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Review Article On Asthma

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Abstract

Asthma is a long-term inflammatory condition that affects the airways, leading to breathing difficulties, wheezing, coughing, and chest tightness. It is marked by airway inflammation, hyperresponsiveness, and variable airflow obstruction. The immune system plays a significant role in asthma, with cells such as mast cells, eosinophils, and T cells contributing to airway inflammation. Elevated nitric oxide levels serve as an indicator of inflammation in asthmatic patients. Asthma is classified based on its underlying inflammatory patterns, including T2-high and T2-low types. Proper management involves following treatment guidelines, using inhaled corticosteroids, and identifying potential triggers. Poor asthma control is commonly linked to inadequate treatment adherence, misdiagnosis, or severe disease forms. This study examines the mechanisms, classification, and management of asthma while emphasizing the need for timely diagnosis and appropriate therapy to enhance patient well-being.

Keywords: Mast cell, Airways, T cells, Asthma control, Asthma severity

Introduction

Asthma is one of the most common diseases in industrialized countries. Despite better recognition and increased prescriptions for anti-asthma therapy, morbidity is increasing. For many years, it has been assumed that mast cells play a critical role in asthma and that mast cell mediators produce the pathophysiology of asthma. Recent research has established that asthma, even in its mildest clinical forms, involves a special type of inflammation in the airways.

Asthma is a chronic inflammatory disease, with inflammation persisting over many years in most patients. Asthma is clinically categorized into occupational, non-atopic, and atopic (allergic) forms. T cells are the predominant cells that infiltrate the airways in asthma and are the major source of cytokines. Increased eosinophilia in asthmatics is observed not only in the large or central airways of these patients but also in the peripheral parts of the lungs.

Asthma resistance increases significantly at night, whether subjects sleep or not, although the increase is much greater during sleep. Studies show that the onset of asthmatic attacks is less common in the first part of the night.

Asthma Classification

Asthma has been broadly classified as:

- **Type 2 (T2) high inflammation**
- **T2-low inflammation**

T2-high inflammation is currently the best-understood inflammatory endotype. Exposure to a detector antigen-presenting cell induces a T-helper cell type 2 (Th2) response. Th2 cells secrete cytokines such as interleukins 4, 5, and 13, which drive the downstream recruitment of effector cells and facilitate the isotype switching of B cells to secrete immunoglobulin E (IgE). IL-4 and IL-13 promote subepithelial fibrosis, airway remodeling, mucus hypersecretion, and airway hyperreactivity.

T2-low inflammation accounts for about 50% of cases, where eosinophilic airway inflammation is absent. A different class of T lymphocytes, known as Th17 cells, secretes IL-17, which is associated with neutrophilic inflammation and corticosteroid resistance.

Nitric Oxide (NO) in Asthma

Increased NO production plays a key role in physiological regulation of the airways and is implicated in the pathophysiology of airway conditions. Large quantities of NO generated by immune cells may amplify the inflammatory response.

Asthma Control

Asthma is controllable, but three key reasons for poor control include:

1. Failure to follow asthma guidelines
2. Presence of a non-asthmatic condition
3. Severe asthma

The most common reason for poor control is failure to adhere to asthma treatment guidelines. Many practitioners may fail to recognize frequent symptoms as indicators of poor control.

Asthma Severity

Asthma severity refers to:

- Overall asthma severity
- Severity of an asthma attack
- Degree of airflow obstruction at a given time

Traditionally, asthma severity is defined by a combination of four factors:

- Symptoms
- Medication requirements
- Physiological abnormalities (e.g., reduced flow rates)
- Morbidity

Most of these criteria (symptoms, beta-2 agonist requirements, morbidity, and reduced airflow rates) indicate poor asthma control. Direct costs of asthma are influenced by disease severity, medication compliance, frequency of the condition, and healthcare expenses, including doctor visits.

Hospital and Indirect Costs

Hospital Costs: Hospitalization generally occurs when asthma management has failed to prevent an acute severe attack, leading to high expenses.

Indirect Costs: Indirect costs include loss of work productivity, premature withdrawal, and time spent by caregivers. These costs vary based on patient age and disease severity.

Minimum Treatment

Minimum treatment refers to the lowest dose of inhaled steroids required to maintain asthma control in Phase 1 for one month. This is synonymous with maintenance treatment.

Study Treatment

The study treatment was directed by two doctors in each of the four centers in an effectiveness (rather than efficacy) manner to make it more applicable to routine clinical practice. Treatment followed the Canadian Asthma Consensus Group Guidelines.

Strategy management included:

1. Avoidance strategies for allergens and intolerance to non-steroidal anti-inflammatory medicines.
2. Patient education regarding treatment adherence, reinforced at each visit in Phases 1 and 2.
3. Review of factors affecting asthma control, such as rhinosinusitis, nasal cysts, and gastroesophageal reflux, along with their treatment.

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