ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-515-x, Impact Factor: 9.23

American Academic publishers, volume 6, issue 01,2026

Journal: https://www.academicpublishers.org/journals/index.php/ijai

ANAPHYLACTIC SHOCK: CAUSES, EARLY SIGNS AND TYPES

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Abstract: Anaphylactic shock is among the extreme cases and danger situations that occur with immediate hypersensitivity reactions, and it is marked by the quick appearance of systemic symptoms that involve multiple organ systems. The present study explores the causative agents of anaphylaxis, discusses the early clinical manifestations that are critical for prompt treatment, and classifies the different types according to the mechanisms of triggering and the manner in which they affect the body.

Keywords: anaphylactic shock, hypersensitivity reactions, allergens, clinical manifestations, immediate type reactions, pathophysiology, emergency medicine

Аннотация: Анафилактический шок представляет собой одно из наиболее тяжелых и потенциально смертельных проявлений реакций немедленной гиперчувствительности, характеризующееся быстрым началом системных симптомов, поражающих множественные системы органов. В данной статье рассматриваются этиологические факторы, способствующие развитию анафилаксии, определяются ранние клинические проявления, имеющие решающее значение для своевременного вмешательства, и классифицируются различные типы на основе пусковых механизмов и патофизиологических путей.

Ключевые слова: анафилактический шок, реакции гиперчувствительности, аллергены, клинические проявления, реакции немедленного типа, патофизиология, неотложная медицина

Annotatsiya: Anafilaktik shok tezkor boshlanishi bilan xarakterlanadigan va ko'plab organ tizimlariga ta'sir qiluvchi tizimli simptomlar bilan namoyon bo'ladigan, bevosita yuqori sezuvchanlik reaksiyalarining eng og'ir va potensial o'limga olib kelishi mumkin bo'lgan ko'rinishlaridan biridir. Ushbu maqolada anafilaksiya rivojlanishiga hissa qo'shadigan etiologik omillar o'rganiladi, o'z vaqtida davolash uchun hal qiluvchi ahamiyatga ega bo'lgan erta klinik ko'rinishlar aniqlanadi va turli xil turlar qo'zg'atuvchi mexanizmlar va patofiziologik yo'llar asosida tasniflangan.

Kalit so'zlar: anafilaktik shok, yuqori sezuvchanlik reaktsiyalari, allergenlar, klinik ko'rinishlar, bevosita turdagi reaksiyalar, patofiziologiya, shoshilinch tibbiyot

Introduction. Anaphylaxis is a very severe and fast-acting type of allergic reaction that can be fatal if not treated immediately, thus considered a critical emergency in current clinical practice. The hallmark of the condition is its rapid onset, which occurs usually within minutes to hours after the patient's exposure to the allergen, and it affects the whole body at once, especially the heart, lungs, skin, and intestines [1]. The world over, the incidence rate of anaphylaxis has been increasing alarmingly over the past few decades, with estimates suggesting a range of 50 to 200 cases per 100,000 person-years, though the actual numbers might be much higher due to the factors of underreporting and misdiagnosis in some healthcare centers [2]. Anaphylaxis has a relatively low mortality rate of about 0.3-0.5% of all cases, but it still emphasizes the critical nature of the condition, especially when there is a delay in recognition and treatment [3]. The pathophysiological mechanism of anaphylactic shock is based on the very large release of inflammatory mediators, among which are histamine, tryptase, and leukotrienes, from the activated mast cells and basophils. This release of mediators causes a

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chain reaction that results in vasodilation, increased permeability of blood vessels, bronchoconstriction, and impaired cardiac function [4].

Methodology and literature analysis. A comprehensive literature review was the main methodology of this study that analyzed the current scientific knowledge about the anaphylactic shock, its causes, clinical presentation, and classification systems. The analysis of the immunopathological mechanisms of various types of anaphylaxis, which include IgE-mediated reactions, non-IgE-mediated responses, and idiopathic occurrences where specific triggers are still unknown, was given special attention [5]. The review further investigated the diagnostic criteria that have been laid down in international consensus guidelines, particularly the clinical criteria that were drawn up by the National Institute of Allergy and Infectious Disease and the Food Allergy and Anaphylaxis Network, which give out standardized frameworks for recognizing anaphylaxis in different clinical settings [6].

