KRATOM NEUROTOXICITY

INTERESTING CASE PRESENTATION

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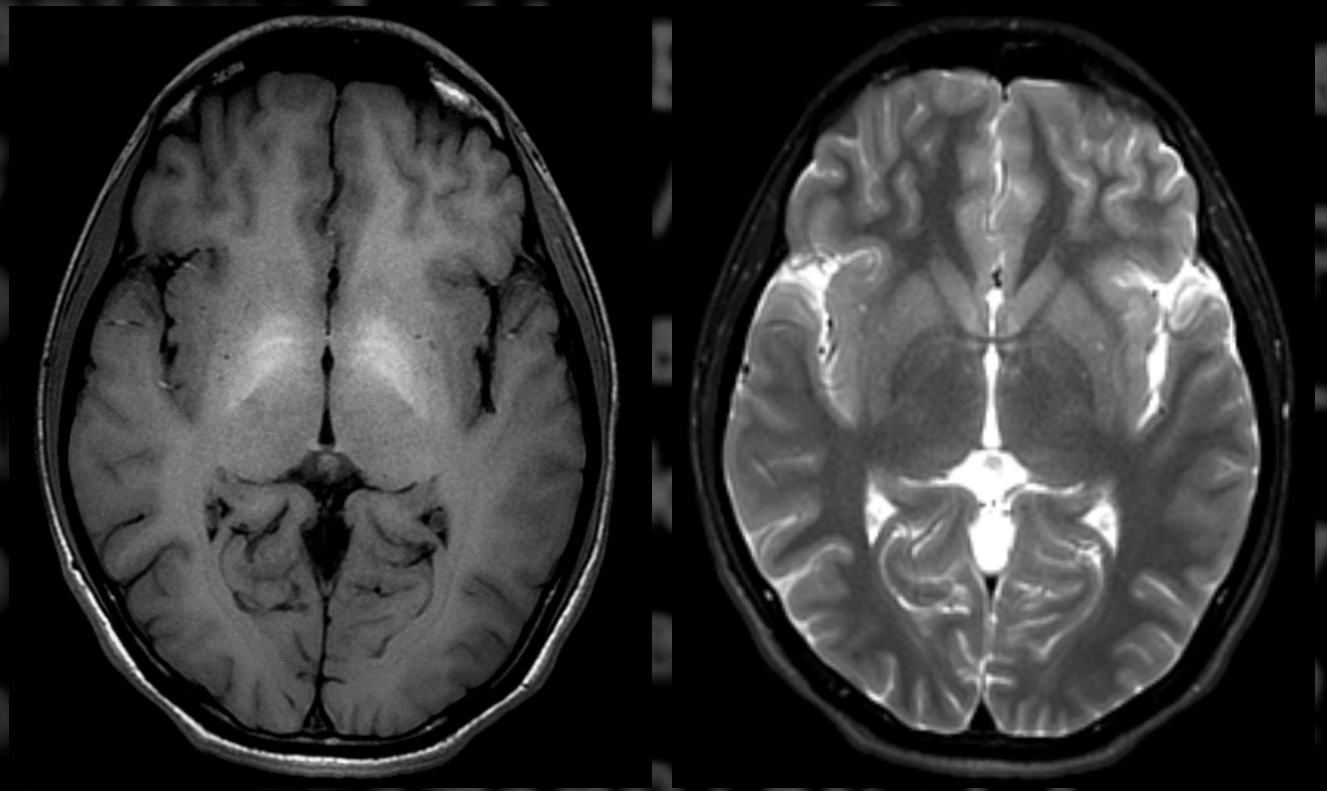
CLINICAL PRESENTATION

The patient is a 20 year old male presenting for evaluation of progressive generalized numbness.

- One year prior, the patient noticed **static-like numbness** in his bilateral distal lower extremities. The numbness was patchy and intermittent, with paresthesia. It slowly progressed to involve the lower back, face, arms, and legs.
- On exam, there was patchy hyperesthesia and dulled sensation to light touch throughout all 4 extremities in a **non-dermatomal pattern**. Normal vibratory sensation and reflexes were observed in all 4 extremities.
- EMG/NCS and OCTs were unremarkable. Laboratory values were within normal limits.
- A brain MRI WO from 2 years prior reportedly showed no acute intracranial abnormality. Repeat MR imaging of the brain, C-Spine, and T-spine WWO were obtained.

