

Clinical Communications: Adult

COLD ANAPHYLAXIS: A CASE REPORT

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Abstract—Background: Cold anaphylaxis is a severe form of hypersensitivity reaction to cold temperatures. Such reactions include a spectrum of presentations that range from localized symptoms to systemic involvement. The condition can be acquired or heritable, although it may also be idiopathic. Treatment consists of second-generation H₁ antihistamines, epinephrine, and supportive care. Prevention involves avoidance of known triggers, most commonly cold immersion due to environment or water exposure. **Case Report:** We report the case of a 34-year-old man with cold-induced urticaria/anaphylaxis who presented to our emergency department with hypotension and shortness of breath after exposure to cold air after getting out of a shower. He required two doses of intramuscular epinephrine and was ultimately started on an epinephrine infusion. He was admitted to the intensive care unit for anaphylaxis monitoring and was found to have a positive ice cube test, reinforcing the suspected diagnosis. **Why Should An Emergency Physician Be Aware of This?:** Cold anaphylaxis is a potentially life-threatening phenomenon with specific testing. It is occasionally described in the emergency medicine literature. Providers should be aware of the potential for cold anaphylaxis as it can change patient guidance and alter management. This condition can also contribute to otherwise unclear and sudden decompensation in critically ill patients, as has been reported in cases of cold anaphylaxis induced by cold IV infusions. © 2020 Elsevier Inc. All rights reserved.

Keywords—anaphylaxis; cold exposure; urticaria

INTRODUCTION

Anaphylaxis is a life-threatening condition that requires rapid response. The lifetime prevalence of anaphylaxis in the United States is estimated to be between 0.05% and 2%; however, recent studies suggest a significant increase in ED presentations (1). Treatments include the standard H₁ blockers (both first and second generation), corticosteroids, epinephrine, and admission for airway monitoring if the patient meets criteria (2). Although most emergency medicine (EM) providers are comfortable identifying and treating anaphylaxis, a significant portion of cases have no identified trigger. Most common triggers include medications, foods, and insect stings (1).

Cold anaphylaxis is a clinically significant phenomenon that can recur and its identification as a trigger can have important implications for counseling and treatment. Cold anaphylaxis and urticaria has been described in the pediatric and dermatology literature with scant representation in EM literature. This phenomenon is generally seen in the outpatient setting as a chronic or recurrent condition manifesting as isolated urticaria without significant systemic complications or hemodynamic instability reported. Cold urticaria may be acquired or inherited. Inherited forms are transmitted in autosomal-dominant familial pattern and usually endure throughout a patient's life (3). Acquired forms often present in young adulthood and improve or remit after 5 years

in 50% of cases. Acquired forms may be primary or secondary, associated with cryoglobulinemia, human immunodeficiency virus, syphilis, mononucleosis, and various drugs (3). Administration of cold IV fluids has been identified as an iatrogenic trigger that may go unrecognized (4).

EM providers should be aware that cold temperature alone may be the trigger for anaphylactic shock. This understanding guides both management and recommendations to patients at the time of admission or discharge. Prevention of recurrence coupled with appropriate pharmacologic resources should be at the forefront of patient education.

CASE REPORT

A 34-year-old man with a medical history of back surgery presented to the emergency department (ED) with symptoms of shortness of breath and urticaria, found to be in anaphylactic shock with a blood pressure of 84/60 mm Hg and heart rate of 60 beats/min. The prehospital course for this patient involved him collapsing after exiting the shower into the cold air of his home. He was found by his family on the floor with diffuse urticaria and acute respiratory distress. The timing of the episode after leaving the hot shower, patient's history, as well as clinical course made syncope related to a hot shower less likely. The patient's family stated that he had a history of being "allergic to the cold weather." The patient had previously lived in Micronesia and has had several episodes of reaction to cold since moving to Colorado. He had been prescribed an epinephrine auto-injection pen in the past, which he had used previously in response to urticaria, but had never had anaphylaxis. He did not use his auto-injector on this occasion.

