

A Case of Benzonatate Overdose

A 19-year-old female with a past medical history of Ehler Danlos syndrome and POTS presents to the emergency department 30 minutes after deliberately ingesting thirty 100mg pills of Benzonatate (a.k.a. Tessalon perles). She admits to ingesting the pills as an attempt to commit suicide, as she has been under a lot of stress lately. The patient notes that she did not ingest any other pills. Other than some mild nausea and one small episode of vomiting during which she thinks she expectorated about 3 of the ingested pills, the patient denies any other symptoms. She denies homicidal ideation or hallucinations.

On exam, the patient is resting comfortably on the stretcher in mild distress. She appears anxious. Upon auscultation of the heart, there is regular rate and rhythm with no murmurs. The lung sounds are clear and equal bilaterally, and the abdomen is soft and nontender. There are no visible signs of self-harm on the skin. The rest of the physical exam is normal.

Vital signs are as follows: Heart Rate: 121; Blood pressure: 153/90; Respiratory Rate: 18; Oxygen saturation: 98%; Temperature: 37.8 C.

Which of the following is a potential outcome of Benzonatate toxicity?

- A) Cardiac arrest
- B) Coma
- C) Seizures
- D) Severe metabolic acidosis
- E) All of the above

What are the next steps in management of this patient?

1. Call-out to Poison Control:

- Recommends treating the patient with activated charcoal.
- Advises on supportive care and observation for 4-6 hours. If no symptoms past this time frame, patient may be discharged.
- If signs/symptoms of cardiac toxicity, recommends considering the use of Intralipids.

2. Order tests:

- Electrocardiogram
- Toxicology screen
- Complete Blood Count
- Complete Metabolic Panel
- Troponin level
- Creatine Kinase level

Results of all tests are unremarkable.

Answer Key

The correct answer is E: All of the above.

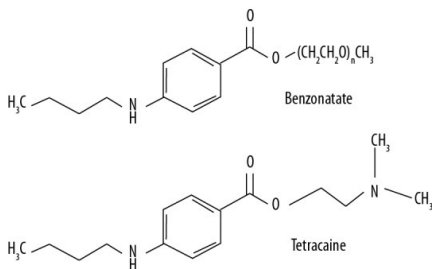
Literature shows that Benzonatate toxicity has been linked to cardiac arrest, coma, seizures, and severe metabolic acidosis.

Discussion

Benzonatate (Tessalon perles) is a commonly prescribed medication which was first approved for use as an antitussive agent in 1958³. Benzonatate's chemical structure is similar to that of Tetracaine (Image 1), allowing the drug to act as a local anesthetic by blocking sodium ion channels on vagal sensory nerve fibers within the respiratory mucosa³. This is what allows for its widespread use as a cough suppressant.

Benzonatate comes in 100 mg and 200 mg formulations, and should not exceed a daily limit of 600 mg. The onset of action is 15 to 20 minutes, and duration of action is 3 to 8 hours⁵.

Several cases of Benzonatate overdose have been reported in children and adults. The most common manifestations of Benzonatate overdose are cardiac arrest, seizures, and dysrhythmias⁶, although other ones include encephalopathy, severe metabolic acidosis, apnea, and respiratory distress. These signs and symptoms have been reported within as little as 15 minutes after ingestion^{1,2,4,5}.



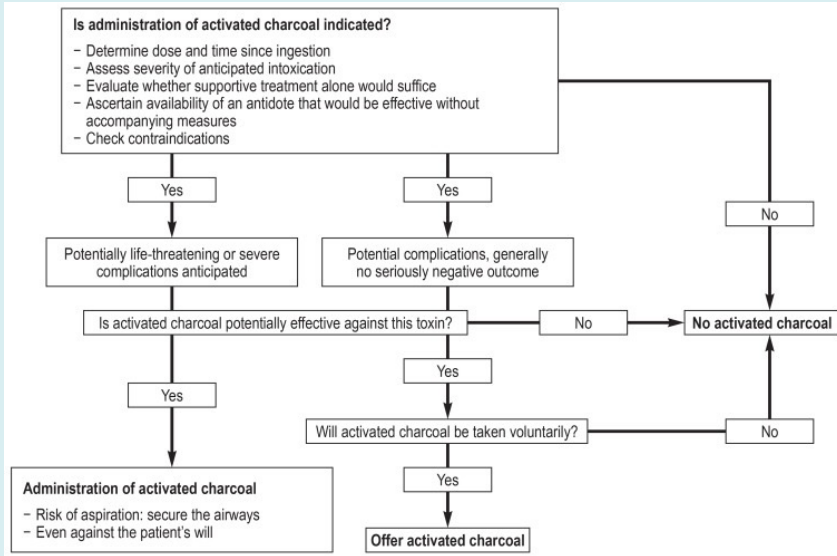
Jin et.al. 2019. Image 1: Structure comparison between Benzonatate and Tetracaine.

Treatment

Treatment of Benzonatate overdose is mainly supportive. Emergent interventions such as intubation, cardiopulmonary resuscitation, and vasopressors, in cases of cardiovascular collapse, have been reported⁶. In cases where return of spontaneous circulation was achieved, most patients exhibited residual, irreversible neurologic deficits or end-organ damage⁶.

The use of activated charcoal after suspected ingestion is recommended on a case-by-case basis, weighing the risks and benefits (Image 2). A poison control center should be contacted prior to administration of activated charcoal in the ED. Activated charcoal is usually administered within one hour of ingestion. It should not be administered if the patient is at risk of aspiration or without a secure airway⁷.

Intravenous lipid emulsion therapy (i.e. Intralipids) for treatment of local anesthetic toxicity was documented in 2006, and has been a widely accepted treatment since then⁹. It has been shown to be effective at treating the cardiovascular and neurological symptoms associated with this type of toxicity¹⁰. The most widely accepted theory for its mechanism of action is the "lipid sink" theory, which proposes that lipid emulsions, when present in the plasma, absorb lipid-soluble drugs such as local anesthetics, reducing their availability within affected tissues¹⁰.



Zellner et al. 2019. Image 2: Decision algorithm for administration of activated charcoal.

Take Home Points

- Benzonatate is a commonly used antitussive agent with local anesthetic properties.
- Benzonatate toxicity can present with cardiovascular and neurologic signs and symptoms, with cardiac arrest, seizures, and arrhythmias being the most common.
- Activated charcoal should be considered on a case-by-case basis, and the poison control center should be consulted.
- Intravenous lipid emulsion therapy has proven to be effective in the treatment of cardiovascular and neurological toxicity resulting from local anesthetics.

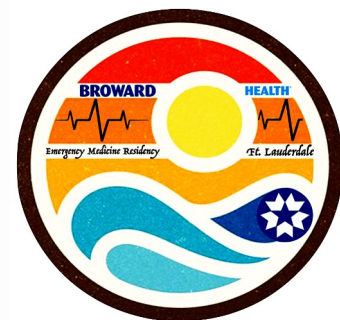


About the Author

Diana Lacatusu is a fourth year medical student at Nova Southeastern University College of Osteopathic Medicine. Diana was born in Romania, but has been living in Florida since 2011. Diana will be pursuing a career in emergency medicine after graduation.

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