Nitrous Oxide Use Leading to Coagulopathy

A Case Report

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Learning Objectives

- Identify the clinical manifestations associated with chronic nitrous oxide use
- Identify the importance of comprehensive physical exams and screening for VTE in those reporting nitrous oxide use

Case: Presentation

A 33-year-old female with a history of MDD, GAD, SUD, known use of daily N_2O and hx of bilateral PE on rivoroxaban. Presented with one week of

- Acute mental status changes
- Bilateral LE weakness

Physical exam and laboratory findings

- Bilateral LE edema and superficial burns in abdominal area
- Neurological exam: disoriented patient with leftward nystagmus on left upward gaze. Strength 5/5 in bilateral upper extremities, 4/5 in left hip flexor, 4-/5 in right hip flexor, 4/5 in right knee extension, 5/5 in left knee extension, 5/5 in bilateral ankle plantar/dorsiflexion.
- B12 137 (low), MMA 4.37 (high), TSH wnl.

Hospital Course:

- **Day 1:** Presented with bilateral LE weakness, and encephalopathy; presumed to be from N2O use/acute B12 deficiency. Treated with daily B12 injections.
- **Day 2:** Improvement in mental status, unremarkable brain and lumbar spine MRI. Developed O2 requirement and reported right LE pain, found to have acute large DVT on Doppler. Cardiac arrest with ROSC, suspected obstructive shock secondary to massive PE.
- **Day 3**: multiorgan system failure, patient transitioned to CMO by family, passed away later that day.

Learning points

N_2O toxicity[3,4]

Acute

Can result in hypoxia

Chronic

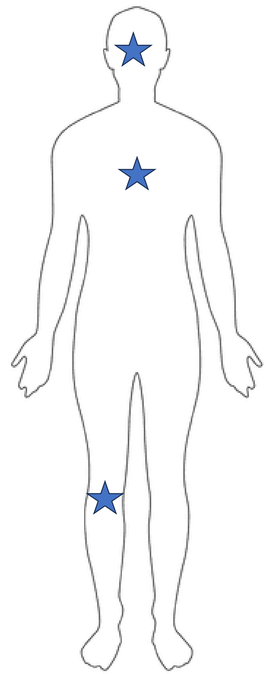
Vitamin B12 deficiency, increased homocysteine and MMA.

Clinical manifestations[1,2]

General
Dizziness, euphoria, light-headedness, nausea

Neurological
Sensorimotor polyneuropathy, ataxia, myelopathy, cognitive impairment

Hematological
Megaloblastic anemia, increased risk of VTE/PE, acute limb ischemia, abdominal vein thrombosis



Treatment[1]

Hematological

- Multidisciplinary care with psychiatry, psychology
- B12 repletion – even with normal B12 levels can still be functionally depleted
- Some case reports showing efficacy of naltrexone in reducing cravings

Accumulation of homocysteine from nitrous oxide overuse can lead to thromboembolic complications[4]

Discussion

- Nitrous oxide is a safe medical and dental anesthetic, but its recreational use has surged in recent years.[3]
- Reported lifetime use prevalence in the USA is approximately 30% in adults.[4]
- No FDA approved medications to treat and prevent relapse
- Important to identify adverse neurological sequelae early on in course, and treat with high dose B12 to avoid peripheral and central nervous system demyelination
- This case highlights the role of conducting comprehensive physical exams, including assessing for VTE and polyneuropathy, in adults reporting nitrous oxide use
- In young adults with severe B12 deficiency or VTE events not otherwise explained by other factors, important to screen for nitrous oxide use

Conclusion

Clinicians should be aware of the association between N_2O use and thromboembolic events. Targeted VTE screening is needed, especially in young adults (18-35) who present to the hospital with N_2O misuse.

References

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