

Postgraduate Course ERS Munich 2006 Paediatric respiratory medicine: allergy for paediatric pulmonologists

Management of paediatric anaphylaxis



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Educational aims

- › To understand how to identify those patients at substantial risk of anaphylaxis who are likely to be encountered in everyday practice.
- › To explain how to undertake initial preventive strategies to reduce risk and facilitate specialist care aimed at further risk reduction and treatment.
- › To detail the prescription of an adrenaline self-administration device and provide instructions on its proper use.

Summary

Anaphylaxis is a severe, systemic allergic reaction. It is also potentially life-threatening. Acute treatment depends on the administration of adrenaline. It is possible to identify those at greatest risk of anaphylaxis and to reduce the danger, by helping them to modify their behaviour and by prescribing them an adrenaline self-administration device. Education and prevention are vital.



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The Epipen adrenaline self-administration device.



Although there is no universally accepted definition of anaphylaxis, beyond the fact that it is a severe, systemic allergic reaction, the central aspect of interest to clinicians is its potentially life-threatening nature. Acute treatment of anaphylactic episodes is an essential clinical skill, but preventing them happening in the first place is paramount in reducing morbidity and mortality. This means that physicians need to be able to identify those patients at risk from anaphylaxis, and to initiate appropriate strategies to reduce the likelihood both of an episode occurring and that episode becoming life-threatening.

Acute treatment of anaphylaxis

The timely administration of appropriate doses of adrenaline, to open the airways and increase cardiac output, is still the mainstay of acute treatment of anaphylactic episodes. The preferred route of adrenaline administration for children is intramuscular, in the anterolateral thigh, at a dose of 0.01 mg per kg [1].

Other factors can influence outcome. For instance, studies have shown that putting

patients in an upright position increases mortality [2], possibly as it allows blood to pool in the lower extremities, exacerbating the effects of decreases in blood-pressure and cardiac frequency. Patients should be put in the recumbent recovery position, with their legs elevated. In addition, general measures to support the airways, breathing and circulation should be taken.

Severe anaphylactic reactions

The risk of severe anaphylactic reactions is determined by many factors, the most important of which are the cause, the age of the patient, comorbidity and severity of previous reactions. The risk of a bad outcome is further dependent on the capacity of the patient to avoid exposure and to treat reactions.

There are three major groups of patients at high risk of death from an anaphylactic episode (table 1) [3, 4]. An analysis of anaphylactic episodes leading to cardiorespiratory arrest shows that adolescents and young adults allergic to foods are at high risk, and that the mode of death in these patients is overwhelmingly respiratory. The high-risk groups for anaphylaxis caused by venoms and drugs comprise older individuals with significant comorbidity. Further analysis of risk in adolescent food-allergic patients shows that asthma is a highly correlated comorbidity, and that almost all patients were allergic to peanuts and/or tree nuts [5].

Value of skin testing and RAST/EAST tests

The utility of skin tests or radioallergo-sorbent/enzyme-allergosorbent (RAST/EAST) tests to allergens to predict the severity of allergic reactions is extremely limited [6, 7]. Rather, history taking is vital: the characteristics of a patient who is likely to be at risk of severe

Table 1 The major high-risk anaphylaxis groups			
Cause	Age yrs	Time to arrest min	Mode of death
Food	17–27	30	Respiratory (86%)
Venoms	45–70	15	Shock
Drugs	60–75	5	Shock

Table adapted from [3], with permission from the publisher.

Table 2 Management of anaphylaxis in different types of allergy

Cause	Initial management	Refer for
Food	Elimination diet \pm Epipen	Challenge testing
Venoms	Avoidance \pm Epipen	Venom immunotherapy
Drugs	Avoidance	Skin testing
Unknown	Epipen	Assessment

anaphylaxis include a history of relatively severe allergic symptoms following small doses of allergen and systemic symptoms following contact without ingestion. In a paediatric pulmonology practice, these patients are likely to fall into three groups:

- peanut/tree nut allergic, adolescent asthmatic patients with previous (severe) reactions;
- venom allergic patients with significant comorbidity; and
- antibiotic/latex allergic patients with significant comorbidity (*e.g.* cystic fibrosis).

Management of at-risk patients

The initial management of patients at risk for anaphylaxis should include adequate measures to avoid exposure to allergens and prescription of an adrenaline self-administration device (Epipen). Patients who are food allergic should be given information about eliminating culprit foods from their diets by a trained dietician. Challenge testing will be necessary to confirm the diagnosis and the need for the Epipen (table 2).

Adrenaline self-administration

Prescription of an Epipen involves choosing the correct dosage for the weight of the patient [8] and deciding how many Epipens are necessary to ensure that the patient has continual access to at least one Epipen (for instance, one at school and one at home). For severe reactors and patients in remote areas, two Epipens may be necessary [9]. It is important that patients and/or their families be instructed in how and when to use the Epipen, possibly by a specially trained respiratory nurse, and told to seek further medical attention directly after use in order to obtain definitive treatment of the acute episode (*e.g.* additional adrenaline if necessary). Patients and their families, as well as teachers, should be given written information about the proper use of the Epipen. These instructions should be repeated at regular intervals.

Conclusion

In anaphylaxis, prevention is paramount, so identification of patients at risk is essential. For patients, education is the key to effective prevention.

Educational questions

1. Which of the following patients is most in need of an Epipen?
 - a) An 11-year-old male with allergic rhinoconjunctivitis, who has developed generalised itching and hives following a yellow jacket sting.
 - b) A 15-year-old female with stable asthma and a peanut allergic reaction in the past year, which consisted of nausea and itchy palms after eating a jam sandwich prepared with a knife previously used to make a peanut butter sandwich.
 - c) A 7-year-old female who had a hypotensive reaction after receiving ciprofloxacin for an upper respiratory tract infection.
2. An 8-year-old boy with asthma has had a severe reaction to hazelnut, requiring hospitalisation and adrenaline administration. How many Epipens does this patient require?
 - a) 0. b) 1. c) 2. d) 4. e) >4.

Suggested answers

1. b
2. Generally, c will be correct although d might be appropriate for patients living in remote areas.

To be prepared for anaphylaxis in a paediatric pulmonology practice

Ask about systemic reactions to foods, stings, drugs, latex.

Consider prescribing an Epipen to every such patient (document the decision).

Train a respiratory nurse to give Epipen instructions to patients and review these at each visit.

Where appropriate, secure proper elimination diets and avoidance advice from a dietician.

Collaborate with a paediatric allergist able to carry out food challenge testing, skin testing to drugs, venom immunotherapy, etc.

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