

> THE PATIENT

27-year-old woman

> SIGNS & SYMPTOMS

- Headache
- Fatigue
- Blurred vision

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> THE CASE

One month after moving into her mother's apartment, a 27-year-old woman sought care at our clinic for fatigue, headache, blurred vision, nausea, and morning vomiting. She had weakness and difficulty sleeping, but denied any fever, rashes, neck stiffness, recent travel, trauma, or tobacco or illicit drug use. She did, however, have a 6-year history of migraines. Her physical exam was normal. She was sent home with a prescription for tramadol 50 mg bid for her headaches.

The patient subsequently went to the emergency department 3 times for the same complaints; none of the treatments she received there (mostly acetaminophen with codeine) relieved her symptoms. Three weeks later she returned to our clinic. She was distressed that the symptoms hadn't gone away, and noted that her family was now experiencing similar symptoms.

Her temperature was 98.1°F (36.7°C), blood pressure was 131/88 mm Hg, pulse was 85 beats/min, and respiratory rate was 18 breaths/min. Physical and neurologic exams were normal.

THE DIAGNOSIS

Although most of the patient's lab test results were within normal ranges, her carboxy-hemoglobin (COHb) level was 4.2%. COHb levels of >2% to 3% in nonsmokers or >9% to 10% in smokers suggest carbon monoxide (CO) poisoning.^{1,2} Based on this finding and our patient's symptoms, we diagnosed unintentional CO poisoning. We recommended that she and her mother vacate the apartment and have it inspected.

DISCUSSION

CO is the leading cause of poisoning mortality in the United States, and causes half of all fatal poisonings worldwide.^{1,3,4} It is a colorless, odorless, and tasteless gas that is produced by the incomplete combustion of carbon-based products, such as coal or gas.^{5,6} Exposure can occur from car exhaust fumes, faulty room heaters, and other sources (TABLE 1).⁶ The incidence of CO poisoning is higher during the winter months and after natural disasters. Individuals who have a lowered oxygen capacity, such as older adults, pregnant women (and their fetuses), infants, and patients with anemia, cardiovascular disease, or cerebrovascular disease, are more susceptible to CO poisoning.^{5,6}

COHb, a stable complex of CO that forms in red blood cells when CO is inhaled, impairs oxygen delivery and peripheral utilization, resulting in cellular hypoxia.¹ Signs and symptoms of CO poisoning are nonspecific and require a high degree of clinical suspicion for early diagnosis and treatment. Although cherry-red lips, peripheral cyanosis, and retinal

hemorrhages are often described as “classic” symptoms of CO poisoning, these are rarely seen.⁶ The most common symptoms are actually headache (90%), dizziness (82%), and weakness (53%).⁷ Other symptoms include nausea, vomiting, confusion, visual disturbances, loss of consciousness, angina, seizure, and fatigue.^{6,7} Symptoms of chronic CO poisoning may differ from those of acute poisoning and can include chronic fatigue, neuropathy, and memory deficit.⁸

■ **The differential diagnosis for CO poisoning includes** flu-like syndrome/influenza/other viral illnesses, migraine or tension headaches, depression, transient ischemic attack, encephalitis, coronary artery disease, gastroenteritis or food poisoning, seizures, and dysrhythmias.^{1,4} Lab testing for COHb can help narrow the diagnosis. CO poisoning can be classified as mild, moderate, or severe based on COHb levels and the patient’s signs and symptoms (TABLE 2).⁶ However, COHb level is a poor predictor of clinical presentation and should not be used to dictate management.^{2,7}

Oxygen therapy is the recommended treatment

Early treatment with supplemental oxygen is recommended to reduce the length of time red blood cells are exposed to CO.¹ A COHb level >25% is the criterion for hyperbaric oxygen therapy.^{1,3} Patients should receive treatment until their symptoms become less intense.

■ **Delayed neuropsychiatric sequelae** (DNS) can occur in up to one-third of patients with acute CO poisoning more than a

TABLE 1
Potential sources of CO exposure⁶

Car exhaust fumes
Faulty room heaters
Burning charcoal for indoor grilling
Fires
Inadequate ventilation of natural gas
Gas-powered generators
Exposure to methylene chloride in spray paint
Gas stoves

CO, carbon monoxide.

month after apparent recovery.^{1,6,9} DNS symptoms include cognitive changes, emotional lability, visual disturbances, disorientation, depression, dementia, psychotic behavior, parkinsonism, amnesia, and incontinence.^{1,6,9} Approximately 50% to 75% of patients with DNS recover spontaneously within a year with symptomatic treatment.^{1,6,9}

Our patient

After recommending that our patient (and her mother) leave the apartment and have it inspected, we later learned that the fire department was unable to determine the source of the CO. A CO detector was installed and our patient was advised to keep the windows in the apartment open to allow for adequate oxygen flow. One month later she returned to our clinic and reported that her symptoms resolved; serum COHb was negative upon repeat lab tests.

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The 3 most common symptoms of CO poisoning are headache, dizziness, and weakness.

TABLE 2
Classification of CO poisoning⁶

Classification	COHb level	Signs/symptoms
Mild	≤10%	Patients may or may not develop symptoms
Moderate	>10%–<20%	Headache, lethargy, fatigue
Severe	≥20%–25%	Loss of consciousness, confusion, cardiac ischemia

CO, carbon monoxide; COHb, carboxyhemoglobin.

CONTINUED

THE TAKEAWAY

Patients who present with headaches, dizziness and/or fatigue should be evaluated for CO poisoning. The patient's environmental history should be reviewed carefully, especially because CO poisoning is more common during the winter months. Oxygen

therapy is the mainstay of treatment. Up to one-third of patients with acute poisoning may develop delayed neuropsychiatric sequelae, including cognitive changes, emotional lability, visual disturbances, disorientation, and depression, that may resolve within one year. **JFP**

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