

EM CASE OF THE WEEK

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Living in a tropical region of South Florida, it is essential for us to consider ciguatera toxicity when patients present with a history of fish consumption and subsequent GI/cardiac/neuro symptoms. Ciguatera toxicity is caused by ingesting fish that have consumed toxin-producing dinoflagellates found mainly in coral reefs.

EM CASE OF THE WEEK

EM Case of the Week is a weekly “pop quiz” for ED staff. The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.



Ciguatera Toxicity

36 y/o male with no PMH presents to the ER c/o non-bloody vomiting, diarrhea and pain in the lower extremities x 4 days. Pt. admits to eating fried fish purchased at a Caribbean fish market 3 days ago. Vomiting and diarrhea started 5-6 hours after eating and had improved by the time of arrival to the ER. Pt. also developed b/l leg pain X 4 days. LE pain was 7/10, intermittent, crampy, and radiating to his upper back. No alleviating factors noted; ambulating increased the pain. Pt. admits to paresthesias in all 4 extremities along with severe pain to light skin touch, pruritus, subjective fevers and perioral numbness. He denies a history of sickle cell disease, aneurysm or CVA. He also denies recent travel, sick contacts or tick bite. VS were T 97.9 P 80 RR 20 BP 130/86 O2 99% on room air. Physical exam was positive for temperature dysesthesia bilaterally in the lower extremities. What is the next step in the management of this patient?

- A. Perform an LP to rule out possible infectious etiology.
- B. Start aggressive fluid resuscitation to prevent the patient from going into hypovolemic shock.
- C. Order MRI of the brain and orbits to assess for MS lesions
- D. Place patient on BiPAP and possibly intubate thereafter.
- E. Administer IV mannitol to treat the patient’s neurological symptoms.



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Some Fish associated with Ciguatera



Take Home Points

- Ciguatera poisoning is caused by consumption of reef fish contaminated with ciguatoxin.
- Barracuda, moray eel, amberjack, certain types of grouper, mackerel, parrotfish, & red snapper are the most common sources of ciguatera toxicity.
- Consider CFP if the patient presents with a history of fish ingestion along with GI, cardiac and neurological symptoms.
- Treatment includes IV mannitol and symptomatic control with IVF, SSRIs, and pain control as needed.
- Patients should avoid caffeine, alcohol, and chicken to prevent symptom recurrence.

Ciguatera Toxicity!

The correct answer is E. The patient's history of eating fish imported from the Caribbean (tropical region), onset of GI symptoms of diarrhea and vomiting, and neurological sign of temperature dysesthesia all point to the diagnosis of Ciguatera fish poisoning (CFP). Ciguatera toxicity is a clinical diagnosis. Lab abnormalities are non-specific and may include elevated LDH and CPK. Hence, treatment is mainly supportive and guided by the patient's symptomatology.

IV mannitol has been shown to produce immediate relief of the neurological symptoms. In a report of IV mannitol use by South Florida physicians in treating CFP, Blythe *et al.* described 70 CFP cases treated with IV mannitol. The mean time from exposure to clinical presentation was 11.5 days. The study indicated that 29 of the 32 (91%) patients who received mannitol within 48 hours of presumed exposure reported a total reversal of symptoms. Moreover, there was also a benefit reported in patients even when IV mannitol was administered up to 70 days after exposure. The mechanism by which mannitol reduces neurological symptoms is hypothesized to be an osmotic reduction of neuronal edema caused by the toxin. Also, mannitol may act as a scavenger of free radicals generated by the ciguatera toxin molecule.

Discussion:

Ciguatera fish poisoning is the most common nonbacterial fish-borne poisoning in the United States. It is caused by consuming fish that ingest dinoflagellates, which are typically found in coral reefs. Reef-dwelling tropical fish include barracuda, moray eel, amberjack, certain types of grouper, mackerel, parrotfish, & red snapper are the most common sources of CFP. Between 10,000–50,000 people per year who live in or visit tropical and subtropical areas suffer from CFP, but the true incidence of CFP is difficult to determine due to the under-reporting to the health departments. Only 2–10% of CFP cases are reported to health authorities.

