



Case Report

Food dependent exercise induced anaphylaxis triggered by inhaled antigen

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ABSTRACT

We present a unique case of food dependent exercise induced anaphylaxis (FDEIA) triggered by an inhaled allergen in a 23-year-old professional cyclist. FDEIA is considered a rare form of anaphylaxis in which the state of exercise can trigger mast cell degranulation to an allergen which normally does not cause a reaction. It is closely related to exercise induced anaphylaxis, which occurs with exercise but in the absence of a food trigger. The patient experienced an anaphylactic reaction during a bicycle race when the race went through an almond orchard in full bloom. He was successfully stabilized with aggressive measures including steroids, fluids, anti-histamines and multiple doses of epinephrine.

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1. Case report

SS, a 23-year-old male professional bike racer, was competing in bicycle race in Southern California. He had been in his usual state of health, on his normal diet and is not on any medications. Medical history is significant only for an allergy to peanuts. He has been previously tested by his allergist and has no other allergies. In the final 20 km of a 180 km race, he rode through an almond orchard in full bloom.

He soon afterwards reported throat constriction to race officials. Evaluation by medical staff on scene demonstrated an ashen appearance, facial angioedema, urticaria, hypersalivation, nausea and vomiting, and wheezing without stridor. Medical staff at the event provided SS with albuterol nebulization treatment (2.5 mg via nebulizer mask), diphenhydramine (50 mg orally) and epinephrine (0.3 mg (1:1000) intramuscular (IM)). An ambulance then transported him to the nearest hospital with medical staff in attendance.

Once at the hospital SS received solumedrol (125 mg intravenously (IV)), ondansetron (4 mg IV), normal saline (2 L IV), and 4 more doses of epinephrine (0.3 mg IM). His symptoms improved after these measures. Laboratories and chest x-ray were unremarkable. There were no episodes of reported hypotension and his mental status remained intact throughout the evolution. He was admitted overnight, maintained on anti-histamines as needed and released the next day.

SS was evaluated by his allergist in follow up and had repeat skin testing done which demonstrated allergy to peanuts but no other allergens including tree nuts.

The patient was diagnosed with food dependent exercise induced anaphylaxis (FDEIA). He was instructed to refrain from any nut

ingestions with, or prior to exercise, to avoid almond orchards and to carry an epinephrine auto-injector at all times including during competition. Team cars were supplied with Epinephrine auto-injectors and team staff was instructed on its use.

2. Discussion

Inhaled antigens are a known trigger for allergic and anaphylactic reactions but we could find no reports of food dependent exercise induced anaphylaxis (FDEIA) triggered with inhaled antigens.

Exercise induced anaphylaxis is a serious and often unpredictable condition. While episodes may occur exclusively due to exercise, it often occurs in combination with exposure to food. These two subtypes, exercise induced anaphylaxis (EIA) and food dependent exercise induced anaphylaxis (FDEIA) may occur at any level of physical activity but are less likely to occur with lower levels of activity [1]. In a study of 76,000 Japanese junior high school students EIA was estimated at 0.03% of the population and FDEIA at 0.02% [2]. It has been estimated that 5–15% of all pediatric anaphylaxis cases are from EIA/FDEIA [3].

FDEIA was first described in 1979 by Maulitz et al. [4], Sheffer and Austen later characterized 4 stages of EIA [5]. The prodrome occurs after starting exercise and includes, fatigue, warmth, pruritis, and erythema. Early symptoms follow with generalized urticaria followed by fully developed symptoms including choking, stridor, abdominal pain, nausea and vomiting. Later sequelae may include a headache lasting 24–72 h. As with other forms of anaphylaxis a loss of vascular tone may lead to hypotension and anaphylactic shock.

Symptoms of purely EIA mostly occur within 30 min of exercise while with FDEIA development of symptoms relative to ingestion of the causative food can range from a few minutes to 6 h [1]. Cycling has been associated with 19–24% of EIA [1,6].

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For some subjects FDIA may be predictable with repeatable triggers. For others it is less so. The most reported food triggers are wheat, shellfish, tomatoes, peanuts, and corn, and may be dose dependent [7,8]. Importantly non-steroidal anti-inflammatories and aspirin have been shown to potentiate FDEIA [9]. Subjects can generally tolerate exposure of food triggers in the absence of exercise. Skin testing may reveal undiagnosed sensitivities but also may be negative [10]. Screening tests are insufficient for the diagnosis and treatment of FDEIA.

Emergency physicians typically query for the common triggers for anaphylactic reactions such as food, insect venom and drugs [11]. FDEIA and EIA likely constitute up to 5–15% of cases of anaphylaxis but is not commonly taught or considered in anaphylaxis [3]. FDEIA and EIA should be strongly considered when assessing a patient for an anaphylactic trigger especially before diagnosing a patient with idiopathic anaphylaxis. The triggering allergen could be as much as 6 h prior to exercise and as this case demonstrates may be from atypical sources of exposure. The emergency management of FDEIA/EIA is the same as for other causes of anaphylaxis, the most time critical and important intervention being epinephrine. Other standard treatments would include steroids, inhaled bronchodilators, antihistamines, fluids and vasopressors. All patients with anaphylactic reactions should be prescribed epinephrine auto-injectors upon discharge. Patients with new or idiopathic reactions should be provided education on common triggers and referred to an allergist for additional testing. While FDEIA may be prevented by the avoidance of exercise in association with triggering foods or medicines, there is no known prophylactic measure to prevent EIA. While EIA is less likely to occur at lower levels of exercise

these patients should carry an epinephrine autoinjector especially when exercising.

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