

Difference Between Anaphylaxis and Anaphylactic Shock

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Key Difference – Anaphylaxis vs Anaphylactic Shock

The human **immune system** typically recognizes harmful cells and molecules and takes action to eliminate them from the body. However, in some instances, harmless molecules and cells are also incorrectly identified as injurious agents by the body's defense mechanisms, provoking an **immune response** that can cause tissue damage and death. Such exaggerated immune responses are called hypersensitive reactions or **allergic reactions**. **Serious allergic reactions which are rapid in onset are collectively known as anaphylaxis. If anaphylaxis is left untreated, it will lead to a state of systemic hypoperfusion followed by impaired tissue perfusion, which is called anaphylactic shock.** Therefore, the key difference between anaphylaxis and anaphylactic shock is the presence of severe tissue hypoperfusion in shock state which may progress into a failure of vital organs.

What is Anaphylaxis?

Serious allergic reactions that are rapid in onset are called anaphylactic reactions. Anaphylaxis can be defined as severe, life-threatening, generalized or systemic hypersensitive reactions characterized by rapidly developing, life-threatening changes either to airway or/and breathing or/and circulation.

Pathophysiology

Anaphylaxis arises as an acute, Ig-E mediated immune reaction. Mainly mast cells and **basophils** are involved in bringing out the immune response through inflammatory mediators. These mediators cause:

- Smooth muscle contraction
- **Mucous** secretion
- **Bronchial spasms**
- Vasodilation
- Increased vascular permeability

- [Edema](#)

Systemic absorption of allergen is necessary for the initiation of anaphylaxis. This can be either by ingestion or parenteral injection. Commonly identified triggers for anaphylaxis are,

Food – Peanut, shellfish, lobsters, milk, egg

Stings – Wasps, bees, hornets

Medicines – Penicillin's, Cephalosporin's, Suxamethonium, Non-steroidal anti-inflammatory drugs(NSAIDs), Angiotensin Converting Enzyme inhibitors(ACEi), Gelatin solutions

Cosmetics – Latex, hair dye

Signs and Symptoms

Symptoms of anaphylaxis may range from widespread urticarial to cardiovascular collapse, laryngeal edema, airway blockage and respiratory failure causing death. Sudden onset and rapid progression of these symptoms following exposure to an antigen is a cardinal feature of anaphylaxis.

- [Stridor](#), hoarseness- due to the increased capillary permeability, extravasation, and edema
- [Angioedema](#)
- Rhonchi
- [Dyspnea](#)
- Laryngeal edema
- [Diarrhea](#) and vomiting- due to the edema and secretions of gastrointestinal tract

More serious consequences of anaphylaxis are [hypotension](#), bronchospasm, laryngeal edema and cardiac arrhythmia. Hypotension can occur due to the vasodilation which results in reduced afterload and preload, causing myocardial depression. Confusion may occur as a result of cerebral [hypoxia](#). Cerebral hypoperfusion and hypotension can result in syncope.

