

Report of ventricular fibrillation in a 44-year-old man using kratom

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SUMMARY

Kratom is an unregulated kappa-opioid receptor agonist available for order on the internet that is used as a remedy for chronic pain. We present a case of a middle-aged man who suffered a cardiac arrest in the setting of kratom ingestion.

BACKGROUND

Kratom is a complementary medicine used in non-western medicine for chronic pain, however it has potential side effect of QT prolongation along with others that can cause users to become severely ill with its use.

CASE PRESENTATION

The patient was a 44-year-old man who presented to our emergency room after a witnessed cardiac arrest.

He was at a restaurant when he slumped over and became unresponsive, hitting his head. Bystander cardiopulmonary resuscitation was started almost immediately. After emergency medical services arrived, advanced cardiac life support was initiated and multiple episodes of ventricular fibrillation required three unsynchronised shocks, multiple rounds of epinephrine and the initiation of amiodarone.

At baseline the patient was very active, walking several miles a day. He had hypertension and hyperlipidemia, both controlled with medical therapy. A routine ECG with his yearly physical was unremarkable. The patient had no prior cardiac workup. The family reported the patient had recently begun consuming 'Premium Maeng Da Kratom' an energy supplement in addition to his chronic ingestion of 2–8 Monster energy drinks daily with each drink containing approximately 86 mg of caffeine.

INVESTIGATIONS

In the emergency department, initial laboratory analysis was significant for a potassium of 3.1 mg/dL and a troponin of <0.01 ng/mL. A urine toxicology report was positive for ethanol. The ECG on arrival to the emergency room showed prolonged QT interval and intraventricular conduction block (figure 1). His chest X-ray was remarkable for pulmonary vascular congestion (figure 2). He was intubated in the setting of hypoxic respiratory failure. A head CT showed no acute pathology including being negative for an acute bleed. Emergent cardiac catheterisation revealed normal coronary arteries. His ECG revealed normal global left ventricular (LV) function without LV dilation or

significant valvular abnormalities. A cardiac MRI showed no late gadolinium hyperenhancement or abnormalities in T1/T2 images.

DIFFERENTIAL DIAGNOSIS

Myocardial infarction with non-obstructive coronary arteries.

Idiopathic ventricular arrhythmia.

Cardiomyopathy secondary to infiltrative disease (haemochromatosis, amyloidosis).

TREATMENT

Targeted temperature management (TTM) was not used for this patient as he developed purposeful neurologic recovery after resuscitation. He was loaded with amiodarone for rhythm control and started on broad-spectrum antibiotics for aspiration pneumonia.

OUTCOME AND FOLLOW-UP

The patient was extubated, demonstrated mild retrograde amnesia and a short-term memory difficulty which later improved prior to discharge. He received a subcutaneous defibrillator prior to discharge for secondary prevention with guidance to avoid supplement use, including Premium Maeng Da Kratom.

DISCUSSION

Mitragyna speciosa, commonly known as kratom, is a tropical evergreen tree found in Southeast Asia that has been used in non-western medicine practices for generations. Due to some of its opiate-like properties, kratom has been used for managing chronic pain, especially for those who experience opioid withdrawal symptoms.¹ However, there are no Food and Drug Administration approved uses for kratom, and the agency has previously expressed concerns about its safety, banning its use in 2016 but removing the ban in 2018, perhaps due to public backlash.² Additionally, there is concern that labelling kratom as a Schedule I controlled substance could impede further research as well as lead to worsening public health issues.³ A literature review performed by Singh *et al* compared the reported side effects of kratom in Southeast Asia and the West. However, the literature from Southeast Asia was primarily from public surveys while the literature from the West consisted mostly of case reports. The authors comment that more studies are needed prior to undertaking any legal ramifications of kratom.⁴

The growing popularity of kratom worldwide has drawn major concerns from many states. Several



