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INDOXACARB POISONING: A RARE PRESENTATION AS METHEMOGLOBINAEMIA

Emergency Medicine

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ABSTRACT

Indoxacarb is a broad-spectrum non-organophosphorus oxidiazine insecticide widely used in farming. Once absorbed it acts on sodium channels and blocks the flow of sodium ions. We reported a case of indoxacarb poisoning in a female patient following suicidal consumption, manifested as unconsciousness, cyanosis and stationary SpO2 values. Methemoglobinaemia was suspected on clinical presentation which was successfully managed with inj. methylene blue and other symptomatic and supportive treatment.

KEYWORDS

Indoxacarb, methemoglobinaemia, methylene blue

INTRODUCTION

Indoxacarb is an oxadiazine insecticide, which acts by blocking sodium channels in the nervous system of insects and causes mild tremors, cessation of feeding, and death in couple of hours. Widely used in commercial and farm planting for the control of certain insects, i.e. moth, leaf hopper and fruit worm. Contact with the substance can take place through ingestion, physical contact, translaminar action, during preening and at rewetting of surfaces.[1]

Figure 1: Indoxacarb poison bottle

Case Report

A 35-year-old female came to our emergency medicine department with an alleged history of consumption of an unknown pesticide (suicidal attempt) while working in the farm during the day hours. As per records she was given gastric lavage in a local hospital and then referred to our hospital for further management.

Physical Examination And Treatment

On admission she was cyanosed and unresponsive with a Glasgow coma scale (GCS) of 8/15. She was immediately intubated and put on controlled mechanical ventilatory support with a FiO2 of 1.0. The Blood pressure was 80/50 mmHg, pulse rate (PR) was 140 per min and SpO2 was 85%. The pupils were bilaterally dilated and were sluggishly reacting to light. The right internal jugular vein was cannulated and central venous pressure (CVP) was 5 cm of water. Intravenous fluids were given to keep a CVP of 10-12 cm of water or a urine output of 0.5-1 ml/kg/h. The investigations like complete blood count, kidney function test, liver function test, serum electrolytes and serum cholinesterase were sent. While sampling, the arterial blood was found to be chocolate brown coloured [3] which did not change its colour even on deliberate exposure to room air. Another arterial sample was analysed and revealed pH 7.20, PaCO2 32, PaO2 288, HCO3 16 and SaO2 85%. It was observed that despite continuing mechanical ventilation with 100% O2, the SpO2 value did not rise and remained stationary at 83–84% for another hour.

The patient's relatives were thoroughly questioned again about the poison and later on they could bring the bottle of poison consumed. It was indoxacarb (14.5% SC *Avaunt*), which is a non-organophosphorus oxidiazine insecticide. Considering the cyanosis, stationary SpO2, chocolate brown colour of arterial blood and disproportionately high PaO2 on arterial blood gas (ABG) analysis, the possibility of methemoglobinaemia was suspected. As the facility for determining methemoglobin levels was unavailable, we started the treatment on the basis of clinical suspicion.

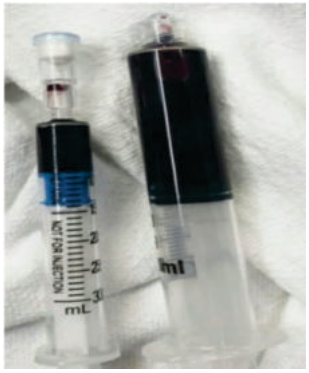

Figure 2: ABG syringe (chocolate brown colour)

Injection methylene blue 120 mg diluted in 100 ml saline (dose 2 mg/kg, preparation 1%, was given over a period of 10 min intravenously. The patient started improving in terms of better sensorium and an increased SpO2 value (90%). Repeat ABG analysis showed pH 7.45, PaCO2 35, PaO2 330, HCO3 24.8 and SaO2 98% at a FiO2 of 1.0. Thereafter, FiO2 was reduced to 0.6 and inj. methylene blue 60 mg (dose 1 mg/kg dose were continued at 12-h intervals.

The next day SpO2 value rose to 92%; ABG analysis revealed pH 7.45, PaCO2 32, PaO2 330, HCO3 24 and SaO2 100% at a FiO2 of 0.6 and she became responsive to verbal commands. She was put on the synchronised intermittent mandatory ventilation (SIMV) mode with a FiO2 of 0.5 and a pressure support of 13 cm of H2O. On day 3, the SpO2 value rose to 95% and she became fully conscious. She was given a T-piece trial with O2 at a rate of 5 l/min. ABG showed a pH 7.45, PaCO2 34, PaO2 440, HCO3 22.6 and SaO2 100%. The next day she was extubated and was kept on face mask with O2 at a rate of 5 l/min. On day 5 with stable haemodynamics and GCS 15/15 she was shifted to ward.

