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The Use of Epinephrine in Acute Allergic Reaction to Food

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CASE 1

A 2-year-old boy presents in the emergency department (ED) for hives on his torso and arms. His medical history is unremarkable except for an egg allergy. His parents are certain he has not been in contact with egg. The pruritus and hives appeared spontaneously about 20 minutes prior. The last meal was more than 2 hours ago and contained no suspect ingredient. The patient is in no apparent distress and vital signs are within normal limits. His lungs are clear. Ear-nose-throat (ENT) exam reveals conjunctivitis and rhinitis. He is given oral diphenhydramine, but within 5 minutes, he reports throat pruritus and the mother notes a change in voice. The nurse asks whether she should administer the intramuscular (IM) epinephrine.

CASE 2

A father calls the on-call service concerning his teenage daughter who is allergic to peanuts. He is worried that she may have accidentally eaten a cookie that contained peanuts. He sounds very anxious and is asking what to do and whether he should administer the epinephrine auto-injector. The daughter does not report any itching or skin symptoms. Her breathing appears to be normal with no wheezing and she does not report any gastro-intestinal symptoms. Upon realizing that she may have eaten something containing peanut, she began to panic, cry, and feel dizzy. The father is wondering if he should drive to the hospital rather than wait for the paramedics.

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CASE 3

A 7-year-old boy has been admitted for a severe asthma attack that is refractory to treatment with albuterol and ipratropium bromide nebulization. Although the parents report the patient had previous wheezing with viral infections when younger, he has had no symptoms in the last 2 years. He does have a history of hay fever, but no known food allergy. The respiratory symptoms first began after the family left the restaurant where the patient had eaten pesto pasta, suspected to have contained pine nuts. Shortly after dinner, he complained of a “tummy ache” and began to vomit. A medical student asks whether this could be an allergic reaction to a food and if intramuscular epinephrine should be administered. The patient did not report pruritus or any skin or mucosal signs of an immuno-globulin E (IgE)-mediated reaction.

DISCUSSION

The diagnosis of anaphylaxis can often be difficult in an acute setting. While anaphylaxis can be extremely obvious in some cases, in other cases making the diagnosis can be challenging when the symptoms are uncharacteristic. Up to 57% of likely episodes of anaphylaxis are due to foods and are not properly identified and diagnosed in the ED.¹ Physicians will often use terms such as “acute allergic reactions” or “acute hypersensitivity reaction.”² Failure to correctly identify anaphylaxis may result in the delay of epinephrine administration, which has been associated with greater fatalities.³

The Table (at right) presents the clinical criteria for the diagnosis of anaphylaxis. The criteria, validated in both clinical and research settings, were developed in 2004 to 2006 by a National Institutes of Health-sponsored international consensus group, to facilitate the prompt recognition of anaphylaxis.⁴⁻⁶ In the emergency setting, this definition has a high sensitivity (97%) with lower specificity (82%).⁷ The definition includes three sets of criteria combining symptoms and allergen exposure. It is worth noting that neither hypotension/shock nor skin symptoms are prerequisites for diagnosis.

Intramuscular epinephrine should be administered as soon as anaphylaxis is recognized by anyone trained or authorized to give it. If necessary, the administration can be repeated after 5 to 15 minutes. Without delaying the administration of epinephrine, life support should be initiated using supplement oxygen and maintaining airway, establishing access, and administering large volumes of intravenous fluids.

H1-antihistamines (anti-H1) medications are only useful for relieving itching and urticaria and will not prevent life-threatening upper and lower airway obstruction, hypotension, or shock. They are appropriate for milder reactions limited to the skin and mucosa. Corticosteroids have a slow onset of action (4 to 6 hours) and will not affect acute outcome. Their use is mainly to prevent protracted or biphasic reactions, although there is very little scientific evidence to support or refute efficacy with this regard.⁴

All patients who have experienced anaphylaxis should be sent home with an anaphylaxis emergency action plan, an epinephrine auto-injector twin pack, a plan for monitoring auto-injector expiration dates, an information sheet on how to properly use an epinephrine auto-

injector, a plan for arranging further evaluation of the allergy, and printed information about anaphylaxis, how to recognize the symptoms and its treatment.⁴

