H111 Sodium Nitrite Suicide: A Case Report

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Learning Overview: After attending this presentation, attendees will be able to identify the gross autopsy findings associated with fatal methemoglobinemia and utilize that information in conjunction with scene investigation for the identification of cases with fatal sodium nitrite ingestion.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting the value of thorough scene documentation and the interplay of multiple aspects of forensic investigation in coming to the correct conclusions at the time of autopsy.

Sodium nitrite has wide uses in food preservation, pesticides, pharmaceuticals, industry, and construction. Toxic exposure to sodium nitrite is usually secondary to accidental ingestion or inhalation and results in a dose-dependent methemoglobinemia.[1] However, suicide through intentional ingestion of sodium nitrite is rarely described in the literature.

An autopsy case of a 25-year-old African American male with a history of depression and suicidal ideation is presented. He was found deceased in his bed at home. At autopsy, heavy foam was present within the airway and exuded from the nares. The body had a slight ashen appearance; however, no obvious abnormal coloration was noted in the visible livor, subcutaneous tissues, or organs. Pulmonary edema, bilateral pleural effusions, and mild cerebral edema were identified grossly. Blood spots on filter paper collected at the time of autopsy had a dark brown color. Initial toxicological examination was negative for common drugs of abuse and ethanol. The negative toxicology, despite autopsy findings suspicious for drug overdose, prompted additional review of the scene photographs and documentation. No drug paraphernalia was at the scene; however, the following items were noted: three bottles of sodium nitrite (anhydrous) with a mailing envelope from the Amazon.com store where it was purchased, a pack of "AAA Ormus" Advanced Artisan Alchemy pills and "Garden of Life—mykind organics" men's vitamins. Subsequent toxicological analysis targeted for methemoglobin was performed on an autopsy blood sample; the results revealed greater than 80% methemoglobin saturation. The cause of death was attributed to fatal methemoglobinemia due to intentional sodium nitrite ingestion.

Methemoglobin is an oxidized form of hemoglobin that cannot bind oxygen. In humans, normal physiologic levels are less than 1%–2%. Levels above 70% are generally lethal, though survival has been reported with levels up to 94%.[1,2] The mechanism of death in sodium nitrite overdose is tissue hypoxia due to the oxidizing effects of the chemical leading to impaired oxygen binding and transport ability.[1-3] Patients presenting with methemoglobinemia may experience non-specific symptoms, including headache, lightheadedness, or fatigue/lethargy; these symptoms may even progress to shock and coma due to hypoxia.[3] At autopsy, the body may show discoloration of the *livor* ranging from blue to green to brown, and similar discoloration may be noted on blood spots.[2] Of note, discoloration of the blood, as seen on the blood spot on filter paper (red to chocolate brown), can suggest methemoglobinemia and the degree of discoloration is reported to correlate with severity.[3]

Reference(s):

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2. Huang, S., Wange, R., et al. (2020) Fatal methemoglobinemia due to acute inhalation of methyl nitrite in an industrial accident. *J Forensic Sci*, May 2020, Vol. 65, No. 3.
3. Prchal, Josef T. (2020) Methhemoglobinemia. *UpToDate*. https://www.uptodate.com/contents/methemoglobinemia. Last accessed 9/30/2020

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