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New Trend for Suicide: A Case Report of Sodium Nitrite Intake

Talha Karahan[1,a], Levent Şahin[1,b,*], Gözde Nil Okan[1,c]

[1]*Department of Emergency Medicine, Medical School, Kafkas University, Kars, Türkiye*

**Corresponding author*

Case Report

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ABSTRACT

Sodium nitrite is an agent used as both a food preservative and an antimicrobial agent, and it is easily accessible. When taken in high doses, it can be life-threatening due to its ability to cause methemoglobinemia. Our case report examines the intentional ingestion of sodium nitrite for suicidal purposes and discusses its clinical management. The patient was brought to the emergency room displaying symptoms of nausea, vomiting, hypoxemia, and peripheral cyanosis. Methemoglobinemia was detected in the blood gas, and the patient's relative confirmed the history of sodium nitrite ingestion. Supportive treatment was initiated until methylene blue was provided. Given its easy accessibility, sodium nitrite intoxication should be included in the differential diagnosis for patients presenting with intoxication and methemoglobinemia. Initiating methylene blue treatment as soon as possible is crucial for the patient's recovery prognosis.

***Keywords*:** Sodium nitrite, methemoglobinemia, suicide, cyanosis

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İntiharda Yeni Trend: Sodyum Nitrit Alımına İlişkin Bir Vaka Raporu

Olgu Sunumu

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ÖZ

Sodyum nitrit hem gıda koruyucu hem de antimikrobiyal ajan olarak kullanılan bir maddedir ve kolayca erişilebilir. Yüksek dozlarda alındığında, methemoglobinemiye neden olma yeteneği nedeniyle yaşamı tehdit edebilir. Olgu sunumumuz, intihar amaçlı kasıtlı sodyum nitrit yutulmasını inceliyor ve klinik yönetimini tartışıyor. Hasta, bulantı, kusma, hipoksemi ve periferik siyanoz semptomları göstererek acil servise getirildi. Kan gazında methemoglobinemi tespit edildi ve hastanın yakını sodyum nitrit yutma öyküsünü doğruladı. Metilen mavisi sağlanana kadar destekleyici tedavi başlatıldı. Kolay erişilebilirliği göz önüne alındığında, zehirlenme ve methemoglobinemi ile gelen hastalarda sodyum nitrit zehirlenmesi ayırıcı tanıya dahil edilmelidir. Metilen mavisi tedavisine mümkün olan en kısa sürede başlanması, hastanın iyileşme prognozu için çok önemlidir.

Anahtar Kelimeler: Sodyum nitrit, methemoglobinemi, intihar, siyanoz

Telif Hakkı

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[a] *talhakarahan2829@gmail.com* *0000-0003-0193-4393*
[b] *levsahin44@gmail.com* *0000-0003-0193-4393*
[c] *gozdenilokan@gmail.com* *0009-0009-7847-8454*

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Introduction

Sodium nitrite (NaNO2) is an essential chemical compound widely recognized for its role as a preservative and antimicrobial agent in the food industry. It is readily available in powder form from numerous online suppliers and raw material distributors.[1] Sodium nitrite effectively oxidizes iron in hemoglobin, which leads to the formation of methemoglobin. Furthermore, it serves as a critical antidote for cyanide poisoning.[2] This oxidation process converts ferrous iron (Fe++) in hemoglobin to ferric iron (Fe+++), resulting in methemoglobinemia.[2-3] The ability of hemoglobin to transport oxygen and carbon dioxide can become significantly impaired, potentially resulting in tissue hypoxemia and, in severe cases, death. It is important to note that pulse oximetry readings in cases of methemoglobinemia can be misleading. Even when methemoglobin levels reach 100%, pulse oximetry may still show a reading around 85%. The reliability of these readings declines at lower methemoglobin levels. Once methemoglobin levels rise to 30-35%, pulse oximeters tend to stabilize, fixing oxygen saturation values between 82% and 86%. This makes these readings unreliable for assessing a patient's clinical condition. Instead, a more accurate evaluation of methemoglobin levels should be conducted through arterial blood gas analysis, which provides a clearer representation of the patient's status.[3] In individuals with normal hemoglobin levels (15 g/dL), methemoglobin levels below 10% typically do not present any symptoms. However, when methemoglobin levels rise between 10% and 20%, cyanosis may become noticeable. At levels between 20% and 30%, individuals may experience symptoms such as anxiety, fainting, headache, and tachycardia. As methemoglobin levels increase to between 30% and 50%, patients often face symptoms like weakness, confusion, dizziness, tachypnea, and further increased heart rate. When levels reach 50% to 70%, serious complications may occur, including coma, seizures, arrhythmias, and acidosis. Levels exceeding 70% can be fatal. Understanding these risks is essential for effective clinical management.[3]



