

Anaphylaxis

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Abstract

Manifestations of anaphylaxis may occur within seconds or minutes after exposure to a causative antigen. Almost any substance can be implicated as a potential precipitating agent. Reactions may be slow, progressive, or rapidly fatal within minutes. Any healthcare worker involved in the administration of medications or the care of patients, whether a doctor, dentist, nurse, paramedic or allied health professional, is ethically obliged to be able to appropriately manage the potential consequences of such an action – *a life-threatening anaphylactic reaction*.

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Introduction

Any antigen capable of activating IgE can trigger anaphylaxis. The release of histamines, leukotrienes, thromboxanes, prostaglandins and bradykinins results in increased capillary permeability, vasodilatation, excessive mucous membrane secretions and bronchoconstriction. Manifestations of anaphylaxis may occur within seconds or minutes after exposure to a causative antigen. Non-immunological reactions (known as anaphylactoid reactions) can present identically, and are treated in the same way. Severe reactions can occur without any documented prior exposure.

Common causes of anaphylaxis include antibiotics, aspirin, non-steroidal anti-inflammatory agents, contrast media, latex, insect stings, nuts, seafood, wheat and many other medications and foodstuffs, although almost any substance can be implicated as a potential precipitating agent.

Manifestations

Differentiation must be made between an isolated non-emergent allergic reaction involving a single organ system, as opposed to life-threatening anaphylaxis involving multiple systems. Anaphylactic reactions may become life-threatening if two or more organ systems are affected:

- a. Respiratory difficulty
- b. Signs of shock/hypotension

- c. Involvement of skin/mucosal tissue
- d. Gastrointestinal symptoms

a. Respiratory difficulty

Respiratory distress may manifest with hoarseness, dysphonia, inspiratory stridor, expiratory wheezing and increasing dyspnoea. Peak expiratory flow will be diminished, resulting in features of progressive hypoxaemia and respiratory failure.

b. Signs of shock/hypotension

A systolic blood pressure of less than 90 mmHg (or a 30% reduction in the patient's baseline systolic pressure) may result in agitation, light-headedness, hypotonia, syncope, incontinence and circulatory collapse.

c. Involvement of skin/mucosal tissue

The patient's skin may be pale or flushed, with generalised hives and/or pruritis. Swelling of the neck, face, lips, tongue, uvula and larynx may result in progressive angioedema and complete upper airway obstruction. Rhinitis is often an early manifestation.¹

d. Gastrointestinal symptoms

Patients may present with nausea, vomiting, diarrhoea and abdominal pain or cramps.

Reactions may either be slowly progressive, or rapidly fatal within minutes. The onset of manifestations may be delayed, and may persist for more than 24 hours. They may recur up to 36 hours after the initial onset (biphasic reactions). Generally, the shorter the interval between exposure and reaction, the more severe the reaction.

Prevention

1. Ask about allergies

The most important aspect in the management of anaphylaxis is to try and prevent the condition from occurring in the first place. Obtain details of any previous suspected allergic or adverse reactions. If there is any doubt, carefully weigh up the absolute necessity of administering the medication, especially parenterally, and rather consider other alternatives. It is wise to keep a written record of the questions asked and the patient's replies.

2. Advanced preparation

Before administering medications, ensure that you have the necessary skill, drugs and emergency equipment to handle an adverse reaction. Is a properly stocked advanced life-support kit or resuscitation trolley readily available, and are the staff adequately trained to use the equipment? An acute anaphylactic reaction can develop literally within seconds and is one of the most frightening of medical emergencies for both patient and doctor. The resuscitation skills of those present may well be put to the ultimate test.

3. Anticipation

It is worthwhile asking patients to wait in a dedicated observation area for up to 30 minutes, especially following parenteral administration of medications. Inform patients of the early symptoms of anaphylaxis, and that they should report these immediately if they occur. Stop further administration at the first signs of anaphylaxis. Although rare, severe reactions may occur up to 24 hours after exposure.

4. Accessibility

In the pre-hospital management of the patient, it is essential to ensure the safety of the rescuer as well as the patient. Following a bee sting, for example, first make sure that the scene is safe. Do not squeeze the venom sac when attempting to remove the stinger; instead of using your fingers, rather use a credit card or blunt end of a knife to scrape the stinger off the skin.

5. Accurate assessment

The symptoms and signs of an anaphylactic reaction must be differentiated from the non-life-threatening features of a simple allergic reaction (urticaria, conjunctivitis,

etc.), and from other conditions, such as vasovagal attacks (syncope), hypoglycaemia, panic attacks, etc. Recognition of the development of the abovementioned manifestations of anaphylaxis is of utmost importance, since deaths have been reported within hours and even minutes of the onset of symptoms.

