CASE REPORT

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Carbon Monoxide Poisoning from Heavy Cigarette Smoking Presenting as Delusion in a Patient with a History of Chronic Schizophrenia (Methamphetamine Induced)

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Abstract

We describe a case of carbon monoxide poisoning in a 54-year-old male from heavy cigarette smoking presenting as delusions. The patient has a history of methamphetamine-induced schizophrenia now in remission for 2 years, and not on any psychotropics and is drug-free.

Keywords: Arterial blood gas, Carbon monoxide, Hyperbaric oxygen, White blood cell count.

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Abbreviations Used in this Article

ABG = Arterial blood gas; CT = Computed tomography; ER = Emergency room; WBC = Whole blood cell.

A 54-year-old male with a history of smoking two cigars and one pack of cigarettes a day presents twice to the emergency room (ER) with a history of chronic headache and nausea for years but worse for the last 4 days and a feeling of something stuck in his head and reports “feeling funny” and having a foreign body sensation. He has a history of chronic headaches for the last 4 years along with nausea but is on tylenol only and stated this headache is worse and different. Additionally, he feels a foreign body sensation which is new from his previous headaches. He denies dizziness, double vision, or vomiting or photophobia, no fever or chills, or seizures.

Past Medical History

- Positive for methamphetamine use, hearing voices, and visual hallucinations, went through drug rehabilitation 2 years ago, and currently not on any psychotropic medications.
- Mild abdominal pain and nausea with a negative endoscopy, colonoscopy, and computed tomography (CT) scan of the abdomen.
- Hepatitis C.

Past Surgical History

- Splenectomy.
- Tonsillectomy.

Social History

Smokes one pack of cigarettes/day with two cigars a day, last meth use 2 years ago. Works at an electric supply store.

Physical Exam

Normal vital signs and normal physical exam.

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Workup

Labs normal.

Computed tomography head during the first ER visit shows mild mucoperiosteal thickening involving the left maxilla, and the patient was given amoxicillin, prednisone, motrin, and an albuterol inhaler and was sent home with a diagnosis of maxillary sinusitis.

Follow-up

The patient was seen the next day in the office and complained of a headache, something stuck in his head, and a foreign body sensation and diagnosis of relapse of delusions and psychosis were considered, as he denied any drug use.

He was sent to the ER for an arterial blood gas (ABG) with a carboxyhemoglobin measurement and the ABG results were: pH 7.45 PO_2 90, PCO_2 36, HCO_3 25, and carboxyhemoglobin level 11.6%.[1–4]

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Repeat white blood cell (WBC) was 26.0 and hemoglobin was 14.9. The high WBC count was attributed to steroids as the patient appeared non-toxic. His electrocardiogram was normal. He was diagnosed with mild carbon monoxide poisoning with symptoms and advised to quit smoking and sent home. He did not meet admission criteria for carbon monoxide which are listed below.

Admission criteria for hospitalization are as follows:

- Carboxyhemoglobin greater than 25% and treated with 100% oxygen or hyperbaric oxygen.
- Patient with ischemic heart disease and carboxyhemoglobin level greater than 15%.
- Pregnant patient with carboxyhemoglobin level greater than 10%.

The patient was advised to quit smoking and sent home. The patient went to the emergency room three more times for nausea. Repeat ABG after 10 days showed a carboxyhemoglobin level of 5.4, and he reported reducing his cigarette smoking to five cigarettes a day. Additionally, the gas company was sent to his house and workplace to make sure he was not exposed to any carbon monoxide leakage.[5] His headache, as well as the reported "funny feeling in his head" and nausea, all resolved.

Discussion

Heavy cigarette smoking is prevalent in the psychiatric population, and carbon monoxide poisoning should be considered in the differential diagnosis if a drug screen is negative in a patient with systemic complaints.[6] In this case, we were tempted to start psychotropics as we thought the patient had active psychosis from drug use. Since the patient had a negative urine drug screen and the schizophrenia was in remission, other causes were explored as a cause for his multiple complaints.

Carbon monoxide is a colorless, odorless, and non-irritating gas formed by hydrocarbon combustion. Atmospheric concentration is below 0.001% but is higher in urban areas. Carbon monoxide binds to hemoglobin in red cells 200 times faster than oxygen and is slower to exit, taking 24 hours to exit, and starves the body of oxygen. Non-smokers may have up to 3% carboxyhemoglobin levels. Severe chronic obstructive lung disease can cause modest but significant elevation in carboxyhemoglobin level without exposure to tobacco use, and the mechanism and clinical significance are unclear. Carboxyhemoglobin also interferes with peripheral utilization of oxygen.[2] About 10–15% of carboxyhemoglobin is extravascular and binds to myoglobin cytochrome and NADH reductase and affects mitochondrial function, and can produce myocardial stunning despite oxygen delivery.

One pack of cigarettes raises carbon monoxide levels to 3–6% and two packs 6–10%. Carbon monoxide levels above 10% can cause headache, nausea, dizziness, and confusion. Delirium levels above 25% can cause death at higher levels.

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