RESOLUTION OF CASES

Case 1

The patient was not exposed to an identifiable allergen and thus the diagnosis of anaphylaxis is dependent upon the first set of criteria. This patient presented with compatible skin and mucosal involvement. However, the physician must determine whether there is associated respiratory compromise. Voice hoarseness is an imprecise symptom that needs better evaluation. In the setting of an IgE-mediated reaction with ENT and oral involvement, slight voice changes can result due to the post-nasal drip of associated acute rhinitis, or from slight urticaria or pruritus of the throat from local contact with the food. In that case, watchful waiting for the anti-histamine to act would be appropriate. Here, administration of epinephrine would not be warranted as the symptoms could very well reflect acute urticaria from an upper respiratory viral infection, for example. Conversely, a significant change of voice with difficulty to swallow saliva or inspiratory stridor are signs of eminent upper airway compromise and would definitively fulfill anaphylaxis criteria and warrant administration of epinephrine. In doubt, epinephrine should be administered. With IM injection, side effects are usually mild. They commonly include tremor, anxiety, tachycardia, light-headedness and/or headache.

Case 2

The patient ingested a known allergen and thus hypotension alone is required for the diagnosis of anaphylaxis. In the clinic, this is very easy to ascertain. However, when dealing with a patient over the phone, it can be difficult to determine. Loss of consciousness or seizures should probably be interpreted as signs of shock, but more subtle symptoms such as light-headedness can be very hard to differentiate from anxiety or hyperventilation, which may accompany the reaction.

Vagal reaction can usually be differentiated from anaphylactic shock by checking the pulse, but the patient or her guardian may not be able to take it. Also, anaphylaxis can sometime present with bradycardia in infants and younger children. Again, in doubt, epinephrine should be administered. The patient should be instructed to remain calm and in a recumbent position. She should abstain from physical activity as it may increase the severity of the reaction. Sitting or standing up suddenly after receiving epinephrine can lead to “empty vena cava” or “empty ventricle” syndrome and sudden death.⁶

Case 3

When there is a potential exposure to a probable allergen, the second set of criteria applies. The main difference from the first set being that skin or mucosal involvement is not required. In the case of a severe or refractory asthma attack, the clinician should investigate the story and look for evidence of other systemic manifestations of IgE-mediated disease.

If a bronchospasm is triggered by a systemically circulating allergen (food, drug, or insect venom), systemic treatment with IM epinephrine may be appropriate. Status asthmaticus can be impressive, making it easy to overlook the differential diagnosis. Clinicians may make fixation error and forget to examine the patient for skin or mucosal involvement, which would orient toward a diagnosis of anaphylaxis. One should also remember that 10% to 20% of cases of anaphylaxis will present without any skin involvement, hence the importance of the history.⁸

CONCLUSION

Familiarity with the clinical criteria for anaphylaxis can help its prompt recognition and should guide the clinician's decisions when managing a child with an acute food allergic reaction, especially with regard to the indication for epinephrine.

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TABLE**Clinical Criteria for Diagnosis of Anaphylaxis**

Anaphylaxis is highly likely when any one of the following three criteria is fulfilled:	
1	Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, and swollen lips-tongue-uvula) AND at least one of the following: <ul style="list-style-type: none"> A. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia) B. Reduced BP or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
2	Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours): <ul style="list-style-type: none"> A. Involvement of the skin–mucosal tissue (eg, generalized hives, itch-flush, swollen lips-tongue-uvula) B. Respiratory compromise (eg, dyspnea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia) C. Reduced BP or associated symptoms (eg, hypotonia [collapse], syncope, incontinence) D. Persistent gastrointestinal symptoms (eg, cramping abdominal pain, vomiting)
3	Reduced BP after exposure to a known allergen for that patient (minutes to several hours): <ul style="list-style-type: none"> A. Infants and children: low systolic BP (age-specific) or greater than 30% decrease in systolic BP* B. Adults: systolic BP < 90 mm Hg or greater than 30% decrease from that person's baseline.

BP = blood pressure; PEF = peak expiratory function.