

STATUS ASTHMATICUS: PATHOPHYSIOLOGICAL MECHANISMS AND MODERN TREATMENT METHODS

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Abstract

Status asthmaticus is the most severe form of bronchial asthma, characterized by prolonged bronchospasm, hypoxia, and respiratory failure. This condition requires emergency medical intervention; otherwise, life-threatening complications may develop. Global and Uzbekistan-specific statistics indicate a rising prevalence of asthma-related diseases. Treatment primarily involves the use of beta-2 agonists, corticosteroids, and bronchodilators. Preventive measures and environmental improvements are crucial in reducing the incidence of the disease. This article discusses the pathogenesis, clinical manifestations, diagnosis, and treatment approaches for status asthmaticus.

Keywords: Status asthmaticus, bronchial asthma, bronchospasm, hypoxia, beta-2 agonists, corticosteroids, resuscitation, medical care, diagnosis, prevention.

Introduction

According to the World Health Organization (WHO), more than 260 million people worldwide suffer from bronchial asthma. Approximately 450,000 people die each year from asthma-related complications. Asthma is one of the most common chronic diseases in children, especially in low- and middle-income countries. Although asthma incidence rates are high in industrialized countries, mortality rates are relatively low because of improved access to medicines and medical care. North America and Europe have an estimated prevalence of asthma of 8–10% of the population. Asia and Africa have lower incidence rates (3–5%) in some regions, but higher mortality rates. Australia and New Zealand have some of the highest asthma prevalence rates in the world. According to the Ministry of Health of Uzbekistan, the number of asthma patients in the country is more than 200,000. The incidence rate among children is approximately 5–7%. Asthma is common in urban areas, especially in Tashkent and other large industrial cities.

The main reasons:

1. Air pollution (especially in Tashkent, Navoi and the Fergana Valley).
2. Allergic factors and deterioration of the ecological environment.
3. Failure to adhere to a healthy lifestyle and insufficient development of medical prevention.

Deaths from asthma are rare, but the disease can leave serious complications. Special programs to combat asthma are being implemented in Uzbekistan, but the effectiveness of medications and preventive measures still requires development.

Status asthmaticus is one of the emergency conditions with a high mortality rate, developing in approximately 5-10% of patients with bronchial asthma. According to studies, the mortality rate is around 3-10%, and among patients in intensive care units this figure can reach up to 30%.

Pathogenesis: One of the main reasons for the development of asthmatic status is the blockade of β_2 -adrenoreceptors due to the administration of β_2 -adrenomimetics in extremely high doses. In addition, impaired mucociliary transport, sputum discharge, and bronchial congestion play an important role in the development of this severe form of the disease. Hypoxia, hypercapnia develop and rapidly increase, acidosis develops. Pathogenesis: The increasing involvement of accessory muscles in breathing causes severe physical exertion in patients. Severe sweating occurs. As a result, hypovolemia occurs, which in turn exacerbates pathological processes. As a result, sputum thickens and increases its viscosity, bronchial obstruction increases, blood thickens due to hypovolemia, microcirculation is impaired, severe hypoxia and circulatory hypoxia are formed. In some cases, as a result of impaired adrenaline production during an asthmatic state, hypovolemia deepens and pulmonary edema may occur.

In the clinical picture of an asthmatic state, 3 stages are distinguished:

Stage I (initial):

The patient takes a forced position with the shoulder girdle tightened. The head is not broken, but severe fear and excitement may appear. The lips are bluish. The respiratory rate is 26-40 per minute, breathing is difficult, sputum does not come out. FEV1 decreases to 30%. Heart sounds are weak, tachycardia, arterial hypertension. PaO₂ approaches 70 mmHg, PaCO₂ decreases to 30-35 mmHg.

Stage II (decompensation):

The patient is not enough, tired, cannot eat, drink, sleep. Cyanosis of the skin and visible mucous membranes, cervical veins are swollen. Respiratory rate exceeds 40 per minute, wheezing is heard from afar. FEV1 decreases to 20%. PaO₂ decreases to 60 mmHg, PaCO₂ increases to 50-60 mmHg.

Stage III (hypercapnic acidotic coma):

The patient is in a very serious condition, unconscious, convulsions. Cyanosis, pupils dilated, respiratory rate exceeds 60. Heart rate exceeds 140 per minute, blood pressure drops sharply, PaO₂ is below 50 mmHg, PaCO₂ increases to 70-80 mmHg.

Treatment of patients with severe attacks of BA with the help of emergency medicine is as follows:

1. The total mandatory volume of therapy.
2. Infusion of 1.0 - 2.0 mg of fenoterol or 5 - 10 mg of salbutamol or 2.0 - 4.0 ml of berodual solution through an oxygen nebulizer.
3. Inhalation of bronchodilator solutions through a nebulizer with oxygen is repeated 4 times a day every 6 hours.
4. GKS-hydrocortisone 100-200 ml every 6 hours, methylprednisolone 60-125 mg every 6 hours, prednisolone 40-60 mg.
5. Budesonide solution (pulmicort) 2 - 10 mg through a nebulizer with oxygen 2 times a day.
6. Magnesium sulfate - at a dose of 2.0 - 2.5 g every 4-6 hours.

7. Ipratropium bromide 0.5 mg every 6 hours.

8. Epinephrine 1:100 diluted 0.3 ml subcutaneously.

With increasing severity of BA, indications for tracheal intubation and artificial pulmonary ventilation:

1. Respiratory arrest.

2. Impairment of consciousness (stupor, coma).

3. Unstable hemodynamic state: AD 70 mm.sym. above, heart rate more than 50 or 160 per minute.

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