

Nitrobenzene Compound Poisoning Induced Methemoglobinemia

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ABSTRACT

Acute poisoning with nitrobenzene causing significant methaemoglobinaemia is uncommon but life threatening emergency. We present a case of a 20 year old female presenting with dyspnoea, delirium and cyanosis following consumption of Nitrobenzene 20%. Prompt clinical suspicion of methemoglobinemia and early initiation of IV methylene blue and ascorbic acid resulted in complete recovery. Presence of normal pO₂ on ABG and low SpO₂ on pulse oximetry in a cyanosed patient should lead to prompt clinical suspicion of methemoglobinemia .

Introduction :

Nitrobenzene is a nitrite compound often used in solvents. Its toxic effects are due to its ability to induce methemoglobinemia which is a medical emergency. Acute poisoning with methylene blue causes life threatening methemoglobinemia which if diagnosed and treated promptly may prevent a fatal outcome.¹

Case Report :

A 20 year old female was referred from primary health centre with history of consumption of unknown quantity of a pesticide "Boomflower" (a compound containing 20% nitrobenzene) two hours prior to admission. On examination patient was drowsy, tachypneic, cyanosed and had a pulse rate of 130/min. Her chest was clear and SpO₂ on room air was 62%. She was immediately intubated and put on mechanical ventilation but inspite of FiO₂ of 100%, her SpO₂ failed to improve. Her ABG revealed pH-7.4, pO₂ - 590mm of Hg, pCO₂ - 28 mm of Hg and PaO₂/FiO₂ - 2812.5.

In view of central cyanosis, low peripheral SpO₂ and normal PaO₂ on ABG, methemoglobinemia was suspected. The blood sample drawn from the patient was chocolate brown colour which failed to turn

bright red inspite of passing 100% oxygen through it. Facility for measuring methemoglobin level was not available with us. Patient was empirically started on iv methylene blue 50mg iv stat (1mg/kg) and her SpO₂ improved to 90%. She was also given lavage by activated charcoal and PEG enema was also given. After 4 hours of methylene blue administration her SpO₂ again dropped to 60% with normal pO₂ on ABG and she was administered more stat dose 30 mg of iv methylene blue.

Over the next 4 days, patient had repeated episodes of intermittent drop in SpO₂ and was given iv methylene blue 6 hourly for 5 doses along with oral ascorbic acid 500 mg tds. Patient gradually recovered and was discharged on day 9 with normal SpO₂, ABG, and lab parameters.

Discussion :

Nitrobenzene (nitrobenzol oil) is a pale yellow liquid with an odour of bitter almonds which is used in dyes, paints and synthetic rubber. In India, it is also used as a pesticide. The lethal dose ranges from 1 to 10 gm.¹ The toxic effects are due to production of methemoglobinemia, a condition in which iron within the haemoglobin is oxidised from (Fe²⁺) ferrous to (Fe³⁺) ferric state resulting in inability to transport oxygen. Methemoglobinemia can also result after exposure to oxidizing agents like aniline, benzocaine, dapsone, phenazopyridine, nitrates, nitrites and naphthalene. Acute intoxication is usually asymptomatic and presents with cyanosis alone up to the level of 10-15% of methemoglobin. Beyond 20% headache, dyspnea, chest pain, tachypnea, tachycardia develop. At 40-50%,

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confusion, lethargy, metabolic acidosis occur leading to coma, seizures, bradycardia, ventricular dysrhythmia and hypertension. Fractions around 70% are fatal².

The management includes gastric lavage, use of activated charcoal, PEG enema, high flow oxygen and mechanical ventilation if necessary. Methylene blue is the specific antidote.³ Methylene blue is given in the dose of 1-2 mg/kg iv over 5 mins. Dose maybe repeated if patient is still symptomatic till a maximum dose of 7mg/kg.

Methylene blue is exogenous cofactor that donates electron which reduces methemoglobin to ferrous state through NADPH dependent methemoglobin reductase system.³ Methemoglobin is contraindicated in patients with G6PD deficiency as it may trigger hemolysis. Adjuvant treatment includes ascorbic acid an antioxidant, free radical scavenger which reduces NAD⁺ at doses 0.5 to 1gm 8 hourly. RBC exchange transfusion and hyperbaric oxygen therapy are reserved for patients with severe symptoms refractory to management.¹

Conclusion :

Nitrobenzene is an uncommon compound, especially when used as a pesticide and hence physicians lack awareness about its presenting features. Methemoglobinemia is a medical emergency and should be promptly suspected in the face of cyanosis, reduction in SpO₂ and normal PaO₂ on ABG. Lack of facilities to diagnose methemoglobinemia should not deter physicians from starting IV methylene blue or ascorbic acid at the earliest.

References :

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