

Decompression sickness or ciguatera intoxication: a case report

Robert A van Hulst¹

¹ Departments of Hyperbaric Medicine and Anesthesiology, Academic Medical Centre, University of Amsterdam, The Netherlands

Corresponding author: Professor Robert van Hulst, Departments of Hyperbaric Medicine and Anesthesiology, Academic Medical Centre, University of Amsterdam, Meibergdreef 9, 1100 DD, Amsterdam, the Netherlands

ORCID: [0009-0002-6945-5508](https://orcid.org/0009-0002-6945-5508)

r.a.vanhulst@amsterdamumc.nl

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Abstract

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This report presents the case of a diver who suffered from ciguatera intoxication (CTX). After three days of consecutive diving, he arrived at hospital with symptoms of chest pain, shortness of breath, nausea, and had sensory abnormalities across his body, arms and legs. Although his clinical signs and symptoms may have suggested cardiac involvement or decompression sickness (DCS), ultimately his condition was caused by CTX after eating fish. This case illustrates the similarities between DCS and food intoxication. The common pathology of CTX is described and its differential diagnosis with DCS is discussed.

Introduction

Decompression sickness (DCS) can present with a large variety of clinical signs and symptoms, for example, joint pain, skin marbling, cardiorespiratory, and neurological deficits.¹ Decompression sickness treatment is performed based on the diver's history of dive time, dive depth, and the latency of presenting symptoms.

This report describes a case of an experienced diver who presented with cardiac symptoms, gastro-intestinal complaints, and subtle neurological signs after three days of consecutive diving. Based on his additional medical history, as well as medical and neurological evaluation, it was finally concluded that he had a ciguatera intoxication (CTX). This diagnosis was made by *par exclusion*. This report discusses the importance of having a broad differential diagnosis in a diver with subtle neurological signs.

Case report

The diver provided written consent for publication of his case details.

An experienced 63-year-old male diver (> 200 dives) attended the emergency room (ER) in Bonaire with chest pain, shortness of breath, gastrointestinal complaints, nausea and vomiting, and tingling in his arms and legs. In the past three days, he had completed six dives, each lasting a maximum of 50 minutes, with a minimum of an hour surface

interval between each dive. All dive times were less than 30 minutes at a maximum depth of 24 m, with slow ascents and safety stops at 3–5 m for 5–10 minutes.

At 17:00, he finished his final dive and then at 18:00 went to a restaurant with his family. At 19:00, after eating his fish dish, the diver experienced nausea and vomiting, along with shortness of breath. Shortly after, the family decided to go to the hospital as he was experiencing some weakness and tingling in his chest, arms, and legs.

At 20:00 he attended the ER and had a heartrate of 102 beats·min⁻¹, his breathing rate was 24 breaths·min⁻¹, oxygen saturation 98%, ECG was normal, and a chest X-ray was also normal. In addition, his troponins were normal, and in his repeated measurements three hours later, his blood pressure was 150/95, and temperature 37.1°C. The initial physical examination showed the patient to be in no acute stress, he was alert and oriented to time, place, and person. There were no cardiac or neurological disorders, or prescription/over-the-counter medications present in his health history. Physical examination of his heart and lungs was normal.

Neurological examination revealed normal cranial nerves, symmetrical reflexes in the extremities, and strength in the arms and legs was normal. His coordination was normal, though there were subjective sensory abnormalities across his body, arms, legs, and lower abdominal region and these changes were not in a dermatomal distribution. More specifically, he had temperature related dysesthesias that

were more pronounced in the hands and feet. When exposed to cold water his hands and feet experienced an unpleasant burning sensation.

After a thorough examination and based on his dysesthesias, the patient was determined to have a mild CTX poisoning due to eating a barracuda steak. Decompression sickness was reasonably ruled out given his conservative dives and he was treated symptomatically with intravenous fluids and antiemetics. During his 24-hour stay at the hospital, he slowly recovered from his symptoms and made the decision to return to his island apartment prior to departing for the USA.

Lab testing for CTX is complicated as it uses a bioassay designed Neuro-2a assay, and this was not available in the island's hospital.²

Discussion

Neurological signs and symptoms presenting acutely after diving are most likely manifestations of DCS and require oxygen and hyperbaric treatment.¹ However, neurological diseases and neurological DCS can share similarities in their presentations and thus may be mistaken for one another.^{3–5} After reviewing the literature, this appears to be the first case report to consider a diver with the diagnostic dilemma of distinguishing between DCS and CTX. However, a previous publication presented a case series of eight divers who had CTX while diving from a liveaboard. This group of divers presented a variety of signs and symptoms that lasted from days to weeks. The authors warned that divers should be aware of ciguatera and the similarity of symptoms of DCS.⁶

Ciguatera fish poisoning is the world's most frequently reported seafood poisoning, with around 50,000 cases reported annually.⁷ Ciguatera is a neurotoxin and unaffected by heat, freeze drying, or gastric acid. The presence of this toxin is not detected by taste or appearance when consuming fish.⁸ The toxins are potent, lipophilic sodium channel activators that bind to the voltage sensitive sodium channel on the cell membranes of all excitable tissues.⁹

The full syndrome of CTX involves gastro-intestinal, neurological musculoskeletal, dermatological, and psychological symptoms.⁹ Neurological features may include peripheral sensory or motor symptoms, while central symptoms may present as severe headache or autonomic features. At the onset, the most prevalent symptoms were paraesthesia, dysesthesia, myalgia, and arthralgia.¹⁰ The paraesthesia may last for a minimum of several days and in severe cases, can persist for many weeks. Ciguatoxic dysesthesia is classically referred to as a reversal of thermal sensation. According to reports cited here, cold or room-temperature objects cause a burning sensation that is unpleasant when touched, while warm objects are described by patients as being ice-burned, cold, or chilled.^{9,10}

Treatment of CTX is symptomatic. In the old literature, hyperosmotic mannitol infusions were advised, although the pharmacological basis for use remains speculative. The mannitol effect is thought to be due to osmotic reduction on neuronal oedema and a scavenger property of the molecule has been suggested.⁹ However, other small case studies have suggested that this approach may not be particularly efficacious, and a double blind randomised controlled trial found no significant differences in the mannitol group compared to the control population.¹¹ More recently, other studies disagreed with the data collection and methods in the latter clinical trial and thereby questioned their conclusions; thus the use of mannitol to treat CTX symptoms perhaps remains equivocal.^{12,13}

Informal conversations with chefs from restaurants on the island of Bonaire revealed a belief that large barracudas (> 90 cm) had a higher chance of being poisoned with CTX. In contrast, researchers in French Polynesia found that fish size is not an effective indicator of fish toxicity.¹⁴

This case report has some limitations; first of all, due to the lack of a CTX bioassay kit on the island it was not possible to confirm the intoxication by means of a lab test. Secondly, it was only possible to observe the patient for 36 hours because he decided to return to the USA with his mild complaints. In the case presented here, it is concluded that the diver had CTX based on his health status before the dive, his conservative dive-profiles, and exclusion of other cardiac and neurological diseases. Further indicators include his neurological complaints following his history of eating fish and his response to conservative therapy. Physicians treating divers must be alert to subjects' dive history and in addition, also include recent dietary intake in their history-taking questions.

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