Case Report

Severe methemoglobinemia due to insecticide poisoning

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Abstract

Methemoglobinemia is an altered state of hemoglobin resulting in impaired oxygen delivery to the tissues. Deliberate ingestion of certain insecticides and pesticides may result in this condition. We report a case of severe methemoglobinemia after deliberate ingestion of an insecticide marketed to be safe and containing only biological extracts and fillers. Methemoglobinemia should be suspected with low oxygen saturation on pulse oxymetry and the presence of chocolate colored blood. The methemoglobin level of 91% in our patient is the highest level reported among methemoglobinemia survivors.

Keywords: Biological extracts, insecticide, methemoglobinemia

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Introduction

Methemoglobinemia is a potentially fatal condition that occurs when the ferrous iron of heme is oxidized to ferric iron, causing decreased capability of hemoglobin to deliver oxygen. Methemoglobinemia has been linked to a wide array of substances, like local anesthetics, industrial chemicals, and insecticides.[1] Methemoglobin (MetHb) level of more than 70% is usually fatal. We describe a patient who presented with a very high MetHb level of 91%, after deliberately consuming an insecticide containing biological extracts and previously not known to have caused methemoglobinemia.

Case Report

A 26-year-old lady with no premorbid illnesses allegedly consumed about 20 ml of an insecticide called 'Kick' (composition: Biological extracts-2%, Stabilizers-8%, and Fillers and others-90%) with suicidal intent. She was found unresponsive and was taken to a local hospital where she was intubated and mechanically ventilated. She was referred to our hospital after 24 hours of ingestion for further management. At presentation, she was cyanotic with a heart rate of 160/min and blood pressure of 110/70 mm Hg. Saturation measured by pulse oxymetry was 80% on 100% oxygen and her blood was noted to be dark brown in color [Figure 1]. This raised the suspicion of methemoglobinemia and was confirmed by serum MetHb levels of 91% on co-oximetry. Glucose 6 phosphate dehydrogenase (G6PD) level was normal. She was administered 2 mg/kg of methylene blue and a repeat Arterial Blood Gas (ABG) at 1 hour showed a reduction in MetHb level to 27%. Another bolus dose was administered following which the MetHb level decreased further to 13.6%. In view of possible rebound increase in MetHb levels, methylene blue infusion was started at 10 mg/hr for 24 hours and gradually tapered off over the next 24 hours. On the 3rd day, she developed

Figure 1: Dark brown colored blood due to methemoglobinemia on the left

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hemolysis and methylene blue had to be discontinued following which hemolysis resolved. Three pints of packed red cells were transfused to maintain the hemoglobin level above 9 gm%. MetHb levels slowly decreased and reached levels of <2% only after 6 days. High dose injection Vitamin C and Riboflavin was also administered. Her sensorium improved with the above measures and she was slowly weaned off the ventilator after 9 days. She had complete neurological recovery at discharge from the ward.

Discussion

Methemoglobinemia is a condition where methemoglobin levels in the blood exceed normal levels of 2%. The overwhelming oxidative stress leads to oxidation of ferrous iron resulting in high levels of methemoglobin, thereby, reducing oxygen delivery to the tissues. Symptoms include headache, nausea, vomiting, cyanosis, altered mental state eventually progressing to drowsiness, coma, and death. The typical pattern seen is cyanosis, low hemoglobin oxygen saturation on pulse oximetry, normal partial pressure of oxygen in arterial blood (PaO_2) on ABG and chocolate colored blood.[2]

Indoxacarb, aluminum phosphide, and paraquat are the commonly implicated insecticides for methemoglobinemia. The insecticide she consumed reportedly contains biological extracts, stabilizers, and fillers. It was marketed as a safe compound with no reports of toxicity and no mention of an antidote. Biological extracts are rich in nitrogenous products and hence can potentially cause Methemoglobinemia.

MetHb levels of up to 20% are usually well tolerated by otherwise healthy individuals. MetHb levels of >70% are usually fatal, though survival has been reported with a MetHb level of 81%.[3] Our patient with a MetHb level of 91% had the highest reported level among methemoglobinemia survivors. The usual recommended dose of methylene blue is 7 mg/kg. Higher doses may cause chest pain, hypotension, and hemolysis especially with G6PD deficiency. We continued the infusion till a total of 8 mg/kg as our patient presented late and had a very high MetHb level. Garg *et al*., previously reported successful treatment of persistently high levels of methemoglobin due to rebound methemoglobinemia with a prolonged infusion of methylene blue.[4] Role of methylene blue infusion needs to be explored. Exchange transfusion is another modality of treatment shown to be beneficial in severe cases.[5] Our patient received multiple blood transfusions along with methylene blue and ascorbic acid and was discharged with no residual neurological deficits. Our report suggests that a prolonged infusion of methylene blue may be useful in severe cases for persistent methemoglobinemia provided there are no contraindications or complications of methylene blue therapy.

Conclusion

In conclusion, one has to be cautious of the numerous compounds without details of the composition which can cause unexpected complications. Methemoglobinemia should be suspected with low oxygen saturation on pulse oximetry and the presence of chocolate colored blood. MetHb levels may be elevated and need to be monitored for up to 7 days.

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