Concepts of Arterial Oxygen Saturation in the Presence of Carboxyhemoglobin

To the Editor:

The letter by Hol and coworkers (1) serves as an example that the intricacies of carbon monoxide poisoning in conjunction with the various methods to measure arterial blood oxygenation are difficult concepts, and in their effort to clarify some of the issues, the authors may have left some readers more confused.

When a middle-aged male with a history of a past suicide attempt is found unconscious within an enclosed space in the presence of fuel-burning appliances, intentional CO poisoning should immediately come to mind. It should not require 3 days and the discovery of a dead canary to prompt the diagnosis.

While it may be true that mechanical ventilation (on oxygen) for 16 hours would clear circulating blood carboxyhemoglobin (COHb), it still may not be too late to make a diagnosis. One should call the lab to see if they saved an anticoagulated emergency department blood sample, as COHb can still be accurately measured on it. Carboxyhemoglobin is stable for at least a month in anticoagulated blood collection tubes used for routine tests in the emergency department, including those with light blue caps containing citrate and used for coagulation assays, and those with green caps containing heparin and used for plasma electrolyte measurements (2).

While CO poisoning is common in the United States, the citation used to support an incidence of 10,000 cases per year is quoting an estimate made in 1929 by the US Public Health Service (3). Now, over 80 years later, there exist more contemporary estimates of incidence that are substantially greater (4).

Regarding oxygen saturation, it is well known that it cannot accurately be measured in the presence of significant amounts of dyshemoglobin on a 2-wavelength pulse oximeter, nor can the proportions of dyshemoglobin be identified (5). When the authors write about the patient’s “percutaneous oxygen saturation of 99%,” they likely mean “transcutaneous” (noninvasive) oxygen saturation.

Finally, most new arterial blood gas analyzers sold today include spectrophotometry and measure COHb and methemoglobin automatically. I suspect that the instrument in Hol and colleagues’ hospital does, too. Otherwise, I do not understand how a “re-evaluation of the patient’s initial blood gas analysis” could reveal a COHb of 25.4%. I suspect that the lab had the value but did not report it because the clinicians did not request it.

Author disclosures are available with the text of this letter at www.atsjournals.org.

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References