Signs and symptoms of **Anaphylaxis**

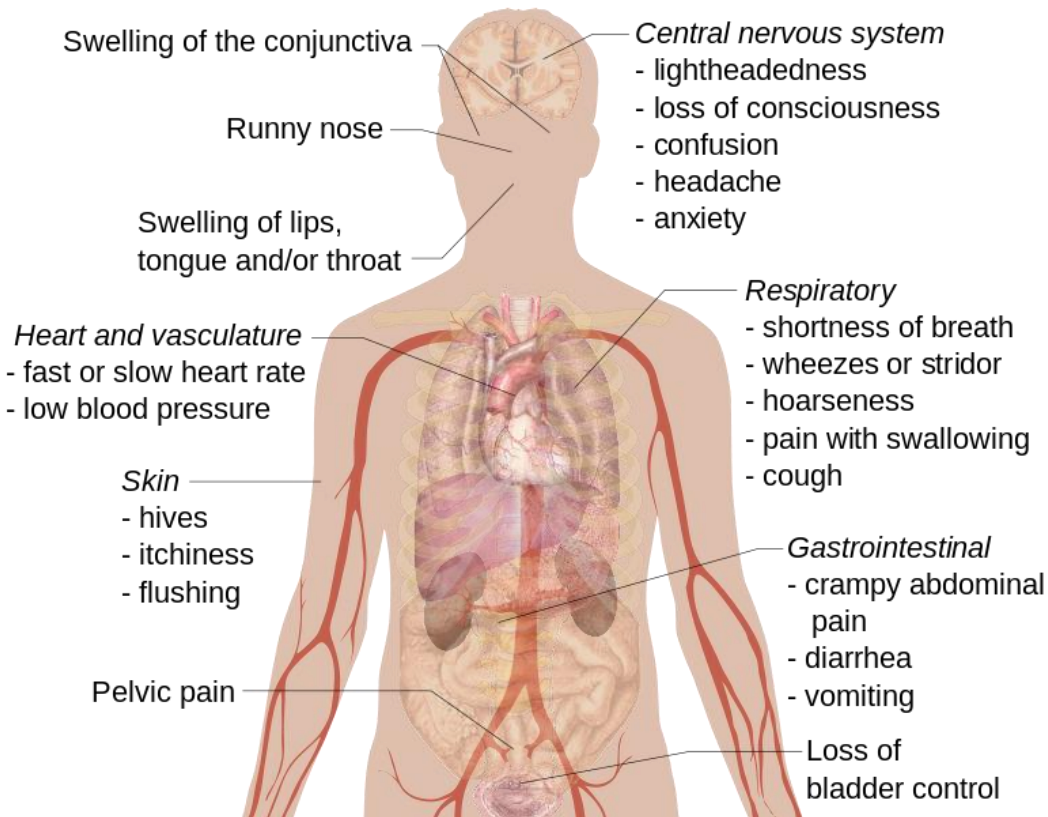


Figure 01: Signs and Symptoms of Anaphylaxis

Management

The aim of management of anaphylaxis is the restoration of oxygenation and perfusion of the brain along with the reversal of pathological changes. Taking measures to prevent repeated exposure to the **allergen** is very important. Early recognition of anaphylaxis and treatment is essential.

- ABCDE approach is necessary (airway, breathing, circulation, disability, exposure)
- Make patient lie supine and feet raised
- Make airway free
- High flow oxygen via mask
- Blood pressure mandatory
- Prepare venous access

Drug of choice for anaphylaxis is adrenaline. Administer 0.5 mg of Adrenaline intramuscularly (0.5ml of 1:1000 adrenaline). In order to inhibit the inflammatory

responses, one should administer 200mg of Hydrocortisone intravenously and 10-20mg of chlorphenamine intravenously.

What is Anaphylactic shock?

Anaphylactic shock is defined as a state of systemic tissue hypoperfusion due to the reduced cardiac output and/or reduced effective circulatory blood volume. The resultant hypoperfusion is followed by impaired tissue perfusion and cellular hypoxia. Anaphylaxis may reach the shock level due to severe systemic vasodilation, increased permeability of vasculature, hypoperfusion and cellular anoxia. Anaphylactic shock is a progressive disorder and it can have fatal consequences unless the underlying cause is corrected. The disease progression can be divided into 3 stages as; non-progressive stage, progressive stage, and irreversible stage.

Non-progressive Stage

During this stage, reflex compensatory neurohormonal mechanisms are activated to maintain the perfusion of vital organs, specifically the brain and heart. The adrenal gland secretes catecholamines which increase the peripheral resistance, raising the blood pressure. The kidneys secrete renin which retains sodium and thus water increasing the preload. Posterior pituitary will secrete ADH to act on distal nephron to preserve sodium and water. All these mechanisms take place in order to restore tissue perfusion.

Progressive Stage

If the underlying cause is not corrected, persistent oxygen deficit may result in vital organ damage and failure.

Stages

1. Persistent oxygen deficit
2. [Aerobic respiration](#) is replaced by [anaerobic glycolysis](#)
3. [Lactic acid](#) production increases
4. Tissues plasma becomes acidic
5. Vasomotor response is blunted
6. Arterioles dilate and blood pools in the microcirculation

7. Cardiac output critically is reduced
8. Anorexic injury to the endothelial cells
9. Vital organ damage and failure

Irreversible Stage

If the underlying cause of anaphylactic shock is not corrected, irreversible cellular injury occurs.

Signs and Symptoms

- Signs of severe vasodilation: warm peripheries, tachycardia, low blood pressure
- Bronchospasm
- Generalized urticaria, angioedema, pallor, erythema
- Edema of pharynx and larynx
- Pulmonary edema
- Diarrhea, nausea, vomiting
- Hypovolemia due to fluid leak

Management

In a shocked patient airway, breathing and circulation should be well managed. Delay in the recognition of a shocked patient is associated with increased death rate.

The access to the patient's obstructed airway can be gained by clearing any blockage of the oropharyngeal airway, by an endotracheal tube or using tracheostomy. Oxygen can be supplied by the continuous positive airway pressure (CPAP), non-invasive ventilation (NIV) or protective mechanical ventilation. Airway and breathing of the patient should be monitored by calculating the respiratory rate, pulse oximetry, capnography and blood gases.