DISCUSSION

Indoxacarb insecticide is formulated as 30% active water-soluble granule. The oral LD50 [1] is 1800 mg/kg and dermal LD50 [1] is >5000 mg/kg. It affects insects by either direct exposure of spray droplets or

through ingestion of treated foliage and fruit. Once absorbed, it kills the organism by blocking the flow of sodium ions.[1,4] This results in impaired nerve function, cessation of feeding, paralysis and death in insects. Methemoglobin[7] (MetHb) is generated by the oxidation of haem iron moieties to the ferric state causing characteristic bluish brown colour resembling cyanosis. MetHb has such a high affinity to O2 that virtually no O2 is delivered to tissues and the O2 dissociation curve is shifted towards left.

Methemoglobinaemia[5] should be suspected in patients with hypoxic symptoms who appear cyanotic, though PaO2 levels on ABG analysis are sufficiently high to fully saturate the haemoglobin. The characteristic chocolate brown appearance of freshly drawn blood can be a critical clue.[3] The SpO2 value around 85% is because of the typical light absorbance spectra[8] of MetHb. Normally MetHb levels are less than 1%. The cyanosis usually manifests at a level of 15% and treatment is warranted at levels above 30% while levels >60% are considered to be lethal. [3,5-7]

Methemoglobinaemia is treated with methylene blue, 1–2 mg/kg, administered slowly. If cyanosis persists, the dose may be repeated at an hourly interval to a maximum of 7 mg/kg/day. The maintenance dose [5] of methylene blue is 1 mg/kg twice or three times a day. Other supportive measures include the administration of vitamin C and correction of the metabolic abnormalities.

In our patient, methemoglobinaemia had occurred following the ingestion of indoxacarb insecticide which was identified and treated on the basis of clinical suspicion and ABG analysis. Further literature research revealed a similar case report.[9]

CONCLUSION:

Therefore, it can be substantiated that indoxacarb, an oxidiazine insecticide, also manifests its toxicity in humans in the form of methemoglobinaemia. As in our patient, it could be successfully managed with intravenous methylene blue and other supportive and symptomatic treatment. As indoxacarb is a commonly used insecticide, the clinicians working in ICUs should be able to recognise and manage it.

REFERENCES:

1. McKinley N, Kijima S, Cook G, Sherrod D. Avaunt (indoxacarb): A new mode of action insecticide for control of several key orchard pests. Proceedings of the 76th Annual Western Orchard Pest and Disease Management Conference 9-11 January 2002 published by Washington State Univ., Pullman,.
2. Udwadia FE. Critical care poisonings. Principles in critical care. 2nd ed. New Delhi: Oxford University Press; 2005. p. 646-7.
3. Linden CH, Burns MJ. Poisoning and drug overdosage. In: Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, editors. Harrison's principles of internal medicine. 15th ed. New York: McGraw-Hill, Medical Publishing Division; 2001. p. 2612.
4. Indoxacarb (Avaunt) NYSDEC Registration Letter 3/02.
5. Schmitter CR. Diseases due to altered hemoglobin concentrations or structures. In: Stoelting RK, Dierdorf SF, editors. Anaesthesia and co-existing diseases. 4th ed. Noida: Elsevier, a division of Reed Elsevier India Limited; 2007. p. 484.
6. Henry JA. Management and complications of commonly ingested and inhaled poisons. In: Wylie, Churchill, editors. Davidson's a practice of Anaesthesia. 7th ed. London: Arnold, a member of the Hodder Headline Group; 2003. p. 1188.
7. Verive M, Kumar M. Methemoglobinemia. In eMedicine Specialties > Pediatrics: Hematology > Hematology.
8. Barker SJ, Tremper KK, Hyatt J. Effects of methemoglobinaemia on pulse oximetry and mixed venous oximetry. Anesthesiology 1986;65:550-2.
9. Prasanna L, Rao SM, Singh V, Kujur R, Gowrishankar. Indoxacarb poisoning: An unusual presentation as methemoglobinemia. Indian J Crit Care Med 2008;12:198-200.