6. Ambulance

Rapid deployment of advanced life-support paramedics will be required in the pre-hospital setting in order to provide the necessary equipment and expertise in view of the potential rapid progression of an anaphylactic reaction.

Knowledge of the telephone numbers of the nearest appropriate ambulance service is fundamental, yet surprisingly few people have these numbers readily available. Emergency numbers should be clearly visible and securely taped onto all telephones, as there may not be sufficient time to start searching for a telephone directory or a misplaced piece of paper. Family members should be adequately trained in the techniques of cardiopulmonary resuscitation (CPR). Oxygen therapy, airway protection and other life-support procedures can be provided by ambulance personnel in accordance with their qualifications. It is wise for healthcare professionals to have an ampoule of adrenaline, needle and syringe safely stored in their home at all times.

Management of anaphylaxis

1. Halt further exposure

Remove or stop the precipitating agent immediately.

2. Oxygen

Provide high-flow oxygen, preferably by rebreather face mask, as soon as possible.

3. Maintain a patent airway

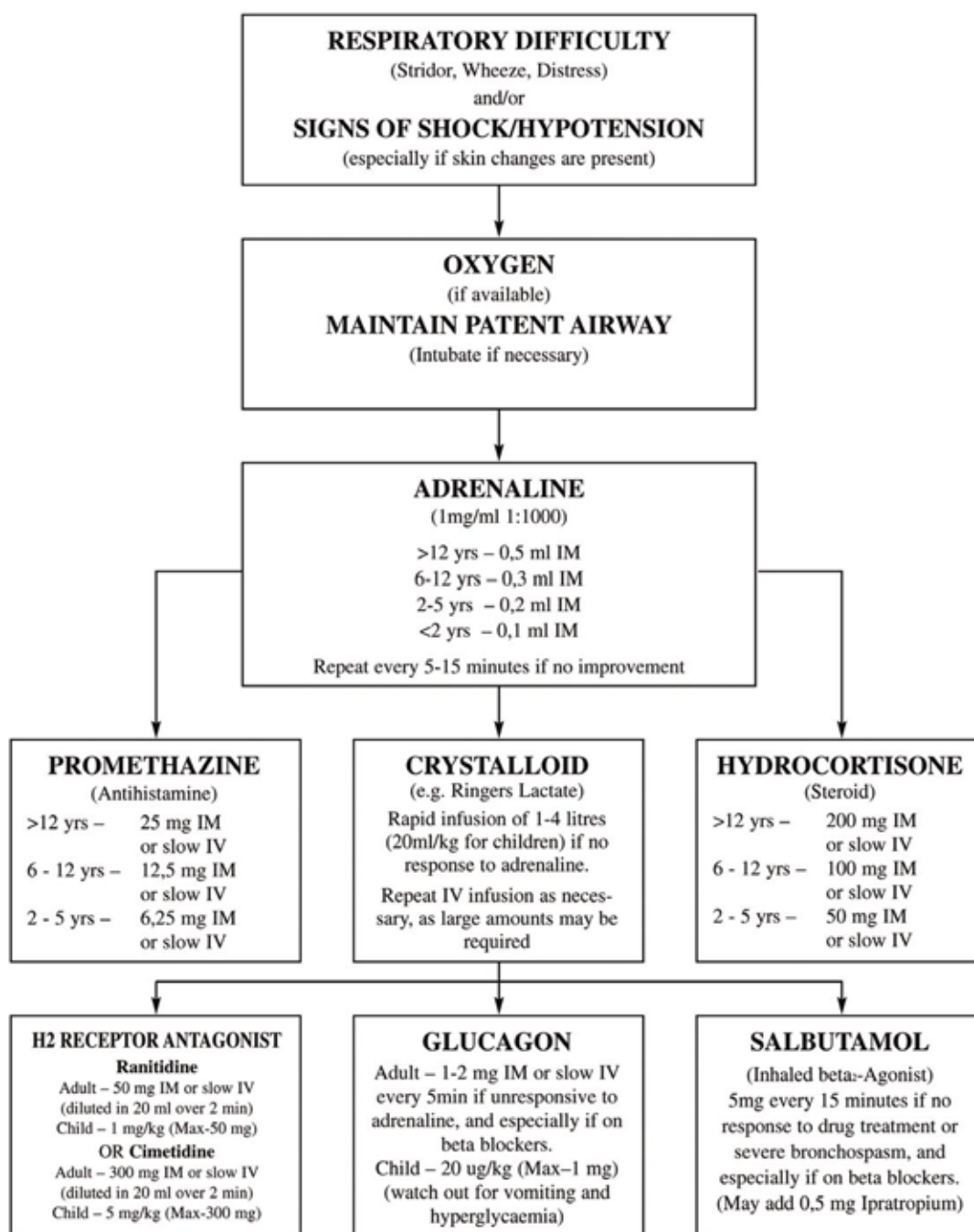
Position the patient in a semi-Fowler's position (unless severely hypotensive) to assist with breathing efforts. Monitor respiratory parameters, pulse oximetry (if available) and vital signs continuously. Remember that progressive airway obstruction may occur, necessitating urgent intubation (using a smaller-sized tracheal tube if necessary) or even emergency cricothyroidotomy.