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and click on the "Conference" link. All are welcome to attend!

Pathophysiology

Ciguatera is caused by several toxins of which ciguatoxin is the best known. Toxins are formed by dinoflagellates (single-celled algae-like organisms) of the genus *Gambierdiscus* that grow around coral reefs and surfaces of seaweeds. These dinoflagellates serve as nutrition for small fish, which are then consumed by larger fish like barracuda and amberjack, and subsequently consumed by humans. Eating fish organs such as the head, liver or gonads is associated with greater symptom severity as ciguatoxin is present in higher concentrations in such organs.

Ciguatoxin is a lipid-soluble, heat stable, acid resistant neurotoxin. It opens voltage-dependent Na⁺ channels, triggering membrane depolarization at the neuromuscular junction, leading to hyper-excitability and neurotransmitter release. Other toxins include Maitotoxin, which increases Ca²⁺ influx through excitable membranes and Scaritoxin, which increases the permeability of Na⁺ channels causing norepinephrine & acetylcholine release. Ciguatoxin most notably affects the cardiac, gastrointestinal and neurological systems.

Signs & Symptoms

-Constitutional: Chronic ciguatera can present as neuropsych illness with fatigue & malaise, pruritic paresthesias, premature labor & spontaneous abortion in pregnant females, and painful ejaculation in an affected males.

-GI symptoms (occur 3-6 hours after ingestion) include: nausea, vomiting, diarrhea, abdominal cramps

-Cardiac symptoms: bradycardia, hypotension, heart block

-Neuropsychiatric symptoms: paresthesias, blurred vision, painful teeth, depression, nerve palsies, painful urination, hot/cold dysesthesias, lingual & perioral numbness, arthralgias, myalgias, ataxia, respiratory depression, coma

Workup

Ciguatera toxicity is a clinical diagnosis.-therefore, no specific labs can be used to confirm the diagnosis.

The current gold standard diagnosis of CFP would include confirmation of ciguatoxin in the consumed fish using laboratory methods sent to the CDC. However, this is not very useful in the acute setting as the results of the test have to be sent off and are not readily available..

Fish testing performed by CDC: 1) *in vitro* assay is the screening test for presence of voltage-gated sodium channel-specific activating effects on cell membranes, which is the mode of action of ciguatoxin.

2) an analytical chemistry technique known as liquid chromatography-mass spectrometry (LC-MS) is performed if the fish samples have a positive screening test in order to confirm the presence of ciguatoxin in the fish tissue.

Treatment

-Mainly supportive and symptom-driven

- GI decontamination with activated charcoal within 3-4 h of onset.

-IV mannitol is administered at 0.5 to 1.0 g/kg body weight over a 30-45 minute period.

-IV atropine dosing as needed for symptomatic bradycardia (0.5 mg every 5 minutes to maintain a heart rate goal of 60 beats per minute, with no maximum total dosage limit)

-IVF to prevent hypovolemic shock.

- SSRIs are reported to benefit suffering from chronic fatigue, insomnia, and depression.

- Gabapentin reported to improve polyneuropathic symptoms.

-Patients to avoid all fish, EtOH and caffeine for at least 6 months.

Is Ciguatera toxicity fatal?

CFP is rarely fatal. However, death may occur in severe cases due to severe dehydration secondary to vomiting and diarrhea, cardiovascular shock during the initial illness period, or respiratory failure.

Freidman MA, Fleming LE, Fernandes M, Bienfang, P. Ciguatera Fish Poisoning: Treatment, Prevention and Management. *Marine Drugs* 2008; 6, 456-479;

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ABOUT THE AUTHOR:
This month's case was written by Sana Kausar Shamji. Sana is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in December 2015. Sana plans on pursuing a career in Internal Medicine after graduation.