Figure 1. Palmar and dorsal surfaces of the patient's hand before methylene blue treatment

Case Report

A 30-year-old male patient was brought to our emergency department with symptoms of poisoning and hypoxemia. In the ambulance, his oxygen saturation was measured at 40% using a pulse oximeter, and intranasal oxygen therapy was initiated. Upon arrival, the patient exhibited peripheral cyanosis (**Figure 1**), while bilateral pulses in both the upper and lower extremities were normal. His spontaneous respiration was regular but tachypneic. His blood pressure was recorded at 90/60 mmHg, and his pulse was 110 beats per minute, indicating hypotension and tachycardia. Following the initiation of intranasal oxygen therapy, his oxygen saturation increased to 88%. The patient's Glasgow Coma Scale (GCS) score was 11, Respiratory sounds were equal bilaterally, and no pathological sounds were detected. His abdominal examination showed no defense, rebound tenderness, or local tenderness.

Table 1: Blood gas values taken at 1-hour intervals

Blood gas parameters	pH	FMetHb (%)	FCOHb (%)	HCO_3	Lactate
At admission	7.35	55.7	0.1	18.1 (P, st)	6.3
1 hour after admission	7.38	47.7	- 0.7	16.2 (P, st)	-
2 hours after admission	7.41	36.9	- 0.5	22	1.3

The device was unable to give result.

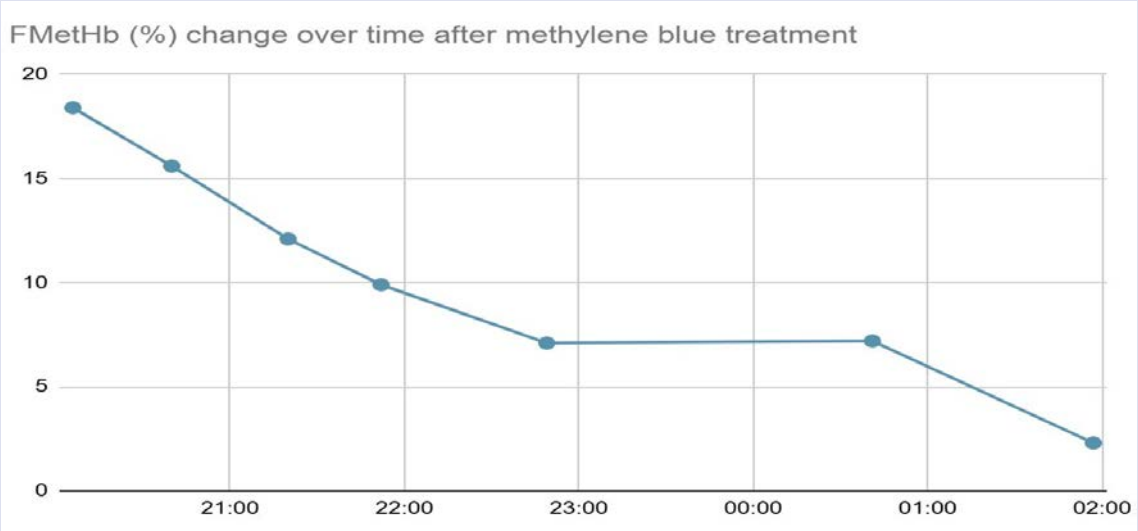


Figure 2. FMetHb (%) value change graph after methylene blue treatment in the intensive care unit