Results and discussion. The ongoing literature analysis suggests that anaphylactic shock is a clinical emergency that is brought about by multiple pathophysiological mechanisms that are not only of different kinds but are also caused by different agents. The severity and the anatomical region of manifestation change from person to person and are thus, dependent on the specific patient referred to and the exposure characteristics. The principal causative factors of anaphylactic reactions are classified into many important groups i.e., foods which are majorly peanuts, tree nuts, shellfish, fish, milk, and eggs, that together constitute the common triggers in the case of children; drugs which include antibiotics (especially β-lactams), nonsteroidal anti-inflammatory drugs, neuromuscular blocking agents, and chemotherapy drugs; insect venoms from Hymenoptera species like that of bees, wasps, and hornets; latex proteins found in healthcare and work environments; and various environmental and physical factors [7]. The pathogenic mechanism in anaphylaxis is mainly through IgE-mediated hypersensitivity, whereby the person is sensitized and produces allergen-specific IgE antibodies that are then caught up with high-affinity receptors on mast cells and basophils located all over the body.

When the allergen is presented again, the cross-linking of the surface IgE molecules which are bound to the mast cells, leads to a very fast degranulation process of these cells, which in turn liberates the already made mediators, such as histamine, tryptase, and heparin, along with the newly synthesized lipid mediators that include prostaglandins and leukotrienes [8]. The actions of these mediators taken together, affect the whole body in the same way as anaphylaxis through different mechanisms: histamine leads to the opening up of blood vessels and their permeability which results in the loss of blood volume and low blood pressure; leukotrienes cause the contraction of the airway muscles and additionally make the blood vessels even more permeable; the platelet-activating factor supports the tightening of the airways and the dysfunction of the heart; and the release of various cytokines causes the inflammatory responses that may delay or intensify the original reaction.

Anaphylactic shock's early clinical symptoms usually start in a matter of minutes after allergen exposure, but may take hours in rare cases, especially in food-induced reactions or drugs. The skin and mucous membranes are the primary sites of initial symptoms and nearly 80-90% of the patients display cutaneous manifestations such as urticaria (hives), angioedema (especially on the face, lips, and tongue) generalized erythema, and intense pruritus [9]. The above-mentioned dermatological symptoms are undoubtedly the first signs that can be detected, and can even be the ones that precede more serious systemic symptoms by several minutes, thus providing a critical window for intervention. About 30% of patients with gastrointestinal involvement have symptoms like nausea, vomiting, abdominal cramps, and diarrhea, which are

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due to increased intestinal secretions and contractions of smooth muscles caused by the release of mediators.

Classification of anaphylactic reactions can be approached from multiple perspectives, including immunological mechanisms, causative agents, and clinical severity. From an immunological standpoint, anaphylaxis is primarily divided into IgE-mediated reactions, which represent the classic pathway and account for the majority of cases, and non-IgE-mediated reactions, which may involve complement activation, direct mast cell activation, or other immune pathways independent of IgE antibodies [10]. IgE-mediated anaphylaxis follows the type I hypersensitivity pattern described by Gell and Coombs, requiring prior sensitization and subsequent re-exposure to the allergen for reaction manifestation. Non-IgE-mediated anaphylactoid reactions can occur on first exposure and may be triggered by agents such as radiocontrast media, certain antibiotics, and aspirin, which directly activate mast cells or complement pathways without involving specific IgE antibodies. Based on causative agents, anaphylaxis can be categorized as food-induced, drug-induced, venom-induced, latex-induced, exercise-induced, or idiopathic when no specific trigger can be identified despite thorough investigation.

Conclusion. Anaphylactic shock represents a critical medical emergency characterized by rapid onset of multisystem involvement following exposure to specific triggers, with potential for fatal outcome if not promptly recognized and treated. This comprehensive literature analysis has elucidated the diverse etiological factors contributing to anaphylaxis development, including common allergens such as foods, medications, insect venoms, and latex, as well as the complex immunological mechanisms, particularly IgE-mediated pathways, that underlie most anaphylactic reactions. The early clinical manifestations, including cutaneous signs (urticaria and angioedema), respiratory symptoms (dyspnea, wheezing, stridor), gastrointestinal disturbances, and cardiovascular compromise, serve as critical indicators requiring immediate therapeutic intervention with epinephrine administration as the cornerstone of treatment. Classification of anaphylaxis based on immunological mechanisms, causative agents, and clinical severity provides essential frameworks for understanding the heterogeneous nature of these reactions and developing appropriate management protocols. Healthcare professionals across all specialties must maintain heightened awareness of anaphylaxis presentation patterns, as delays in recognition and treatment significantly increase morbidity and mortality risks.

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