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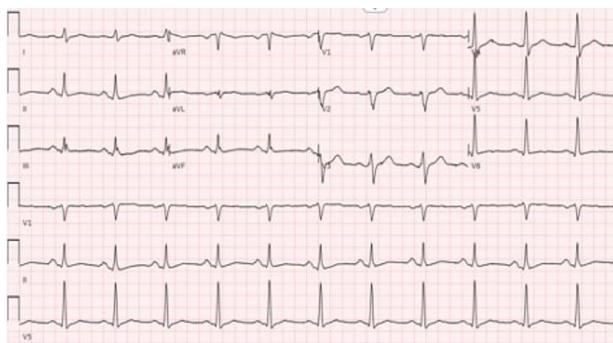


Figure 1 ECG showing QT interval >480 ms with a heart rate of 75 at paper speed of 25 mm/s.

countries in the European Union along with Australia, South Korea, Malaysia and Israel have enacted laws to better regulate kratom.⁵ The prevalence of kratom use in the USA is unclear, but some studies have found up to 20% of individuals with substance-use disorders have reported using kratom,⁶ a major concern for public health officials during the current opioid epidemic. A retrospective review conducted by Eggleston *et al* revealed 2312 cases of kratom exposure in the USA reported to the National Poison Data System between 2011 and 2018. They also note that the number of cases in 2011 was only 18 but increased to 357 in 2018.⁷ A recent survey by Garcia-Romeu *et al* found that in the USA most users of kratom found over 90% of responders were Caucasian with a mean age of 40.⁸ We can conclude from this information that while there is still much to be learnt about the overall public use of kratom, its popularity in the USA and other areas of the world is increasing with demographics that extend beyond usage by the Asian community.

Both leaves and extracts of kratom have been used in traditional remedies for coughs, gastrointestinal symptoms, musculoskeletal pain and as a local anaesthetic. However, due to its psychoactive effects, kratom has also been abused in combination with caffeine and codeine. The plant's active constituents include the alkaloids mitragynine and 7-hydroxymitragynine.⁹ At high doses, both act as partial agonists to the mu-opioid receptors as well as competitive antagonists to the kappa-opioid and



Figure 2 Severe congestion seen on portable anteroposterior view chest X-ray.

delta-opioid receptors.¹⁰ They also potentiate alpha-2 receptors, a potential cause of kratom's stimulating effect.¹¹

There are multiple reports of fatal outcomes in patients who ingested kratom. Autopsy findings from multiple deaths attributed to kratom have reported pulmonary congestion and oedema as well as urinary retention, which is consistent with findings from autopsies in opiate overdose cases.^{12–14} There are also reports that kratom can prolong the QT interval, increasing the risk for ventricular arrhythmias.¹⁵ The combination of these adverse effects is the hypothesised mechanism behind cardiac arrest. However, there is minimal data in the literature thus far to confirm this hypothesis.

Treatment in these cases is mostly supportive, though some have expired prior to or on arrival to the emergency room.^{12,13} In a case presented by Matson and Schenk, naloxone was given in the field to a 33-year-old patient who developed cardiac arrest from kratom ingestion, but with no meaningful response.¹² Aggarwal *et al* presented a case in which lipid emulsion was used on a 26-year-old man who presented in similar fashion 24 hours after ingesting kratom with initial improvement in his oxygenation status but ultimate deterioration.¹⁶ Abdullah *et al* reported a patient in whom use of TTM resulted in improvement and ultimate discharge.¹⁵ Our patient responded to supportive care without receiving any of the interventions listed above. Given the lack of literature on the subject, it cannot yet be stated as fact which of these interventions, if any, is most beneficial to these patients.

The question of whether or not the patient's consumption of energy drinks contributed to his condition remains uncertain. A causal relationship between energy drinks and cardiac events has not been defined in a well-designed prospective study. A statement from the European Cardiac Arrhythmia Society analysed 22 case reports of cardiac events in patients who consumed energy drinks, 8 of which developed life-threatening arrhythmias. And while there is concern based on these events, definitive causal relationship has yet to be identified.¹⁷

Learning points

- ▶ Kratom is a substance used for chronic pain.
- ▶ While it has opiate-like properties, there is a potential for QT prolongation which can pre-dispose healthy individuals to ventricular arrhythmias.
- ▶ Continued vigilance for the role of kratom use and its potential to cause life-threatening arrhythmias is warranted.

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