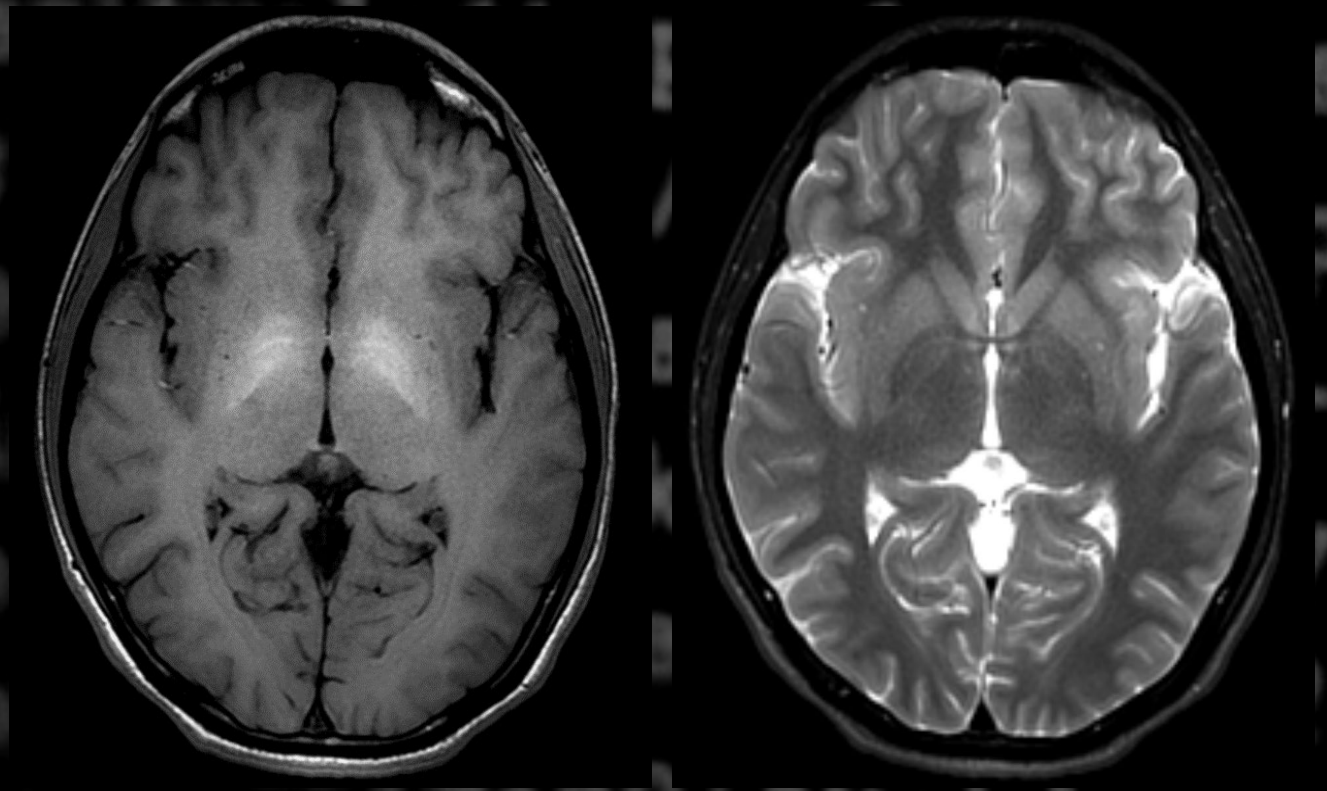
IMAGING DISCUSSION



MRI Brain without and with contrast showed symmetric high T1 signal in the region of the globus pallidus bilaterally.

- No abnormal high T1 signal is noted in the dentate nuclei.
- There was no corresponding abnormal signal on T2-weighted imaging and no associated enhancement.

IMAGING DISCUSSION



The differential diagnosis provided by radiology for the abnormal T1 signal included hepatic encephalopathy, prolonged total parenteral nutrition administration, or sequela of gadolinium deposition.

- However, none of these seemed likely upon clinical correlation.
- A detailed history of any possible toxin ingestion was recommended by radiology.

MANAGEMENT

Upon further discussion, the patient reported Kratom use beginning 2 years prior to presentation ultimately progressing to an addiction 1 year prior.

