disease [7] [9] [10]. Children are particularly vulnerable due to frequent hand-to-mouth behavior, ingestion of soil and dust, frequent contact with soil, floors, and carpets where spray residues are deposited [11]. At 2 months of age, none of these behaviors previously mentioned are found in the child. The infant was exposed after the grandmother, who is not literate, sprayed the room where he was sleeping. This accidental exposure occurred because of the lack of knowledge of the precautions mentioned on the insecticide bottle. The vast majority of domestic poisonings by pyrethroids are of little or no severity. In more than half of the cases, there are no symptoms. However, in case of inhalation of aerosol in a confined environment there is a risk of bronchospasm in sensitive subjects [12], as illustrated by the clinical case. Despite the safety, low persistence in the environment and low bioavailability of pyrethroids [7] [12], different clinical manifestations have been described in the literature. The most frequently reported symptoms are respiratory (breathing difficulty, signs of acute lung edema, wheeing), followed by neurological (altered state of consciousness, convulsions, paresthesias) and gastrointestinal (abdominal pain, vomiting) [7] [11]. The infant presented 20 minutes after exposure to the toxic product with severe respiratory signs associated with a muscarinic syndrome, making organophosphorus poisoning discussed. Type 1 pyrethroids

cause a so-called "T" syndrome characterized by generalized tremors, prostration, convulsions and hyperexcitations and death, whereas type 2 causes a so-called "CS" syndrome with drooling, incoordination, choreoathetosis, convulsions, apnea and death [12]. Patients with pyrethroid poisoning may exhibit clinical signs similar to those of organophosphates [8]. Treatment of pyrethroid poisoning is usually symptomatic. The use of atropine because of the similar clinical picture to cholinesterase inhibitor poisoning is controversial [10]. Treatment for bronchospasm and corticosteroid therapy did not improve the clinical condition of the patient in our case. The atropine protocol [13] after 24 hours weaned this infant from oxygen. Drago reported a case series of 3 brothers with accidental acute permethrin intoxication in whom initial treatment with atropine did not improve the clinical condition [6]. On the other hand, Cham reported acute pyrethroid intoxication in an 89-year-old adult who presented with a muscarinic syndrome and progressed favorably with atropine. There are a few cases in the literature where patients with pyrethroid poisoning have been misdiagnosed as organophosphate poisoning [8]. Permethrin has been shown to increase acetylcholine and acetylcholinesterase levels *in vitro* and *in vivo* [6]. M.S. has presented a muscarinic syndrome, which motivated the use of atropine with a favorable clinical outcome. In view of all the above, we would suggest considering atropine sulfate treatment in case of a symptomatology in favor of a muscarinic syndrome.

4. Conclusion

This clinical fact illustrates the importance of looking for the notion of spraying in any sudden onset of respiratory distress in infants. The clinician should repeat the clinical examination to demonstrate a muscarinic syndrome revealing anticholinesterase activities. In addition to the use of anti-muscarinic drugs, it is essential—taking into account the lack of knowledge of the precautions for use—to raise awareness at the community level of the risks inherent in pesticide use.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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