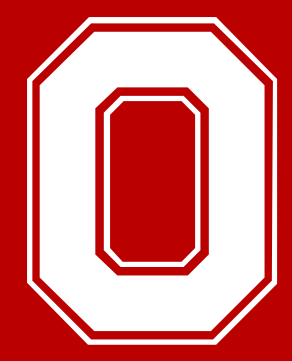


A Case of Nitrous Oxide ("Whippet") Induced Polyneuropathy in a Middle-Aged Patient with Weakness, Sensory Changes, and Suicidal Ideation



THE OHIO STATE
UNIVERSITY

WEXNER MEDICAL CENTER

Authors: Matthew Phillips MD¹, Shazadie Soka MD², Timothy Durr DO³, David Kasick MD¹

Institutions: The Ohio State University Wexner Medical Center¹, Wayne State University School of Medicine², Creighton University School of Medicine³

Background

- Nitrous oxide (N₂O), often referred to as "whippets" due to its use in charging whipped cream dispensers, is a commonly misused inhalant that can cause neurotoxicity through functional inhibition of vitamin B12.¹
- We present a case of N₂O induced polyneuropathy in a middle-aged patient with suicidal ideation.



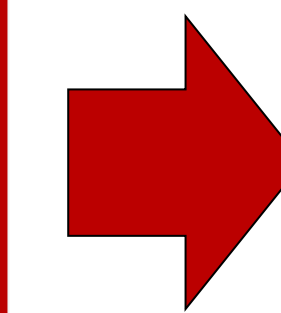
Figure 1. Whipped cream charge cannisters ("whippets")

Initial History

- A 46-year-old woman with a history of myocardial infarction, depression, and anxiety presented to the emergency department with six months of worsening weakness, numbness and tingling in her distal extremities, and the recent onset of suicidal ideation.
- She was admitted for diagnostic workup with consults to neurology (weakness) and psychiatry (suicide risk assessment).

Key Points

- A patient reported weakness, numbness, and SI. Her presentation was initially thought to be conversion disorder, but psychiatric evaluation revealed N₂O use.
- Workup revealed high B12, high homocysteine and MMA, and EMG consistent with polyneuropathy.



- N₂O misuse appears increasingly common and presents with neurological, psychiatric, and thrombotic sequelae.
- Substance use evaluation is an important part of psychiatric consultation regardless of age or reason of consultation.

Workup

Test	Result
CBC	WBC 16.64(H), Hgb 13.6, Platelets 360, MCV 95.6
Vitamin B12	952(H)
Folate	8.43
Homocysteine	67.4(H)
MMA	27(H)
Vitamin B6	9
Hgb A1C	5.6
CRP	8.43
ESR	24(H)
TSH	2.549
HIV-1/HIV-2 Ab/p24 Antigen	Non-reactive
Syphilis IgG/IgM total	Non-reactive
EBV by PCR	<1,000
MRI Brain with and without contrast	Normal
MRI Entire Spine Screening without contrast	No severe spinal canal stenosis, cord compression or cord signal abnormality.
EMG and Nerve Conduction	There is an axonal predominant polyneuropathy that appears to affect motor fibers more than sensory fibers.

Hospital Course

- Neurologic assessment revealed an unremarkable MRI Brain and Spine, negative HIV and syphilis tests, elevated Vitamin B12, and a fluctuating neurological exam, leading to initial concerns for functional weakness or conversion disorder.
- However, psychiatric evaluation revealed recent increased use of N₂O cannisters (~25-50 daily for six months). The patient was determined to be at low suicide risk, but further testing was recommended including homocysteine, methylmalonic acid (MMA), and electromyography (EMG).
- This workup revealed elevated homocysteine, MMA, and axonal predominant polyneuropathy of motor and sensory fibers.
- The patient was started on B12 therapy and discharged for rehabilitation.
- At two-month follow up, the patient demonstrated recovery from near-walker dependence to independent ambulation.

Discussion and Conclusion

- While this patient reported symptoms consistent with N₂O misuse, she was not initially queried about her substance use. Her psychiatric history may have contributed to anchoring bias and a misdiagnosis of conversion disorder prior to a more complete workup.
- Substance misuse occurs throughout the lifespan. Screening this patient for substance use regardless of her age or reason for consultation (i.e., suicide risk assessment) led to the discovery of the cause of her symptoms and likely prevented significant morbidity due to accurate diagnosis and opportunity to counsel patient on cessation of N₂O use.
- This case serves as a review of how N₂O misuse, which appears increasingly common, presents clinically (Allan, 2022). A recent systematic review demonstrated that patients typically present in their 20s with neurological symptoms including weakness, sensory changes, often normal Vitamin B12, and elevated homocysteine and MMA. Psychiatric symptoms such as mood disturbance and psychosis as well as thrombotic events are also associated but are more rare.²

References

- Allan J, Cameron J, Bruno K: A Systematic Review of Recreational Nitrous Oxide Use: Implications for Policy, Service Delivery and Individuals. Environ Res Public Health 2022; 19:11567.
- Marsden P, Sharma A, Rotella J: Review article: Clinical manifestations and outcomes of chronic nitrous oxide misuse: A systematic review. Emerg Med Australas 2022; 34:492-503.