- His symptoms were considered likely secondary to Kratom use and he started Suboxone therapy immediately, ultimately weaning off and quitting successfully.
- Despite cessation of substance use, the patient's symptoms continued to progress.
- An additional EMG/NCS was obtained the following year without evidence of large fiber neuropathy.
- Skin biopsy was also negative for small fiber neuropathy.

WHAT IS KRATOM?

Kratom (*Mitragyna speciosa*) is a tropical tree native to Southeast Asia, and is used as an over-the-counter, opioid-mimic.

- Consumption of its leaves produces both stimulant effects (in low doses) and sedative effects (in high doses).
- Kratom leaves contain two major psychoactive ingredients (mitragynine and 7-hydroxymytragynine) which stimulate μ opioid receptors and are more potent than morphine.
- Psychotic symptoms have been observed in some patients as well as psychological and physiological dependence.

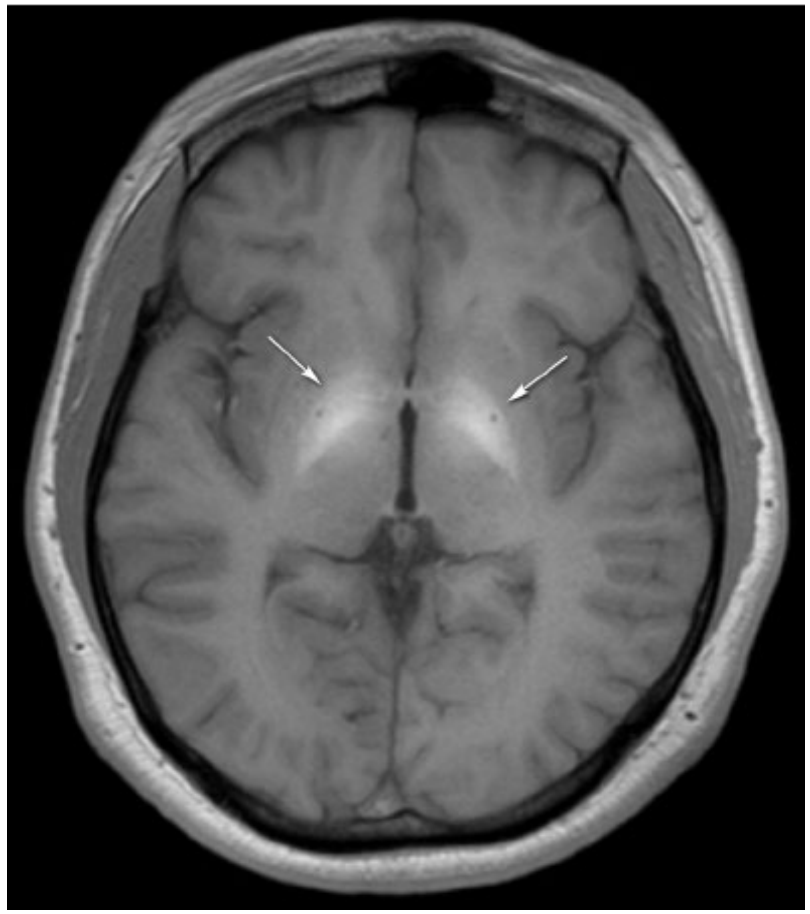
KRATOM IN THE U.S.

- In the U.S., **Kratom and Kratom-based products are currently legal**, though advised against by the FDA for medical treatments.
- This drug can be purchased online or in person at recreational stores, and its abuse has increased markedly in recent years.
- An estimated **1.7 million Americans** aged 12 and older used Kratom in 2021, according to the Substance Abuse and Mental Health Services Administration's National Survey on Drug Use and Health.

OUTCOME

The patient's continued symptoms were thought to be due to long-term Kratom exposure.