On the arrival of paramedic personnel, he was diaphoretic with mottled skin and diminished breath sounds. Paramedics started him on 12 L of oxygen via non-rebreather mask and administered 2 doses of 0.3 mg of intramuscular epinephrine and 50 mg IV diphenhydramine. The patient had some improvement, but still appeared to be in respiratory distress with persistent urticaria and hypotension, with a blood pressure of 84/60 mm Hg and a heart rate of 60 beats/min. The patient was alert throughout with a Glasgow Coma Scale score of 14. Paramedics started an epinephrine drip for refractory shock. As our emergency medical services (EMS) does not routinely carry epinephrine drips, EMS personnel injected 1 mg/mL epinephrine into a 1000-mL bag of saline (1 μ g/mL), which was infused at 2 μ g/min. Blood pressure improved to 108/80 mm Hg with heart rate of 60 beats/min. On arrival in the ED, the patient appeared profoundly diaphoretic with full body urticaria. Lung sounds were diminished in all fields

without wheezes. The remainder of his physical examination was reassuring and noncontributory. He was protecting his airway and did not have any other significant symptoms.

In the ED, the patient received methylprednisolone 125 mg IV, famotidine 20 mg IV, and a 1 L normal saline bolus. Due to clinical improvement, the epinephrine drip was stopped shortly after arrival.

Laboratory evaluation was notable for a white blood cell count of 12.9 cells/mL, lactate of 5.3 mmol/L, hypokalemia with potassium of 2.9 mmol/L, with the remainder of the chemistry results and other values including troponin within the expected range. Chest x-ray study was read as negative for acute cardiopulmonary disease. Electrocardiogram was interpreted as normal sinus rhythm of 64 beats/min, with normal P and QRS axis, no ST-elevation myocardial infarction or other signs of ischemic change, with a QTc interval of 437.

On admission to the intensive care unit, the patient underwent testing for other causes of syncope, including telemetry monitoring and echocardiogram. He had an ice cube test, which was positive, and confirmed the presumed diagnosis of cold urticaria. During this test, an ice cube was placed on his skin for approximately 5 min, resulting in local urticaria. Repeat lactate level was 2.3 mmol/L. Additional evaluation and laboratory workup was completed without other likely cause of symptoms identified. The patient was prescribed cetirizine 10 mg daily for maintenance therapy and prevention and counseled on avoidance of exposure to cold water and other cold immersion. He was prescribed an epinephrine auto-injector and was scheduled for rapid follow-up with an allergy specialist. He was discharged without recurrence of symptoms and in stable condition.

DISCUSSION

Prevalence of cold urticaria is relatively equal in both sexes (5). Symptoms range in severity from mild and self-limited urticaria to involving organ systems and presenting in fulminant anaphylactic states, affecting cardiac, pulmonary, and gastrointestinal function, with characteristics similar to other forms of anaphylaxis. Given the concern for cold exposure causing debilitating alterations in hemodynamics, patients should be counseled to avoid immersion in cold water due to the increased risk of drowning and hypothermia due to possible loss of consciousness (6).

Some patients with the inherited form can experience symptoms throughout their lives with only moderate changes in severity. However, full remission of symptoms is possible in the acquired form and has been found to occur in 50% of patients at the 5- to 6-year mark (7).

Patients should be counseled about potential serious systemic symptoms and the importance of wearing appropriate cold-weather clothing. Avoidance of cold-water activities and overexposure to cold weather also should be emphasized (3). Some patients benefit from prophylactic therapy with nonsedating antihistamines (8). As with any patient at risk for anaphylaxis, patients should be prescribed an epinephrine pen and educated about its appropriate use.

Various methods exist for confirmatory testing. The simplest procedure is the “ice cube test,” which entails simply placing an ice cube on the patient’s skin for a period of 3 to 5 min and observing the area for development of local urticaria (3). The sensitivity for this test is approximately 83%, but specially designed thermal probes are also available for use (9).

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

This case of a patient presenting in anaphylaxis due to a suspected response to cold exposure demonstrates the importance of recognition and awareness for the purpose of optimizing management and patient outcomes. Although uncommon, or perhaps underdiagnosed, the core tenets of treating this condition are quite familiar to the EM provider. When evaluating patients with urticaria or anaphylaxis, providers should screen for cold exposure as a trigger as well as history of similar epi-

sodes. This condition may also contribute to otherwise unclear and sudden decompensation in critically ill patients, as has been reported in cases of cold anaphylaxis induced by cold IV infusions (4).

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