Figure 3. Palmar and dorsal surfaces of the patient's hand after methylene blue treatment

The patient was started on oxygen at 10 L/min via a non-rebreather mask and received intravenous hydration. After approximately five minutes, his GCS score returned to normal, and he was able to provide his medical history. He reported that after an argument with his wife, he mixed 5 grams of sodium nitrite with fruit juice and ingested it around noon (12 o'clock) with the intent to commit suicide. Symptoms began with nausea and vomiting approximately three hours after ingestion. Upon arrival, the patient's FMetHb value in venous blood was found to be 55.7%. One hour later, his arterial blood gas showed an FMetHb value of 47.7%, and after two hours, it decreased to 36.9%.

Once the ingestion of sodium nitrite was confirmed, the National Poisoning Line (UZEM) was contacted. They recommended intravenous administration of methylene blue at a dosage of 1 mg/kg over 5-30 minutes, with the same dose to be repeated if the FMetHb value did not drop below 30% one hour after the first dose or if the patient's symptoms persisted. Two ampoules of 100 mg/10 cc methylene blue were obtained within approximately 2.5 hours. Once the methylene blue was received, the patient was transferred to the intensive care unit for treatment and monitoring. In the ICU, 100 mg of methylene blue was administered intravenously in 100 cc of normal 0.9% NaCl saline. Following treatment, there was a significant reduction in the patient's hypoxia and FMetHb levels (Table 1, Figure 2). Peripheral cyanosis symptoms, especially in the hands, regressed (Figure 3).

Discussion

For patients brought to the emergency room with acute intoxication or poisoning, it's essential to obtain a detailed history from the patient or their relatives. Key information to determine includes the substance involved, the amount taken, and the duration of ingestion. However, if the patient is suicidal, psychotic, or in a blurred state of consciousness, they may not provide reliable information.[4] Emergency department physicians should be familiar with toxidromes and the signs of poisoning. If the patient's history doesn't identify the substance taken, the physician must evaluate the clinical presentation through physical examination and laboratory tests. In the meantime, supportive treatment should be initiated until the etiology or toxidrome is established. The airway should be assessed, and intubation should be performed if necessary. For hypotension, the first line of treatment is the administration of adequate intravenous fluids. Additionally, cardiac monitoring, pulse oximetry, and fingertip blood glucose monitoring are vital steps for patients presenting with toxidrome or poisoning. The patient's vital signs should be closely and frequently monitored, and any changes should prompt immediate intervention.[5]

In one particular case, the patient presented with nausea, vomiting, confusion, tachycardia, hypotension, and generalized cyanosis. Blood gas tests revealed a high FMetHb value, indicating methemoglobinemia based on the clinical picture. Given that the patient's FMetHb level exceeded 30% and they were symptomatic, rapid administration of methylene blue was necessary.[6] In cases of methemoglobinemia resulting from a drug or ingested substance, it is crucial to obtain methylene blue as soon as possible or transfer the patient to a facility equipped with the antidote. In this situation, efforts were made to contact a center with methylene blue for the patient's transfer. However, due to the time constraints, methylene blue was obtained from another center. It was determined that monitoring the patient with high-flow oxygen therapy via a non-rebreathing mask and providing intravenous hydration would be in the patient's best interest until antidote treatment commenced.

With the increasing accessibility of the internet, the substances used in suicide attempts are evolving.[7] Physicians in emergency departments should be aware of these changing trends. Additionally, a thorough psychiatric history should be obtained from the patient, and a psychiatric consultation should be considered.

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