4. Adrenaline

Adrenaline is the undisputed drug of choice for severe reactions, as it reverses vasodilatation, increases myocardial contractility, reduces oedema, dilates the airways and suppresses the release of histamine and leukotrienes.



Treatment of Severe Anaphylactic Reactions (Adult and Child)



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Inject 0.3 to 0.5 ml of adrenaline (1:1000) **intramuscularly** into the anterolateral aspect of the thigh if systemic features such as hypotension, progressive airway swelling or respiratory distress are present. Do **NOT** inject adrenaline subcutaneously, as the absorption may be delayed and unreliable. Repeat the administration of adrenaline every five to fifteen minutes if no improvement occurs.

Intravenous adrenaline is potentially hazardous in anaphylaxis, and should **only** be considered if life-threatening hypotension persists despite the administration of intramuscular adrenaline and aggressive fluid resuscitation.² Dilute 1 mg adrenaline in 200 ml normal saline, and slowly infuse at 1 ml/minute (5 µg/minute) with continuous ECG monitoring. Precipitation of angina and ischaemic heart disease is a recognised complication of adrenaline infusion.

5. Establish rapid intravascular access

Rapidly infuse one to four litres of crystalloid (Ringers lactate, normal saline or balanced salt solutions) if the patient is hypotensive or unresponsive to adrenaline. Large amounts of fluid may be required in severe reactions.

6. Glucagon

Administer 1 to 2 mg IM or slowly IV every five minutes if the patient is unresponsive to adrenaline, and especially if the patient is taking beta-blockers. Patients on beta-blockers are particularly at risk of developing severe anaphylactic reactions in view of their inability to mount a tachycardic response. An infusion of 5 to 15 µg/minute may be considered.³ Watch out for the development of nausea, vomiting and hyperglycaemia.

7. Antihistamine

Administer an antihistamine such as promethazine 25 mg IM or slowly IV. As histamine is only one of many chemical mediators released in anaphylaxis, the use of an antihistamine should be used after IM adrenaline, and not as a substitute for adrenaline in severe reactions.

8. Corticosteroid

Administer hydrocortisone 200 mg IM or slowly IV. Although corticosteroids take four to six hours to be effective, their administration may be particularly useful for preventing or shortening protracted reactions.

9. Inhaled beta-agonists

Nebulised salbutamol (5 mg) and ipratropium (0.5 mg) should be given every 15 minutes if bronchospasm persists. Ipratropium may be particularly beneficial for patients who are on beta-blockers.

10. H₂ receptor blockers

Consider the administration of either cimetidine (300 mg IM or slowly IV) or ranitidine (50 mg IM or slowly IV, diluted in 20 ml and administered over two minutes).

11. Admit for observation

Recurrences may occur, and therefore the patient should be observed for between four and twenty-four hours, depending on the severity of the reaction and/or the presence of underlying complications.

12. Prevent recurrence

Identification of the cause to prevent recurrence is important, and a thorough search for a possible aetiology should be done. Arrange for a "Medic Alert" warning bracelet for the patient prior to discharge.

It is essential to prescribe for and educate the patient and relevant family members and friends on the use of a self-injectable adrenaline device (EpiPen). Although relatively expensive, all patients who have had a severe reaction must have such a kit on their person at all times in case of recurrence.

Conclusion

Healthcare workers involved in the administration of medications or the care of patients, whether doctors, dentists, nurses, paramedics or allied health professionals, are ethically obliged to be able to appropriately manage the potential life-threatening consequences of such actions - **the anaphylactic reaction**.

Conflict of interest

Nil

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