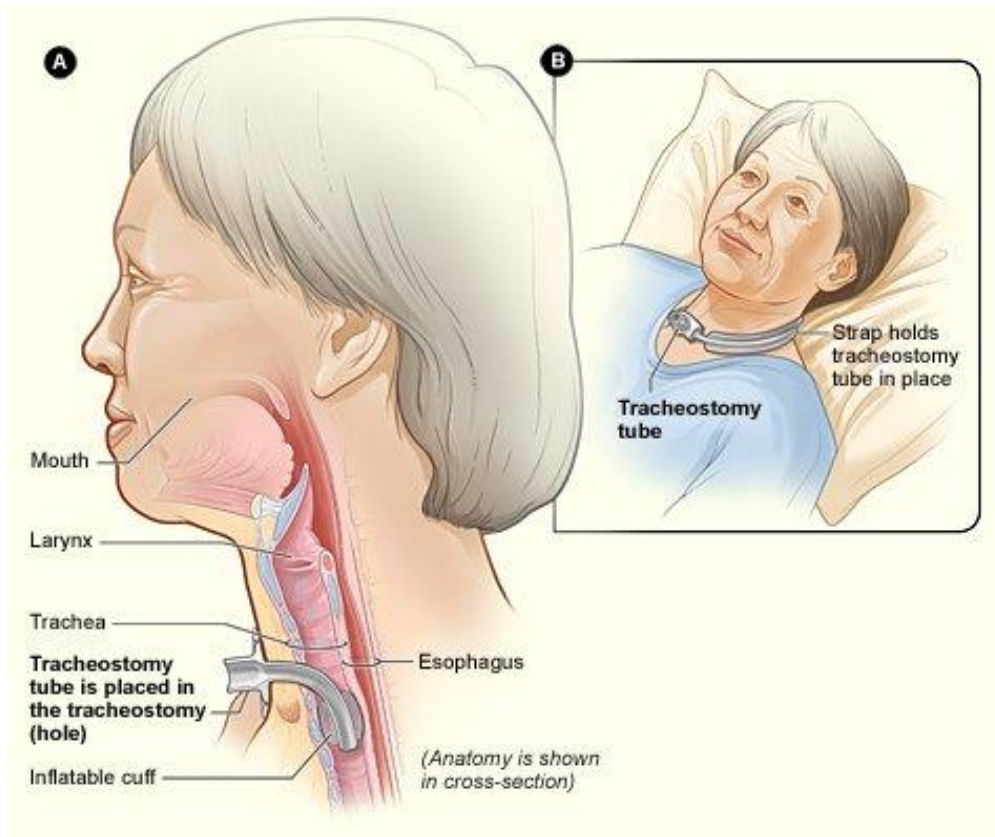


Figure 02: Clearing the patient's obstructed airway using tracheostomy.

Cardiac output and blood pressure can be brought to the normal levels by expanding the circulatory volume by giving blood, colloids or crystalloids. Inotropic agents, vasopressors, vasodilators and intra-aortic balloon counterpulsation can be used to support cardiovascular function. Monitoring of the cardiac function is done by blood pressure measurement, ECG, urine output measurement and by evaluating the mental status of the patient.

What are the similarities between Anaphylaxis and Anaphylactic Shock?

- Anaphylaxis and anaphylactic shock are immunologically mediated.
- Both conditions are fatal if untreated.

What is the difference between Anaphylaxis and Anaphylactic Shock?

Anaphylaxis vs Anaphylactic Shock

Serious allergic reactions that are rapid in onset are called anaphylactic reactions or anaphylaxis.

Anaphylactic shock is defined as a state of systemic tissue hypoperfusion, due to the reduced cardiac output and/or reduced effective circulatory blood volume.

Tissue Hypoperfusion

There is no severe tissue hypoperfusion.

Tissue hypoperfusion is the defining characteristic of anaphylactic shock.

Summary – Anaphylaxis vs Anaphylactic Shock

Anaphylactic reactions are sudden, widespread, potentially fatal allergic reactions. If left untreated, this can lead to a state of systemic hypoperfusion followed by impaired tissue perfusion. This latter condition is known as anaphylactic shock. Thus, the main difference between anaphylaxis and anaphylactic shock is their severity level.

References:

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2. Kumar, Parveen J., and Michael L. Clark. Kumar & Clark clinical medicine. Edinburgh: W.B. Saunders, 2009. Print.

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