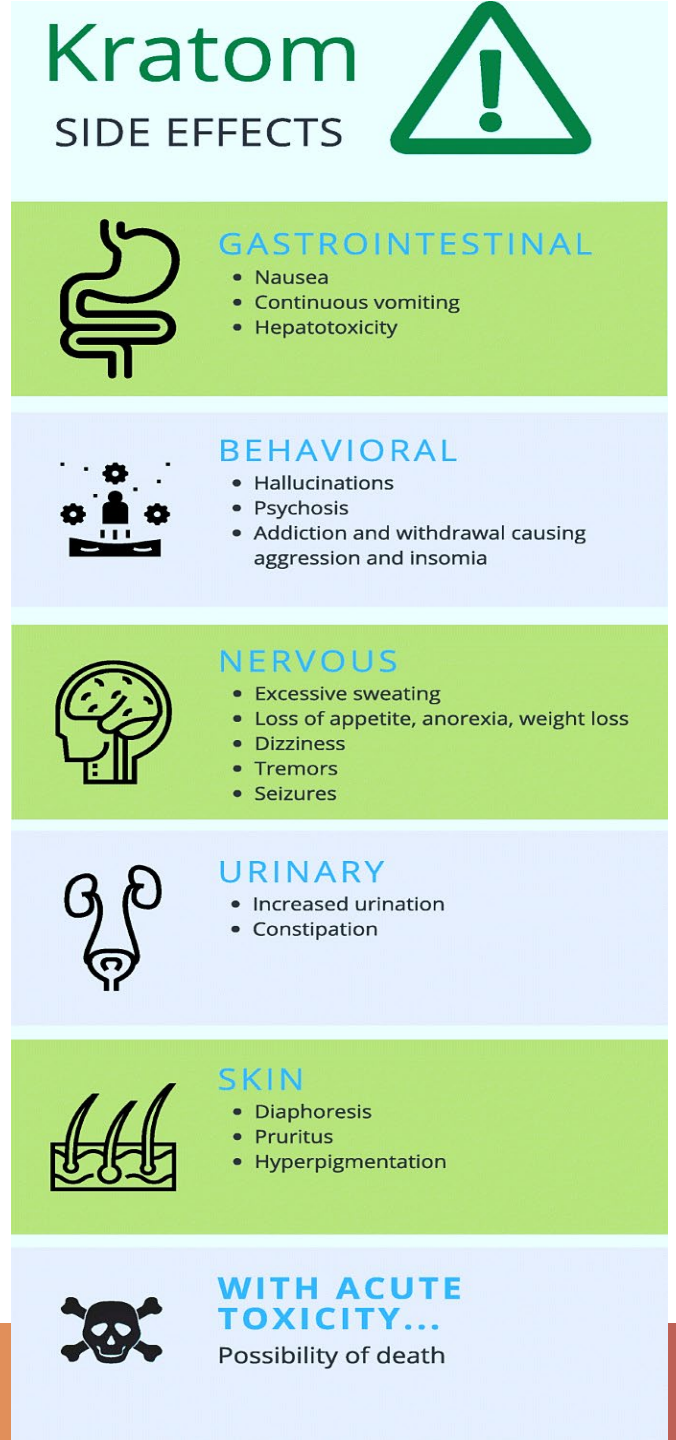
- Other considerations such as manganese toxicity were considered.
- However, high levels of manganese could also be linked to Kratom use, as heavy metals have previously been reported in Kratom samples.
- Repeat MRI may be indicated if symptoms continue to worsen substantially.
- For the time being, management consists of monitoring and continued abstinence from Kratom use.



TAKE HOME POINTS

- On MRI of the brain, Kratom toxicity typically presents **with symmetric T1 signal hyperintensity involving the globi pallidi, subthalamic nuclei, and cerebral peduncles** with no corresponding diffusion restriction or enhancement.
- These signal changes have been shown to resolve following cessation of Kratom use, however the time course is still uncertain.
- These findings are nonspecific and should be correlated clinically with drug and toxin-exposure history.

Figure: Typical brain MRI in manganism, showing bilateral hyperintensities in GP in T1 weighted image. (Courtesy of Dr M. Okujava, Institute of Medical Research, Tbilisi.)



TAKE HOME POINTS

- Manganese toxicity may present similarly with distinctive symmetrical high-signal lesion in the globus pallidus region of the basal ganglia on T1- but not T2-weighted MR.
- In a 2019 survey of Kratom-based products, the FDA found levels of lead and nickel exceeding the guidelines for safe exposure, which raises concern for heavy metal poisoning in long-term users.
- A smaller 2023 analysis of Kratom-based products showed high levels of manganese in a minority of samples, but at levels concerning for manganese toxicity with long term use.
- Due to the lack of FDA regulation of this product, there is significant variation in what Kratom users may consume and healthcare practitioners should maintain a high index of suspicion for associated toxicities.

RESOURCES

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