Methemoglobinemia caused by sodium nitrite overdose

Dana Saleh MD, Scott Lucyk MD, Eric McGillis MD

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A 20-year-old man who was comatose and centrally cyanotic arrived at the emergency department 1 hour after ingesting 21 g of sodium nitrite that was purchased online as part of a "suicide kit" found by the patient's family; it included a measurement scale, a flask for dissolution in water and antiemetics (metoclopramide and famotidine). The patient's heart rate was 60 beats/min, systolic blood pressure was 80 mm Hg, body temperature was 36.5°C; and oxygen saturation as measured by pulse oximetry (SpO_2) was 85%, despite oxygenation by way of a supraglottic airway with a fraction of inspired oxygen (FiO_2) of 1. We observed conjunctival, nail bed and palmar pallor. Arterial blood was dark and chocolate coloured (Figure 1A). We intubated the patient after initiating fluid resuscitation and vasopressor support. We performed decontamination by gastric lavage and activated charcoal (1 g/kg) by way of an orogastric tube. We administered empiric methylene blue (1 mg/kg) intravenously. The patient's methemoglobin level was later reported as greater than 29%, the upper limit reporting cut-off for our laboratory. The patient clinically improved within hours after receiving a total of 4 mg/kg of methylene blue; hemolysis was not noted. He was alert and oriented at discharge from the intensive care unit 2 days later.

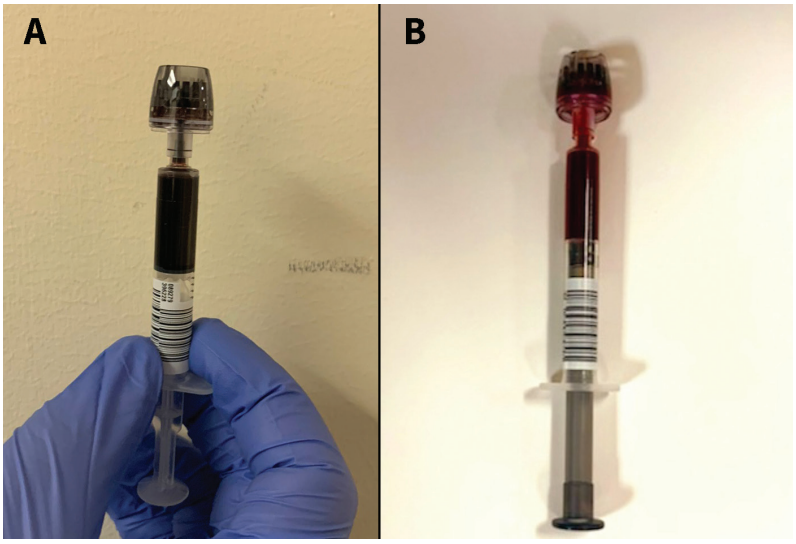

Figure 1: (A) Arterial blood gas sample from a 20-year-old man with methemoglobinemia showing dark, chocolate-coloured blood and (B) from a healthy patient for comparison.

Sodium nitrite is readily available online as it is used in meat curing and as a laboratory reagent. It oxidizes the ferrous iron in hemoglobin to ferric iron, which cannot bind oxygen. This impairs oxygen transport to tissues.[1] The lethal dose of sodium nitrite is between 0.7 and 6 g. Ingestion should be suspected in comatose patients with chocolate-coloured blood and hypoxemia that does not respond to supplemental oxygen; pulse oximeters are calibrated to the specific wavelengths of oxyhemoglobin and deoxyhemoglobin only.[2,3]

A recent rise in intentional ingestions and deaths from sodium nitrite poisoning has been reported in multiple countries, including Canada.[2,4,5] This has been attributed to websites that promote its use for suicide and sell suicide kits.[2,5] The United Kingdom now requires that sodium nitrite suppliers refuse "suspicious transactions" when people pay in cash or appear nervous.[2,6] Enhanced employee training and legal scrutiny are needed in Canada to restrict the sale of sodium nitrite and ban dangerous websites.

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Affiliations: Department of Medicine (Saleh) and Department of Emergency Medicine (Lucyk, McGillis), University of Calgary; Section of Respiratory Medicine (Saleh) and Section of Clinical Pharmacology and Toxicology (Lucyk, McGillis), Alberta Health Services; Poison and Drug Information Service (PADIS) (Lucyk, McGillis), Calgary, Alta.

Correspondence to: Dana Saleh, dana.saleh@ucalgary.ca

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